IMPERIAL OIL RESOURCES N.W.T. LTD.

2023 Aquatic Effects Monitoring Program Summary

Norman Wells Operations

Document no. Rev 1: 417085-49223-23200-EN-REP-0001

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Plain Language Summary

Imperial Oil Resources N.W.T. Limited (Imperial) has retained Tłegǫ̀hłı̨ Reclamation Services Advisian (TRSA) for the 2023 aquatic effects monitoring program (AEMP) on the Mackenzie River and Bosworth Creek in the vicinity of its Norman Wells Operations (NWO). The AEMP activities in 2023 followed the methods outlined in the version of the AEMP most recently submitted to the Sathu Land and Water Board (SLWB) in December 2022 for review (Version 4). Notable changes to the 2023 AEMP include:

- Revised surface water monitoring locations designed to better investigate the accumulated environmental state (AES) of the Mackenzie River;
- Addition of a fourth season of surface water chemistry sampling in the winter;
- Addition of passive sampling devices (PSDs) to better characterize organic contaminants of potential concern (e.g. polycyclic aromatic hydrocarbons [PAHs] and petroleum hydrocarbons);
- Addition of an effects-based small-bodied fish study (SFS) component in Bosworth Creek; and
- Investigation of potential small-bodied sentinel fish species and sampling locations in the mainstem of the Mackenzie River.

A large-bodied fish study (LFS) was not included in the 2023 AEMP; however, per direction received from the SLWB in November 2023, Imperial continues to work with members of the SLWB-led Water and Fish Health Study Group, towards establishing an agreed upon LFS to incorporate into AEMP Version 5.

The surface water monitoring component of the AEMP changed substantially in 2023 compared with previous years of the AEMP. This enabled a more regional approach to monitoring; however, several new sampling locations have limited historical data available as a result. Temporal trends were assessed for sites with existing historical data collected between 2017 and 2022 and an upstream dataset was established for the Mackenzie River using data from one sampling location (AEMP-US-02, previously AEMP-10) on 10-Mile Island. Subsequent years of the AEMP will continue to build on this upstream dataset to provide more refined control limits for the monitoring program. Passive sampling devices (PSDs) were deployed for the first time in 2023 at each sampling location to measure polycyclic aromatic hydrocarbons (PAHs) using semi-permeable membrane devices (SPMDs) and petroleum hydrocarbons (PHCs) using passive diffusion bags (PDBs). These samplers were deployed for approximately 30 days to allow sufficient time for sorption (measurement) of these contaminants of potential concern.

Results from the surface water sampling program were compared to upper control limits (UCL) and lower control limits (LCL) established from sample locations upstream of Norman Wells intended to represent the natural water conditions. These limits have been established for the main parameters identified for NWO, known as Key Indicator Parameters (KIPs). Of the KIPs analyzed, chromium was the only parameter that exceeded the UCL and environmental quality guideline in the Mackenzie River in winter 2023.

A few other parameters were above or below their control limits in 2023; however, all KIPs that were outside control limits, apart from chromium, remain within environmental health guidelines. The control limits are an evolving dataset that will be updated as new samples are collected. Total aluminum, cadmium, chromium, copper, and iron exceeded federal guidelines for the protection of freshwater aquatic life developed by the Canadian Council of Ministers of the Environment (CCME) at one or more downstream sampling locations on the Mackenzie River, however, as these were generally within control limits, they are interpreted to represent natural conditions. No KIP concentrations exceeded these guidelines in Bosworth Creek; however, chloride, calcium, total dissolved solids, molybdenum, and nickel exceeded the UCL in 2023.

PAH and alkylated PAH (aPAH) concentrations have been calculated from the mass results provided through SPMD analysis. Calculators developed by the United States Geological Survey were used to estimate concentration in water for measured PAHs and aPAHs, where developed chemical-specific properties are available to allow for estimation. All PAH and aPAH concentrations are below the applied guidelines, when available, which is consistent with findings for previous PAH grab sample analysis. However, SPMD analyses did achieve lower detection limits for PAHs and aPAHs compared to grab sample analyses allowing for detectable concentration results rather than all results being reported as below the laboratory reportable detection limit.

For the first time, a SFS was included in the AEMP in 2023. Backpack electrofishing was used to collect slimy sculpin (*Cottus cognatus*) from two reaches within Bosworth Creek. Health of fish collected from the site upstream from the NWO (AEMP-FS-01) was compared with fish from the sampling reach within the NWO (AEMP-FS-02). Endpoints and tissue analyses used for this component of the AEMP used technical guidance for environmental effects monitoring (EEM) for metal mining in Canada, and included:

- Fish condition (e.g. condition factor and length versus weight relationships);
- Energy allocation (e.g. liver and gonad size relative to body size);
- Analysis of detoxification protein in liver (e.g. CYP1A1 enzyme content); and
- Tissue concentration characterization for metals and PAHs.

Fish health metrics were calculated for mature individuals and several differences were documented between female and male sculpin from Bosworth Creek. Condition was higher in females from the downstream sampling reach but the percent difference (6%) was below the critical effect size (CES) of 10%, which is the action level threshold for this metric. Younger (smaller) females from the downstream site had smaller gonads relative to body size, however, as fish grew the gonad size increased faster than that observed upstream. This resulted in higher gonad sizes relative to body size in older (larger) females from the downstream site. Liver weight relative to body size was higher in males from the downstream site, and the quantity of detoxifying protein was also elevated in males from the downstream site. The percent difference between sites for liver weight relative to body size (33%) exceeded the CES of 25% for this metric. This result will need to be verified during the 2024 AEMP as per the EEM guidance. Tissue

concentrations for KIPs were similar between sampling reaches with no statistical differences observed in 2023.

Notably, males tended to have higher metal concentrations than females within Bosworth Creek. Generally, metal concentrations in slimy sculpin tissues were similar in Bosworth Creek between sites upstream and downstream from the NWO. Total PAH concentrations in slimy sculpin tissue from Bosworth Creek was lower than slimy sculpin previously analyzed in the oil sands region of Alberta. The potential toxicity from carcinogenic PAHs was also lower than those previously documented in the oil sands region and were below available maximum levels.

The results of the 2023 AEMP identified some values outside of control limits and/or exceeding water quality guidelines, however, these water chemistry exceedances are consistent with historical data and observed at both upstream and downstream sampling locations. The results from the fish tissue sampling program indicate that there are clear differences between males and females and there is evidence of differing energy allocation towards organs responsible for reproduction and contaminant detoxification. Despite these differences, tissue residue concentrations are similar between sites. Potential effects observed in 2023 would need to be confirmed in 2024 before they trigger any action level responses. As such, the results from the 2023 AEMP do not prompt any changes to the AEMP beyond those proposed in Version 5, which is currently under development. Version 5 of the AEMP currently adds an additional water chemistry and small-bodied fish sampling location upstream from AEMP-FS-01 to provide a second control location for comparison with AEMP-FS-02. In addition, communication is continuing to develop a LFS component of the AEMP, through continued participation in the SLWB-led Water and Fish Health Study Group; however, the inclusion of this in 2024 is contingent on support from the SLWB and local communities.

Glossary

Term	Description
Accumulated Environmental State (AES)	The existing state of the system as it has integrated all existing stressors, both natural and anthropogenic (human influence). In relation to the AEMP, the AES is focused on the aquatic environment including water quality and fish health
Adaptive Monitoring	An approach that responds to a potential effect by triggering confirmation steps which may include changing the frequency of monitoring and the extent and magnitude of monitoring. The process and steps that serve as a response framework in this document.
AEMP	Aquatic Effects Monitoring Program
Background Chemistry	The chemical characterization of substances or locations that are not influenced by releases from a site (USEPA 2002). This may represent the natural state of the environment or a state that has been influenced by other factors but not by the site in question.
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CES	Critical Effect Size is the difference between background and experimental site conditions before an action level is triggered to initiate the adaptive monitoring response framework. The critical effect size is variable dependent and based on existing knowledge of site conditions, as well as existing literature where published critical effect sizes are available.
CPF	Central Processing Facility – the main facility that processes oil at Norman Wells prior to shipment.
Control-Impact	Control-impact designs compare areas potentially affected with those that cannot be because of geographical location or sequence in time.
CPUE	Catch per Unit Effort is calculated by dividing the number of fish caught per the fishing unit for the respective fishing method used. For electrofishing the fishing effort is based on how many fish are caught per 100 seconds of fishing effort. For minnow trapping CPUE is determined based on the number of fish captured per hour that the trap is deployed.
GSI	Gonadosomatic Index is the ratio between gonad weight and body weight in fish and is often used as a measure of the energy/resources being put into reproductive development.
HSI	Hepatosomatic Index is the ratio between liver weight and body weight in fish and is often used as a measure of the energy/resources an animal is putting towards contaminant detoxification and the availability of energy stores (e.g. glycogen, lipids).
KIPs	Key Indicator Parameters. Chemical and water quality parameters that have been identified as most applicable to the Site.
Imperial site	Norman Wells Operations (NWO)
Large-bodied fish study (LFS)	A monitoring program focused on large-bodied fish species that are of value to local communities as a food source.
Low Action Level Threshold	Conditions that if exceeded would trigger the adaptive monitoring approach. The low action level is set at the critical effect size for a specific measurement endpoint to ensure that changes are detected and addressed in a proactive manner.
Mixed-Function Oxygenase (MFO)	A group of enzymatic proteins that are responsible for contaminant detoxification in the liver of fish by adding oxygen to lipophilic compounds to convert contaminants into secondary metabolites. The CYP1A1 protein is an important MFO enzyme that is produced when animals are exposed to foreign compounds because it is a downstream target of the Aryl Hydrocarbon Receptor.

Term	Description
mg/L	Milligrams per litre (parts per million)
µg/L	Micrograms per litre (parts per billion)
pg/l	Picograms per litre (part per trillion)
Norman Wells Operations (NWO)	The department within Imperial that is responsible for the operation and decision making associated with all well sites, flowlines, the central processing facility and maintenance activities.
PAHs/aPAHs	Polycyclic Aromatic Hydrocarbons/alkylated Polycyclic Aromatic Hydrocarbons
Passive Diffusion Bag (PDB)	Are a PSD used to capture volatile organic compounds (VOCs) in water. An example of VOCs would be light hydrocarbons (e.g. BTEX).
Potency Equivalency Quotient (PEQ)	Overall carcinogenic potential of a mixture of PAHs found in environmental media measured in relation to Benzo(a)pyrene (BaP).
Potency Equivalency Factor (PEF)	Carcinogenic potency of individual PAHs with sufficient toxicological information relative to benzo(a)pyrene (BaP).
Passive Sampling Device (PSD)	Are technologies that sequester and concentrate bioavailable organic compounds from the environment.
Semipermeable Membrane Device (SPMD)	A type of PSD used to capture and organic compounds. Their primary use is in surface water sampling for PAHs and PCBs.
SLWB	Sahtu Land and Water Board
Small-bodied fish study (SFS)	A monitoring program focused on small fish that can act as a sensitive sentinel species and be indicative of the health of the wider ecosystem.
VOC	Volatile Organic Compounds

1. Introduction

Imperial Oil Resources N.W.T. Limited (Imperial) has retained Tłegǫ̀hłı̨ Reclamation Services Advisian (TRSA) to conduct an Aquatic Effects Monitoring Program (AEMP) to meet the requirements of their Water Licence (S13L1-007) issued by the Sahtu Land and Water Board (SLWB) for their Norman Wells Operation (NWO).

The NWO is owned by Imperial Oil and the Government of Canada and is operated by Imperial. NWO is an upstream oil and gas facility located approximately 700 km northwest of Yellowknife, Northwest Territories (NT) as shown on Figure 1. Operations include a central processing facility (CPF), which receives production from the mainland, along the north-eastern shore of the Mackenzie River, natural islands (Goose Island, Bear Island, and Frenchy's Island), and six artificial islands.

The AEMP includes assessment of water quality and fish health upstream, near facility and downstream from the NWO in the Mackenzie River and Bosworth Creek.

Limitations of liability, scope of report and third-party reliance are provided in Appendix A.

1.1 Background

Surface water monitoring on the Mackenzie River and Bosworth Creek near NWO has been conducted each open water season since 2017 and has been tied to AEMP plans submitted to the SLWB. To date, no SLWB-approved version of the AEMP exists and the program has evolved as changes to the plan have been made. The work conducted in 2023, and reported herein, reflects the proposed plan in AEMP Version 4 (AEMP Version 4; TRSA 2022) and subsequent updates.

Prior to 2023, the AEMP was limited to surface water grab sampling and analysis within the Mackenzie River and Bosworth Creek during spring, summer and autumn; changes implemented in AEMP V4 included the following:

- Revised and additional sampling locations intended to provide assessment of the accumulated environmental state (AES) as opposed to sampling near locations of potential inputs to the environment;
    - Monitoring near potential input locations did not provide detectable changes which may be due to dilution within the large volume of water in the Mackenzie River or may be due to a lack of inputs to the environment. AES monitoring is intended to capture overall changes to the aquatic environment near NWO that may be attributable to the operation.
- Addition of under ice sampling in winter, during seasonal low flow conditions of the Mackenzie River;
- Use of passive sampling devices (PSDs) for water analysis of petroleum hydrocarbons and polycyclic aromatic hydrocarbons (PAHs);
- Small-bodied fish study (SFS) in Bosworth Creek; and

- An investigation into the feasibility of establishing a SFS program in the mainstem of the Mackenzie River.

A large-bodied fish study (LFS) was not included in 2023; the program is currently in development through the SLWB-led Water and Fish Health Study Group and will be incorporated into AEMP Version 5 (AEMP V5).

2. Norman Wells Oilfield Site Description

2.1 Site Location and Description of Operations

Imperial produces oil from wells drilled in the vicinity of the Town of Norman Wells. The oil-bearing reservoir lies largely under the Mackenzie River at depths ranging from 320 meters to 625 meters below ground surface. Within the operation, there are active production and injection wells connected through a flowline network to a CPF.

Producing wells are located on the Mainland, the Natural Islands (Goose, Bear, and Frenchy's), and the Artificial Islands (1-Rayuka, 2-Rampart, 3-Dehcho, 4-Ekwe, 5-Iteh K'ee and 6-Little Bear; Figure 1). Crude oil production is received at the CPF, where it is processed for shipment via the Enbridge pipeline to Alberta. No refining is conducted on-site (Imperial 2019).

2.2 Topography

The Imperial site is located predominantly on the north shore of the Mackenzie River. Elevations range from approximately 50 to 70 metres above sea level (masl). The river flows in a west-northwesterly direction past the Town of Norman Wells. The valley within which this major river flows is bounded on the south by the Mackenzie Mountains and on the north by the Franklin Mountains (Imperial 2019).

2.3 Permafrost

The presence of discontinuous permafrost in the area influences local groundwater flow patterns. Ice lenses and the low conductivity associated with frozen soil in the subsurface act as barriers to groundwater movement. Two groundwater bearing intervals have been identified in the Norman Wells Operational area: a shallow discontinuous interval and a deeper unconfined interval.

The Norman Wells area lies in a zone of discontinuous permafrost, where typical maximum permafrost thickness ranges from 50 to 65 m. Permafrost in the Norman Wells area is not uncommon and is regularly encountered at the Imperial site beneath roads and other locations (Imperial 2019).

2.4 Natural Seepage

The presence of natural hydrocarbon seeps in the Sahtu Settlement Area, especially around the Town of Norman Wells, is known to predate Imperial's operation. Many natural oil and gas seeps have been documented in the lower Mackenzie River Valley.

Natural oil and gas seepage continues to occur along the shoreline and below the riverbed in several locations. The surficial on-shore seeps are most visible at these specific locations:

- Along the Mackenzie shoreline upstream and downstream of the former Refinery area;

- Within the Bosworth Creek delta area;
- Along the Mackenzie shoreline below the F-28X well;
- At Seepage Lake (between the Former Refinery area and Bosworth Creek); and
- In Bosworth Creek several hundred meters downstream of where the winter road crosses Bosworth Creek.

The presence of seeps has led to a natural source of hydrocarbons in the groundwater and surface water at the Imperial site (Imperial 2019).

2.5 Mackenzie River

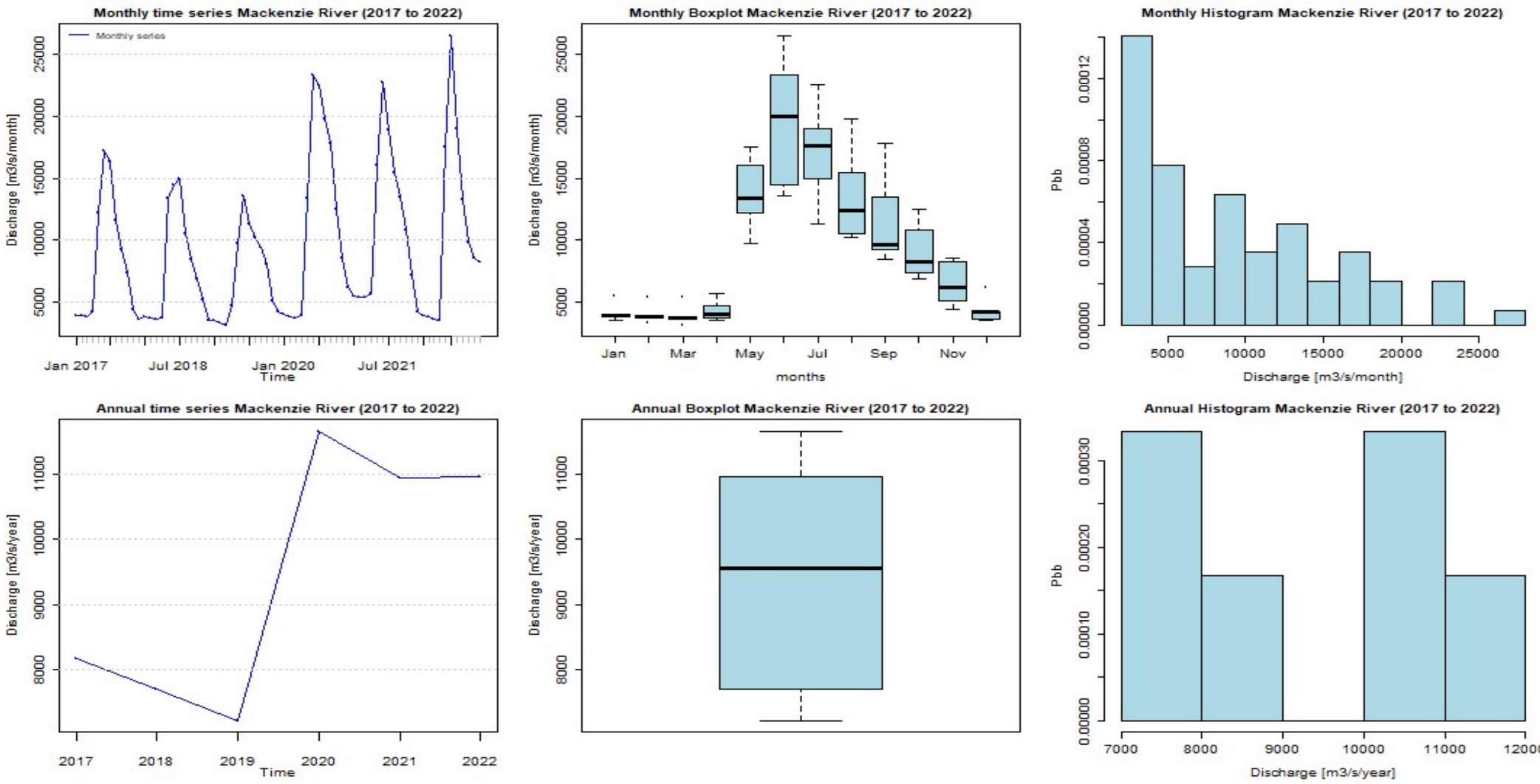
The Mackenzie River drainage basin is the largest river basin in Canada and the tenth largest river basin in the world. The Mackenzie River system flows roughly 4,200 km from the headwaters of the Athabasca River in the Columbia icefield in Jasper National Park, Alberta, and the snowfields of the upper Peace River headlands in northeastern British Columbia to its final destination at the Beaufort Sea of the NT (MRBB 2004). The river empties a volume of approximately 10,000 cubic metres per second (m^3/sec) into the Beaufort Sea of the Arctic Ocean along the Mackenzie River delta, accounting for 60% of the freshwater that flows into the Arctic Ocean from Canada and about 9% of the freshwater discharged to all the oceans by all Canadian watersheds (MRBB 2004).

The water levels in the Mackenzie River are variable throughout the year. Typical levels are approximately 41 masl during the winter, with short-term peaks of up to 51 masl (Komex 1980). Breakup of the Mackenzie River ice at Norman Wells usually occurs over a two-week period in May, and freeze-up typically occurs during a three-week period in October – November. The ice thickness of the Mackenzie River usually ranges from 1 to 1.5 m. The variability of flows that can be encountered during a month can be extreme, especially during the spring melt. For instance, flows recorded during the month of July (1962 – 2020) have ranged from 8,450 m^3/s to 33,300 m^3/s. The lowest recorded daily flow between 1962 and 2020 was 1,680 m^3/s on November 21-22, 1990. The largest recorded daily flow for the same time-period was 33,300 m^3/s on July 4, 1988 (WSC 2024a). Seasonal discharge historically measured at the Water Survey of Canada (WSC) station at Norman Wells (Station No. 10KA001) during the AEMP (2017 to 2022) is illustrated in Figure 2-1.

2.6 Bosworth Creek

Bosworth Creek drains a small watershed (~125 km^2) near the Town of Norman Wells, in the Sahtu Settlement Area of the NT. Bosworth Creek originates at the outlet of Hodgson (Jackfish) Lake and travels northwest approximately 8 km before bending southwest towards the NWO to eventually drain into the Mackenzie River (Collins et al., 2011). Bosworth Creek is an important part of the local landscape and is used frequently by residents for recreation. Seasonal habitat surveys were completed for Bosworth Creek as part of the Mackenzie Gas Project in 2002. Wetted channel widths along the stream ranged from 3.5 to 16 m and habitat was primarily riffles, with the remainder composed of shallow and moderate-depth run habitat.

Coarse gravel and cobble substrate predominated in most habitat types. Unstable or slumping banks were common, with both banks showing signs of erosion at high flow (Imperial 2019). Seasonal flow in Bosworth Creek historically measured at the WSC station near Norman Wells (Station No. 10KA007) during the AEMP (2017 to 2022) is summarized in Figure 2-2 (WSC 2024b).



Notes:
Top row of figures summarize average daily flow characteristics between 2017 and 2022 and the bottom row summarizes monthly flow characteristics.
Box plots in the middle column provide the median discharge (thick horizontal line), upper and lower quantiles (limits of each box), and minimum/maximum discharges (error bars outside of each box) for each corresponding category.
Pbb = probability of measuring a given range of discharges at the site between 2017 and 2022.

IMPERIAL
AQUATIC EFFECTS MONITORING PROGRAM
NORMAN WELLS, NT

MACKENZIE RIVER AT NORMAN WELLS (STATION 10KA001)
DISCHARGE SUMMARY (2017 TO 2022)

Date : 13-Apr-24	Drawn by: GY	Edited by: CM	App'd by: AH
		Worley Project No. 417085-49223-22200	
		FIGURE: 2-1	REV A

Imperial

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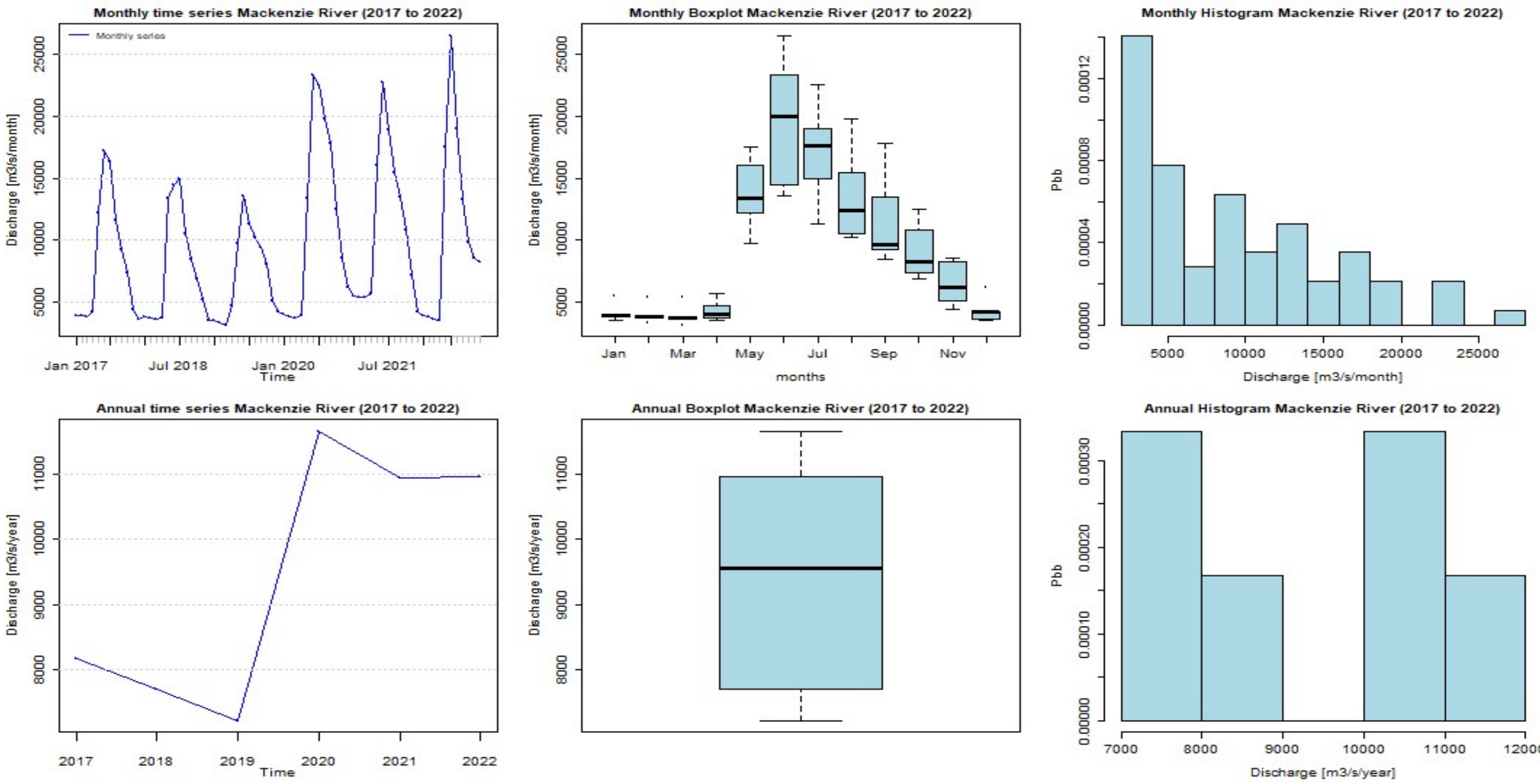

Notes:
Top row of figures summarize average daily flow characteristics between 2017 and 2022 and the bottom row summarizes monthly flow characteristics.
Box plots in the middle column provide the median discharge (thick horizontal line), upper and lower quantiles (limits of each box), and minimum/maximum discharges (error bars outside of each box) for each corresponding category.
Pbb = probability of measuring a given range of discharges at the site between 2017 and 2022.

IMPERIAL
AQUATIC EFFECTS MONITORING PROGRAM
NORMAN WELLS, NT

MACKENZIE RIVER AT NORMAN WELLS (STATION 10KA001)
DISCHARGE SUMMARY (2017 TO 2022)

Date : 13-Apr-24	Drawn by: GY	Edited by: CM	App'd by: AH
		Worley Project No. 417085-49223-22200	
		FIGURE: 2-1	REV A

Imperial

TRS Aviation

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3. Scope of Work

The AEMP scope of work in 2023 included the following:

- Four seasons (including winter) of surface water sampling from the Mackenzie River and Bosworth Creek at revised water quality monitoring locations;
- Passive sampling using semi-permeable membrane devices (SPMDs) and passive diffusion bags (PDBs) to better characterize concentrations of PAHs, alkylated PAHs (aPAHs), and petroleum hydrocarbons in surface water;
- A SFS in Bosworth Creek to characterize fish health
- An investigation into potential sentinel small-bodied fish species and monitoring locations in the mainstem of the Mackenzie River; and
- Preparing a summary report of the methods and findings.

3.1 Surface Water Sampling

The surface water sampling component of the AEMP included grab samples and passive sampling in the Mackenzie River and Bosworth Creek. Grab samples were collected in March, July, August and September 2023, whereas PSDs were deployed to measure PAHs/aPAHs and petroleum hydrocarbons during the open water period (June to September).

3.1.1 Surface Water Sampling Locations

Surface water sampling locations are summarized in Table 3-1 and presented over aerial imagery on Figure 2 and Figure 3. The locations sampled on Bosworth Creek in 2023 are provided in Figure 4. Sample sites are either upstream or downstream of the NWO to fit a Control-Impact experimental design where upstream sites are used to establish normal background ranges for comparison with conditions downstream. Seasonal sampling over all four seasons occurs on the Mackenzie River, whereas samples are not collected from Bosworth Creek in winter because the creek freezes to bottom. Note that additional sampling locations have been added to commence in 2024 but are not presented since these locations were not sampled in 2023.

With the addition of passive sampling in 2023, the site locations were chosen to allow for more reliable deployment and retrieval of PSDs. Fluctuating water levels were an important consideration for determining deployment locations for PSDs since water levels can change locally by several metres throughout the season. The PSD deployment upstream at 10 Mile Island provides an example of a sampling location used during the 2023 AEMP (Photo 3-1).

Table 3-1: 2023 Surface Water Sampling Locations[1]

Name	Target Environment	Potential Facility-related Stressors	Number of Samples per year	Latitude (Northing)	Longitude (Easting)	Historical Sampling Location ID
AEMP-US-01 (Tulita/Midway Island)	Near shore river flow	None	4	64.97904°	-126.09987°	---
AEMP-US-02 (10 Mile Island)	Near shore river flow	None	4	65.23335°	-126.73602°	AEMP-10
AEMP-US-04 (Bosworth Creek)	Main creek flow in a deep cutbank	None	3	65.29494°	-126.88292°	---
AEMP-DS-01 (Bosworth Creek)	Main creek flow in a deep cutbank	Imperial site	3	65.28184°	-126.86905°	AEMP-02
AEMP-DS-02 (Marine Dock)	Near shore flow, near facility	Boat Activity and Water Release	4	65.27932°	-126.87707°	AEMP-08
AEMP-DS-03 (Islands 3)	Mid-channel flow	Flowline; Island Maintenance	4	65.27790°	-126.91692°	AEMP-01
AEMP-DS-04 (Refinery)	Near shore flow	Imperial site, tank farm, historical contamination	4	65.27954°	-126.84972	AEMP-07
AEMP-DS-09 (End of Facility)	Mid-channel flow	Imperial site	4	65.28690°	-126.98148°	---
AEMP-DS-05 (Radar North)	Mid-channel flow as it splits around an island	Imperial site	4	65.30947°	-127.09514°	AEMP-11

[1] Note that additional locations have been added for AEMP Version 5 commencing in 2024.

Name	Target Environment	Potential Facility-related Stressors	Number of Samples per year	Latitude (Northing)	Longitude (Easting)	Historical Sampling Location ID
AEMP-DS-06 (Fort Good Hope-Blue Fish)	Deep pool area near natural islands – identified by locals as a high value fishing area	Imperial site	4	66.18755°	-128.97973°	---

Photo 3-1: Sampling location AEMP-US-02 with PSD deployed adjacent to 10 Mile Island

3.1.2 Surface Water Sampling Analytical Suite

Surface water samples were analyzed for the parameters presented in Table 3-2. Analytes identified as Key Indicator Parameters (KIPs) for the Norman Wells field are indicated by **bold** text. Rationale for the KIPs chosen is available in the proposed AEMP V4 plan (TRSA 2022).

Table 3-2: Surface Water Analytical Suite and Sample Method

Category	Parameters
General	Electrical conductivity (measured and calculated)[1], Dissolved Oxygen (DO)[1], pH[1], Temperature[1], Turbidity[1], Total hardness as $CaCO_3$, Total alkalinity as $CaCO_3$
Indicators	**Chloride**, **Sulphate**, **Iron**, Manganese, **Total dissolved solids (TDS),** Total suspended solids (TSS)
Cations, Anions, and Ion Balance	**Calcium**, **Magnesium**, Potassium, Sodium, Bicarbonate, Carbonate, Hydroxide, Anion sum, Cation sum, Ion balance
Organics	Total organic carbon, Dissolved organic carbon,
Nutrients	Nitrite as N, Nitrate as N, Nitrate plus nitrite as N, Total Kjeldahl nitrogen (TKN), Ammonia as N, Sulphide, Sulphur (total and dissolved), Orthophosphate
BTEX compounds[2]	**Benzene, Toluene, Ethylbenzene, Total xylenes**
Select Hydrocarbons[2]	Oil and grease, PHC F1 (C6-C10), PHC F1 (C6-C10) – BTEX, PHC F2 (>C10-C16), F3 (>C16-C34) and F4 (>C34-C50)
Polycyclic Aromatic Hydrocarbons (PAHs)[2]	Acenaphthene [AN], Acenaphthylene [AC], Acridine, Anthracene [A], Benzo(a)Anthracene [BA], Benzo(a)Pyrene [BaP], Benzo(b,j)Fluoranthene [BbjFl], Benzo(c)Phenanthrene, Benzo(e)Pyrene [BeP], Benzo(g,h,i)Perylene [BG], Benzo(k)Fluoranthene [BkFl], Chrysene [C], Dibenzo(a,h)Anthracene [DA], Fluoranthene [FL], Fluorene [F], Indeno(1,2,3-c,d)Pyrene [IP], Naphthalene [N], Perylene [PR], Phenanthrene [P], Pyrene [PY], Quinoline
Alkylated PAHs (aPAHs)[2]	C1-Naphthalene [N1], C2-Naphthalene [N2], C3-Naphthalene [N3], C4-Naphthalene [N4], Biphenyl [B], C1-Biphenyl [B1], C2-Biphenyl [B2], C1-Fluorene [F1], C2-Fluorene [F2], C3-Fluorene [F3], Dibenzothiophene [D], C1-Dibenzothiophene [D1], C2-Dibenzothiophene [D2], C3-Dibenzothiophene [D3], C4-Dibenzothiophene [D4], C1-Phenanthrene/Anthracene [PA1], C2-Phenanthrene/Anthracene [PA2], C3-Phenanthrene/Anthracene [PA3], C4-Phenanthrene/Anthracene [PA4], C1-Fluoranthene/Pyrene [FlPy1], C2-Fluoranthene/Pyrene [FlPy2], C3-Fluoranthene/Pyrene [FlPy3], C4-Fluoranthene/Pyrene [FlPy4], C1-Benzo(a)anthracene/Chrysene [BaAC1], C2-Benzo(a)anthracene/Chrysene [BaAC2], C3-Benzo(a)anthracene/Chrysene [BaAC3], C4-Benzo(a)anthracene/Chrysene [BaAC4], C1-Benzo(b,j,k)Fluoranthene [BFl1], C2-Benzo(b,j,k)Fluoranthene [BFl2], C1-Acenaphthene [AC1], 1-Methlynaphthalene
Metals and Trace Elements (total/dissolved)	**Aluminum**, Antimony, **Arsenic**, **Barium**, Beryllium, Boron, **Cadmium**, **Chromium**, Cobalt, **Copper**, Lead, lithium, Mercury, **Molybdenum**, **Nickel**, Phosphorus, **Selenium**, Silicon, Silver, Strontium, Thallium, Tin, Titanium, **Uranium**, Vanadium, **Zinc**

Notes:

Superscript 1 – denotes parameters that are measured in the field in addition to grab sampling

Superscript 2 - denotes parameters that are measured using passive sampling techniques in addition to grab sampling

3.2 Small-bodied Fish Health Sampling

The SFS component of the AEMP in 2023 included minnow trapping in the Mackenzie River and backpack electrofishing in Bosworth Creek. Fishing efforts in the Mackenzie River were to investigate potential sampling locations and small-bodied sentinel species in the mainstem for potential monitoring (Section 4.2.1). Tissue samples from slimy sculpin (*Cottus cognatus*) were collected from sampling reaches in Bosworth Creek (Table 3-3) in September and October. Reaches where fish tissue was collected from Bosworth Creek in 2023 are shown on aerial imagery in Figure 5. The upstream sampling reach (AEMP-FS-01) encompassed approximately 750 m of Bosworth Creek from the upstream side of the pipeline right-of-way (ROW) north from the NWO to the winter road ROW (Photo 3-2). The downstream reach (AEMP-FS-02) extended approximately 1,350 m from immediately upstream of the NWO to the creek's confluence with the Mackenzie River (Figure 5). There is approximately 750 m between AEMP-FS-01 and AEMP-FS-02 ensuring there is no overlap in the sculpin populations sampled (Section 4.2.2 and TRSA 2022). All fishing activities for the 2023 AEMP were done under the S-23/24-3024-YK licence to fish for scientific purposes provided by Fisheries and Oceans Canada.

Table 3-3: Locations for slimy sculpin tissue sampling during the 2023 AEMP

Site Name	Location	Latitude	Longitude
AEMP-FS-01	Bosworth Creek Upstream of Facility	65.29791° to 65.29261°	-126.88653°to -126.88102°
AEMP-FS-02	Bosworth Creek Downstream of Facility	65.287897° to 65.28184°	-126.87461° to -126.86905°

Photo 3-2: Typical habitat in Bosworth Creek targeted for sampling slimy sculpin

3.2.1 Small-bodied Fish Analytical Suite

Small-bodied tissue samples were analyzed for the parameters presented in Table 3-4. Analytes identified as a KIP for the Norman Wells field are indicated by **bold** text. Fish health was assessed based on body weight relative to length, as well as liver and gonad weight relative to body weight as described in Section 4.2.2.

Table 3-4: Small-bodied fish tissue analytical suite in 2023

Category	Parameters
Polycyclic Aromatic Hydrocarbons (PAHs)	Acenaphthene [AN], Acenaphthylene [AC], Anthracene [A], Benzo(a)Anthracene [BA], Benzo(a)Pyrene [BaP], Benzo(b)Fluoranthene [BbFl], Benzo(e)Pyrene [BeP], Benzo(g,h,i)Perylene [BG], Benzo(j,k)Fluoranthene [BjkFl], Chrysene [C], Dibenzo(a,h)Anthracene [DA], Fluoranthene [FL], Fluorene [F], Indeno(1,2,3-c,d)Pyrene [IP], Naphthalene [N], Perylene [PR], Phenanthrene [P], Pyrene [PY]
Alkylated PAHs (aPAHs)	C1-Naphthalene [N1], C2-Naphthalene [N2], C3-Naphthalene [N3], C4-Naphthalene [N4], C1-Fluorene [F1], C2-Fluorene [F2], C3-Fluorene [F3], Dibenzothiophene [D], C1-Dibenzothiophene [D1], C2-Dibenzothiophene [D2], C3-Dibenzothiophene [D3], C4-Dibenzothiophene [D4], C1-Phenanthrene/Anthracene [PA1], C2-Phenanthrene/Anthracene [PA2], C3-Phenanthrene/Anthracene [PA3], C4-Phenanthrene/Anthracene [PA4], C1-Fluoranthene/Pyrene [FlPy1], C2-Fluoranthene/Pyrene [FlPy2], C3-Fluoranthene/Pyrene [FlPy3], C4-Fluoranthene/Pyrene [FlPy4], C1-Benzo(a)anthracene/Chrysene [BaAC1], C2-Benzo(a)anthracene/Chrysene [BaAC2], C3-Benzo(a)anthracene/Chrysene [BaAC3], C4-Benzo(a)anthracene/Chrysene [BaAC4], C1-Benzofluoranthenes/Benzopyrenes [BFlBPy1], C2-BenzoFluoranthenes/Benzopyrenes [BFlBPy2], C1-Acenaphthene [AN1], 1-Methlynaphthalene
Metals and Trace Elements (total and dissolved	**Aluminum**, Antimony, **Arsenic**, **Barium**, Beryllium, Boron, **Cadmium**, **Chromium**, Cobalt, **Copper**, Lead, lithium, Mercury, **Molybdenum**, **Nickel**, Phosphorus, **Selenium**, Silicon, Silver, Strontium, Thallium, Tin, Titanium, **Uranium**, Vanadium, **Zinc**
Mixed-function Oxygenase Protein	Total protein, CYP1A1 protein

4. Sampling Methods

4.1 Water Quality Monitoring

Water quality monitoring used two approaches, grab sampling and passive sampling. Grab sampling was used to obtain a snapshot of conditions at time of collection and is used to analyze general chemical and physical water quality parameters, metals, and nutrients. Passive sampling includes the deployment of PDBs and SPMDs that are submerged in the water column for a longer period. Water from PDBs is transferred to laboratory-supplied bottles for analysis of petroleum hydrocarbons (BTEX, PHC F1-F4 and Oil and Grease). Triolein strips used in the SPMD deployment are analyzed for PAHs and aPAHs. Only grab sampling was employed during winter due to difficulties in retrieving under-ice equipment.

Seasonal changes in surface water chemistry are closely associated with changes in flow, therefore discharges in the Mackenzie River and Bosworth Creek measured at WSC hydrometric stations were used to contextualize water quality results. Hydrographs showing the discharge of the Mackenzie River and Bosworth Creek in 2023 are provided in Figure 4-1 and Figure 4-2, respectively. Notably, flow data for 2023 is preliminary and has not been reviewed by the WSC.

4.1.1 Grab Sampling

Open water grab samples were collected by wading into the watercourse and/or using an extendable pole with a sample cup to extend the reach. The sampling cup was triple rinsed using water from the waterbody before sampling at each location and rinse water was discarded away from the sampling location. Samples were collected upstream of where the sampler was standing by lowering the sample cup to a depth of approximately 30 cm (or mid-column if depth was less than 30 cm). Water was poured into laboratory-supplied sample containers specific to the analysis required. In winter, boreholes through ice were drilled using a battery-powered ice auger and samples were collected by lowering an extendable pole into the open hole. Samples were stored in coolers, on ice, for shipment to Bureau Veritas Laboratory (BV Labs) and standard chain of custody protocols were followed for each submission. Grab sampling dates corresponded to the retrieval dates for PSDs.

4.1.2 Passive Time-Integrated Sample Collection

Passive samplers, including PDBs and SPMDs, were set in all sampling locations during the open water season. The sampler deployment arms (Photo 4-1 and Photo 4-2) were created using two metal poles attached with a bolt. One pole was placed into the sediment using a post pounder leaving the other to act as an articulating arm within the water column. A buoy was attached to the end of the arm so the PSDs would remain suspended in the water column despite water level changes. Two PDBs were filled with deionized water then secured to the arm using zip ties.

Water from PDBs was transferred to laboratory supplied sample containers upon retrieval and shipped to BV Labs on ice along with grab samples.

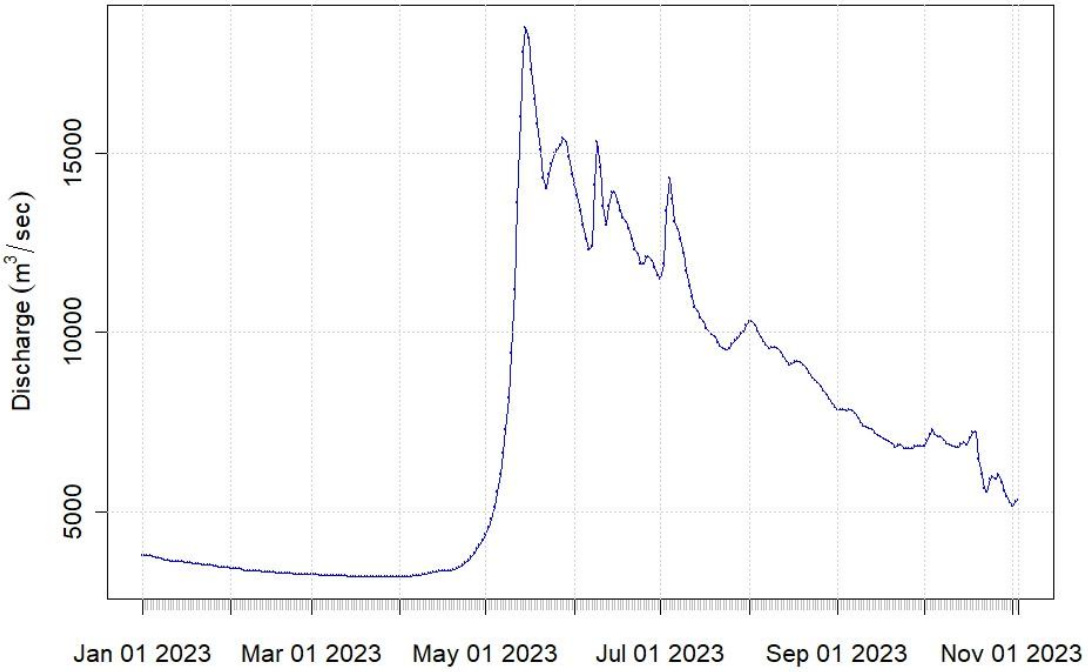


Figure 4-1: Mackenzie River 2023 Hydrograph (January 1 to November 4)

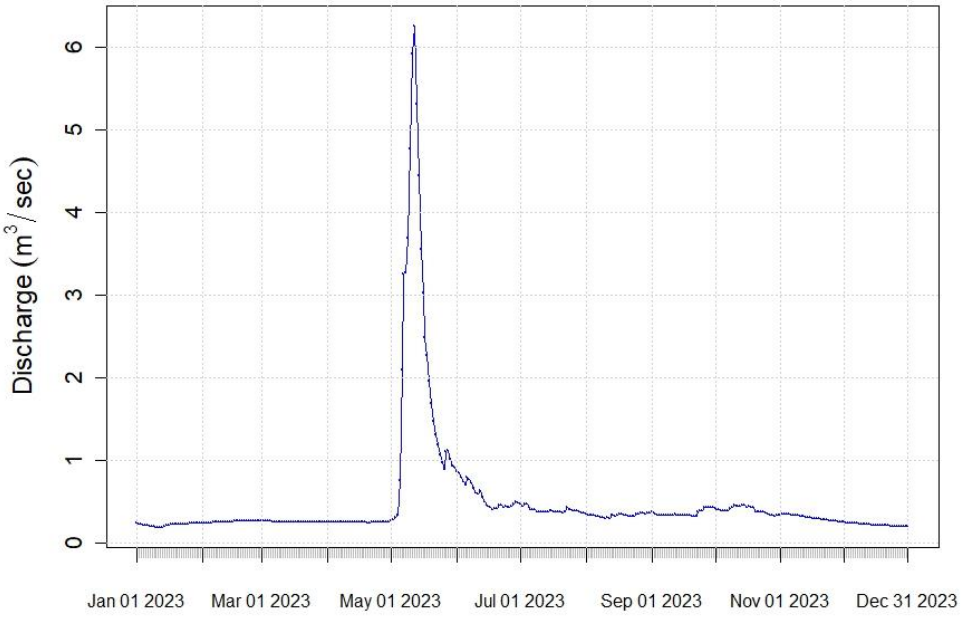


Figure 4-2: Bosworth Creek 2023 Hydrograph

Photo 4-1: Passive Sampler Deployment Arm deployed in 2023

Photo 4-2: PSDs deployed in Bosworth Creek in 2023

Triolein film SPMDs were set in each sampling location for a target duration of 30 days following the procedures outlined in the Standard Operating Procedures for Deployment Arrays (Environment and Climate Change Canada [ECCC] 2018).

Two or three film strips (depending on bracket size) were woven around brackets (Photo 4-3) and placed into a SPMD cannister (Photo 4-4) that was then attached to the end of the articulating arm. Following deployment, films were transferred to a glass jar; the film was kept frozen and away from light before and after deployment. Each film was pre-spiked by the supplier with 10 µg of Anthracene-d10, 10 µg of Fluoranthene-d10 and 1 µg Dibenz[a,h]Anthracene-d14 as performance reference compounds (PRCs). All SPMD samples were shipped on ice to the SGS AXYS laboratory for analysis.

Actual deployment durations varied at each site due to travel and support availability. Furthermore, several samples were lost due to greater than anticipated drops in water elevation, damage from debris or vandalism. If PSDs were damaged or otherwise unusable then a grab sample was collected at that location instead. Deployment times and retrieval status of PSDs deployed in 2023 are summarized in Table 4-1.

Photo 4-3: Triolein film SPMD woven into bracket.

Photo 4-4: Deployment arm with SPMD cannister and PDBs deployed into the Mackenzie River in 2023

Table 4-1: Passive Sampler Deployment Summary[2]

Location	Spring Deployment June – July 2023	Summer Deployment July – August 2023	Fall Deployment August – September 2023
AEMP-US-01 (Midway Island)	Duration: 23 Jun – 25 Jul (32 days) Discharge Deploy: 12,200 m^3/s Discharge Retrieve: 9,570 m^3/s Status: Dry, damaged	Duration: 25 Jul – 19 Aug (25 days) Discharge Deploy: 9,570 m^3/s Discharge Retrieve: 9,180 m^3/s Status: Good	Duration: 19 Aug – Sep 26 (38 days) Discharge Deploy: 9,180 m^3/s Discharge Retrieve: 6,780 m^3/s Status: Dry, damaged
AEMP-US-02 (10 Mile Island)	Duration: 23 Jun – 25 Jul (32 days) Discharge Deploy: 12,200 m^3/s Discharge Retrieve: 9,570 m^3/s Status: Dry, damaged	Duration: 25 Jul – 19 Aug (25 days) Discharge Deploy: 9,570 m^3/s Discharge Retrieve: 9,180 m^3/s Status: Good	Duration: 19 Aug – Sep 26 (38 days) Discharge Deploy: 9,180 m^3/s Discharge Retrieve: 6,780 m^3/s Status: Dry, damaged
AEMP-US-03 (NW Upstream)	Duration: 23 Jun – 25 Jul (32 days) Discharge Deploy: 12,200 m^3/s Discharge Retrieve: 9,570 m^3/s Status: Missing, vandalized	Location abandoned due to frequent public use of the area. Will be re-established in another location.	Location abandoned
AEMP-US-04 (Upper Bosworth)	Duration: 21 Jun – 26 Jul (35 days) Discharge Deploy: 0.454 m^3/s Discharge Retrieve: 0.380 m^3/s Status: SPMDs not analyzed[3], PDBs good	Duration: 26 Jul – 18 Aug (23 days) Discharge Deploy: 0.380 m^3/s Discharge Retrieve: 0.342 m^3/s Status: Good	Duration: 18 Aug – Sep 24 (37 days) Discharge Deploy: 0.342 m^3/s Discharge Retrieve: 0.393 m^3/s Status: Good
AEMP-DS-01 (Lower Bosworth)	Duration: 21 Jun – 26 Jul (35 days) Discharge Deploy: 0.454 m^3/s Discharge Retrieve: 0.380 m^3/s Status: SPMDs not analyzed, PDBs good	Duration: 26 Jul – 18 Aug (23 days) Discharge Deploy: 0.380 m^3/s Discharge Retrieve: 0.342 m^3/s Status: Good	Duration: 18 Aug – Sep 25 (38 days) Discharge Deploy: 0.342 m^3/s Discharge Retrieve: 0.392 m^3/s Status: Good
AEMP-DS-02 (Mainland Dock)	Duration: 24 Jun – 26 Jul (32 days) Discharge Deploy: 11,900 m^3/s Discharge Retrieve: 9,680 m^3/s Status: Dry, damaged	Duration: 26 Jul – 18 Aug (23 days) Discharge Deploy: 9,680 m^3/s Discharge Retrieve: 9,200 m^3/s Status: Good	Duration: 18 Aug – Sep 24 (37 days) Discharge Deploy: 9,200 m^3/s Discharge Retrieve: 6,770 m^3/s Status: Good

[2] Discharge data for Mackenzie River based on station 10KA001 (WSC 2024a); discharge data for Bosworth Creek based on station 10KA007 (WSC 2024b).

[3] Spring SPMDs in Bosworth Creek were missing performance reference compounds. Time-integrated analysis could not be completed.

Location	Spring Deployment June – July 2023	Summer Deployment July – August 2023	Fall Deployment August – September 2023
AEMP-DS-03 (Island 3)	Duration: 23 Jun – 25 Jul (32 days) Discharge Deploy: 12,200 m^3/s Discharge Retrieve: 9,570 m^3/s Status: Dry	Duration: 25 Jul – 19 Aug (25 days) Discharge Deploy: 9,570 m^3/s Discharge Retrieve: 9,180 m^3/s Status: Good	Duration: 19 Aug – Sep 26 (38 days) Discharge Deploy: 9,180 m^3/s Discharge Retrieve: 6,780 m^3/s Status: Good
AEMP-DS-04 (Refinery)	Duration: 24 Jun – 26 Jul (32 days) Discharge Deploy: 11,900 m^3/s Discharge Retrieve: 9,680 m^3/s Status: Dry, damaged	Duration: 26 Jul – 18 Aug (23 days) Discharge Deploy: 9,680 m^3/s Discharge Retrieve: 9,200 m^3/s Status: Good	Duration: 18 Aug – Sep 24 (37 days) Discharge Deploy: 9,200 m^3/s Discharge Retrieve: 6,770 m3/s Status: Missing
AEMP-DS-05 (Radar Island)	Duration: 23 Jun – 25 Jul (32 days) Discharge Deploy: 12,200 m^3/s Discharge Retrieve: 9,570 m^3/s Status: SPMD damaged, PDB okay	Duration: 25 Jul – 19 Aug (25 days) Discharge Deploy: 9,570 m^3/s Discharge Retrieve: 9,180 m^3/s Status: Good	Duration: 19 Aug – Sep 26 (38 days) Discharge Deploy: 9,180 m^3/s Discharge Retrieve: 6,780 m^3/s Status: Good
AEMP-DS-06 (FGH-Blue Fish)	Duration: 22 Jun – 27 Jul (33 days) Discharge Deploy: 12,300 m^3/s Discharge Retrieve: 9,800 m^3/s Status: Dry	Duration: 27 Jul – 21 Aug (25 days) Discharge Deploy: 9,800 m^3/s Discharge Retrieve: 9,000 m^3/s Status: Good	Duration: 21 Aug – Oct 3 (43 days) Discharge Deploy: 9,000 m^3/s Discharge Retrieve: 7,170 m^3/s Status: Dry, damaged

4.1.3 Water Quality Assurance and Quality Control

Water sampling field quality assurance and quality control (QA/QC) methods included the following:

- Grab samples
  - Field duplicate samples collected at a rate of 10%;
  - Field blank samples, one per trip;
  - Trip blank samples, one per trip.
- SPMD samples
  - Field duplicate sample, one per season;
  - Trip blank sample, one per season; and
  - Film degradation (Day Zero) sample, one per season.

Water sample laboratory QA/QC consists of equipment blanks, methods blanks, laboratory duplicates, matrix spikes and laboratory control samples. The Day Zero blank SPMD was sent directly from the supplier to the laboratory to quantify potential degradation of the PRCs. Results of the QA/QC analyses for the 2023 AEMP are presented in data tables summarizing analytical data, laboratory certificates of analysis, and deficiencies and potential impact on data quality and interpretation are discussed in Appendix B.

Overall, the QA/QC analysis indicated that the data presented is fit-for-purpose. No QA/QC issues were identified that would alter the overall conclusions presented herein.

4.2 Small-Bodied Fish Health Monitoring

The 2023 AEMP included a SFS in Bosworth Creek and the viability of a SFS in the Mackenzie River was further investigated.

4.2.1 Mainstem Mackenzie River Monitoring Investigations

As the Mackenzie River is a very large, turbid, and fast flowing watercourse with limited shoals available within the project perimeter, areas suitable to use a backpack electrofisher are uncommon. Similarly pool habitat suitable for minnow trapping is also limited. These challenges limit suitable small-bodied fish tissue sampling locations within the mainstem, however, stakeholders and reviewers on AEMP V4 expressed a strong desire to sample fish tissue within the mainstem. In addition, small-bodied tissue sampling within the mainstem of the Mackenzie would provide an improved understanding of the AES around the NWO. Consequently, several potential small-bodied fish sampling locations were investigated along the mainstem to ensure all potential sentinel species and site location options were considered (Photo 4-5).

Photo 4-5: Minnow trap deployment on Mackenzie River shore adjacent to Radar Island

Investigations into small-bodied fish sampling sites and species in the mainstem included describing habitats around each of the artificial islands within the NWO (TRSA 2024) and sampling (backpack electrofishing, minnow trapping, underwater videography) the fish community at various locations within the mainstem of the Mackenzie River (Table 4-2). The requirements of suitable sentinel species for the AEMP are described in detail in the proposed AEMP V4 plan (TRSA 2022).

Table 4-2: Fish community sampling locations on the Mackenzie River during the 2023 AEMP

Site Name	Latitude	Longitude	Site Name	Latitude	Longitude
ISL1-MT1	65.27684°	-126.86950°	ISL5-MT1	65.26903°	-126.88367°
ISL1-MT2	65.27670°	-126.86837°	ISL5-MT2	65.27084°	-126.88742°
ISL1-MT3	65.27685°	-126.87173°	ISL5-MT3	65.26905°	-126.88601°
ISL2-MT1	65.27252°	-126.84695°	ISL5-EF1	65.26903° to 65.26907°	-126.88595° to °-126.88395°
ISL2-MT2	65.27296°	-126.85157°	ISL6-MT1	65.26650°	-126.86918°
ISL2-ROV1	65.27186°	-126.85100°	ISL6-MT2	65.26573°	-126.86960°
ISL3-MT1	65.27700°	-126.91084°	ISL6-MT3	65.26603°	-126.86928°
ISL3-MT2	65.27694°	-126.91034°	ISL6-MT4	65.26556°	-126.86993°
ISL3-MT3	65.27680°	-126.91022°	MRFS-MT1	65.135519°	-126.316303°
ISL3-MT4	65.27675°	-126.91032°	MRFS-MT2	65.254000°	-126.691442°

Site Name	Latitude	Longitude	Site Name	Latitude	Longitude
ISL4-MT1	65.27349°	-126.89628°	MRFS-MT3	65.312306°	-127.111992°
ISL4-MT2	65.27335°	-126.89620°	MRFS-MT4	65.351742°	-127.268108°
ISL4-MT3	65.27252°	-126.89709°	MRFS-MT5	65.280797°	-126.869417°
ISL4-EF1	65.27256° to 65.27247°	-126.89892° to -126.89686°	MRFS-MT6	65.262183°	-126.730061°
ISL4-ROV2	65.27256°	-126.89709°	MRFS-MT7	65.285266°	-126.899294°

Notes: Minnow trapping locations are identified using MT#, backpack electrofishing locations are identified using EF#, and underwater remotely operated vehicle launch locations are identified using ROV in the site name of the respective sampling location. ISL represents island sampling and MRFS represents sampling along the mainstem bank.

4.2.2 Bosworth Creek Slimy Sculpin Sampling

Effort for the SFS has focused on sampling in Bosworth Creek due to its proximity to site, lower flow rate, and challenges within the Mackenzie River mainstem. SFS sampling locations on Bosworth Creek are shown on Figure 5. Sampling methods have been briefly summarized and are described in detail in the AEMP V4 plan (TRSA 2022).

Slimy sculpin were collected from each sampling reach using a Smith-Root LR-24® backpack electrofisher targeting shallow riffle and run habitat in Bosworth Creek. One person controlled the electrofisher while up to three people netted immobilized fish. Sculpin prefer to reside under rocks and other debris and will flare their gills and fins when hit with the electrical pulse from the electrofisher. Therefore, boulder/cobble substrates were flipped during electrofishing to dislodge any sculpin that may have become stuck under the substrate. All fish were identified upon capture and non-target species were immediately released downstream from the sampling area. Slimy sculpin that were at least 50 mm long were placed in a 5 gallon aerated bucket filled with creek water (Photo 4-6) and transported to a clean dissection area in the Imperial workshop.

Once back at the dissection location, each sculpin was removed from the bucket and placed in 200 mg/L tricaine methanesulfonate (MS-222) until the fish became unresponsive (Photo 4-7). The spinal cord was severed behind the gills to ensure the fish was deceased. Total length (mm) and body weight (g) were measured and the fish was inspected for abnormalities and parasites (Photo 4-8). During dissection, the liver and gonads (if developed) were removed measured to the nearest milligram (mg) and inspected for deformities. The gonads were assessed to determine the sex and maturity of each individual, with underdeveloped or lack of gonads indicating immaturity. These parts were weighed to the nearest mg using an Ohaus SPX223 Scout® analytical balance. Total length, body weight, liver weight, gonad weight, maturity, sex, and gross pathology were recorded, and livers were placed on ice in cryovials. Liver samples were frozen as soon as possible following dissection. Samples for metals testing were packed individually in whirlpack® bags, whereas composite PAH samples were placed in hexane and acetone washed aluminum foil. Samples for metal and PAH analysis were frozen as soon as possible following dissection. All tools and workstations were sterilized after every dissection using 80% ethanol and nitrile gloves were changed.

Samples for metal analysis were shipped to Trich Analytics Laboratory (Trich) in Saanichton, British Columbia (BC), while PAH samples were submitted to SGS AXYS for analysis. Liver samples were submitted to the Innotech Alberta (Innotech) laboratory in Vegreville, Alberta to measure CYP1A1 protein and total protein concentrations.

Photo 4-6: Slimy sculpin in sampling bucket on Bosworth Creek

Photo 4-7: Slimy sculpin in MS-222 solution during euthanasia

Photo 4-8: Slimy sculpin in fish viewer during dissection process

Mixed-Function oxygenase (MFO) enzymes are localized in the liver and play a key role in the detoxification of many contaminants such as PAHs in fish (Hodson et al. 1991). The CYP1A1 enzyme is a MFO protein that is considered the most important MFO enzyme responsible for detoxification of xenobiotics (Hodson et al. 1991, Brooks et al. 2015). The CYP1A1 protein content was measured using a commercially available enzyme-linked immunosorbent assay (ELISA) kit targeting CYP1A1. TRSA worked with Innotech to develop a protocol for liver tissue preparation and CYP1A1 concentrations were normalized to total protein in tissue lysates. Total protein was measured using a commercially available Pierce Bicinchoninic acid (BCA) protein assay kit. The liver protein measurement protocol developed is outlined alongside validation steps included in the laboratory report provided by Innotech (Appendix C).

4.2.2.1 Quality Control and Quality Assurance

An effective QA/QC program is vital to ensure accurate data collection/interpretation and to quantify any uncertainty introduced during the field execution or laboratory analysis. The tissue sampling QA/QC program during the 2023 AEMP included analysis of the following:

- Certified reference materials (CRMs) such as DORM-5, NIST-1566b, and NIST-2976
- Field sample duplicates;
- Triplicate analysis of protein content analyses; and
- Analysis of brook trout (*Salvelinus fontinalis*) liver tissue for protein assay protocol validation.

The QA/QC results of the fish tissue component of the 2023 AEMP are reviewed in detail in Appendix D and any potential uncertainties are described alongside results presented in Section 6.2. Overall, the QA/QC program demonstrated that the 2023 results are considered fit for purpose.

4.3 Deviations and Potential Method Improvements

4.3.1 Surface Water Sample Program

During the 2023 season, the Mackenzie River experienced low water levels and surface water elevation drops that were greater than anticipated and greater than the designed PSD deployment mechanism could accommodate in several locations. Water level drops resulted in lost PSD data as SPMDs and PDBs were out of the water and unusable (Photo 4-9 and Photo 4-10).

Photo 4-9: PSD when deployed - Fort Good Hope June 2023

Photo 4-10: PSD out of water - Fort Good Hope July 2023

Due to the limited success of the deployment mechanisms during water level drops, an anchoring system that can be deployed and retrieved into deeper water, further from shore will be used in 2024. The system was designed to mimic how local fisherpeople deploy nets in the river. The deployment arms were successful in Bosworth Creek and will continue to be used for those sample locations.

Triolein film strips deployed in June at Bosworth Creek locations (AEMP-US-04 and AEMP-DS-01) were determined to not contain a performance reference compound upon retrieval, meaning that determining a time-integrated concentration would not be possible. As such, these SPMDs were not analyzed.

4.3.2 Fish Tissue Analysis

Efforts to source materials to flash freeze fish tissue (e.g. dry ice and liquid nitrogen) before the AEMP 2023 fall sampling period were unsuccessful given the remoteness of the NWO. Although whole body and liver tissues retained were placed on ice and frozen as quickly as possible, the time-lag between dissection and freezing increases the potential for protein degradation. The ELISA assay depends on anti-bodies that are highly specific and require intact protein structures. CYP1A1 protein results are near the detection limit (Section 6.2.2) and faster freezing following dissection may prevent protein degradation and increase concentrations further above the detection limit. It is notable, that results near the detection limit often have reduced precision therefore limiting protein degradation after euthanasia may improve overall precision.

Imperial and TRSA continue to explore options to enable flash freezing of tissue during dissection, including but not limited to, transporting dry ice from Yellowknife to the site during mobilization, transporting a dewar flask pre-charged with liquid nitrogen to site during mobilization, and sourcing field dry ice making equipment

Some liver samples submitted for CYP1A1 protein analysis were too small to complete the analysis, or were not able to be analyzed as triplicates. During the CYP1A1 protocol validation, Innotech identified a minimum sample value of 20 mg; therefore, no liver samples weighing less than 20 mg will be submitted for this analysis during future analyses.

5. Data Evaluation and Interpretation Methods

5.1 Water Quality Assessment Methods

Water quality data are presented as follows:

- Data tables with published guideline and control limit comparison;
  - All data parameters and historical data presented.
- Dot plots with control limits;
  - All KIPs presented.
- Trend charts;
  - All KIPs presented for locations with an appropriate dataset is established. Dataset development is provided in Appendix E.
  - Data is presented per season to account for natural variation that may affect results.
- Mann-Kendall (M-K) trend analysis;
  - M-K analysis is used to determine if there are statistically significant trends in data.
  - All KIPs presented for locations with an appropriate dataset is established.
  - Data is analyzed per season to account for natural variation that may affect results.
- Piper plots of major ions;
  - Piper plots provide a visual representation of water ion chemistry which can indicate differences in the overall chemical characterization of a sample.

5.1.1 Published Environmental Guideline Comparison

Water quality variables are compared to the following guidelines sets with guideline exceedances highlighted:

- Canadian Council of Ministers of the Environment guidelines for the protection of freshwater aquatic life (CCME FWAL; CCME 2012, as amended);
- Federal Environmental Quality Guidelines (ECCC 2021); and
- Health Canada Guidelines for Canadian Drinking Water Quality (Maximum Acceptable Concentrations only; Health Canada 2022).

Where environmental quality guidelines are equation-derived based on site-specific factors that modify the toxicity of a parameter (such as pH or hardness), the upstream data water quality set is used to represent the natural conditions of the receiving environment. As upstream water chemistry will be presented as ranges, the more conservative (e.g. 25th percentile or similar) is used. Water quality guidelines are used as a screening tool and in the overall interpretation of the potential meaning of results. Several parameters are known to naturally exist within the Mackenzie River near or above published guidelines.

As such, water quality guideline comparison will be considered in conjunction with assessments of changes between upstream and downstream location but are generally not a reliable indicator of potential site influence.

5.1.2 Control Charting – Upstream vs Downstream Comparison

As data is collected at upstream locations (including data collected during AEMP Version 3 sampling from 2017 to 2022), a dataset of upstream water quality for each water body is being developed. The upstream water quality dataset is used for direct comparison of an individual event's data and to investigate any exceedances of applied guidelines to determine if they are naturally occurring. Due to the potential for changing conditions associated with climate change (for example, increased sediment loading, increased groundwater infiltration related to degrading permafrost or unusual variations in river discharge), the upstream data is presented as a range (upper and lower control limits; UCL and LCL) rather than discrete "background" numbers.

Surface water chemistry varies seasonally with discharge. For example, total metal fractions often increase during higher discharge as increased suspended sediment loads mobilize these potential contaminants, while dissolved fractions have an inverse relationship with discharge because they become more diluted during high flow (Arciszewski et al. 2018). To address this, flow-corrected control charting can be used where relationships between contaminant concentration and discharge (i.e. linear regressions or locally estimated scatterplot smoothing [LOESS]) exist. These models can be assessed and UCLs/LCLs can then be defined using the residuals from these relationships (COSIA 2018). The relationship between KIPs and discharge in the Mackenzie River were investigated during the 2023 AEMP, however, flow-corrected control charting was not employed due to a lack of a defined relationship between KIP concentrations in the upstream dataset and discharge. In the absence of this statistical relationship between water chemistry and discharge, control charting using reported concentrations provides a suitable comparison between upstream and downstream conditions.

Upstream dataset development is presented in Appendix E.

UCL and LCL are presented on the trend charts in Appendix F and in the data tables.

5.1.3 Piper Plots of Major Ions

Piper plots provide a visual tool to describe ionic composition of water to compare between water types and identify mixing between different sources.

Major ions measured during 2023 were plotted on piper plots to determine water types upstream and downstream from Norman Wells operations on the Mackenzie River and Bosworth Creek. Results have been plotted individually for each season and for the full year results together to assess for seasonal variation.

Results below detection were replaced with half the detection limit and water types were determined for each site. Piper plots are presented in Appendix G and results are discussed in Section 6.1.3.

5.1.4 Statistical Trend Analysis

Trend analysis was performed using the non-parametric Mann-Kendall test for trend (Mann 1945; Kendall 1975) with modified Sen's non-parametric slope estimator (Sen 1968). Trend analysis was conducted using all available data for locations with a historical dataset (i.e. 2017 to 2023) and that meets that dataset criterion for detection limits.

The Mann-Kendall statistical process involves first placing the data in chronological order. The sign of the differences between all forward combinations of data pairs are then used to compute the Mann-Kendall statistic (S). Next, the Mann-Kendall S and the number of data points (n) are used for the normal approximation test. The results yield a probability value from 0 to 1. The Sen's slope is used to provide and approximate magnitude on trends. Sen's slope is calculated by evaluating the slope between all forward combinations of data pairs. The slopes are then ranked, and the median slope value is selected. Slopes are presented both in absolute terms (mg/L per year) and normalized relative to the median concentration (% change per year).

Results of a Mann-Kendall test with modified Sen's Slope were considered significant, for any of the trend analysis components of this program, when:

- the two-tailed probability value (the probability of the data set having zero trend; p-value) was less than 0.05; and
- the normalized slope of concentration change was greater than ± 10%/year.

5.1.5 Use of Data from Previous Sampling Years

Where applicable, data from 2017 to 2022 program was incorporated. Historical sample locations that correspond to current sample locations are presented in Table 3-1. Historical data is included in data tables and incorporated into the upstream dataset, where applicable.

5.1.6 Semi-permeable Membrane Device PAHs and aPAHs Analyses

PAH and aPAH concentrations have been calculated from the mass results provided through SPMD analysis. Laboratory results for PAHs and aPAHs are provided as a mass per strip, calculations developed by the United States Geological Survey (USGS 2010, 2016) were used to estimate concentration in water for measured PAHs and aPAHs, where developed chemical-specific properties are available to allow for estimation. SPMD Calculator Version 5.2 (USGS 2016) was used to determine concentrations using PRCs and where certain physical properties of parameters are known or have been estimated. SPMD Calculator Version 4.1 (USGS 2010) was used for parameters not available for calculation in Version 5.2. Calculator Version 4.1 requires a water temperature selection of either 10°C, 18°C or 26°C.

While 10°C or 18°C more closely resemble conditions in the Mackenzie River and Bosworth Creek during the sampling season, selection of these temperature eliminates estimation of several compounds as uptake sampling rates have not been determined; as such, the temperature within the calculation was set to 26°C. This provides an estimate of water concentration as opposed to reporting as not available.

PAH concentrations calculated from SPMDs were used to determine total PAH concentrations for each sample. In addition, the profile of PAHs and aPAHs are presented in bar charts to visually compare their abundances among sites. The relative contribution of petrogenic and pyrogenic PAHs are summarized by calculating a Pyrogenic Index (PI) for each sample using Equation (1) as described in Lévesque et al. 2023 (PAHs abbreviation definitions listed in Table 3-2).

Equation 1

$$Pyrogenic\ Index\ (PI) = \frac{\Sigma(AN,\ AC,\ BA,\ BaP,\ BbjFl,\ BeP,\ BG,\ BkFl,\ DA,\ FL,\ IP,\ PR)}{\Sigma(N0{-}4,\ PA0{-}4,\ F0{-}3,\ D0{-}3,\ BaAC0{-}3)}$$

5.2 Fish Health Assessment Methods

The fish health data analysis is modelled off the guidance developed for environmental effects monitoring (EEM) in Canada (Environment Canada 2012) and are based primarily on the overall fish condition and allocation of resources to contaminant detoxification in the liver and reproduction. Fish morphometrics and tissue residue concentrations were compared between the upstream reference site (AEMP-FS-01) and the downstream site adjacent to the NWO operating area (AEMP-FS-02). This included anecdotal comparisons of gross pathology and field observations, as well as quantitative statistical comparisons using a one-way analysis of variance (ANOVA). The assumptions of a normal distribution of residuals and similar variance between treatments/sites (homoscedasticity) was visually assessed using quantile-quantile (normal distribution) and residuals versus fitted plots, respectively. A Sharpiro-Wilk statistical test was also used to confirm that the assumptions of the ANOVA were met. For analyses where ANOVA assumptions were not met, data transformations were applied to meet test assumptions, or a Fisher permutation test was used to compare between sites.

Fish health metrics including hepatosomatic index (HSI) and gonadosomatic index (GSI) were calculated and compared between sites. Statistically significant differences between sites are noted and the relevance to potential effects is discussed. In addition, the percent difference between sites was calculated for each metric for comparison with critical effect sizes (CES) established in the proposed AEMP V5 (Table 5-1; TRSA 2022).

Table 5-1: Critical Effect Sizes (CES) for fish tissue endpoints measured during the 2023 AEMP

Health Metric	Critical Effect Size
Condition	10%
Hepatosomatic Index (HSI)	25%
Gonadosomatic Index (GSI)	25%
Tissue Residues	2*Standard Deviation of reference
MFO Induction (i.e. CYP1A1 content)	2*Standard Deviation of reference

Comparing liver and gonad size indices (i.e. GSI and HSI) are often influenced by poor statistical properties (e.g. assumptions about data distributions are often violated) that limit confidence in parametric statistical tools (Environment Canada 2012). For example, permutation tests were used to compare the average body length, body weight, HSI, and GSI between sites, because data distributions did not meet statistical assumptions and data transformation was ineffective. Consequently, fish metrics that are dependent on each other were analyzed using an analysis of covariance (ANCOVA) approach. This included assessing body weight as it relates to fish length, and assessing the relationship between liver and gonad weight with body weight. Differences between sites for each sex were assessed by comparing the linear model (ordinary least squares regression) for each site using the ANCOVA. Linear models were first analyzed with an interaction term included to investigate whether the relationship between covariates was altered by a site effect. These models take the form provided in Equation (2), where:

- the first term (β_0) describes the model intercept;
- the second term (β_1) describes the strength/slope of the regression between covariates;
- the third term (β_2) describes the distance between the regression models for each site; and
- the last term (β_3) describes the interaction between the covariate regressions and the site.

Equation 2

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 (x_1 * x_2)$$

It is notable that a significant interaction between the covariates and the site are typically either a change in the direction or the magnitude of the relationship between the covariates among sites. If there was no interaction between the covariate relationship and the site, then it was assumed that linear model slopes were the same for both sites. In these cases, the percent difference between the reference and downstream site was calculated according to Equation (3).

Equation 3

$$\%\, difference = \left(10^{\beta_2} - 1\right) * 100$$

If a significant interaction was observed, the methods outlined in the EEM technical guidance (Environment Canada 2012) was followed. Alternatively, percent differences based on independent means (observed or adjusted) are calculated by dividing the difference between the downstream site and reference site (downstream - reference) by the reference mean as described for EEM programs (Environment Canada 2012).

Statistical power analyses were completed in the R programming language (Rstudio Version 2023.09.1) using the power.anova.test (ANOVA comparisons) and pwr.f2.test (ANCOVA comparisons) functions. Effect size for ANOVAs was determined based on the within group and between group variances (sum of squares), while effect size (f^2) was calculated according to Equation 4 for ANCOVA analyses. Where r^2 is the adjusted r-square value for the associated linear regression model.

Equation 4

$$f^2 = \frac{r^2}{1 - r^2}$$

Summary statistics for metal tissue residue concentrations were calculated and concentrations for KIPs were compared using an ANOVA if data structure met assumptions or a permutation test if the assumptions were not met using data transformations. Site comparisons for metal concentrations were completed independently for females and males. Site comparisons for CYP1A1 content (normalized according to total protein content) in slimy sculpin livers followed the same methods as those described for metal tissue residue concentrations.

The concentrations of PAHs and aPAHs measured in tissue residues are based on composite samples of multiple fish to meet tissue quantity requirements for laboratory analysis. Therefore, only one sample was analyzed for each site and no statistical comparisons between sites are possible. Total PAH was calculated for each site by summing the concentrations for all PAHs and aPAHs measured. Concentrations measured below the sample-specific detection limit were replaced with half the detection limit value for each respective PAH/aPAH to determine total PAHs concentration as well as to assess cancer risk. Cancer risk at each site was calculated using the carcinogenic potency of individual PAHs relative to Benzo(a)pyrene as described in ATSDR 2022. Overall cancer risk is summarized for each site as a potency equivalency quotient (PEQ) using the potency equivalency factors (PEF) for PAHs (Table 5-2). It is important to note that the PEQ accounts for potential effects from PAHs shown to be carcinogenic based on previous toxicological studies and does not account for potential toxicity of non-carcinogenic PAHs (ATSDR 2022). The abundances of PAHs/aPAHs are presented in bar charts. It is notable that differences in the rates of biotransformation and metabolism among PAHs/aPAHs influences the profile of PAHs/aPAHs present in tissue. Therefore, the PI was not calculated for tissue residue results and the discussion of PAH profiles between sites is limited.

Table 5-2: Potency Equivalency Factors (PEF) of PAHs Measured in Slimy Sculpin from Bosworth Creek

Polycyclic Aromatic Hydrocarbon	Potency Equivalency Factor
Benzo[a]anthracene	0.10
Benzo[b]fluoranthene	0.10
Benzo[j,k]fluoranthenes	0.10
Benzo[a]pyrene	1.00
Chrysene	0.01
Dibenz[a,h]anthracene	2.40
Indeno[1,2,3-cd]pyrene	0.10
5/6-Methylchrysene	1.00

Potency Equivalency Factors (PEFs) adopted from ASTDR 2022

6. Results and Discussion

6.1 Surface Water Quality

Surface water quality results and interpretation are presented below. Each evaluation method represents a line of evidence of water quality; however, all are considered together in discussing overall water quality. Surface water quality results are presented in Tables 1 through 7 and in the water laboratory certificates of analysis in Appendix H.

6.1.1 Comparison with Environmental Quality Criteria

The following KIPs were found to be above one or more set of applied environmental criteria at one or more downstream locations in one or more sampling events in 2023 (Table 6-1):

Table 6-1: KIP Guideline Exceedances in 2023

KIP	Sample Location(s)	Guideline Set Exceeded	Historical Context
Aluminum (total)	AEMP-DS-02 (Marine Dock) AEMP-DS-03 (Island 3) AEMP-DS-04 (Refinery) AEMP-DS-05 (Radar North) AEMP-DS-06 (FGH)	CCME FAL	Aluminum concentrations have consistently exceeded the FAL guideline in both upstream and downstream locations of the Mackenzie.
Cadmium (total)	AEMP-DS-03 (Island 3)	CCME FAL	Cadmium concentrations have frequently exceeded the FAL guideline in both upstream and downstream locations of the Mackenzie, however, with some variation between above and below guideline detections.
Chromium (total)	AEMP-DS-03 (Island 3)	CCME FAL, FEQG	Chromium concentrations have frequently exceeded the FAL and FEQ guidelines in both upstream and downstream locations of the Mackenzie, however, with some variation between above and below guideline detections.
Copper (total)	AEMP-DS-02 (Marine Dock) AEMP-DS-03 (Island 3) AEMP-DS-04 (Refinery) AEMP-DS-05 (Radar North) AEMP-DS-06 (FGH)	CCME FAL	Copper concentrations have frequently exceeded the FAL guideline in both upstream and downstream locations of the Mackenzie, however, with some variation between above and below guideline detections.

KIP	Sample Location(s)	Guideline Set Exceeded	Historical Context
Iron (total)	AEMP-DS-02 (Marine Dock) AEMP-DS-03 (Island 3) AEMP-DS-04 (Refinery) AEMP-DS-05 (Radar North) AEMP-DS-06 (FGH)	CCME FAL	Iron concentrations have consistently exceeded the FAL guideline in both upstream and downstream locations of the Mackenzie.

All PHCs were below applied guidelines, where available, and were nearly all were below method detection limits. No KIP guideline exceedances were observed in Bosworth Creek.

6.1.1.1 Semi-permeable Membrane Device PAH Results

All PAH and aPAH concentrations are below the applied guidelines, when available, which is consistent with findings for previous PAH grab sample analysis. However, SPMD analyses did achieve lower detection limits for PAHs and aPAHs compared to grab sample analyses allowing for detectable concentration results rather than all results being reported as below the laboratory reportable detection limit.

Total PAH concentrations measured in SPMDs, including PAHs and aPAHs, are summarized for the Mackenzie River and Bosworth Creek in Table 6-2. The concentrations of individual PAHs and aPAHs are provided in Table 6 and Table 7, respectively. The total PAH concentrations were highest near the mainland dock and refinery site locations and lowest at Island 3 and Fort Good Hope. Elevated concentrations at the refinery and marine dock may be a result of known seeps near these locations. The total PAH concentration in Bosworth Creek was similar to midstream locations along the mainstem of the Mackenzie River. Apart from the mainland dock and refinery locations, total PAH concentrations measured in 2023 are within the same range as those measured from SPMDs in the Athabasca River near the oil sands region (Lévesque et al 2023). Notably, the upstream deployment site (AEMP-US-01) had a higher total PAH concentration than the mid-channel downstream sites and is unlikely to be influenced by NWO operations. The 2023 total PAH concentrations therefore suggest that background PAH concentrations in the Mackenzie River are higher than those present farther upstream in the watershed in the Athabasca River.

Table 6-2: Polycyclic Aromatic Hydrocabon (PAH) Summary in the Mackenzie River and Bosworth Creek

Watercourse	Sample Location	Deployment Period	Total PAHs (µg/L)	Pyrogenic Index
Mackenzie River	AEMP-DS-02 (Mainland Dock)	Summer	0.621	0.076
	AEMP-DS-02 (Mainland Dock)	Fall	0.757	0.049
	AEMP-DS-03 (Island 3)	Summer	0.051	0.003
	AEMP-DS-03 (Island 3)	Fall	0.062	0.026
	AEMP-DS-04 (Refinery)	Summer	0.433	0.016
	AEMP-DS-05 (Radar Island)	Summer	0.090	0.028

Watercourse	Sample Location	Deployment Period	Total PAHs (µg/L)	Pyrogenic Index
	AEMP-DS-05 (Radar Island)	Fall	0.143	0.018
	AEMP-DS-06 (FGH – Blue Fish)	Summer	0.049	0.010
	AEMP-US-01 (Midway Island)	Summer	0.157	0.023
	AEMP-US-02 (10 Mile Island	Summer	Lost during laboratory analysis	
Bosworth Creek	AEMP-DS-01 (Lower Bosworth Creek)	Summer	0.250	0.045
	AEMP-DS-01 (Lower Bosworth Creek)	Fall	0.106	0.108
	AEMP-US-04 (Upper Bosworth Creek)	Summer	0.179	0.005
	AEMP-US-04 (Upper Bosworth Creek)	Fall	0.138	0.005

Alkylated PAHs contributed most to the total concentrations observed in 2023 (Figure 6-1 and Figure 6-2). Alkylated fluoranthenes/pyrenes and naphthalenes were the most abundant PAHs in all sites in the Mackenzie River and Bosworth Creek. In fall 1995, Parrott et al. (1999) documented higher contributions of naphthalenes and fluoranthene in SPMDs deployed in the Mackenzie River upstream and downstream from the NWO compared to those deployed in effluent from the NWO. Although alkylated fluoranthene concentrations were not reported in this study. High proportions of aPAHs (namely naphthalenes and fluorenes) also contributed to low PI values in the Mackenzie River and Bosworth Creek in 2023. The low PI indicates that PAHs in both watercourses are from a petrogenic origin typical of crude heavy oils and fuels rather than atmospheric deposition from combustion (Lévesque et al 2023). This is consistent with findings from SPMDs deployed in 1995 (Parrott et al. 1999).

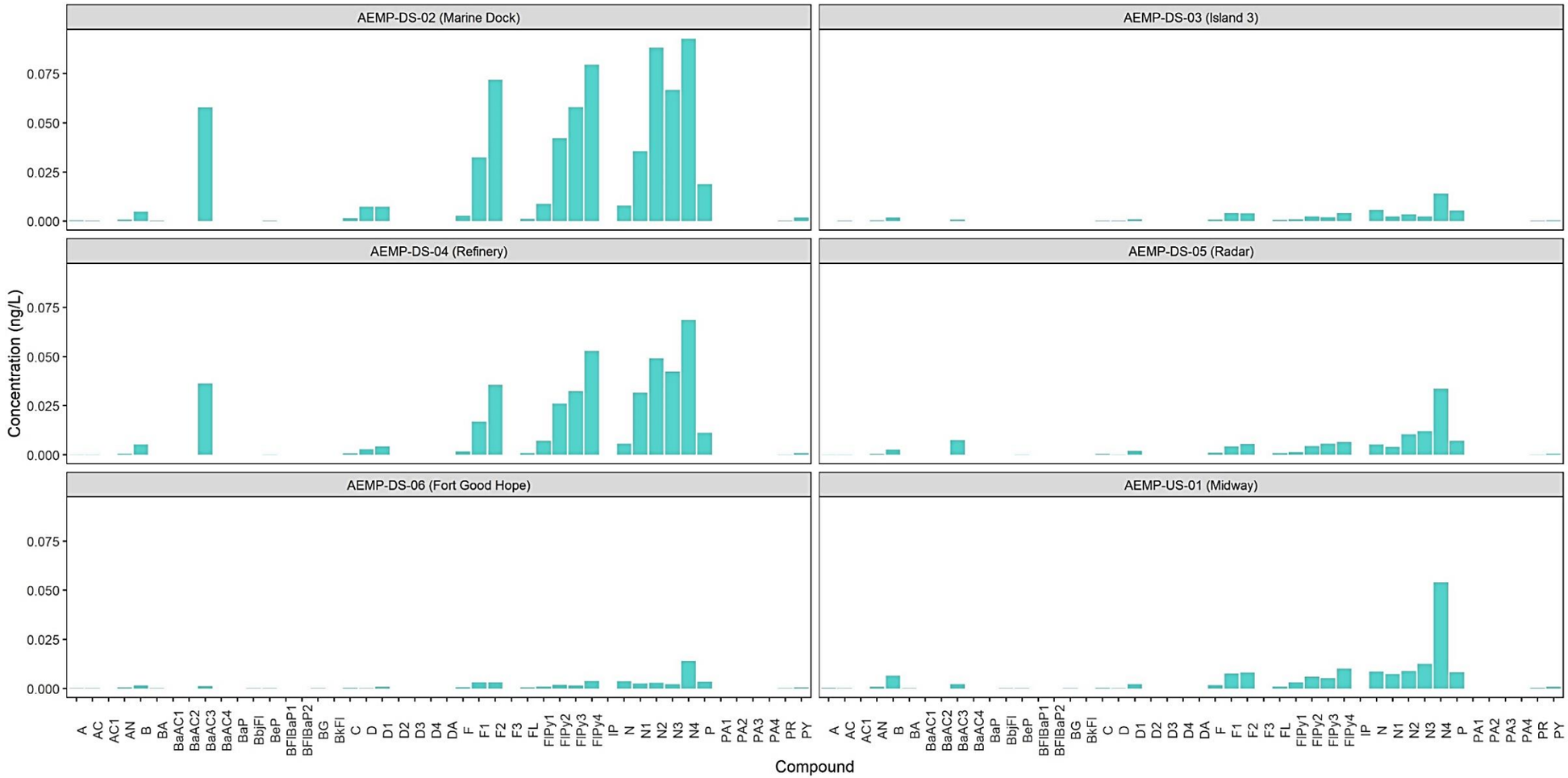


Figure 6-1: Profiles of PAH and aPAH Concentrations measured in SPMDs deployed in the Mackenzie River in 2023

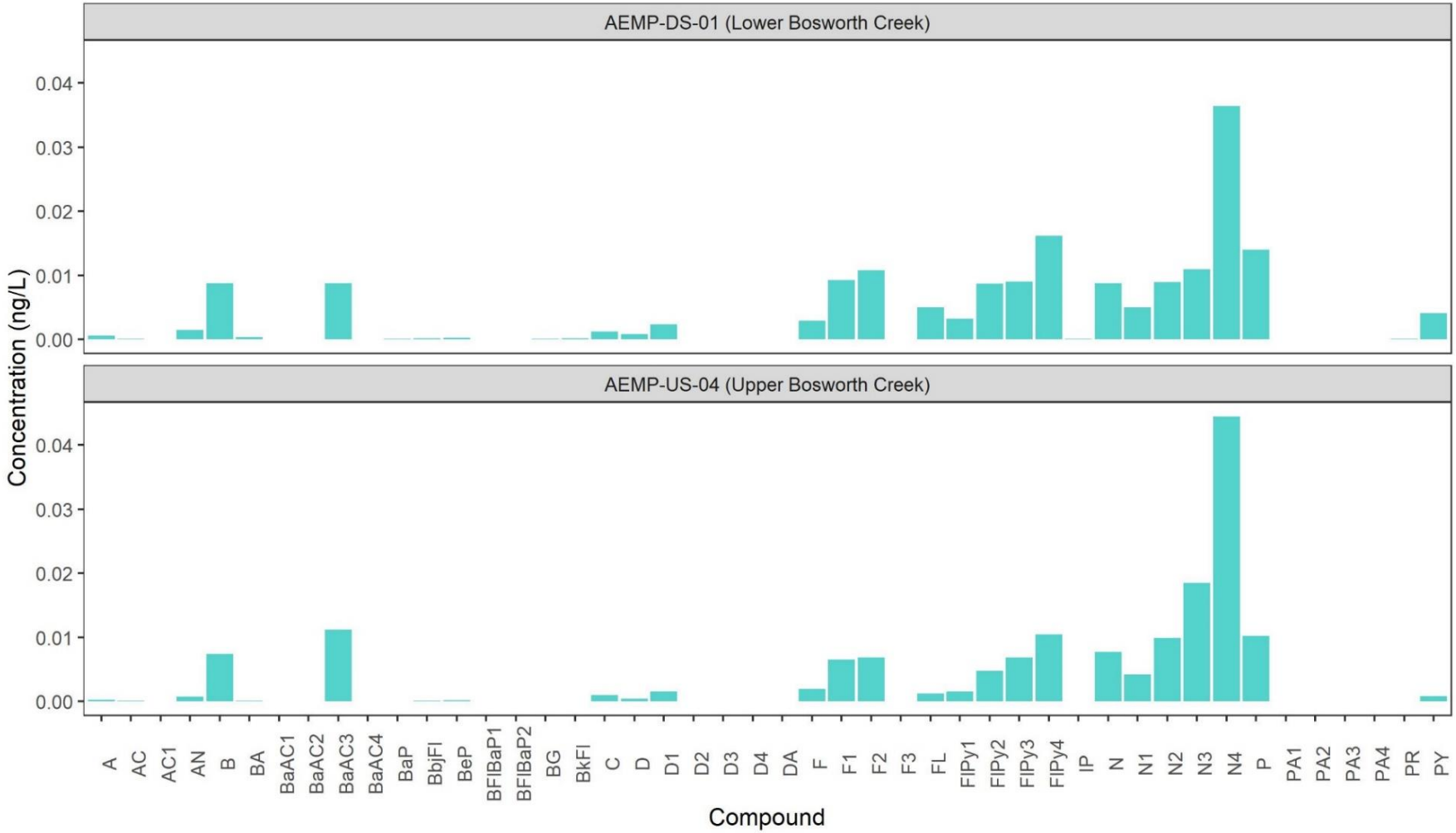


Figure 6-2: Profiles of PAH and aPAH Concentrations measured in SPMDs deployed in Bosworth Creek in 2023

6.1.2 Control Charts – Upstream vs Downstream

Parameter concentrations found to be outside of the calculated upstream UCL and LCLs are presented in Table 6-3. Control charting for SPMD measured PAHs and aPAHs will be incorporated into future reports once an appropriate upstream dataset is established.

Table 6-3: Parameters outside of Upstream Control Limits

KIP	Sample Location(s)	Guideline Set Exceeded	Historical Context
Aluminum (total)	AEMP-DS-02 (Marine Dock) AEMP-DS-03 (Island 3) AEMP-DS-04 (Refinery) AEMP-DS-05 (Radar North) AEMP-DS-06 (FGH)	CCME FAL	Aluminum concentrations have consistently exceeded the FAL guideline in both upstream and downstream locations of the Mackenzie.
Cadmium (total)	AEMP-DS-03 (Island 3)	CCME FAL	Cadmium concentrations have frequently exceeded the FAL guideline in both upstream and downstream locations of the Mackenzie, however, with some variation between above and below guideline detections.
Chromium (total)	AEMP-DS-03 (Island 3)	CCME FAL, FEQG	Chromium concentrations have frequently exceeded the FAL and FEQ guidelines in both upstream and downstream locations of the Mackenzie, however, with some variation between above and below guideline detections.
Copper (total)	AEMP-DS-02 (Marine Dock) AEMP-DS-03 (Island 3) AEMP-DS-04 (Refinery) AEMP-DS-05 (Radar North) AEMP-DS-06 (FGH)	CCME FAL	Copper concentrations have frequently exceeded the FAL guideline in both upstream and downstream locations of the Mackenzie, however, with some variation between above and below guideline detections.
Iron (total)	AEMP-DS-02 (Marine Dock) AEMP-DS-03 (Island 3) AEMP-DS-04 (Refinery) AEMP-DS-05 (Radar North) AEMP-DS-06 (FGH)	CCME FAL	Iron concentrations have consistently exceeded the FAL guideline in both upstream and downstream locations of the Mackenzie.

6.1.2.1 Control Limit Exceedances Discussion

Concentrations reported outside of control limits were not found to be consistent across downstream locations or sampling seasons. Concentrations outside of control limits to not currently suggest identifiable hydrochemical changes between upstream and downstream locations in either water body (Mackenzie River or Bosworth Creek). Five major ion indicators at AEMP-DS-06 near Fort Good Hope exceeded the calculated upstream control limits; as similar concentrations were not observed at near-facility downstream locations, there may be changes to water chemistry between Norman Wells and Fort Good Hope (e.g. mixing with tributary waters) that render application of upstream control limits to locations that far downstream as inappropriate.

6.1.3 Hydrochemical Type – Major Ions

Hydrochemical type is visually represented in Piper plots in Appendix G.

Results for the Mackenzie River show that water quality is predominantly a calcium-magnesium-bicarbonate type with no notable variation between locations upstream and downstream of Norman Wells or between sampling seasons. Ion chemistry near Fort Good Hope is characterized more as a mixed or non-dominant water type; this appears consistent with observed control limit exceedances of major ions (Section 6.1.2.1).

Results for Bosworth Creek show water quality is predominantly a mixed type with some calcium predominance with no notable variation between locations upstream and downstream of NWO or between sampling seasons. One sample at the downstream location plotted as an outlier and appear erroneous, these results will be reviewed in future programs.

6.1.4 Summary Statistics

Mann-Kendall statistical summaries are presented in Appendix F.

Two statistically significant trends were observed, summarized in Table 6-4.

Table 6-4: Statistically Significant Trends in Surface Water

Parameter	Sample Location	Trend Direction
Chloride	AEMP-DS-01 (Lower Bosworth Creek)	Increasing
Copper	AEMP-US-02 (10 Mile Island)	Increasing

Trends in upstream data would not be attributed to NWO site operations. The 2023 chloride concentrations at Bosworth Creek downstream appear consistent with upstream concentrations however both are slightly elevated over chloride at historical upstream sampling locations. Further characterization of upstream Bosworth water quality is planned for 2024.

6.1.5 Surface Water Quality Summary

Surface water quality results do not suggest notable KIP chemical differences between upstream and downstream sampling locations in either the Mackenzie River or Bosworth Creek.

Several total metals KIPs exceeded applied guidelines at several locations; however, only total chromium exceeded guidelines (CCME FAL and FEQG) and the calculated UCL (AEMP DS 03 Island 3, March 2023). Chromium concentrations at that location were below guideline and UCL in July, August and September.

Petroleum hydrocarbons, including BTEX, were sampled using PDBs in 2023, representing the first time passive sampling methods were used in this program. All BTEX concentrations where below detection limits.

Piper plots of major ions suggest consistent hydrochemical type between upstream and downstream locations in both the Mackenzie River and Bosworth Creek. One exception is ion composition at AEMP-DS-06 near Fort Good Hope; a location approximately 167 km downstream of Norman Wells and possible influenced by waters from several tributaries. As near-facility downstream water ion chemistry does not appear to alter from upstream chemistry, changes observed at AEMP-DS-06 are not interpreted to be an indication of site influence.

6.2 Small-Bodied Fish Sampling

Minnow traps were baited and deployed within the study area between September 26 and October 3 over 773.8 trap hours. Small areas adjacent to two islands (4 and 5) were suitable for backpack electrofishing and were fished for an effort of 703 seconds and 819 seconds, respectively. Minnow trapping of the mainstem bank yielded two whitefish (*Coregonus* spp) and one lake chub (*Couesius plumbeus*), while minnow trapping on the islands yielded one juvenile walleye (*Sander vitreus*) and one lake chub. Electrofishing efforts on October 3 yielded one longnose sucker (*Catostomus catostomus*) and one trout perch (*Percopsis omiscomaycus)* from Island 4 and five lake chub from Island 5. The catch per unit effort (CPUE) for minnow trapping on the Mackenzie River was 0.006 fish/trap hour, while electrofishing on Island 4 and 5 resulted in a CPUE of 0.28 fish/100 sec and 0.61 fish/100 sec, respectively.

Lake chub offers the best potential to act as a sentinel species for a SFS in the mainstem Mackenzie River although this species is migratory and has spawning migrations of 0.8 to 1.6 km (Povolo 2014), although studies have shown movements as large as 4 km as well (Stasiak 2006). Based on fishing efforts to date, obtaining enough individuals for testing of small-bodied fish is not feasible within the mainstem Mackenzie River.

Tissue sampling for the SFS during the 2023 AEMP was limited to Bosworth Creek given the challenges associated with sampling small-bodied fish species in the mainstem. Slimy sculpin were selected as the sentinel species for monitoring as they are abundant within Bosworth Creek, they are non-migratory, benthic, and potential sampling locations had been previously confirmed.

6.2.1 Bosworth Creek Slimy Sculpin Health Analysis

Overall, a total of 99 slimy sculpin were collected from Bosworth Creek and used for fish health and tissue residue analysis in 2023 (Table 8). Sixty individuals were collected from AEMP-FS-01 and 39 were collected from AEMP-FS-02. Sex could not be determined during dissection for twelve of the sixty fish collected from AEMP-FS-01 because of underdeveloped gonads and were considered immature. The remaining sculpin from AEMP-FS-01 included 34 females and 14 males. Of these fish, three females and three males were considered immature based on small gonad size (Figure 6-3). This left 31 mature females and 11 mature males to assess fish health at the AEMP-FS-01 site in Bosworth Creek. At the AEMP-FS-02 sampling location, eight fish were immature with no identifiable sex characteristics during dissection. Two individuals were identified as immature females and one fish was an immature male based on gonad size (Figure 6-3). This left 14 mature females and 14 mature males for fish health analysis at the AEMP-FS-02 sampling location. Immature individuals collected in 2023 were included in the composite samples submitted for PAH analysis.

The PAHs analysis requires 50 mg of tissue to account for potential reanalysis, tissue loss, and to meet acceptable detection limits. The number of slimy sculpin over 70 mm was higher at AEMP-FS-02 and these individuals provided more tissue for PAHs analysis. Therefore, more fish were required from AEMP-FS-01 to meet tissue quantities required for PAHs analysis (Figure 6-3). In addition, the proportion of females was higher at AEMP-FS-01 (Table 9), and more fishing effort was needed to collect the target of ten mature males to compare between sexes.

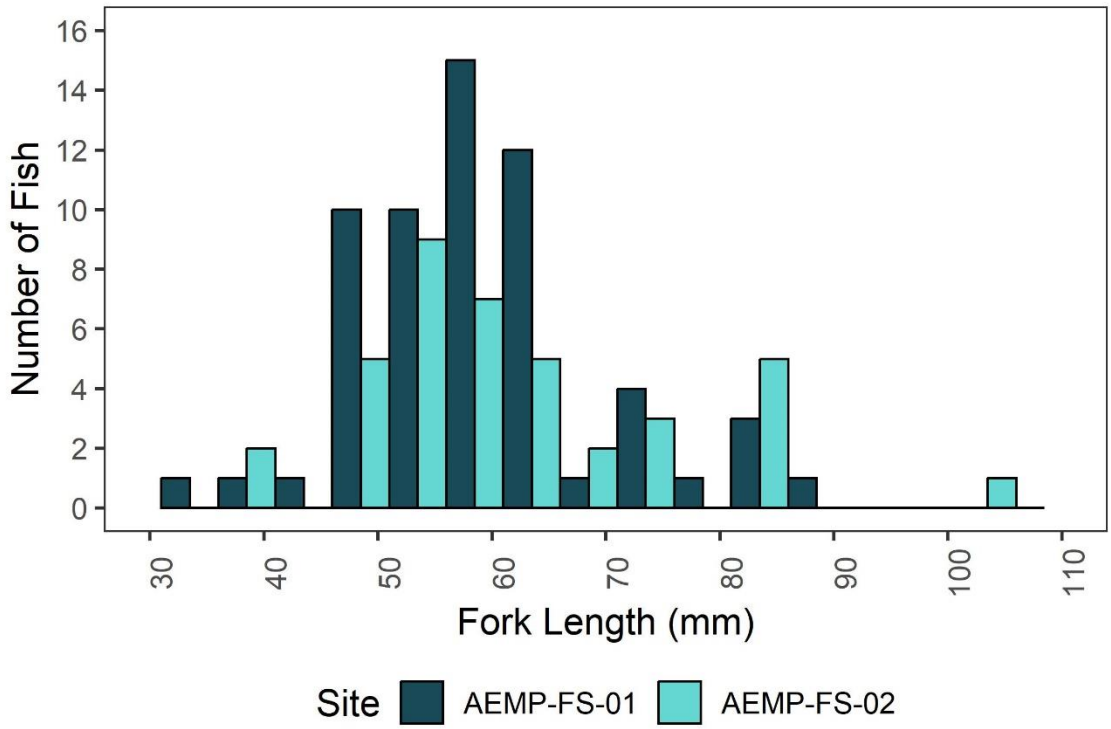


Figure 6-3: Length-Frequency distribution of slimy sculpin captured from Bosworth Creek in 2023

The 2023 AEMP was the first year of the SFS and the length of mature slimy sculpin in Bosworth Creek had not been well defined. Therefore more individuals less than 50 mm long were retained in 2023 to provide a site-specific estimate of fish length at maturity. Reproductive maturity was first determined during dissection based on the presence/absence of gonads. In addition, the gonad weight was plotted as a factor of body weight for fish with gonads sufficiently developed to determine sex during dissection (Figure 6-4). Based on previous literature individuals with a GSI below 1% are typically immature (Environment Canada 2012). This cut off point is shown in Figure 6-4 to identify potentially immature individuals that had been sexed during dissection. Several, presumably sexually mature individuals based on length, had a GSI below 1%, however, the reduced GSI for these individuals is most likely because of the presence of parasitic worms in the peritoneal cavity (Photo 6-1). It was noted during dissection that individuals with these worms present had reduced gonad size compared with others of similar size. Therefore, these individuals were retained in statistical analyses of mature fish. Based on these analyses, the average length of immature slimy sculpin was 48.7 mm and 49.5 mm at AEMP-FS-01 and AEMP-FS-02, respectively. Consequently, future sampling will target individuals that are at least 50 mm at each site and preference will be given to individuals that are at least 60 mm long.

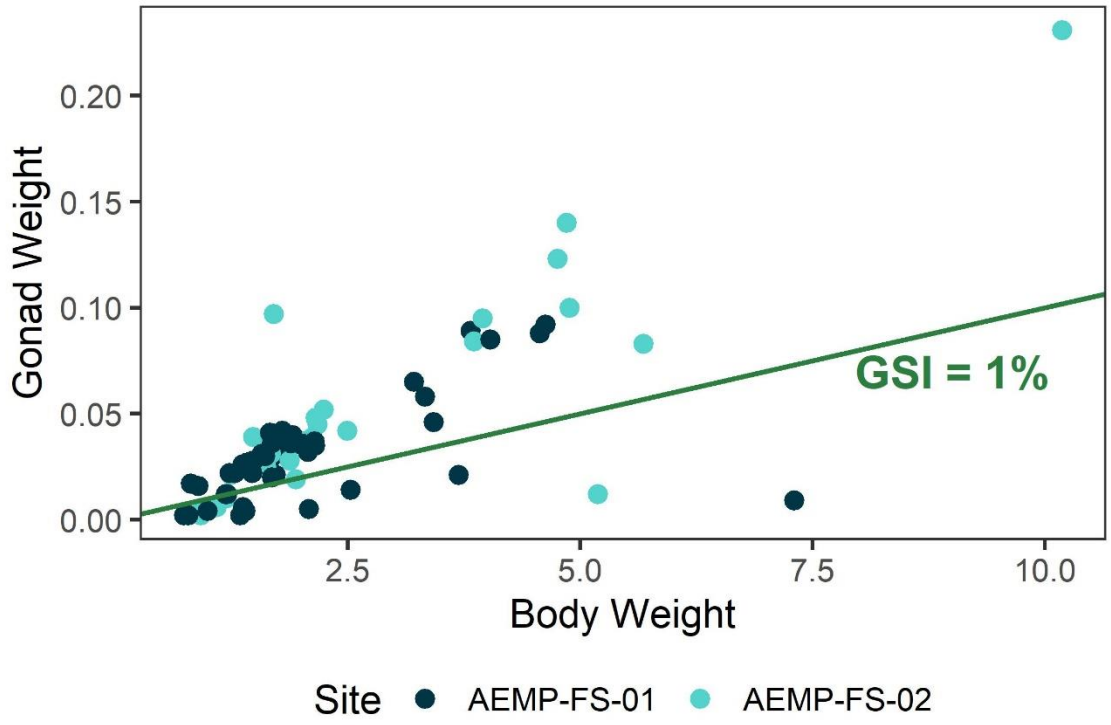


Figure 6-4: Relationship between gonad weight and body weight for slimy sculpin sampled in 2023

Photo 6-1: Large parasite removed from body cavity of slimy sculpin captured from Bosworth Creek

6.2.1.1 Fish Health

Summary statistics for metrics used to assess fish health and energy allocation for slimy sculpin are provided in Table 9. The sample mean and the distribution of observations for fish length, body weight, condition factor, HSI, and GSI for females and males collected from Bosworth Creek in 2023 are presented in Figure 6-5. Population estimates for these metrics were compared between AEMP-FS-01 and AEMP-FS-02 and statistical results of these comparisons are provided in Table 6-5 and Table 10. Notably, these comparisons are based only on mature fish, and the higher abundance of female sculpin at AEMP-FS-01 resulted in an unbalanced comparison between sites.

Table 6-5: Mean morphometric and fish health measurements for slimy sculpin collected from Bosworth Creek in 2023

Parameter	Sex	AEMP-FS-01 (Reference)		AEMP-FS-02 (Downstream)		% Difference	Statistical Difference
		n[1]	Mean ± SE	n[1]	Mean ± SE		
Length (mm)	Female	31	62.2 ± 1.5	14	69.2 ± 4.1	+11.3%	No; $p^2 = 0.05$
	Male	11	64.7 ± 3.6	14	62.5 ± 2.5	-3.4%	No; $p = 0.60$
Weight (g)	Female	31	2.071 ± 0.169	14	3.329 ± 0.669	+60.7%	Yes; $p^2 < 0.05$
	Male	11	2.569 ± 0.566	14	2.320 ± 0.331	-9.7%	No; $p^3 = 0.92$
Condition Factor	Female	31	0.82 ± 0.01	14	0.87 ± 0.02	+6.1%	Yes; $p < 0.05$
	Male	11	0.82 ± 0.04	14	0.88 ± 0.03	+7.3%	No: $p = 0.30$

Parameter	Sex	AEMP-FS-01 (Reference)		AEMP-FS-02 (Downstream)		% Difference	Statistical Difference
		n[1]	Mean ± SE	n[1]	Mean ± SE		
Hepatosomatic Index (HSI)	Female	31	2.20 ± 0.12	14	2.49 ± 0.23	+13.2%	No; p = 0.22
	Male	11	1.30 ± 0.09	14	1.68 ±0.19	+29.5%	No; p = 0.11
Gonadosomatic Index (GSI)	Female	31	1.63 ± 0.09	14	1.65 ± 0.19	+1.3%	No; p^2 = 0.91
	Male	11	1.56 ± 0.26	13	2.03 ± 0.37	+30.1%	No; p^2 = 0.35

Notes:

Bold text denotes statistically significant differences between sites and percent differences that exceed critical effect size (CES)

Superscript 1 – 'n' denotes sample size of the respective experimental group

Superscript 2 – denotes that the associated p-value is based on a Fisher-Pitman permutation test because assumptions for the ANOVA test were not met.

Superscript 3 - denotes that a log10 transformation was applied to the dataset to meet assumptions of normality and/or homoscedasticity for the ANOVA test

Female slimy sculpin assessed from AEMP-FS-02 weighed more than those from AEMP-FS-01, and their condition factor was also significantly higher at the downstream site (Table 6-5). No statistical difference between sites was observed for male HSI, however, the percent difference between average HSI at the sites exceeded the action level CES of 25%. The statistical results for the male HSI comparison was nearly significant (p = 0.11), therefore, additional power from subsequent sampling and further data analysis is needed to determine if male slimy sculpin from the AEMP-FS-02 have an increased HSI.

Although the GSI was similar between sites for female sculpin, the percent difference between sites for males was high in 2023, and also exceeded the action level CES (Table 6-5). The mean GSI for male sculpin was higher at AEMP-FS-02, however, there was no statistical difference between sites. Given the limitations of calculated organ weight to body weight ratios (e.g. HSI and GSI), the liver and gonad size of slimy sculpin from Bosworth Creek were also analyzed while accounting for differences in body size (Table 6-6).

Table 6-6: Statistical results of analysis of covariance (ANCOVA) tests for slimy sculpin assessed from Bosworth Creek during the 2023 AEMP

Parameter	Sex	AEMP-FS-01 (Reference)		AEMP-FS-02 (Downstream)		% Diff.	Sign. Diff.	Sign. Interaction
		n[1]	Adj. Mean	n[1]	Adj. Mean			
Body Weight (Length Covariate)	Female	31	2.465	14	2.474	5.7%	**Yes; p = 0.03**	No; p = 0.11
	Male	11	2.330	14	2.329	8.5%	No; p = 0.18	No; p = 0.57
Liver Weight (Body Weight Covariate)	Female	31	0.055	14	0.056	1.7%	No; p = 0.88	No; p = 0.76
	Male	11	0.036	13	0.036	**32.9%**	**Yes; p < 0.05**	No; p = 0.38
Gonad Weight (Body Weight Covariate)	Female	25	0.029[#2] 0.083[#3]	11	0.020 0.101	**-29.2%[#2]** 21.2%[#3]	**Yes; p < 0.05**	**Yes; p <0.05**
	Male	8	0.043	13	0.043	-8.2%	No; p = 0.67	No; p = 0.17

Notes:
All weights are provided in grams (g).
Bold text indicates statistically significant differences between sites and percent differences above critical effect sizes (CES).
Superscript 1 – 'n' denotes sample size of the respective experimental group
Superscript 2 - denotes that value represents the adjusted mean or percent difference for smaller fish within the population.
Superscript 3 - denotes that value represents the adjusted mean or percent difference for larger fish within the population.

The relationship between body weight and fish length verified results based on fish condition factor suggesting that overall condition of female sculpin is higher at the downstream sampling location (Table 6-6). The percent difference for condition factor and the relationship between body weight and length were both below the CES of 10% for condition. Notably, there was no significant interaction between sampling locations suggesting that body weight increases similarly at each site as fish grow (Figure 6-6). Condition of male sculpin was similar between sites in 2023 (Table 6-6 and Figure 6-6).

Mean liver weight adjusted based on body size is similar between sites (Table 6-6), however, the liver of male sculpin from AEMP-FS-02 is heavier relative to body weight than those captured from AEMP-FS-01 (Figure 6-6). Notably, one outlier was identified within the regression model between liver weight and body weight for male sculpin. This fish (AEMP-FS-02-16) had a liver size of 0.002 g and it was noted that most of the liver tissue was lost during dissection.

Therefore, this individual was removed from the ANCOVA analysis in 2023. Similar to results based on HSI, there were no significant differences in the relationship between liver size and body size for female sculpin in 2023.

The gonad size of several sculpin was reduced potentially because of parasites within the peritoneal cavity. The gonad size of these individuals were identified as outliers during statistical analyses and had GSI values less than 0.9. These individuals were removed from the ANCOVA analysis in 2023 but gonad weight and GSI for these individuals are presented in Table 8. Gonad weight was similar between sites for male sculpin. There was, however, a significant interaction between the sampling location and the relationship between gonad size and body weight (Figure 6-6). The gonad weight of small female sculpin was lower at AEMP-FS-02 than that of small females from AEMP-FS-01. The interaction between gonad and body weight suggest that the growth rate of gonads was higher in females from AEMP-FS-02 resulting in higher gonad weights in larger fish within the population (Table 6-6 and Figure 6-6).

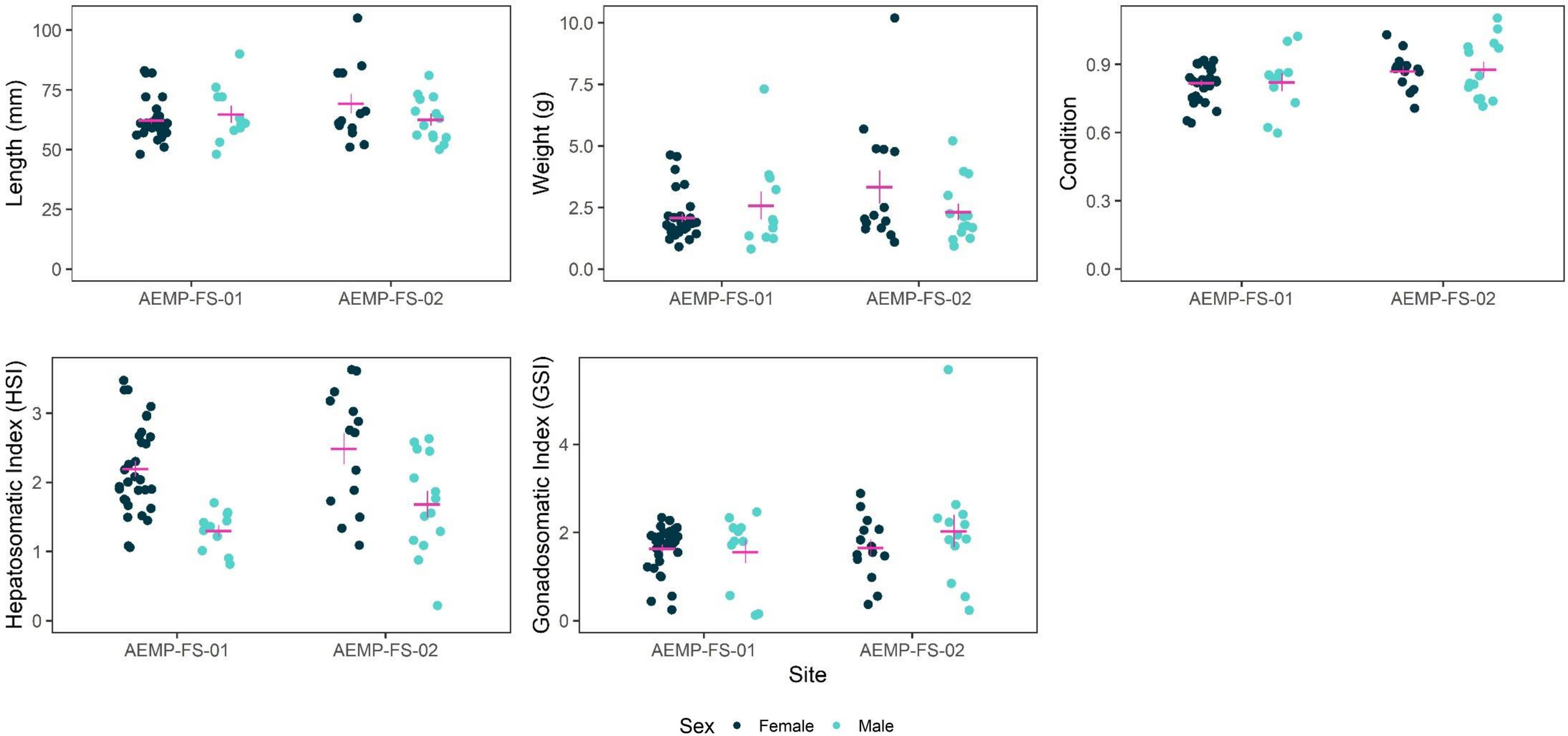


Figure 6-5: Total length (mm), body weight (g), fish condition, hepatosomatic index (HSI), gonadosomatic index (GSI) of Bosworth Creek slimy sculpin collected during the 2023 AEMP

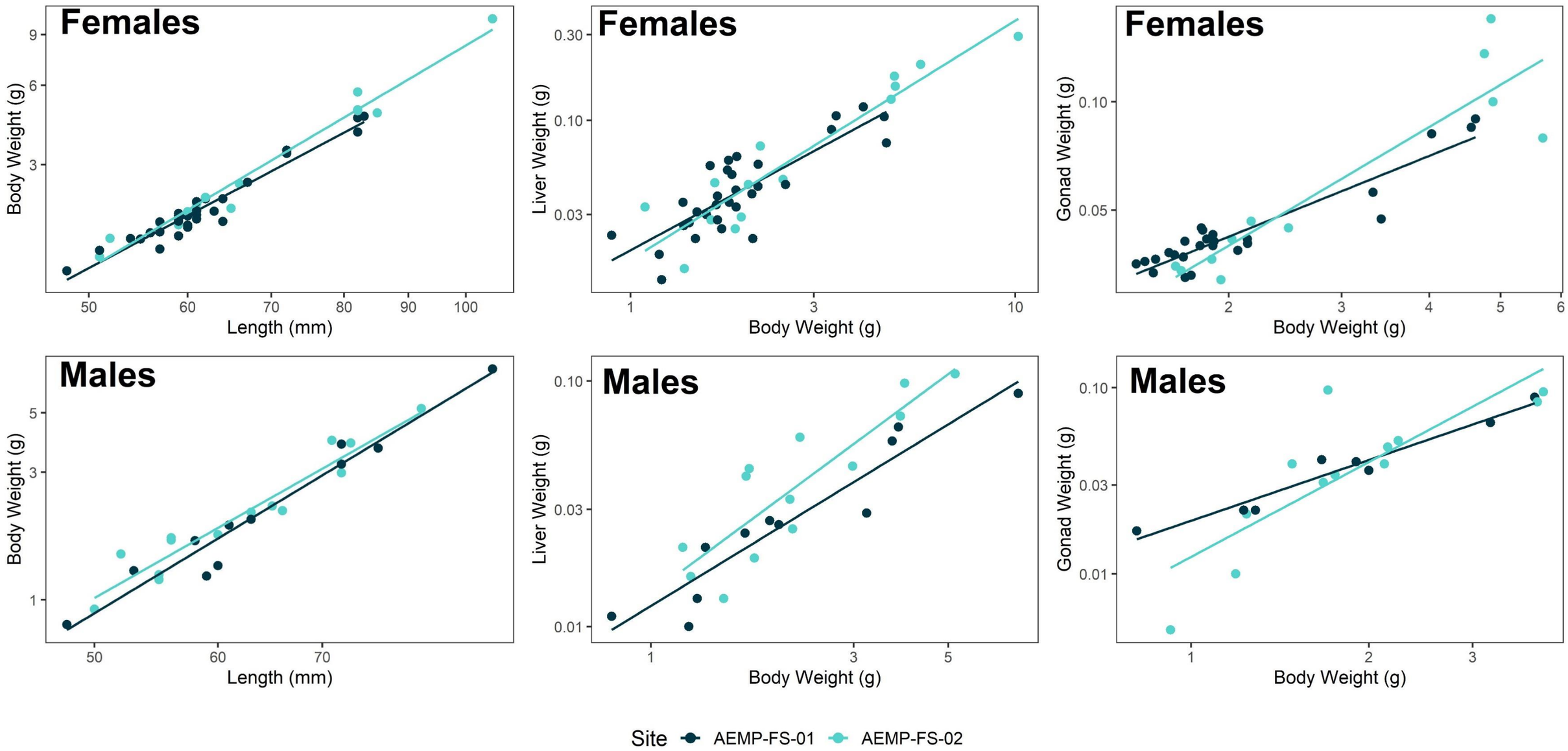


Figure 6-6: Relationships of body weight versus total length (Left), liver weight versus body weight (Centre), and gonad weight versus body weight (Right) for slimy sculpin captured from Bosworth Creek during the 2023 AEMP

6.2.1.2 Mixed-Function Oxygenase Protein Analysis

The CYP1A1 protein content was compared between sexes at each site using an ANOVA approach. At the AEMP-FS-01 site, the CYP1A1 protein content was significantly higher in females compared to male slimy sculpin (One-way ANOVA, $F_{1,16}$ = 15.21, p = 0.001). Alternatively, the average CYP1A1 content in male and female slimy sculpin from the AEMP-FS-02 site was similar (One-way ANOVA, $F_{1,15}$ = 0174, p = 0.68).

Overall, the total protein content was similar between AEMP-FS-01 and AEMP-FS-02 (Table 6-7). Male slimy sculpin from AEMP-FS-02 had elevated hepatic CYP1A1 content compared to males from AEMP-FS-01. Although there was no statistical difference in the amount of CYP1A1 protein in males between sites, the percent difference is high (Table 6-7).Notably, this difference in CYP1A1 protein content was not observed in females from AEMP-FS-01 when compared with AEMP-FS-02. Given that this is the first year of the SFS, upper and lower control limits for CYP1A1 protein concentrations have not been established. Three individuals from AEMP-FS-02 had CYP1A1 concentrations more than two standard deviations above the mean concentration at AEMP-FS-01. These concentrations have the potential to exceed the UCL if similar concentrations corroborate results during the 2024 AEMP.

Table 6-7: Liver protein statistical results for site comparisons during the 2023 AEMP

Parameter	Site	AEMP-FS-01 (Reference)		AEMP-FS-02 (Downstream)		% Difference	Sign. Diff.
		n[1]	Mean ± SE	n[1]	Mean ± SE		
Total Protein	Female	9	5695 ± 375	10	5976 ± 394	4.9%	No; p = 0.62
	Male	9	8631 ± 1036	7	6847 ± 921	-20.7%	No; p = 0.23
CYP1A1 Content	Female	9	15.55 ± 0.87	10	16.63 ± 0.78	6.9%	No; p <0.37
	Male	9	10.33 ± 1.07	7	15.67 ± 2.56	**51.7%**	No; p = 0.05

Notes:

Total protein is presented as µg/mL and CYP1A1 content is presented as pg/mg protein.

Bold text indicates statistically significant differences between sites and percent differences above critical effect sizes (CES).

Superscript 1 – 'n' denotes sample size of the respective experimental group

Superscript 2 – denotes that the associated p-value is based on a Fisher-Pitman permutation test because assumptions for the ANOVA test was not met.

Superscript 3 - denotes that a log transformation was applied to the dataset to meet assumptions of normality and/or homoscedasticity for the ANOVA test

The EEM protocols use the liver size (relative to body size) as an indicator of how much energy/resources are being put towards liver function (Environment Canada 2012). Given that the liver is the primary organ responsible for contaminant detoxification in fish (Hodson et al. 1991), an increase in the HSI may suggest more resources being used for contaminant detoxification. However, there are numerous physiological processes (e.g., increased production of vitellogenin during recrudescence) that can lead to an elevated HSI in fish as well (Nunes et al. 2011). Since CYP1A1 is a key protein in the detoxification of contaminants (including PAHs), the concentrations of this protein in the liver could provide supporting evidence for patterns observed for liver size. Interestingly, statistical results for HSI, liver size relative to body weight, and CYP1A1 content are similar in 2023 suggesting possible correlation between these metrics. The relationship between CYP1A1 concentration and HSI in male and female slimy sculpin were therefore investigated. There was no evidence of a correlation between the CYP1A1 content and HSI in female or male slimy sculpin from Bosworth Creek in 2023 (Figure 6-7).

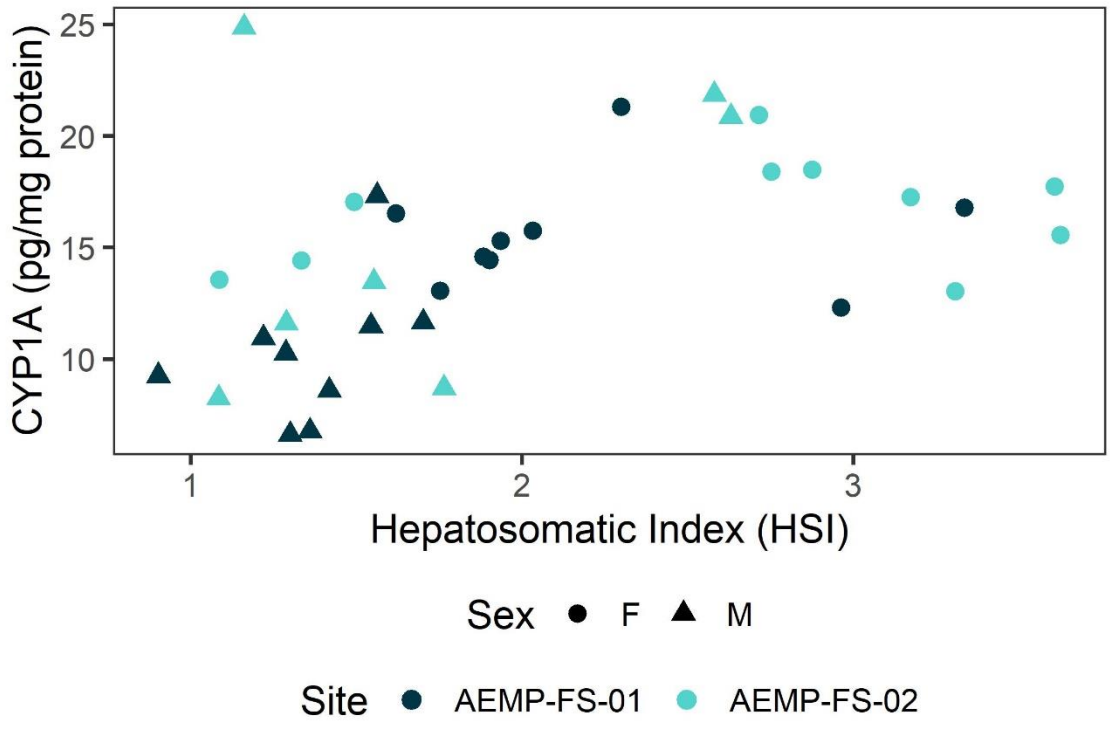


Figure 6-7: CYP1A protein concentration (pg/mg protein) plotted as a factor of hepatosomatic index (HSI) in slimy sculpin collected from Bosworth Creek during the 2023 AEMP

6.2.2 Tissue Residue Concentrations

Metal concentrations in slimy sculpin collected from Bosworth Creek in 2023 are provided in Table 11 and summary statistics for each site are provided in Table 12.

The tissue residue concentrations in the upstream and downstream site locations are compared for each KIP in Table 6-8. The sample mean and distribution of observations for each KIP are also provided in Figure 6. Although composite tissue samples were submitted for PAH analysis, the results of this analysis were not available at the time of this report and are not discussed further. Tissue PAH concentrations are expected to be available in Spring 2024 and will be reported as directed by the SLWB.

The mean concentration of all KIPs were similar between sites with no statistically significant differences between sites. Several tissue metal concentrations were higher in males compared with females. For example, molybdenum, selenium, and zinc were elevated in males compared to females in 2023 but no differences were observed between sites for either sex Figure 6-8.

Table 6-8: Statistical comparison results for KIPs measured in slimy sculpin tissue during the 2023 AEMP

Parameter	Sex	AEMP-FS-01 (Reference) Mean ± SE	AEMP-FS-02 (Downstream) Mean ± SE	% Detect	Trans[1]	Test Stat[2]	Sign. Diff.	Power
Aluminum	Female	3.17 ± 0.5	4.23 ± 1.1	100	Log10	0.645	No; p = 0.43	0.09
	Male[4]	5.60 ± 0.98	5.79 ± 1.2	100	Log10	0.003	No; p = 0.96	0.05
Arsenic	Female	---	---	20	---	---	---	---
	Male	---	---	10	---	---	---	---
Barium	Female	0.40 ± 0.05	0.47 ± 0.10	100	Log10	0.215	No; p = 0.65	0.06
	Male[4]	0.44 ± 0.05	0.46 ± 0.03	100	None	0.133	No: p = 0.72	0.06
Cadmium	Female	---	---	40	---	---	---	---
	Male	0.05 ± 0.01	0.05 ± 0.01	70	None	0.060	No; p[3] = 0.96	---
Chromium	Female	0.64 ± 0.02	0.65 ± 0.02	100	None	0.05	No; p = 0.83	0.05
	Male	0.73 ± 0.05	0.67 ± 0.03	100	None	0.981	No; p = 0.34	0.11
Copper	Female	1.47 ± 0.08	1.35 ± 0.10	100	Log10	1.08	No; p = 0.31	0.11
	Male	1.58 ± 0.11	1.72 ± 0.13	100	None	0.69	No; p = 0.42	0.09
Molybdenum	Female	0.01 ± 0.002	0.02 ± 0.003	100	None	-1.62	No; p[3] = 0.11	---
	Male	0.03 ± 0.004	0.04 ± 0.006	100	Log10	1.96	No; p = 0.18	0.17
Nickel	Female	0.49 ± 0.08	0.72 ± 0.11	100	None	2.94	No; p = 0.10	0.23
	Male	1.24 ± 0.25	0.89 ± 0.20	100	Log10	1.39	No; p = 0.26	0.13

Parameter	Sex	AEMP-FS-01 (Reference) Mean ± SE	AEMP-FS-02 (Downstream) Mean ± SE	% Detect	Trans[1]	Test Stat[2]	Sign. Diff.	Power
Selenium	Female	4.86 ± 0.32	4.80 ± 0.71	100	Log10	0.24	No; p = 0.63	0.06
	Male	6.37 ± 0.69	6.27 ± 0.54	100	Log10	0	No; p = 0.99	0.05
Uranium	Female	---	---	0	---	---	---	---
	Male	---	---	10	---	---	---	---
Zinc	Female	46.5 ± 3.07	48.2 ± 2.81	100	None	0.167	No; p = 0.69	0.06
	Male	69.0 ± 5.46	72.8 ± 4.33	100	None	0.297	No; p = 0.59	0.07

Notes:

All concentrations presented as mg/kg dry weight.

All comparisons included ten individuals from each site and sex unless otherwise noted.

Superscript 1 – 'Trans' denotes the data transformation applied to meet assumptions of the ANOVA statistical test.

Superscript 2 – Test statistic provided is dependent on the test applied. For ANOVA analyses the F-statistic is provided, while when a permutation test is applied the test statistic provided is the Z score.

Superscript 3 - denotes that the associated p-value is based on a permutation statistical analysis because data did not meet assumptions of the ANOVA.

Superscript 4 – Two outliers were removed due to high concentrations at the AEMP-FS-01 site compared with other observations. Means presented do not include outliers, however, outliers remain in summary plots.

There are no tissue residue-based guidelines in the NT established for the KIP metals analyzed. The CCME has an established guideline for methylmercury that is 0.033 mg/kg wet weight (CCME 2016), and Alberta and British Columbia (AB/BC) have established an interim guideline for selenium in fish tissue of 4.0 mg/kg dry weight (GOA 2018). Mean mercury concentrations measured in Bosworth Creek slimy sculpin in 2023 were 0.042 ± 0.003 mg/kg and 0.045 ± 0.003 mg/kg wet weight at the AEMP-FS-01 and AEMP-FS-02 sampling locations, respectively. The mean for both sites exceeds the CCME guideline for methylmercury and each site had four individuals with tissue concentrations below the CCME guideline (Figure 6-8). There was also no statistical difference between the mean mercury concentrations observed at AEMP-FS-01 and AEMP-FS-02 in 2023 (ANOVA, $F_{1,38} = 0.053$, $p = 0.82$). Similarly, mean dry weight selenium concentrations at both sites exceeded the AB/BC tissue guideline regardless of sex (Figure 6-8). Although males had higher selenium concentrations, both males and females had similar tissue concentrations at the AEMP-FS-01 and AEMP-FS-02 sampling locations (Table 6-8). These tissue residue criteria provide some context for the metal concentrations measured in Bosworth Creek slimy sculpin and suggest that metals may be elevated upstream and downstream from the NWO.

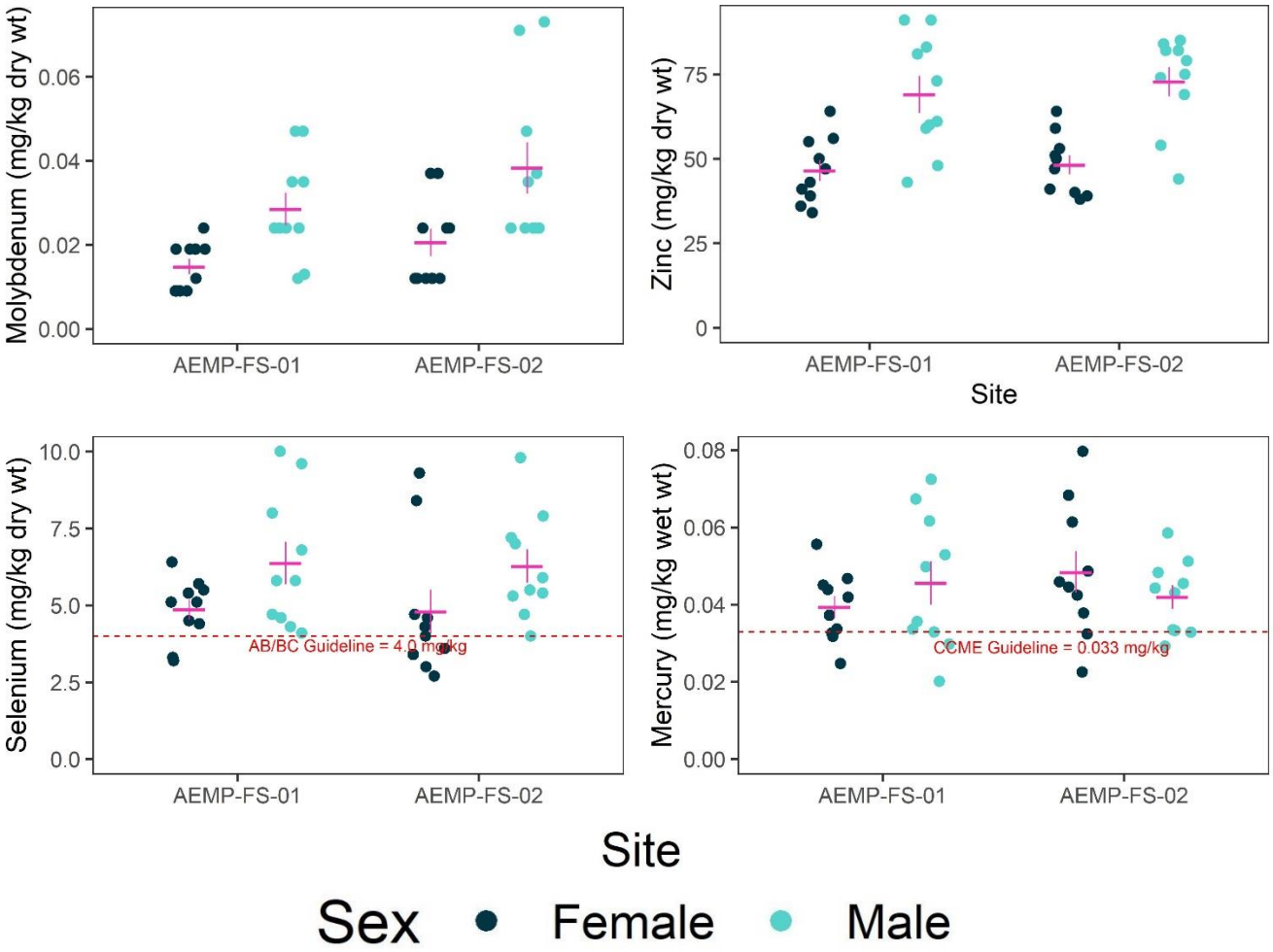


Figure 6-8: Dot plots representing the measured tissue residue concentrations of molybdenum (top left), zinc (top right), selenium (bottom left), and mercury (bottom right) in slimy sculpin captured from Bosworth Creek during the 2023 AEMP. Pink horizontal line represents mean and vertical line represents standard error

6.2.2.1 Polycyclic Aromatic Hydrocarbons (PAHs) Tissue Residues

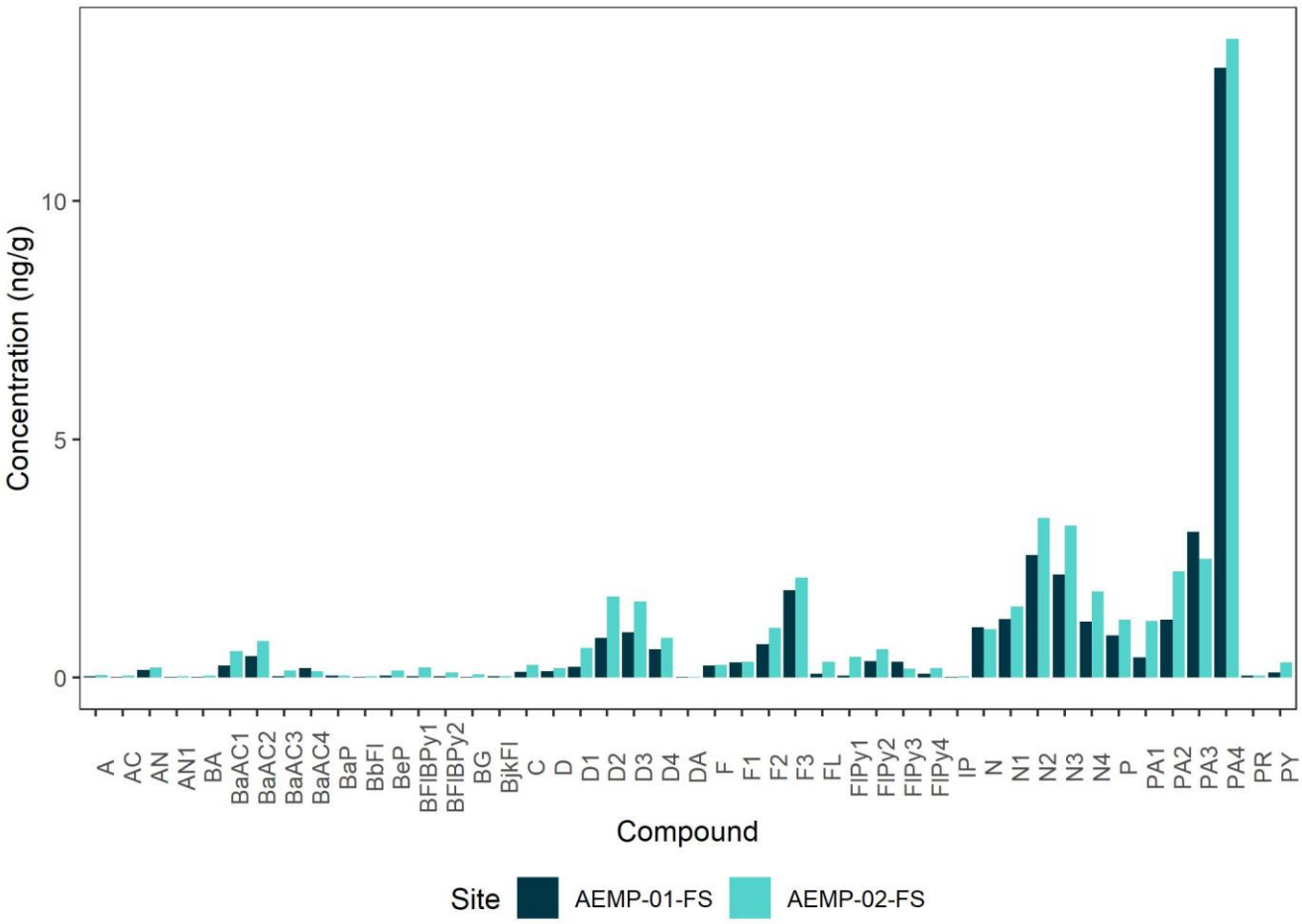
The PAH and aPAH tissue residue concentrations in slimy sculpin from Bosworth Creek in 2023 are summarized in Tables 13 and 14, respectively. The total PAH concentration at the upstream sampling location (AEMP-FS-01) was 40.3 ng/g and the downstream sampling location (AEMP-FS-02) was 53.1 ng/g, while the lab blank had a total PAH concentration of 5.0 ng/g. These concentrations are below those reported in forage fish from the oil sands region of Alberta in 2012 and 2013 (Evans et al. 2019). Like total PAH concentrations in SPMDs, aPAHs contributed most to the overall PAH concentration. Total aPAH concentrations in slimy sculpin from AEMP-FS-01 and AEMP-FS-02 were 29.3 ng/g and 36.0 ng/g in 2023, respectively.

Concentrations of parent PAHs previously shown to have carcinogenic effects were low in Bosworth Creek slimy sculpin. The PEQ calculated for slimy sculpin from AEMP-FS-01 and

AEMP-FS-02 in 2023 was 0.12 ng-BaP/g and 0.14 ng-BaP/g. Although there are no tissue residue guidelines for PAHs established in Canada, Health Canada has established a maximum level in olive-pomace oils that is 3 ng-BaP/g (Health Canada 2020). In addition, the European Commission has established maximum acceptable limits for PAHs of 2 ng-BaP/g and 1 ng-BaP/g in smoked fish for adults and infants, respectively (Evans et al. 2019). The PEQs calculated for Bosworth Creek slimy sculpin in 2023 are below those reported in slimy sculpin and are similar to those measured in more pelagic trout-perch from the Athabasca Region in 2012/2013 (Evans et al. 2019).

The profile of PAHs/aPAHs measured in slimy sculpin from Bosworth Creek in 2023 are shown in Figure 6-9. Parent and alkylated naphthalenes and fluorenes contributed to the PAHs documented in slimy sculpin tissue similarly to those found in SPMDs, however, phenanthrenes/anthracenes were abundant in tissue but were not present in SPMDs deployed into Bosworth Creek. Similar results were observed in slimy sculpin collected from the Steepbank River in the Athabasca Region in 2012 and 2013 (Evans et al. 2019).

Figure 6-9: Polycyclic Aromatic Hydrocarbon (PAH) profiles of Slimy Sculpin from Bosworth Creek



7. Action Level Threshold Summary

The AEMP requires specified response criteria to provide context to annual results. These criteria are under development in the AEMP design document. The AEMP is only capable of adaptive monitoring (i.e. change to the monitoring program or data evaluation and presentation methods), it is not capable of identifying potential operational changes at NWO. Furthermore, trend analysis-based responses may not be possible until the dataset is further established.

7.1 2023 Surface Water Quality Monitoring

Scenarios requiring action within the water quality sampling program and analysis are presented in Table 7-1. Items 1 and 2 require assessment following collection of further data, no changes to the 2024 program, as planned, are required based on surface water results to date.

Table 7-1: Action Level Threshold Summary - Surface Water

Item	Scenario	Contingency Planning	Triggers in 2023 Program	Required Changes for 2024
1.	Detection of KIPs at concentrations above background, but below applied regulatory guidelines.	• Continue seasonal sampling as planned. • Evaluate whether the situation is stable, based statistical trend analysis. • If increasing statistical trends in primary KIP's are identified, consider additional parameter trend analysis (i.e. associated non-KIPs).	Parameters as summarized in Table 6-3. Note that the upstream control limits are an evolving dataset.	None
2.	Detection of primary KIPs at concentrations exceeding both background and applied regulatory guidelines.	• Continue seasonal sampling as planned. • Evaluate whether the situation is stable, based statistical trend analysis. • If increasing statistical trends in KIPs are identified, consider additional parameter trend analysis (i.e. associated non-KIPs) and plan for additional site characterization (more locations) within 3 years to laterally delineate the area, if feasible.	Parameters as discussed in Section 6.1.5. Note that the upstream control limits are an evolving dataset.	None
3.	Increasing trends of KIPs or associated parameters above control limits are confirmed at downstream locations.	• Investigate potential sources of increasing trends, including regional water chemistry changes, site inputs. • Evaluate data in conjunction with other site programs (groundwater sampling and progression reclamation programs). • Attempt to determine source of changes.	Chloride concentrations at AEMP-DS-01 (Lower Bosworth Creek).	Increased upstream data characterization. Review groundwater data (note that the groundwater program at site is changing for 2024).

7.2 2023 Fish Health Monitoring

The SFS during the 2023 AEMP successfully characterized fish health metrics providing information on energy allocation and use, as well as overall fish condition. In addition, hepatic CYP1A1 protein content and whole-body metal tissue residues were measured. The whole-body tissue residues of PAHs were not available at the time of this report; however, tissue samples have been submitted to SGS AXYS for analysis. Length at maturity for slimy sculpin in Bosworth Creek was confirmed to be approximately 50 mm; therefore, future sampling will target slimy sculpin that have a total length greater than 50 mm to avoid capture of immature individuals.

The following provides a summary of the key findings of the SFS during the 2023 AEMP:

- Condition of female slimy sculpin is higher at the downstream sampling location (AEMP-FS-02) based on condition factor and weight-length relationship analysis. Percent differences between sites are below the action level CES and suggest higher condition at the experimental location therefore no immediate actions are required at this time.
- Gonad weight is reduced in younger (smaller) slimy sculpin from AEMP-FS-02 but a higher growth rate results in higher gonad weight in older (longer) fish. Percent difference for longer individuals exceeds the CES but indicates that gonad size is higher at the downstream experimental location.
- The hepatic CYP1A1 protein concentration and liver size relative to body weight was higher in males from AEMP-FS-02 compared with those from AEMP-FS-01. The HSI percent difference exceeded the CES of 25% suggesting more resources are being shunted to the liver at the downstream site in males.
- There were no statistical differences between sampling locations for any tissue residue KIPs in 2023. Tissue residue concentrations were influenced by sex, with males having higher tissue concentrations of several KIP metals.

Low action level threshold exceedances and considerations for the 2024 AEMP are provided in Table 7-2. It is notable that none of the results from the 2023 SFS suggest an immediate risk to the slimy sculpin population in Bosworth Creek and patterns observed require verification during the subsequent sampling year to be considered a verified effect.

Table 7-2: Action Level Threshold Summary – Fish Health

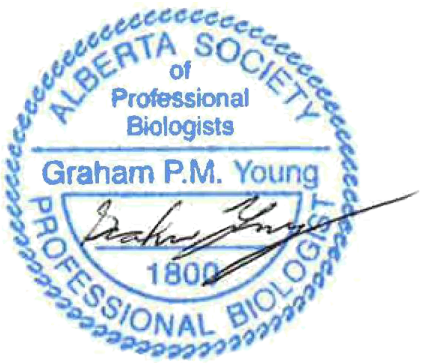
Item	Scenario	Contingency Planning	Triggers in 2023 Program	Required Changes for 2024
1.	Statistical difference between upstream reference and downstream experimental sampling location, but difference is below CES	• Continue tissue sampling as planned. • Evaluate whether the situation is stable, by checking if similar pattern is present in subsequent monitoring year	Female condition is increased at the downstream experimental location based on ANCOVA/ANOVA analyses.	None

Item	Scenario	Contingency Planning	Triggers in 2023 Program	Required Changes for 2024
2.	Statistical difference between upstream reference and downstream experimental sampling location. Results partially exceed CES given trend observed and a single sex influenced.	• Continue tissue sampling as planned. • Evaluate whether the situation is stable, by checking if similar pattern is present in subsequent monitoring year • If trend is confirmed in subsequent year, investigate the potential of the trend to influence productivity of the Bosworth Creek slimy sculpin	Gonad weight in female sculpin is low in small individuals and gonad weight increases at a higher rate than the upstream population.	None
3.	Statistical difference between upstream reference and downstream experimental sampling location. Percent difference between sites exceeds the CES for one sex.	• Continue tissue sampling as planned. • Evaluate whether the situation is stable, by checking if similar pattern is present in subsequent monitoring year	Liver size relative to body weight is higher in males from the downstream experimental location.	None

8. Closure

We trust that this report satisfies your current requirements and provides suitable documentation for your records. If you have any questions or require further details, please contact the undersigned at any time.

Report Prepared by:



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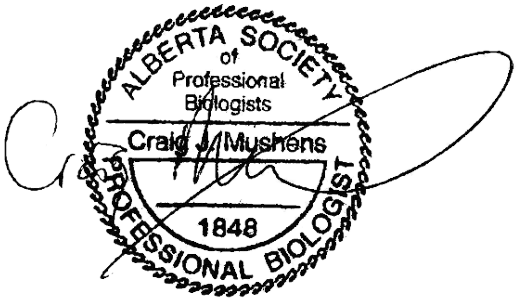

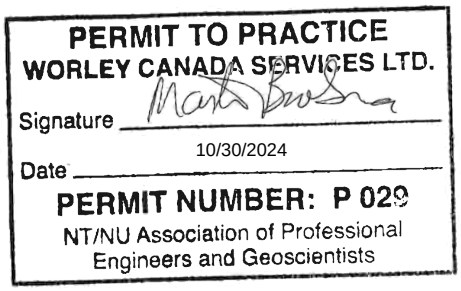

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9. References

Arciszewski, T.J., R.R. Hazewinkel, K.R. Munkittrick, and B.W. Kilgour. Developing and Applying Control Charts to Detect Changes in Water Chemistry Parameters Measured in the Athabasca River Near the Oil Sands: A tool for Surveillance Monitoring. Environmental Toxicology and Chemistry 37(9):2296-2311

Agency for Toxic Substances and Disease Registration (ATSDR). 2022. Guidance for calculating Benzo(a)pyrene equivalents for cancer evaluations of polycyclic aromatic hydrocarbons. Atlanta. GA: U.S. Department of Health and Human Services, Public Health Service. April 14.

Alvarez, D.A., 2010, Guidelines for the use of the semipermeable membrane device (SPMD) and the polar organic chemical integrative sampler (POCIS) in environmental monitoring studies: U.S. Geological Survey, Techniques and Methods 1–D4, 28 p.

Brooks, S., D.M. Pampanin, C.P. Harman, and M. Grung. 2015. Water Column Monitoring 2014: Determining the biological effects of an offshore platform on local fish populations.

CCME (Canadian Council of Ministers of the Environment), 2012. Canadian Water Quality Guidelines for the Protection of Aquatic Life. Canadian Council of Ministers of the Environment.

CCME (Canadian Council of Ministers of the Environment) 2016. Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment: Volume 4 Analytical Methods. ISBN 978-1-77202-032-8 PDF

Collins, L.A., C.D. Murray, and R.T. Stainton. 2011. Bosworth Creek water quality data report: Final Report. Institute for Watershed Science, Report No. 02-11, 69p. Prepared for the Environmental Studies Research Funds (ESRF), Department of Natural Resources, Government of Canada.

COSIA (Canada's Oil Sands Innovation Alliance) 2018. DRAFT In Situ Wetlands Monitoring Guidance.

ECCC (Environment and Climate Change Canada). 2018. Standard Operating Procedures for Water Quality Data Management and Database Procedures. ISBN XXX-X-XXX-XXXX-X. Environment and Climate change Canada, Water Science and Technology, Freshwater Quality Monitoring and Surveillance, Athabasca Arctic Basin, Saskatoon, SK, 18p.

ECCC (Environment and Climate Change Canada), 2021. Federal Environmental Quality Guidelines, Version 1. January 2021.

Environment Canada, 2012. Metal Mining Technical Guidance for Environmental Effects Monitoring. Available at: https://www.canada.ca/en/environment-climate-change/services/managing-pollution/environmental-effects-monitoring/metal-mining-technical-guidance/metal-mining-technical-guidance-environmental-effects-monitoring.html

Evans, M.S., M. Mcmaster, D. Muir, J. Parrott, G. R. Tetreault, and J. Keating. 2019. Forage fish and polycyclic aromatic compounds in the Fort McMurray oil sands area: Body burden comparisons with environmental distribution and consumption guidelines. Environmental Pollution. 255:113-135

GOA (Government of Alberta). 2018. Environmental Quality Guidelines for Alberta Surface Waters. Water Policy Branch, Alberta Environment and Parks. Edmonton, Alberta.

Health Canada. 2020. List of Maximum Levels for Various Chemical Contaminants in Foods. Last revised July 24, 2020. Available at: https://www.canada.ca/en/health-canada/services/food-nutrition/food-safety/chemical-contaminants/maximum-levels-chemical-contaminants-foods.html#a4 [Last accessed August 16, 2024].

Health Canada, 2022. Guidelines for Canadian Drinking Water Quality - Summary Tables. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario. September 2022.

Hodson, P.V., P.J. Kloepper-Sams, K.R. Munkittrick, W.L Lockhart, D.A. Metner, P.L. Luxon, I.R. Smith, M.M. Gagnon, M. Servos, and J.F. Payne. 1991. Protocols for measuring mixed function oxygenases of fish liver.

Imperial (Imperial Oil Resources NWT Ltd.) 2019. Norman Wells Operations Aquatic Effects Monitoring Program. October 2019.

Kendall, M.G., 1975. Rank Correlation Methods, 4th ed., Charles Griffin: London, 1975Komex (Komex International Ltd.) 1980. Esso Resources Canada Ltd, Norman Wells Expansion Project, 1980 Geotechnical Investigations, Report prepared by Komex in association with GEOCON (1975) Ltd. Submitted to Esso Resources Canada, Oct. 1980.

Lévesque, L.M., J. Roy, N.E. Glozier, L. Dirk, and C.A. Cooke. 2023. Dissolved polycyclic aromatic compounds in Canada's Athabasca River in relation to Oil Sands from 2013 through 2019. Environmental Monitoring and Assessment. 195

Mann, H.B 1945, Non-parametric test against trend. Econometrica 13:245-259Nunes, C., A. Silva, E. Soares, and K. Ganias. 2011. The use of Hepatic and Somatic Indices and Histological Information to Characterize the Reproductive Dynamics of Atlantic Sardine *Sardina pilchardus* from the Portuguese Coast. Marine and Coastal Fisheries. 3(1):127-144

MRBB (Mackenzie River Basin Board), 2004. Mackenzie River Basin State of the Aquatic Ecosystem Report 2003. Mackenzie River Basin Board.

Parrott, P.L., S.M. Backus, A.I. Borgmann, and M. Swyripa. 1999. The use of semipermeable membrane devices to concentration chemicals in oil refinery effluent on the Mackenzie River. ARCTIC. 52(2):125-138

Povolo, A. 2014. "Couesius plumbeus" (On-line), Animal Diversity Web. Accessed April 11, 2024 at https://animaldiversity.org/accounts/Couesius_plumbeus/

Sen, P.K 1968. Estimates of the Regression Coefficient Based on Kendall's Tau. Journal of American Statistical Association 63:1379-1389Stasiak, R. (2006). Lake Chub (Couesius plumbeus): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/lakechub.pdf [accessed April 11, 2024)

TRSA (Tłegǫ̀hłı̨ Reclamation Services Advisian). 2022. Norman Wells Operations Aquatic Effects Monitoring Plan. Project 417085-42051, December, 2022

TRSA (Tłegǫ̀hłı̨ Reclamation Services Advisian). 2024. Norman Wells Artificial Island Fish Habitat and Community Assessment. Project 417085-50325, March, 2024.

USEPA (United States Environmental Protection Agency), 2002. Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites. Office of Emergency and Remedial Response U.S. Environmental Protection Agency, Washington, DC 20460. September 2002.

USGS (United States Geological Survey) 2010. SPMD Water Concentration Estimator V4.1. Accessed from: https://www.usgs.gov/centers/columbia-environmental-research-center/science/passive-sampling-using-spmds-and-pocisUSGS (United States Geological Survey) 2016. SPMD Water Concentration Estimator V5.2. Accessed from: https://www.usgs.gov/centers/columbia-environmental-research-center/science/passive-sampling-using-spmds-and-pocis

WSC (Water Survey of Canada) 2024a. Real-time Hydrometric Data Search, Station 10KA001. https://wateroffice.ec.gc.ca/search/real_time_e.html. Accessed 04 April 2024.

WSC (Water Survey of Canada) 2024b. Real-time Hydrometric Data Search, Station 10KA007. https://wateroffice.ec.gc.ca/search/real_time_e.html. Accessed 04 April 2024.

Tables

Table 1

Surface Water Analytical Results: Field-Measured Parameters

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Dissolved Oxygen (mg/L)	Electrical Conductivity (uS/cm)	pH (pH Units)	Temperature (ºC)	Turbidity (NTU)
CCME CEQG Freshwater Aquatic Life [#1]		**>6.5**	**---**	**(6.5 - 9)**	**---**	**---**
NW AEMP V5						
MACKENZIE RIVER						
AEMP-DS-02 (Marine Dock)	10-Jun-2020	12.95	162	8.31	8.7	126
	24-Jul-2020	---	227	**6.0 [#1]**	15.5	---
	18-Sep-2020	12.61	168	8.17	9.0	23.9
	06-Jun-2021	7.82	315.3	7.03	12.0	94.8
	17-Sep-2021	---	259	7.96	10.0	24.5
	12-Jun-2022	12.25	225.8	8.2	8.4	148.8
	06-Aug-2022	9.38	220.2	7.38	16	243.1
	25-Sep-2022	10.9	186	8.13	8.7	---
	26-Jul-23	8.86	318.62	8.27	19.58	27.34
	18-Aug-23	---	---	---	---	---
	24-Sep-23	12.55	158.2	8.06	4.87	201.7
AEMP-DS-03 (Island 3)	12-Jun-2020	12.84	179	8.37	9.7	259
	28-Jul-2020	10.83	273.1	8.11	16.3	212
	22-Sep-2020	10.88	219.7	8.22	9.6	81.0
	07-Jun-2021	9.20	204.9	8.10	11.0	67.5
	18-Sep-2021	---	304	8.30	10.6	56.4
	14-Jun-2022	10.96	228	8.07	9.7	231
	06-Aug-2022	8.62	232.5	7.41	18	50.05
	25-Sep-2022	9.8	227	8.2	10.9	---
	25-Jul-23	8.42	336.47	8.02	21.05	29.05
	19-Aug-23	---	---	---	---	---
	25-Sep-23	---	---	---	---	---
AEMP-DS-04 (Refinery)	10-Jun-2020	12.27	157	8.36	8.2	166
	24-Jul-2020	---	227	**6.0 [#1]**	15.0	---
	18-Sep-2020	13.27	166	8.15	9.0	367
	06-Jun-2021	8.06	335.1	6.90	10.7	99.9
	17-Sep-2021	---	249	8.00	9.1	26.9
	12-Jun-2022	11.87	192	8.18	8.6	220.7
	06-Aug-2022	9.12	206.6	7.45	16.5	461
	24-Sep-2022	10.8	180	8.11	8.2	---
	26-Jul-23	8.66	305.19	8.23	19.6	23.5
	18-Aug-23	---	---	---	---	---
	24-Sep-23	12.03	141.65	7.76	5.14	452
AEMP-DS-05 (Radar)	12-Jun-2020	12.70	169	8.41	9.11	308
	28-Jul-2020	11.05	258.4	8.10	16.2	83.3
	22-Sep-2020	11.06	203	7.94	9.4	63.7
	07-Jun-2021	9.47	228.3	8.12	10.8	146
	18-Sep-2021	---	286	8.24	10.3	42.9
	10-Aug-2022	9.3	204.1	7.33	16.1	---
	25-Jul-23	8.62	311.5	8.02	20.4	21.22
	19-Aug-23	---	---	---	---	---
	26-Sep-23	---	---	---	---	---
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	---	---	---	---	---
	24-Jul-2023	8.62	318.85	8.17	18.19	23.2
	21-Aug-2023	---	---	---	---	---
	03-Oct-2023	11.7	240.68	8.17	6.94	n/m
AEMP-US-01 (Midway)	12-Mar-2023	---	---	---	---	---
	25-Jul-23	8.83	291.64	8.09	18.49	20.96
	19-Aug-23	---	---	---	---	---
	26-Sep-23	---	---	---	---	---
AEMP-US-02 (10 mile)	12-Jun-2020	12.68	169.8	8.30	9.2	277
	28-Jul-2020	10.78	262.2	8.14	16.4	99.5
	22-Sep-2020	10.99	213.0	8.29	9.6	62.8
	07-Jun-2021	9.53	231.7	8.11	11.0	82.8
	18-Sep-2021	---	294	8.16	10.9	51.0
	10-Aug-22	9.28	207.9	7.49	16.4	---
	25-Jul-23	9.09	333.93	8.17	19.89	14.99
	19-Aug-23	---	---	---	---	---
	26-Sep-23	---	---	---	---	---
BOSWORTH CREEK						
AEMP-DS-01 (Lower Bosworth Creek)	10-Jun-2020	10.87	446.1	**9.57 [#1]**	11.7	2.89
	24-Jul-2020	---	557	7.0	16.0	---
	18-Sep-2020	12.18	444	8.35	7.1	0
	06-Jun-2021	7.45	648.8	7.47	8.8	2.68
	19-Sep-2021	---	705	8.27	6.3	1.66
	11-Jun-2022	---	347.5	7.98	11.3	2.44
	06-Aug-2022	9.02	536	8.23	16.3	95.8
	26-Sep-2022	10	435	8.25	3.8	---
	26-Jul-23	8.92	877.16	8.29	17.97	3.24
	18-Aug-23	---	---	---	---	---
	25-Sep-23	13.56	337.14	8.08	1.43	3.94
AEMP-US-04 (Upper Bosworth Creek)	26-Jul-23	8.86	785.89	8.27	17.26	2.29
	24-Sep-23	13.37	398.93	8.35	1.59	14.46

Table 1

Surface Water Analytical Results: Field-Measured Parameters

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Dissolved Oxygen (mg/L)	Electrical Conductivity (uS/cm)	pH (pH Units)	Temperature (ºC)	Turbidity (NTU)
CCME CEQG Freshwater Aquatic Life [#1]		**>6.5**	**---**	**(6.5 - 9)**	**---**	**---**

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Superscript [#1] denotes values exceeding

(CCME. 2014. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life. http://st-ts.ccme.ca/?chems=all&chapters=1 accessed Aug 22, 2014.)

Dissolved Oxygen:

Warm Water Biota:
Early life stages = 6 mg/L
Other life stages = 5.5 mg/L
Cold Water Biota:
Early life stages = 9.5 mg/L
Other life stages = 6.5 mg/L

Table 2

Surface Water Analytical Results: Indicator Analysis Parameters

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Anions: Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Hydroxide (mg/L)	Cations: Calcium (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Fluoride (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			---	---	120	---	---	---	0.3	---	---	---	---	0.12
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			---	---	---	---	---	None required	---	---	0.12	---	---	1.5
NW AEMP V5														
MACKENZIE RIVER														
Mackenzie Upstream Data UCL			---	---	12	59	---	45	5.2	13	---	---	---	---
Mackenzie Upstream Data LCL			---	---	5	26	---	30	0.06	8	---	---	---	---
DOWNSTREAM														
AEMP-DS-02 (Marine Dock)	17-Aug-2017	Grab	120	< 0.50	7.1	54	< 0.50	40	< 0.060	12	< 0.0040	0.93	7.8	---
	21-Aug-2017	Grab	110	< 0.50	9.4	42	< 0.50	31	< 0.060	9.9	< 0.0040	0.83	8.4	---
	16-Sep-2017	Grab	110	< 0.50	10	38	< 0.50	33	< 0.060	10	0.0041	0.83	8.8	---
	16-Oct-2017	Grab	100	< 0.50	9.9	44	< 0.50	30	< 0.060	10	0.0049	0.89	8.8	---
	23-Jun-2018	Grab	97	< 1.0	8.9	36	< 1.0	26	0.2	8.1	0.011	0.72	6.3	---
	13-Aug-2018	Grab	110	< 1.0	11	45	< 1.0	33	< 0.060	11	< 0.0040	0.83	10	---
	15-Aug-2018	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	17-Oct-2018	Grab	100	< 1.0	11	40	< 1.0	31	< 0.060	11	< 0.0040	0.92	9.4	---
	18-Oct-2018	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	03-Jun-2019	Grab	110	< 1.0	8.7	39	< 1.0	31	< 0.060	10	0.0048	0.82	7.4	---
	28-Aug-2019	Grab	110	< 1.0	9.4	47	< 1.0	34	< 0.060	11	< 0.0040	0.84	8.5	---
	02-Oct-2019	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	03-Oct-2019	Grab	110	< 1.0	10	43	< 1.0	32	< 0.060	11	< 0.0040	0.81	8.5	---
	10-Jun-2020	Grab	69	< 1.0	5.9	24	< 1.0	26	< 0.060	7.4	< 0.0040	0.73	5.9	---
	24-Jul-2020	Grab	95	< 1.0	7.3	36	< 1.0	29	< 0.060	8.9	< 0.0040	0.77	6.9	---
	18-Sep-2020	Grab	100	< 1.0	7.7	36	< 1.0	32	< 0.060	8.8	< 0.0040	0.54	6.9	---
	06-Jun-2021	Grab	120	< 1.0	6.1	30	< 1.0	29	0.066	8.4	< 0.0040	1	6.7	0.094
	18-Aug-2021	Grab	110	< 1.0	7.9	41	< 1.0	33	< 0.060	10	< 0.0040	0.93	7.8	0.11
	17-Sep-2021	Grab	110	< 1.0	8.7	41	< 1.0	35	< 0.060	11	< 0.0040	0.95	8.2	0.09
	31-Mar-2022	Grab	---	---	---	---	---	25	< 0.060	9.1	< 0.0040	0.93	8.3	---
	12-Jun-2022	Grab	96	< 1.0	3.9	32	< 1.0	29	0.064	8	< 0.0040	1.1	5.1	0.085
	06-Aug-2022	Grab	110	< 1.0	8.9	40	< 1.0	32	0.34 [#1]	9.5	0.03	0.95	7.9	0.085
	25-Sep-2022	Grab	120	< 1.0	10	36	< 1.0	30	< 0.060	9.3	< 0.0040	0.88	7.9	0.1
	09-Mar-2023	Grab	95	< 1.0	11	29	< 1.0	27	< 0.060	9.7	< 0.0040	0.89	9.3	---
	25-Jul-2023	Grab	120	< 1.0	10	43	< 1.0	35	< 0.060	9.9	< 0.0040	0.88	9	---
	18-Aug-2023	Grab	120	< 1.0	10	45	< 1.0	33	< 0.060	10	< 0.0040	0.85	8.1	---
	24-Sep-2023	Grab	110	< 1.0	12	46	< 1.0	34	< 0.060	11	< 0.0040	0.95	10	---
AEMP-DS-03 (Island 3)	16-Sep-2017	Grab	120	< 0.50	9.4	48	< 0.50	42	< 0.060	11	< 0.0040	0.94	9	---
	16-Oct-2017	Grab	120	< 1.0	10	47	< 1.0	37	< 0.060	11	< 0.0040	0.94	9.3	---
	23-Jun-2018	Grab	100	< 1.0	6.3	44	< 1.0	33	< 0.060	9.5	< 0.0040	0.82	6.1	---
	14-Aug-2018	Grab	120	< 1.0	8.7	57	< 1.0	38	< 0.060	12	< 0.0040	0.84	7.6	---
	18-Oct-2018	Grab	110	< 1.0	11	32	< 1.0	30	< 0.060	10	0.0093	0.91	10	---
	10-Jun-2019	Grab	98	< 1.0	5.8	37	< 1.0	31	< 0.060	8.1	< 0.0040	0.78	5.7	---
	26-Aug-2019	Grab	120	< 1.0	9.6	57	< 1.0	38	< 0.060	12	< 0.0040	0.86	8.2	---
	27-Aug-2019	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	01-Oct-2019	Grab	120	< 1.0	11	60	< 1.0	39	< 0.060	11	< 0.0040	0.93	8.9	---
	12-Jun-2020	Grab	120	< 1.0	4.7	40	< 1.0	32	< 0.060	8.9	< 0.0040	0.74	5.2	---
	28-Jul-2020	Grab	120	< 1.0	5.8	45	< 1.0	35	< 0.060	9.9	< 0.0040	0.7	6.1	---
	22-Sep-2020	Grab	140	< 1.0	6.4	44	< 1.0	35	< 0.060	9.8	< 0.0040	0.85	6.7	---
	07-Jun-2021	Grab	110	< 1.0	5.8	35	< 1.0	32	< 0.060	8.5	< 0.0040	1.1	6.4	---
(Duplicate)	07-Jun-2021	Grab	110	< 1.0	5.8	34	< 1.0	33	0.07	8.6	< 0.0040	1.1	6.4	---
	19-Aug-2021	Grab	110	< 1.0	6.8	42	< 1.0	37	< 0.060	11	< 0.0040	1.1	7	0.093
	18-Sep-2021	Grab	160	< 1.0	7.5	45	< 1.0	37	< 0.060	10	< 0.0040	1	8	0.1
	31-Mar-2022	Grab	---	---	---	---	---	45	< 0.060	12	< 0.0040	1.4	13	---
	14-Jun-2022	Grab	99	< 1.0	2.7	34	< 1.0	30	< 0.060	7.7	< 0.0040	0.87	3.9	0.077
	06-Aug-2022	Grab	110	< 1.0	7.1	47	< 1.0	38	< 0.060	11	< 0.0040	1.1	8	0.09
(Duplicate)	06-Aug-2022	Grab	130	< 1.0	6.8	49	< 1.0	36	< 0.060	9.6	< 0.0040	1	7.4	0.09
	25-Sep-2022	Grab	140	< 1.0	9.7	46	< 1.0	37	< 0.060	10	< 0.0040	0.99	8.4	0.1
	09-Mar-2023	Grab	140	< 1.0	17	51	< 1.0	46	< 0.060	12	< 0.0040	1.2	14	---
	25-Jul-2023	Grab	130	< 1.0	8.6	48	< 1.0	36	< 0.060	11	< 0.0040	0.98	7.7	---
	19-Aug-2023	Grab	150	< 1.0	8.3	60	< 1.0	40	< 0.060	11	0.0044	0.9	7.6	---
	25-Sep-2023	Grab	130	< 1.0	13	56	< 1.0	42	< 0.060	12	< 0.0040	1	10	---
AEMP-DS-04 (Refinery)	21-Aug-2017	Grab	110	< 0.50	9.1	41	< 0.50	31	< 0.060	9.7	< 0.0040	0.79	8.1	---
(Duplicate)	21-Aug-2017	Grab	100	< 0.50	9.2	41	< 0.50	30	< 0.060	9.5	< 0.0040	0.82	8	---
	16-Sep-2017	Grab	100	< 0.50	9.7	35	< 0.50	30	< 0.060	9.8	< 0.0040	0.88	8.6	---
	16-Oct-2017	Grab	100	< 0.50	10	37	< 0.50	29	< 0.060	9.5	0.022	0.85	8.8	---
	23-Jun-2018	Grab	93	< 1.0	7.7	33	< 1.0	27	< 0.060	8.4	< 0.0040	0.78	6.9	---
	13-Aug-2018	Grab	110	< 1.0	11	43	< 1.0	31	< 0.060	10	< 0.0040	0.79	8.9	---
	15-Aug-2018	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	17-Oct-2018	Grab	100	< 1.0	11	35	< 1.0	28	< 0.060	9.5	0.013	0.94	10	---
(Duplicate)	17-Oct-2018	Grab	100	< 1.0	12	36	< 1.0	28	< 0.060	9.6	0.018	0.94	10	---
	18-Oct-2018	Grab	---	---	---	---	---	---	---	---	---	---	---	---

Sampling Location	Date	General: Alkalinity (Total; as $CaCO_3$) (mg/L)	Alkalinity (PP; as $CaCO_3$) (mg/L)	Colour (color unit)	Electrical Conductivity (uS/cm)	Hardness (Total; as $CaCO_3$) (mg/L)	pH (pH Units)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	Inorganic Nitrogen Compounds: Ammonia (Total; as N) (mg/L)	Nitrate (mg/L)	Nitrate (as N) (mg/L)	Nitrite (mg/L)	Nitrite (as N) (mg/L)	Nitrite-plus-Nitrate (as N) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Inorganic Sulphur Compounds: Sulphide (asH2S) (mg/L)	Ion Balance: Ion Balance % Difference (%)	Miscellaneous: Biochemical Oxygen Demand (mg/L)	Chemical Oxygen Demand (mg/L)	Dissolved Organic Carbon (mg/L)	Total Organic Carbon (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]		---	---	---	---	---	(6.5 - 9)	---	---	---	0.20	---	2.9	---	0.06	---	---	---	---	---	---	---	---
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]		---	---	---	---	---	---	---	---	1	None required	45	10	3	1	---	---	---	---	---	---	---	---
NW AEMP V5																							
MACKENZIE RIVER																							
Mackenzie Upstream Data UCL		---	---	---	---	---	---	227	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mackenzie Upstream Data LCL		---	---	---	---	---	---	123	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DOWNSTREAM																							
AEMP-DS-02 (Marine Dock)	17-Aug-2017	96	< 0.50	---	310	150	---	180	33	---	---	0.18	0.04	< 0.033	< 0.010	0.04	---	< 0.0020	0.87	< 2.0	---	4.8	4.1
	21-Aug-2017	88	< 0.50	---	280	120	---	160	31	---	---	0.25	0.057	< 0.033	< 0.010	0.057	---	---	2.8	< 2.0	---	3.7	3.6
	16-Sep-2017	86	< 0.50	---	270	130	---	150	110	---	---	0.3	0.068	< 0.033	< 0.010	0.068	---	0.008	2.2	< 2.0 [#4]	---	4.7	4
	16-Oct-2017	82	< 0.50	---	270	120	---	130	29	---	---	0.38	0.086	< 0.033	< 0.010	0.086	---	< 0.0020	1.7	< 2.0	---	3	3.6
	23-Jun-2018	79	< 1.0	---	250	99	---	140	51	33 [#2]	0.037	0.23	0.052	< 0.033	< 0.010	0.052	0.27	< 0.0020	6.6	---	33	5.5	4.9
	13-Aug-2018	90	< 1.0	---	290	130	---	200	29	---	0.018	0.17	0.037	< 0.033	< 0.010	0.037	0.28	0.003	0.8	---	25	4.8	4.8
	15-Aug-2018	---	---	---	---	---	---	---	---	---	---	0.17	0.038	< 0.033	< 0.010	0.038	---	---	---	< 2.0	---	---	---
	17-Oct-2018	85	< 1.0	---	270	120	---	160	5.3	2.2 [#2]	< 0.015	0.41	0.093	< 0.033	< 0.010	0.093	0.12	< 0.0020	0.39	---	7.2	3	2.8
	18-Oct-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.4 [#7]	---	---	---
	03-Jun-2019	87	< 1.0	17	280	120	8.07	190	130	97 [#2]	< 0.015	0.54	0.12	< 0.033	< 0.010	0.12	0.38	0.007	1.9	< 2.0	52	6.7	5.1
	28-Aug-2019	94	< 1.0	14	300	130	8.17	180	22	17 [#2]	0.026	0.31	0.069	< 0.033	< 0.010	0.069	0.23	0.002	1.7	< 2.0	< 10	4.7	3.6
	02-Oct-2019	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 2.0	---	---	---
	03-Oct-2019	89	< 1.0	8.9	290	120	---	150	18	20 [#2]	0.015	0.34	0.077	< 0.033	< 0.010	0.077	0.19	0.003	1.8	---	26	3.6	3.5
	10-Jun-2020	57	< 1.0	15	180	96	6.76	130	220 [#8]	100 [#2]	< 0.015	0.25	0.057	< 0.033	< 0.010	0.057	0.62	< 0.0020	9.5	< 2.0	52	6.1	6.2 [#9]
	24-Jul-2020	78	< 1.0	19	260	110	8.03	150	74	39 [#2]	< 0.015	0.22	0.051	< 0.033	< 0.010	0.051	0.4	< 0.010	0.25	< 2.0	14	5.1	4.4
	18-Sep-2020	82	< 1.0	15	260	120	7.91	160	25	17 [#2]	< 0.015	0.24	0.055	< 0.033	< 0.010	0.055	0.26	0.013	0.44	< 2.0	12	4.9	4.8
	06-Jun-2021	100	< 1.0	29	240	110	---	210	110	83 [#2]	< 0.015	0.36	0.082	< 0.033	< 0.010	0.082	0.52	0.026	6.3	< 2.0 [#4]	19	7.5	7.3
	18-Aug-2021	90	< 1.0	18	270	120	---	210	230 [#8]	200 [#2]	0.018	0.23	0.051	< 0.033	< 0.010	0.051	0.29	0.027	0.61	< 2.0	57	6.3	5.2
	17-Sep-2021	92	< 1.0	14	270	130	8.07	180	19	18 [#2]	< 0.015	0.32	0.073	< 0.033	< 0.010	0.073	0.2	< 0.0020	1	< 2.0 [#3]	16	5.4	5.4
	31-Mar-2022	---	---	4.5	---	---	7.94	120	< 1.0	2.0 [#2]	< 0.015	0.83	0.19	< 0.033	< 0.010	0.19	0.19	< 0.0020	---	< 2.0 [#3]	< 10	3.6	3.2
	12-Jun-2022	79	< 1.0	37	220	110	7.52	150	270 [#8]	97 [#2,10]	< 0.015	0.26	0.058	< 0.033	< 0.010	0.058	0.35	0.012	0.16	< 2.0	57	6.7	5.9
	06-Aug-2022	87	< 1.0	11	270	120	7.76	180	160	80 [#2,10]	< 0.015	0.23	0.052	< 0.033	< 0.010	0.052	0.31	0.026	1.4	< 2.0	21	4.9	4.7
	25-Sep-2022	96	< 1.0	6	260	110	6.9	170	34	15 [#2]	< 0.015	0.26	0.059	< 0.033	< 0.010	0.059	0.19	< 0.0020	6.2	< 2.0	19	3.6	3.5
	09-Mar-2023	78	< 1.0	---	230	110	---	120	---	---	< 0.015	0.82	0.19	< 0.033	< 0.010	0.19	0.16	< 0.0020	2.1	---	---	2.1	2.1
	25-Jul-2023	100	< 1.0	3.3	290	130	7.35	96	13	10 [#2]	< 0.015	0.18	0.04	< 0.033	< 0.010	0.04	0.11	< 0.0020	3.6	---	< 10 [#6]	3.6	3.1
	18-Aug-2023	97	< 1.0	7.9	280	120	---	180	52	53 [#2]	< 0.015	0.32	0.073	< 0.033	< 0.010	0.073	0.16	< 0.0020	5.8	---	20	3.2	3.1
	24-Sep-2023	90	< 1.0	9.6	290	130	---	130	6.1	7.4 [#2]	< 0.015	0.25	0.056	< 0.033	< 0.010	0.056	0.12	< 0.0020	0.45	---	22	2.7	2.4
AEMP-DS-03 (Island 3)	16-Sep-2017	99	< 0.50	---	320	150	---	160	22	---	---	0.17	0.038	< 0.033	< 0.010	0.038	---	< 0.0020	2.5	< 2.0 [#4]	---	4.3	3.5
	16-Oct-2017	97	< 1.0	---	310	140	---	170	8	---	---	0.2	0.046	< 0.033	< 0.010	0.046	---	0.002	0.42	< 2.0	---	3.6	4.2
	23-Jun-2018	82	< 1.0	---	260	120	---	160	71	60 [#2]	0.024	0.16	0.035	< 0.033	< 0.010	0.035	0.28	< 0.0020	0.77	---	32	5.7	5
	14-Aug-2018	98	< 1.0	---	330	140	---	190	220	130 [#2]	0.033	0.095	0.021	< 0.033	< 0.010	0.021	0.64	0.016	2.9	< 2.0	41	4.9	5.2
	18-Oct-2018	86	< 1.0	---	260	120	---	160	58	7.3 [#2]	< 0.015	0.35	0.079	< 0.033	< 0.010	0.079	0.21	0.005	1.4	2.1	22	2.8	3.1
	10-Jun-2019	80	< 1.0	19	250	110	8	180	150	120 [#2]	< 0.015	0.23	0.052	< 0.033	< 0.010	0.052	0.44	0.009	1.6	< 2.0 [#11]	45	6.8	5.8
	26-Aug-2019	99	< 1.0	9.8	330	150	8.2	190	55	49 [#2]	0.027	0.17	0.038	< 0.033	< 0.010	0.038	0.3	---	2.3	< 2.0	21	5.2	4.7
	27-Aug-2019	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.005	---	---	---	---	---
	01-Oct-2019	96	< 1.0	21	320	140	8.07	220	76	92 [#2]	0.02	0.15	0.033	< 0.033	< 0.010	0.033	0.37	0.011	3.2	2.2	45	6.7	5.9
	12-Jun-2020	100	< 1.0	29	250	120	6.69	180	190 [#8]	100 [#2]	0.023	0.26	0.058	< 0.033	< 0.010	0.058	0.69 [#10]	< 0.0020	7.4	< 2.0	84	5.8	5.8 [#9]
	28-Jul-2020	95	< 1.0	22	280	130	7.66	170	130	60 [#2]	< 0.015	0.088	0.02	< 0.033	< 0.010	0.02	0.50 [#10]	< 0.019	2.7	< 2.0	24	6.6	6
	22-Sep-2020	110	< 1.0	20	300	130	7.75	190 [#12]	39	22 [#2]	< 0.015	0.22	0.049	< 0.033	< 0.010	0.049	0.32	0.012	8.5	< 2.0	20	6	5.9
	07-Jun-2021	91	< 1.0	33	260	120	---	240	140	72 [#2]	0.019	0.29	0.066	< 0.033	< 0.010	0.066	0.56	0.017	1.5	< 2.0 [#4]	24	8.4	6.2 [#9]
(Duplicate)	07-Jun-2021	87	< 1.0	32	260	120	---	210	120	78 [#2]	< 0.015	0.3	0.068	< 0.033	< 0.010	0.068	0.52	0.029	1.1	< 2.0 [#4]	23	8.7	7
	19-Aug-2021	90	< 1.0	28	290	140	---	180	230 [#8]	180 [#2]	< 0.015	0.17	0.038	< 0.033	< 0.010	0.038	0.44	0.027	3	< 2.0 [#13]	29	5.9	6.3
	18-Sep-2021	130	< 1.0	21	300	140	---	250	61	43 [#2]	< 0.015	0.18	0.041	< 0.033	< 0.010	0.041	0.29	0.0098	9.3	< 2.0 [#14]	33	8.2	6.6
	31-Mar-2022	---	---	13	---	---	8.02	210	3.5	7.0 [#2]	< 0.015	0.78	0.18	< 0.033	< 0.010	0.18	0.23	0.006	---	< 2.0 [#3]	14	6.4	5.6
	14-Jun-2022	81	< 1.0	41	220	110	7.45	160	550 [#8]	410 [#2,10]	< 0.015	0.23	0.051	< 0.033	< 0.010	0.051	0.48	0.026	2.4	< 2.0	71	6.4	7.1
	06-Aug-2022	94	< 1.0	14	290	140	7.75	200	63	45 [#2]	< 0.015	0.15	0.033	< 0.033	< 0.010	0.033	0.31	< 0.0020	0.96	< 2.0	22	6.4	5.3
(Duplicate)	06-Aug-2022	110	< 1.0	14	300	130	7.76	190	92	49 [#2]	< 0.015	0.15	0.033	< 0.033	< 0.010	0.033	0.31	< 0.0020	6.6	< 2.0	24	6.1	4.9
	25-Sep-2022	120	< 1.0	8.3	300	130	7.36	190	19	15 [#2]	< 0.015	0.11	0.025	< 0.033	< 0.010	0.025	0.21	< 0.0020	7.9	< 2.0	24	4.9	4.5
	09-Mar-2023	120	< 1.0	---	360	160	---	210	---	---	< 0.015	0.78	0.18	< 0.033	< 0.010	0.18	0.17	< 0.0020	0.006	---	---	4.2	4
	25-Jul-2023	100	< 1.0	6.9	310	130	7.55	110	45	27 [#2]	< 0.015	0.17	0.038	< 0.033	< 0.010	0.038	0.12	< 0.0020	5	---	10	5.4	3.8
	19-Aug-2023	120	< 1.0	9.4	330	150	---	200	220	87 [#2]	< 0.015	0.3	0.068	< 0.033	< 0.010	0.068	0.16	0.0095	9.8	---	16	4	4
	25-Sep-2023	110	< 1.0	7.3	340	150	---	170	14	13 [#2]	< 0.015	0.23	0.052	< 0.033	< 0.010	0.052	0.18	< 0.0020	2.4	---	21	3.5	3.2
AEMP-DS-04 (Refinery)	21-Aug-2017	88	< 0.50	---	270	120	---	170	35	---	---	0.25	0.056	< 0.033	< 0.010	0.056	---	---	3.1	< 2.0 [#3]	---	4.5	3.6
(Duplicate)	21-Aug-2017	86	< 0.50	---	270	110	---	180	37	---	---	0.25	0.056	< 0.033	< 0.010	0.056	---	---	2.9	< 2.0 [#3]	---	4	3.1
	16-Sep-2017	86	< 0.50	---	260	110	---	140	25	---	---	0.31	0.07	< 0.033	< 0.010	0.07	---	< 0.0020	0.77	< 2.0 [#4]	---	5.2	4.2
	16-Oct-2017	82	< 0.50	---	260	110	---	170	17	---	---	0.37	0.083	< 0.033	< 0.010	0.083	---	< 0.0020	1.3	< 2.0 [#7]	---	3.8	3.3
	23-Jun-2018	76	< 1.0	---	230	100	---	120	43	44 [#2]	0.022	0.23	0.053	< 0.033	< 0.010	0.053	0.31	0.005	1	---	32	5	5
	13-Aug-2018	87	< 1.0	---	290	120	---	180	110	56 [#2]	0.028	0.15	0.034	< 0.033	< 0.010	0.034	0.43	0.004	2.9	---	41	4.6	5
	15-Aug-2018	---	---	---	---	---	---	---	---	---	---	0.14	0.032	< 0.033	< 0.010	0.032	---	---	---	< 2.0	---	---	---
	17-Oct-2018	82	< 1.0	---	260	110	---	150	24	12 [#2]	< 0.015	0.4	0.091	< 0.033	< 0.010	0.091	0.18	< 0.0020	0.7	---	9.2	3	2.5
(Duplicate)	17-Oct-2018	83	< 1.0	---	260	110	---	150	27	22 [#2]	< 0.015	0.4	0.09	< 0.033	< 0.010	0.09	0.13	0.002	1.3	---	6.1	3	2.6
	18-Oct-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.9 [#3]	---	---	---

Table 2

Surface Water Analytical Results: Indicator Analysis Parameters

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Anions: Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Hydroxide (mg/L)	Cations: Calcium (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Fluoride (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			---	---	120	---	---	---	0.3	---	---	---	---	0.12
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			---	---	---	---	---	None required	---	---	0.12	---	---	1.5
(Duplicate)	18-Oct-2018	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	03-Jun-2019	Grab	100	< 1.0	8.8	35	< 1.0	28	< 0.060	8.6	0.0098	0.81	8.7	---
	25-Aug-2019	Grab	100	< 1.0	11	38	< 1.0	29	< 0.060	10	< 0.0040	0.81	8.2	---
	27-Aug-2019	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	02-Oct-2019	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	03-Oct-2019	Grab	100	< 1.0	9.7	35	< 1.0	29	< 0.060	9.6	0.029	0.78	7.9	---
	10-Jun-2020	Grab	97	< 1.0	7.3	31	< 1.0	26	< 0.060	7.3	< 0.0040	0.73	5.9	---
	24-Jul-2020	Grab	97	< 1.0	7.3	37	< 1.0	29	< 0.060	8.8	< 0.0040	0.77	6.9	---
(Duplicate)	24-Jul-2020	Grab	100	< 1.0	7.3	37	< 1.0	29	< 0.060	8.8	< 0.0040	0.78	6.8	---
	18-Sep-2020	Grab	100	< 1.0	7.4	34	< 1.0	33	< 0.060	9.1	< 0.0040	0.73	7	---
(Duplicate)	18-Sep-2020	Grab	110	< 1.0	7.2	34	< 1.0	30	< 0.060	8.8	< 0.0040	0.84	7.1	---
	06-Jun-2021	Grab	130	< 1.0	6.2	27	< 1.0	30	0.17	8.5	0.0073	1.1	6.7	0.095
	18-Aug-2021	Grab	100	< 1.0	6.9	37	< 1.0	32	< 0.060	9.7	0.0044	1	7.4	0.097
	17-Sep-2021	Grab	110	< 1.0	8.2	36	< 1.0	34	< 0.060	10	< 0.0040	0.95	7.7	0.11
	12-Jun-2022	Grab	110	< 1.0	5	36	< 1.0	32	0.076	9.4	0.0059	1.2	6.4	0.085
	06-Aug-2022	Grab	110	< 1.0	7.4	38	< 1.0	30	< 0.060	8.5	0.067	0.94	7.4	0.084
(Duplicate)	06-Aug-2022	Grab	110	< 1.0	9.1	37	< 1.0	30	< 0.060	8.8	0.069	0.94	7.6	0.084
	24-Sep-2022	Grab	110	< 1.0	9.4	37	< 1.0	31	< 0.060	9.1	0.068	0.95	8.1	0.1
(Duplicate)	24-Sep-2022	Grab	110	< 1.0	9.4	36	< 1.0	31	< 0.060	9.4	0.073	0.96	8.3	0.1
	11-Mar-2023	Grab	94	< 1.0	11	29	< 1.0	26	< 0.060	9.4	< 0.0040	0.84	8.7	---
	26-Jul-2023	Grab	120	< 1.0	9.6	41	< 1.0	34	< 0.060	11	< 0.0040	1	8.8	---
(Duplicate)	26-Jul-2023	Grab	120	< 1.0	9.6	40	< 1.0	32	< 0.060	9.8	< 0.0040	0.95	8.2	---
	18-Aug-2023	Grab	120	< 1.0	10	46	< 1.0	32	< 0.060	9.6	0.004	0.84	7.6	---
	24-Sep-2023	Grab	110	< 1.0	12	40	< 1.0	32	< 0.060	10	< 0.0040	0.88	8.8	---
AEMP-DS-05 (Radar)	23-Jun-2018	Grab	96	< 1.0	6.8	35	< 1.0	29	< 0.060	8.4	< 0.0040	0.82	6.4	---
	14-Aug-2018	Grab	110	< 1.0	9.3	44	< 1.0	37	< 0.060	10	0.0043	0.79	7.6	---
	18-Oct-2018	Grab	110	< 1.0	12	36	< 1.0	29	< 0.060	9.3	< 0.0040	0.96	9.3	---
	10-Jun-2019	Grab	92	< 1.0	7.7	31	< 1.0	28	< 0.060	7.6	< 0.0040	0.75	5.8	---
	26-Aug-2019	Grab	120	< 1.0	9.8	60	< 1.0	35	< 0.060	11	< 0.0040	0.85	8.1	---
	27-Aug-2019	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	01-Oct-2019	Grab	110	< 1.0	10	56	< 1.0	37	0.91 [#1]	11	0.054	0.92	9.6	---
	02-Oct-2019	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	12-Jun-2020	Grab	120	< 1.0	5.4	33	< 1.0	29	< 0.060	7.7	< 0.0040	0.82	5.7	---
	28-Jul-2020	Grab	110	< 1.0	5.8	39	< 1.0	33	< 0.060	8.9	< 0.0040	0.79	6.4	---
	22-Sep-2020	Grab	130	< 1.0	7.1	38 [#15]	< 1.0	32	< 0.060	9.1	< 0.0040	0.86	6.7	---
	07-Jun-2021	Grab	110	< 1.0	6.3	31	< 1.0	29	< 0.060	7.4	< 0.0040	1.1	6.1	0.1
	19-Aug-2021	Grab	110	< 1.0	6.7	40	< 1.0	31	< 0.060	8.6	< 0.0040	0.9	6.8	0.09
(Duplicate)	19-Aug-2021	Grab	110	< 1.0	6.6	39	< 1.0	32	< 0.060	8.6	< 0.0040	0.9	6.8	0.094
	18-Sep-2021	Grab	130	< 1.0	7.8	37	< 1.0	34	< 0.060	9.7	< 0.0040	0.95	7.8	0.1
	10-Aug-2022	Grab	110	< 1.0	8.2	38	< 1.0	32	< 0.060	9.3	< 0.0040	0.94	7.4	0.093
	11-Mar-2023	Grab	99	< 1.0	12	35	< 1.0	30	< 0.060	11	< 0.0040	0.87	10	---
	25-Jul-2023	Grab	140	< 1.0	10	42	< 1.0	34	< 0.060	9.8	< 0.0040	0.93	8.2	---
	19-Aug-2023	Grab	130	< 1.0	9.1	47	< 1.0	35	< 0.060	10	< 0.0040	0.85	7.4	---
	26-Sep-2023	Grab	130	< 1.0	12	44	< 1.0	35	0.1	11	0.008	0.97	9.5	---
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	Grab	140	< 1.0	17	51	< 1.0	46	< 0.060	12	< 0.0040	1.2	15	---
(Duplicate)	10-Mar-2023	Grab	130	< 1.0	18	51	< 1.0	46	< 0.060	12	< 0.0040	1.1	15	---
	24-Jul-2023	Grab	210	< 1.0	11	70	< 1.0	42	< 0.060	13	0.0048	0.91	9.2	---
	21-Aug-2023	Grab	140	< 1.0	9.7	83	< 1.0	43	< 0.060	14	< 0.0040	0.93	8.6	---
	03-Oct-2023	Grab	150	< 1.0	10	110	< 1.0	48	< 0.060	20	0.0059	0.94	12	---
UPSTREAM														
AEMP-US-01 (Midway)	12-Mar-2023	Grab	87	< 1.0	9.8	22	< 1.0	23	< 0.060	8.9	< 0.0040	0.81	8.1	---
	25-Jul-2023	Grab	120	< 1.0	11	37	< 1.0	30	< 0.060	9.2	< 0.0040	0.87	8.5	---
	19-Aug-2023	Grab	130	< 1.0	11	35	< 1.0	9.6	< 0.060	2.7	< 0.0040	< 0.30	2.3	---
	26-Sep-2023	Grab	100	< 1.0	10	28	< 1.0	24	< 0.060	8.9	< 0.0040	0.77	7.7	---
AEMP-US-02 (10 mile)	23-Jun-2018	Grab	99	< 1.0	7.3	38	< 1.0	31	< 0.060	8.7	< 0.0040	0.79	6.1	---
	14-Aug-2018	Grab	120	< 1.0	8.6	49	< 1.0	36	< 0.060	11	< 0.0040	0.83	7.7	---
(Duplicate)	14-Aug-2018	Grab	120	< 1.0	8.6	49	< 1.0	37	0.28	11	0.018	0.93	7.7	---
	18-Oct-2018	Grab	100	< 1.0	11	33	< 1.0	28	< 0.060	9.5	0.0099	0.91	9.7	---
	10-Jun-2019	Grab	96	< 1.0	6.2	35	< 1.0	30	< 0.060	7.6	< 0.0040	0.78	5.7	---
	26-Aug-2019	Grab	120	< 1.0	11	50	< 1.0	35	< 0.060	11	< 0.0040	0.86	8.1	---
	01-Oct-2019	Grab	120	< 1.0	9.9	60	< 1.0	39	< 0.060	11	< 0.0040	0.9	8.9	---
	12-Jun-2020	Grab	110	< 1.0	5.1	35	< 1.0	30	< 0.060	7.9	< 0.0040	0.78	5.4	---
	28-Jul-2020	Grab	110	< 1.0	6.2	52	< 1.0	32	< 0.060	8.8	< 0.0040	0.72	6.1	---
	22-Sep-2020	Grab	110	< 1.0	7.1	40	< 1.0	35	0.17	9.7	0.0077	0.9	6.8	---
	07-Jun-2021	Grab	140	< 1.0	6.3	34	< 1.0	30	< 0.060	7.6	< 0.0040	1	6.1	0.092
	19-Aug-2021	Grab	110	< 1.0	7.1	40	< 1.0	37	< 0.060	11	< 0.0040	1	7.6	0.091

Sampling Location	Date (dd-mmm-yyyy)	General: Alkalinity (Total; as $CaCO_3$) (mg/L)	Alkalinity (PP; as $CaCO_3$) (mg/L)	Colour (color unit)	Electrical Conductivity (uS/cm)	Hardness (Total; as $CaCO_3$) (mg/L)	pH (pH Units)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	Inorganic Nitrogen Compounds: Ammonia (Total; as N) (mg/L)	Nitrate (mg/L)	Nitrate (as N) (mg/L)	Nitrite (mg/L)	Nitrite (as N) (mg/L)	Nitrite-plus-Nitrate (as N) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Inorganic Sulphur Compounds: Sulphide (as H2S) (mg/L)	Ion Balance: Ion Balance % Difference (%)	Miscellaneous: Biochemical Oxygen Demand (mg/L)	Chemical Oxygen Demand (mg/L)	Dissolved Organic Carbon (mg/L)	Total Organic Carbon (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]		---	---	---	---	---	(6.5 - 9)	---	---	---	0.20	---	2.9	---	0.06	---	---	---	---	---	---	---	---
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]		---	---	---	---	---	---	---	---	1	None required	45	10	3	1	---	---	---	---	---	---	---	---
(Duplicate)	18-Oct-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.6 [#3]	---	---	---
	03-Jun-2019	82	< 1.0	18	260	100	8.16	170	230	190 [#2]	< 0.015	0.35	0.078	< 0.033	< 0.010	0.078	0.52	0.017	2.8	2.5	62	6	5.4
	25-Aug-2019	85	< 1.0	5.9	270	110	8.12	160	18	22 [#2]	0.044 [#15]	0.34	0.077	< 0.033	< 0.010	0.077	0.22	---	2.6	---	15	4.5	3.8
	27-Aug-2019	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.002	---	< 2.0 [#3]	---	---	---
	02-Oct-2019	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 2.0	---	---	---
	03-Oct-2019	85	< 1.0	8.9	260	110	8.03	140	920	120 [#2]	0.027	0.34	0.078	< 0.033	< 0.010	0.078	0.78	0.007	1.8	---	81	3.7	3.8
	10-Jun-2020	79	< 1.0	25	230	95	6.83	88	250 [#8]	93 [#2]	< 0.015	0.32	0.073	< 0.033	< 0.010	0.073	0.77 [#10]	< 0.010	5.7	< 2.0 [#3]	31	6	7.1 [#9]
	24-Jul-2020	79	< 1.0	22	260	110	7.98	150	92	41 [#2]	0.017	0.23	0.052	< 0.033	< 0.010	0.052	0.38	0.014	1.1	< 2.0	30	5.3	4.4
(Duplicate)	24-Jul-2020	82	< 1.0	22	260	110	7.92	150	88	40 [#2]	< 0.015	0.23	0.053	< 0.033	< 0.010	0.053	0.44	< 0.010	2.2	< 2.0	25	5	4.9
	18-Sep-2020	82	< 1.0	16	260	120	8.09	200	36	19 [#2]	< 0.015	0.27	0.061	< 0.033	< 0.010	0.061	0.34	0.011	2.7	< 2.0	17	5.4	4.7
(Duplicate)	18-Sep-2020	88	< 1.0	15	260	110	8.07	120	36	17 [#2]	< 0.015	0.28	0.063	< 0.033	< 0.010	0.063	0.27	0.0086	2.3	< 2.0	20	6	4.8
	06-Jun-2021	100	< 1.0	32	240	110	---	140	120	90 [#2]	< 0.015	0.37	0.083	< 0.033	< 0.010	0.083	0.68	0.023	6	< 2.0 [#4]	26	6.6	7.2
	18-Aug-2021	85	< 1.0	16	260	120	---	200	230 [#8]	220 [#2]	0.02	0.23	0.051	< 0.033	< 0.010	0.051	0.25	0.016	1.3	< 2.0	20	6	5.3
	17-Sep-2021	94	< 1.0	15	260	130	8.07	190	21	22 [#2]	< 0.015	0.31	0.069	< 0.033	< 0.010	0.069	0.24	< 0.0020	0.18	< 2.0 [#3]	13	5.4	4.9
	12-Jun-2022	87	< 1.0	34	250	120	7.64	180	450 [#8]	290 [#2,10]	< 0.015	0.22	0.05	< 0.033	< 0.010	0.05	0.5	0.034	1.4	< 2.0	40	7.8	6.7
	06-Aug-2022	87	< 1.0	13	260	110	7.69	180	700 [#8]	300 [#2,10]	0.032	0.23	0.053	< 0.033	< 0.010	0.053	0.65	0.03	3.9	< 2.0	86	5.4	5
(Duplicate)	06-Aug-2022	86	< 1.0	14	260	110	7.77	180	1000 [#8]	380 [#2,10]	0.043	0.26	0.058	< 0.033	< 0.010	0.058	0.73	0.033	3.5	< 2.0	70	5.3	5.3
	24-Sep-2022	93	< 1.0	7.1	260	110	7.07	160	430	180 [#2]	0.042	0.25	0.057	< 0.033	< 0.010	0.057	0.49	0.004	4.5	< 2.0 [#3]	41	4.1	4.1
(Duplicate)	24-Sep-2022	88	< 1.0	8.5	260	120	6.9	160	440	160 [#2]	0.045	0.24	0.055	< 0.033	< 0.010	0.055	< 0.40	0.003	1.6	< 2.0 [#3]	45	4.7	3.8
	11-Mar-2023	77	< 1.0	---	230	100	---	120	---	---	< 0.015	1.2	0.26	< 0.033	< 0.010	0.26	0.051	< 0.0020	0.41	---	---	3.6	2
	26-Jul-2023	96	< 1.0	6.2	290	130	7.36	170	34	21 [#2]	< 0.015	0.27	0.061	< 0.033	< 0.010	0.061	0.1	< 0.0020	1.1	---	21	3.7	3
(Duplicate)	26-Jul-2023	99	< 1.0	5.9	280	120	7.11	160	24	19 [#2]	< 0.015	0.22	0.05	< 0.033	< 0.010	0.05	0.12	< 0.0020	5.5	---	16	3.5	3.1
	18-Aug-2023	98	< 1.0	7.5	270	120	---	170	90	63 [#2]	< 0.015	0.39	0.089	< 0.033	< 0.010	0.089	0.22	< 0.0020	8.1	---	22	3.7	4
	24-Sep-2023	89	< 1.0	3.9	280	120	---	100	12	9.4 [#2]	< 0.015	0.43	0.097	< 0.033	< 0.010	0.097	0.11	< 0.0020	2	---	21	2.6	2.2
AEMP-DS-05 (Radar)	23-Jun-2018	79	< 1.0	---	240	110	---	140	78	37 [#2]	0.024	0.18	0.039	< 0.033	< 0.010	0.039	0.29	< 0.0020	0.76	---	31	5.2	5
	14-Aug-2018	91	< 1.0	---	290	130	---	180	61	45 [#2]	0.015	0.13	0.029	< 0.033	< 0.010	0.029	0.27	0.004	0.35	< 2.0	28	4.3	4.8
	18-Oct-2018	88	< 1.0	---	280	110	---	150	81	23 [#2]	< 0.015	0.4	0.09	< 0.033	< 0.010	0.09	0.24	0.002	3.9	< 2.0	16	3.1	2.7
	10-Jun-2019	76	< 1.0	20	230	100	7.99	160	200	120 [#2]	< 0.015	0.27	0.061	< 0.033	< 0.010	0.061	0.39	0.006	1.8	< 2.0 [#11]	41	6.4	5.6
	26-Aug-2019	98	< 1.0	9.8	310	130	8.18	180	47	43 [#2]	0.026	0.18	0.04	< 0.033	< 0.010	0.04	0.28	---	6.4	< 2.0	20	4.9	4.4
	27-Aug-2019	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.004	---	---	---	---	---
	01-Oct-2019	94	< 1.0	18	320	140	8.27	200	130	120 [#2]	0.051 [#16]	0.25	0.056	< 0.033	< 0.010	0.056	0.44	0.006	1.5	---	47	5.5	5.3
	02-Oct-2019	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 2.0	---	---	---
	12-Jun-2020	97	< 1.0	29 [#17]	230	100	6.69	180	700 [#8]	650 [#2]	0.024	0.27	0.062	< 0.033	< 0.010	0.062	1	< 0.010	8.4	< 2.0	95	5.9	4.4 [#9]
	28-Jul-2020	92	< 1.0	20	270	120	7.71	160	110	27 [#2]	< 0.015	0.09	0.02	< 0.033	< 0.010	0.02	0.73 [#10]	0.0038	3	< 2.0	29	6.3	5.4
	22-Sep-2020	110	< 1.0	18	280	120	7.63	88	43	20 [#2]	< 0.015	0.24	0.055	< 0.033	< 0.010	0.055	0.29	0.012	7.5	< 2.0	23	6	5.9
	07-Jun-2021	91	< 1.0	38	250	100	7.75	100 [#12]	110	71 [#2]	0.016	0.3	0.068	< 0.033	< 0.010	0.068	0.59	0.022	5.8	< 2.0 [#4]	43	8.5	6.6 [#9]
	19-Aug-2021	89	< 1.0	28	270	110	---	180	190 [#8]	160 [#2]	< 0.015	0.17	0.038	< 0.033	< 0.010 [#12]	0.038 [#12]	0.38	0.033	4	< 2.0 [#13]	51	7.7	6
(Duplicate)	19-Aug-2021	90	< 1.0	25	270	110	---	170	250 [#8]	160 [#2]	< 0.015	0.18	0.04	< 0.033	< 0.010 [#12]	0.040 [#12]	0.74	0.029	3.9	< 2.0 [#13]	55	6	6.4
	18-Sep-2021	110	< 1.0	21	280	130	---	200	60	43 [#2]	< 0.015	0.21	0.047	< 0.033	< 0.010	0.047	0.27	0.012	4.1	< 2.0 [#14]	20	6.9	5.9
	10-Aug-2022	88	< 1.0	9.1	260	120	7.65	160	91	49 [#2]	< 0.015	0.25	0.057	< 0.033	< 0.010	0.057	< 0.20	0.012	1.9	< 2.0	14	5.2	4.1
	11-Mar-2023	81	< 1.0	---	260	120	---	160	---	---	< 0.015	1.1	0.26	< 0.033	< 0.010	0.26	0.12	< 0.0020	2	---	---	3.4	2.1
	25-Jul-2023	110	< 1.0	5	290	120	---	110	19	16 [#2]	< 0.015	0.16	0.036	< 0.033	< 0.010	0.036	0.13	< 0.0020	8.7	---	12	3.6	3.2
	19-Aug-2023	100	< 1.0	9.4	290	130	---	180	35	41 [#2]	< 0.015	0.23	0.053	< 0.033	< 0.010	0.053	0.14	0.0081	6.9	---	18	4.1	3.2
	26-Sep-2023	110	< 1.0	9.9	300	130	---	170	120	69 [#2]	< 0.015	0.28	0.064	< 0.033	< 0.010	0.064	---	0.0037	4.2	---	28	3.1	3
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	110	< 1.0	---	350	170	---	200	---	---	< 0.015	0.71	0.16	< 0.033	< 0.010	0.16	0.16	< 0.0020	3.2	---	---	3.7	3.6
(Duplicate)	10-Mar-2023	110	< 1.0	---	350	170	---	220	---	---	< 0.015	0.72	0.16	< 0.033	< 0.010	0.16	0.12	< 0.0020	3.4	---	---	3.7	3.5
	24-Jul-2023	170	< 1.0	7.8	370	160	7.66	210	17	24 [#2]	< 0.015	0.25	0.056	0.039	0.012	0.068	0.095	0.022	18	---	11	3	2.8
	21-Aug-2023	110	< 1.0	8.9	370	170	---	230	54	49 [#2]	0.016	0.22	0.05	< 0.033	< 0.010	0.05	0.16	< 0.0020	6.8	---	25	3.3	2.8
	03-Oct-2023	120	< 1.0	9.6	430	200	---	240	13	19 [#2]	< 0.015	0.36	0.081	< 0.033	< 0.010	0.081	0.12	< 0.0020	4.9	---	16	3.9	3.7
UPSTREAM																							
AEMP-US-01 (Midway)	12-Mar-2023	72	< 1.0	---	210	93	---	120	---	---	< 0.015	1.5	0.35	< 0.033	< 0.010	0.35	0.29	0.0039	0.96	---	---	2.5	1.8
	25-Jul-2023	95	< 1.0	5.4	270	110	---	96	14	15 [#2]	< 0.015	0.23	0.052	< 0.033	< 0.010	0.052	0.12	< 0.0020	6.5	---	12	3.5	2.9
	19-Aug-2023	100	< 1.0	6.3	250	35	---	150	21	23 [#2]	< 0.015	0.37	0.083	< 0.033	< 0.010	0.083	0.12	0.0061	59	---	22	2.6	2.5
	26-Sep-2023	86	< 1.0	3.8	230	97	---	96	2.2	4.5 [#2]	0.023	0.42	0.094	< 0.033	< 0.010	0.094	0.14	< 0.0020	5.8	---	16	2.5	2.5
AEMP-US-02 (10 mile)	23-Jun-2018	81	< 1.0	---	250	110	---	140	39	40 [#2]	0.025	0.099	0.022	< 0.033	< 0.010	0.022	0.27	0.004	1.3	---	33	5.8	5.1
	14-Aug-2018	97	< 1.0	---	310	130	---	180	59	51 [#2]	0.016	0.093	0.021	< 0.033	< 0.010	0.021	0.3	0.004	3	< 2.0	25	4.5	4.8
(Duplicate)	14-Aug-2018	96	< 1.0	---	310	140	---	170	66	51 [#2]	0.023	0.085	0.019	< 0.033	< 0.010	0.019	0.32	0.003	0.69	< 2.0	26	5.3	4.9
	18-Oct-2018	85	< 1.0	---	260	110	---	150	39	12 [#2]	0.02	0.41	0.093	< 0.033	< 0.010	0.093	0.19	0.003	1.3	< 2.0	9.2	2.9	3
	10-Jun-2019	79	< 1.0	20	240	110	8.06	170	150	120 [#2]	< 0.015	0.23	0.052	< 0.033	< 0.010	0.052	0.45	0.01	1.9	2.0 [#11]	44	7.3	6
	26-Aug-2019	98	< 1.0	11	310	130	8.12	180	46	43 [#2]	0.018	0.17	0.039	< 0.033	< 0.010	0.039	0.26	0.005	3.7	< 2.0	26	5.7	4.6
	01-Oct-2019	100	< 1.0	21	320	140	8.04	230	32	75 [#2]	0.029	0.16	0.036	< 0.033	< 0.010	0.036	0.32	0.014	4	2.1	39	6.5	5.9
	12-Jun-2020	87	< 1.0	31	240	110	6.84	180	280 [#8]	92 [#2]	< 0.015	0.22	0.049	< 0.033	< 0.010	0.049	0.67 [#10]	< 0.0020	4.3	< 2.0	38	6.9	1.4
	28-Jul-2020	90	< 1.0	21	280	120	7.75	170	110	51 [#2]	< 0.015	0.087	0.02	< 0.033	< 0.010	0.02	1.1 [#10]	0.094	8.2	< 2.0	63	7.1	5.6
	22-Sep-2020	93	< 1.0	20	290	130	8.14	200 [#12]	48	21 [#2]	< 0.015	0.19	0.044	< 0.033	< 0.010	0.044	0.36	0.01	0.72	< 2.0	17	6.4	6.1
	07-Jun-2021	110	< 1.0	31	250	110	7.19	130 [#12]	110	79 [#2]	< 0.015	0.29	0.065	< 0.033	< 0.010	0.065	0.53	0.024	13	< 2.0 [#4]	34	8.7	7.9 [#9]
	19-Aug-2021	91	< 1.0	27	280	140	---	190	170 [#8]	160 [#2]	< 0.015	0.15	0.034	< 0.033	< 0.010	0.034	0.37	0.024	4	< 2.0 [#13]	51	5.8	6.3

Table 2

Surface Water Analytical Results: Indicator Analysis Parameters

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Anions: Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Hydroxide (mg/L)	Cations: Calcium (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Fluoride (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			---	---	**120**	---	---	---	**0.3**	---	---	---	---	**0.12**
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			---	---	---	---	---	**None required**	---	---	**0.12**	---	---	**1.5**
	18-Sep-2021	Grab	140	< 1.0	7.5	42	< 1.0	33	< 0.060	9	< 0.0040	0.91	7.5	0.1
	10-Aug-2022	Grab	110	< 1.0	7.9	38	< 1.0	34	< 0.060	9.9	< 0.0040	0.97	7.7	0.089
	12-Mar-2023	Grab	95	< 1.0	10	27	< 1.0	25	< 0.060	9	< 0.0040	0.82	8.5	---
	25-Jul-2023	Grab	140	< 1.0	11	47	< 1.0	34	< 0.060	10	< 0.0040	0.9	8.6	---
	19-Aug-2023	Grab	120	< 1.0	9.5	50	< 1.0	34	< 0.060	10	0.0075	0.84	7.8	---
	24-Sep-2023	Grab	120	< 1.0	11	49	< 1.0	44	0.091	15	0.018	1.2	13	---
AEMP-US-03 (Norman Wells Upstream)	09-Mar-2023	Grab	90	< 1.0	9.8	28	< 1.0	27	< 0.060	9.6	< 0.0040	0.86	9	---
BOSWORTH CREEK														
Bosworth Upstream Data UCL			---	---	**27**	**180**	---	**87**	**0.297**	**34**	---	---	---	---
Bosworth Upstream Data LCL			---	---	**9**	**110**	---	**63**	**0.060**	**23**	---	---	---	---
DOWNSTREAM														
AEMP-DS-01 (Lower Bosworth Creek)	18-Aug-2017	Grab	230	< 0.50	24	140	< 0.50	76	< 0.060	28	0.0077	1.1	23	---
	16-Sep-2017	Grab	220	< 0.50	19	130	< 0.50	80	< 0.060	29	0.0081	1	18	---
(Duplicate)	16-Sep-2017	Grab	220	< 0.50	19	130	< 0.50	79	< 0.060	29	0.0078	0.96	18	---
	16-Oct-2017	Grab	220	< 1.0	20	150	< 1.0	75	< 0.060	30	0.0091	0.97	19	---
	23-Jun-2018	Grab	230	< 1.0	19	130	< 1.0	78	< 0.060	28	0.0058	1.1	17	---
	12-Aug-2018	Grab	220	< 1.0	14	140	< 1.0	74	< 0.060	29	0.0079	1	16	---
	15-Aug-2018	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	16-Oct-2018	Grab	230	< 1.0	17	160	< 1.0	78	< 0.060	31	0.0046	1	18	---
	17-Oct-2018	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	03-Jun-2019	Grab	190	< 1.0	17	120	< 1.0	65	< 0.060	24	0.005	0.85	14	---
(Duplicate)	03-Jun-2019	Grab	190	< 1.0	17	120	< 1.0	65	< 0.060	24	0.0049	0.84	14	---
	28-Aug-2019	Grab	230	< 1.0	17	140	< 1.0	76	< 0.060	27	0.0069	0.96	16	---
	02-Oct-2019	Grab	---	---	---	---	---	---	---	---	---	---	---	---
	03-Oct-2019	Grab	230	< 1.0	19	160	< 1.0	83	< 0.060	32	0.0069	1	19	---
	10-Jun-2020	Grab	210	< 1.0	16	130	< 1.0	70	< 0.060	24	0.0043	0.96	14	---
	24-Jul-2020	Grab	220	< 1.0	25	140	< 1.0	81	0.062	29	0.0075	1	22	---
	18-Sep-2020	Grab	220	< 1.0	21	160	< 1.0	80	< 0.060	31	0.0062	0.97	19	---
	06-Jun-2021	Grab	240	1.5	17	110	< 1.0	72	< 0.060	26	0.0063	1	15	**0.20** [#1]
	18-Aug-2021	Grab	220	< 1.0	**30**	160	< 1.0	83	< 0.060	32	0.0058	1.2	28	**0.23** [#1]
	19-Sep-2021	Grab	250	< 1.0	**38**	**190**	< 1.0	83	< 0.060	32	0.0072	1.1	31	**0.26** [#1]
	11-Jun-2022	Grab	200	< 1.0	18	110	< 1.0	69	< 0.060	26	0.0076	1.2	16	**0.17** [#1]
	06-Aug-2022	Grab	220	< 1.0	**28**	150	< 1.0	79	< 0.060	29	0.0061	1.2	24	**0.20** [#1]
	26-Sep-2022	Grab	230	< 1.0	**30**	150	< 1.0	78	< 0.060	30	0.0055	1	24	**0.22** [#1]
	26-Jul-2023	Grab	250	< 1.0	**28**	160	< 1.0	83	< 0.060	30	0.0063	1.2	27	---
	18-Aug-2023	Grab	240	< 1.0	**34**	170	< 1.0	81	< 0.060	30	0.0073	1.2	29	---
(Duplicate)	18-Aug-2023	Grab	240	< 1.0	**34**	160	< 1.0	81	< 0.060	30	0.0075	1.2	29	---
	25-Sep-2023	Grab	240	< 1.0	**29**	170	< 1.0	**0.33**	< 0.060	< 0.20	< 0.0040	< 0.30	< 0.50	---
(Duplicate)	25-Sep-2023	Grab	230	< 1.0	**31**	170	< 1.0	< 1.5	< 0.30	< 1.0	< 0.020	< 1.5	< 2.5	---
UPSTREAM														
AEMP-US-04 (Upper Bosworth Creek)	26-Jul-2023	Grab	240	< 1.0	29	160	< 1.0	78	< 0.060	29	< 0.0040	1.2	25	---
	18-Aug-2023	Grab	240	< 1.0	34	160	< 1.0	81	< 0.060	30	0.0062	1.1	27	---
	24-Sep-2023	Grab	240	< 1.0	30	170	< 1.0	83	< 0.060	33	0.0052	1.2	27	---
Relative Percent Difference (RPD) Report														
AEMP-DS-04 (Refinery)	26-Jul-2023	Grab	120	< 1.0	9.6	41	< 1.0	34	< 0.060	11	< 0.0040	1.0	8.8	---
(Duplicate)	26-Jul-2023	Grab	120	< 1.0	9.6	40	< 1.0	32	< 0.060	9.8	< 0.0040	0.95	8.2	---
RPD(%)			**0.0%**	**---**	**0.0%**	**2.5%**	**---**	**6.1%**	**---**	**11.5%**	**---**	**5.1%**	**7.1%**	**---**
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	Grab	140	< 1.0	17	51	< 1.0	46	< 0.060	12	< 0.0040	1.2	15	---
(Duplicate)	10-Mar-2023	Grab	130	< 1.0	18	51	< 1.0	46	< 0.060	12	< 0.0040	1.1	15	---
RPD(%)			**7.4%**	**---**	**5.7%**	**0.0%**	**---**	**0.0%**	**---**	**0.0%**	**---**	**8.7%**	**0.0%**	**---**
AEMP-DS-01 (Lower Bosworth Creek)	18-Aug-2023	Grab	240	< 1.0	34	170	< 1.0	81	< 0.060	30	0.0073	1.2	29	---
(Duplicate)	18-Aug-2023	Grab	240	< 1.0	34	160	< 1.0	81	< 0.060	30	0.0075	1.2	29	---
RPD(%)			**0.0%**	**---**	**0.0%**	**6.1%**	**---**	**0.0%**	**---**	**0.0%**	**2.7%**	**0.0%**	**0.0%**	**---**
AEMP-DS-01 (Lower Bosworth Creek)	25-Sep-2023	Grab	240	< 1.0	29	170	< 1.0	0.33	< 0.060	< 0.20	< 0.0040	< 0.30	< 0.50	---
(Duplicate)	25-Sep-2023	Grab	230	< 1.0	31	170	< 1.0	< 1.5	< 0.30	< 1.0	< 0.020	< 1.5	< 2.5	---
RPD(%)			**4.3%**	**---**	**6.7%**	**0.0%**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**

Sampling Location	Date (dd-mmm-yyyy)	General: Alkalinity (Total; as $CaCO_3$) (mg/L)	Alkalinity (PP; as $CaCO_3$) (mg/L)	Colour (color unit)	Electrical Conductivity (uS/cm)	Hardness (Total; as $CaCO_3$) (mg/L)	pH (pH Units)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	Inorganic Nitrogen Compounds: Ammonia (Total; as N) (mg/L)	Nitrate (mg/L)	Nitrate (as N) (mg/L)	Nitrite (mg/L)	Nitrite (as N) (mg/L)	Nitrite-plus-Nitrate (as N) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Inorganic Sulphur Compounds: Sulphide (as H2S) (mg/L)	Ion Balance: Ion Balance % Difference (%)	Miscellaneous: Biochemical Oxygen Demand (mg/L)	Chemical Oxygen Demand (mg/L)	Dissolved Organic Carbon (mg/L)	Total Organic Carbon (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]		---	---	---	---	---	**(6.5 - 9)**	---	---	---	**0.20**	---	**2.9**	---	**0.06**	---	---	---	---	---	---	---	---
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]		---	---	---	---	---	---	---	---	**1**	**None required**	**45**	**10**	**3**	**1**	---	---	---	---	---	---	---	---
	18-Sep-2021	120	< 1.0	19	290	120	---	200	53	**40** [#2]	< 0.015	0.18	0.04	< 0.033	< 0.010	0.04	0.25	0.0039	11	< 2.0 [#14]	28	7.5	6
	10-Aug-2022	90	< 1.0	9.3	270	120	7.68	160	52	**40** [#2]	< 0.015	0.21	0.048	< 0.033	< 0.010	0.048	< 0.20	< 0.0020	0.5	< 2.0	15	4.6	3.9
	12-Mar-2023	78	< 1.0	---	220	100	---	150	---	---	< 0.015	0.87	0.2	< 0.033	< 0.010	0.2	0.11	< 0.0020	0.44	---	---	2.2	2.2
	25-Jul-2023	110	< 1.0	5.1	310	130	---	150	5.7	**6.8** [#2]	< 0.015	0.12	0.027	< 0.033	< 0.010	0.027	0.11	< 0.0020	9.9	---	10	3.3	3.8
	19-Aug-2023	95	< 1.0	8.6	290	130	---	180	51	**42** [#2]	< 0.015	0.31	0.071	< 0.033	< 0.010	0.071	0.18	0.0061	5	---	< 10 [#6]	5	2.5
	24-Sep-2023	100	< 1.0	4	310	170	---	220	170	**46** [#2]	0.026	0.34	0.076	< 0.033	< 0.010	0.076	---	0.0037	9.4	---	15	3.1	3
AEMP-US-03 (Norman Wells Upstream)	09-Mar-2023	74	< 1.0	---	220	110	---	130	---	---	< 0.015	0.9	0.2	< 0.033	< 0.010	0.2	0.093	< 0.0020	3.7	---	---	2	2
BOSWORTH CREEK																							
Bosworth Upstream Data UCL		---	---	---	---	---	---	**497**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Bosworth Upstream Data LCL		---	---	---	---	---	---	**339**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DOWNSTREAM																							
AEMP-DS-01 (Lower Bosworth Creek)	18-Aug-2017	190	< 0.50	---	650	310	---	400	4	---	---	0.054	0.012	< 0.033	< 0.010	< 0.014	---	---	1.5	< 2.0 [#3]	---	3.3	4
	16-Sep-2017	180	< 0.50	---	630	320	---	390	2.7	---	---	0.15	0.033	< 0.033	< 0.010	0.033	---	0.003	2.7	< 2.0 [#4]	---	5.1	4.2
(Duplicate)	16-Sep-2017	180	< 0.50	---	630	320	---	380	1.3	---	---	0.15	0.033	< 0.033	< 0.010	0.033	---	0.002	2.9	< 2.0 [#4]	---	4.3	3.7
	16-Oct-2017	180	< 1.0	---	650	310	---	420	21	---	---	0.26	0.059	< 0.033	< 0.010	0.059	---	< 0.0020	0.47	< 2.0	---	3.8	4
	23-Jun-2018	180	< 1.0	---	620	310	---	400	2	**1.3** [#2]	0.019	0.17	0.038	< 0.033	< 0.010	0.038	0.21	< 0.0020	0.36	---	13	4.8	4.3
	12-Aug-2018	180	< 1.0	---	610	300	---	400	3.3	---	0.018	0.068	0.015	< 0.033	< 0.010	0.015	0.23	0.003	1	---	19	3.8	4.2
	15-Aug-2018	---	---	---	---	---	---	---	---	---	---	0.086	0.019	< 0.033	< 0.010	0.019	---	---	---	< 2.0	---	---	---
	16-Oct-2018	190	< 1.0	---	660	320	---	410	19	**1.5** [#2]	< 0.015	0.17	0.038	< 0.033	< 0.010	0.038	0.17	< 0.0020	2.2	---	13	2.7	2.9
	17-Oct-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.5 [#4]	---	---	---
	03-Jun-2019	160	< 1.0	16	560	260	8.21	350	4.7	**3.7** [#2]	< 0.015	0.18	0.041	< 0.033	< 0.010	0.041	0.21	< 0.0020	2.9	< 2.0	15	5.2	4.7
(Duplicate)	03-Jun-2019	160	< 1.0	18	560	260	8.18	360	4	**4.1** [#2]	< 0.015	0.19	0.042	< 0.033	< 0.010	0.042	0.21	< 0.0020	2.4	< 2.0	20	5	4.9
	28-Aug-2019	190	< 1.0	15	630	300	8.29	400	3.3	**2.0** [#2]	0.028	0.18	0.04	< 0.033	< 0.010	0.04	0.24	< 0.0020	2.9	< 2.0	< 10	5.6	4.5
	02-Oct-2019	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 2.0	---	---	---
	03-Oct-2019	190	< 1.0	7	670	340	---	430	3.3	**2.0** [#2]	0.022	0.27	0.06	< 0.033	< 0.010	0.06	0.19	0.002	0.53	---	20	3.1	2.9
	10-Jun-2020	180	< 1.0	15	600	270	8.25	**320**	7.5	**2.1** [#2]	0.021	0.22	0.049	< 0.033	< 0.010	0.049	0.25	0.0099	4.4	< 2.0	< 10	5.2	4.4
	24-Jul-2020	180	< 1.0	11	710	320	8.29	470	1	0.43	< 0.015	0.14	0.032	< 0.033	< 0.010	0.032	0.2	0.0034	0.83	< 2.0	10	3.3	3
	18-Sep-2020	180	< 1.0	6	690	330	8.25	490	3.6	0.64	< 0.015	0.1	0.022	< 0.033	< 0.010	0.022	0.15	0.0072	1.4	< 2.0	< 10	2.8	2.5
	06-Jun-2021	200	1.3	23	610	290	---	430	9.1	**3.1** [#2]	< 0.015	0.14	0.031	< 0.033	< 0.010	0.031	0.45	0.0043	3.3	< 2.0 [#4]	16	5.2	6.4
	18-Aug-2021	180	< 1.0	6.4	720	340	---	**510**	< 1.0	0.48	< 0.015	< 0.044	< 0.010	< 0.033	< 0.010	< 0.010	0.23	< 0.0020	2	< 2.0	13	3	2.7
	19-Sep-2021	200	< 1.0	3.7	780	340	8.27	490	1.8	0.69	0.022	0.24	0.055	< 0.033	< 0.010	0.055	0.12	< 0.0020	5	< 2.0	13	2.1	2
	11-Jun-2022	170	< 1.0	12	580	280	8.22	370	< 1.0	**1.7** [#2]	< 0.015	0.11	0.026	< 0.033	< 0.010	0.026	0.29	< 0.0020	0.87	< 2.0	16	4.5	3.9
	06-Aug-2022	180	< 1.0	6.4	680	310	8.28	430	4.7	**1.5** [#2]	< 0.015	0.21	0.048	< 0.033	< 0.010	0.048	0.19	< 0.0020	0.083	< 2.0 [#5]	24	3.4	2.7
	26-Sep-2022	190	< 1.0	5.5	720	320	7.91	460	1.2	**1.1** [#2]	< 0.015	0.23	0.053	< 0.033	< 0.010	0.053	0.16	< 0.0020	1.7	< 2.0 [#3]	16	3	2.6
	26-Jul-2023	200	< 1.0	7.3	720	330	8.32	450	2.9	< 0.10	< 0.015	0.24	0.054	< 0.033	< 0.010	0.054	0.093	0.0058	1.8	---	< 10 [#6]	3.2	2.4
	18-Aug-2023	200	< 1.0	8	740	330	---	470	4.5	**2.4** [#2]	< 0.015	0.18	0.041	< 0.033	< 0.010	0.041	0.095	0.009	3.8	---	14	2.2	1.9
(Duplicate)	18-Aug-2023	200	< 1.0	3.1	730	330	---	470	< 0.99	**1.2** [#2]	< 0.015	0.21	0.047	< 0.033	< 0.010	0.047	0.076	0.0046	3	---	< 10 [#6]	2.2	2.2
	25-Sep-2023	200	< 1.0	5	710	0.8	---	400	< 1.0	< 0.10	< 0.015	0.21	0.048	< 0.033	< 0.010	0.048	0.088	0.018	NC	---	18	< 0.50	2
(Duplicate)	25-Sep-2023	190	< 1.0	< 2.0	730	< 0.50	---	**530**	< 1.0	< 0.10	< 0.015	0.26	0.059	< 0.033	< 0.010	0.059	---	0.026	NC	---	20	< 0.50	2.2
UPSTREAM																							
AEMP-US-04 (Upper Bosworth Creek)	26-Jul-2023	190	< 1.0	7.7	720	320	---	460	1.4	0.78	< 0.015	0.22	0.049	< 0.033	< 0.010	0.049	0.088	< 0.0020	3.4	---	17	2.9	2.4
	18-Aug-2023	200	< 1.0	5.6	740	330	---	480	1.3	0.58	< 0.015	0.22	0.049	< 0.033	< 0.010	0.049	0.082	< 0.0020	3.7	---	11	2.3	2.1
	24-Sep-2023	200	< 1.0	2.1	720	340	---	380	< 1.0	< 0.10	< 0.015	0.21	0.048	< 0.033	< 0.010	0.048	0.16	< 0.0020	0.81	---	19	2.2	1.6
Relative Percent Difference (RPD) Report																							
AEMP-DS-04 (Refinery)	26-Jul-2023	96	< 1.0	6.2	290	130	7.36	170	34	**21** [#2]	< 0.015	0.27	0.061	< 0.033	< 0.010	0.061	0.10	< 0.0020	1.1	---	21	3.7	3.0
(Duplicate)	26-Jul-2023	99	< 1.0	5.9	280	120	7.11	160	24	**19** [#2]	< 0.015	0.22	0.050	< 0.033	< 0.010	0.050	0.12	< 0.0020	5.5	---	16	3.5	3.1
RPD(%)		**3.1%**	**---**	**N/C**	**3.5%**	**8.0%**	**N/C**	**6.1%**	**34.5%**	**N/C**	**---**	**20.4%**	**19.8%**	**---**	**---**	**19.8%**	**18.2%**	**---**	**N/C**	**---**	**27.0%**	**5.6%**	**3.3%**
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	110	< 1.0	---	350	170	---	200	---	---	< 0.015	0.71	0.16	< 0.033	< 0.010	0.16	0.16	< 0.0020	3.2	---	---	3.7	3.6
(Duplicate)	10-Mar-2023	110	< 1.0	---	350	170	---	220	---	---	< 0.015	0.72	0.16	< 0.033	< 0.010	0.16	0.12	< 0.0020	3.4	---	---	3.7	3.5
RPD(%)		**0.0%**	**---**	**---**	**0.0%**	**0.0%**	**---**	**9.5%**	**---**	**---**	**---**	**1.4%**	**0.0%**	**---**	**---**	**0.0%**	**28.6%**	**---**	**N/C**	**---**	**---**	**0.0%**	**2.8%**
AEMP-DS-01 (Lower Bosworth Creek)	18-Aug-2023	200	< 1.0	8.0	740	330	---	470	4.5	**2.4** [#2]	< 0.015	0.18	0.041	< 0.033	< 0.010	0.041	0.095	0.0090	3.8	---	14	2.2	1.9
(Duplicate)	18-Aug-2023	200	< 1.0	3.1	730	330	---	470	< 0.99	**1.2** [#2]	< 0.015	0.21	0.047	< 0.033	< 0.010	0.047	0.076	0.0046	3.0	---	< 10 [#6]	2.2	2.2
RPD(%)		**0.0%**	**---**	**N/C**	**1.4%**	**0.0%**	**---**	**0.0%**	**---**	**N/C**	**---**	**15.4%**	**13.6%**	**---**	**---**	**13.6%**	**22.2%**	**N/C**	**N/C**	**---**	**---**	**0.0%**	**14.6%**
AEMP-DS-01 (Lower Bosworth Creek)	25-Sep-2023	200	< 1.0	5.0	710	0.80	---	400	< 1.0	< 0.10	< 0.015	0.21	0.048	< 0.033	< 0.010	0.048	0.088	0.018	NC	---	18	< 0.50	2.0
(Duplicate)	25-Sep-2023	190	< 1.0	< 2.0	730	< 0.50	---	530	< 1.0	< 0.10	< 0.015	0.26	0.059	< 0.033	< 0.010	0.059	---	0.026	NC	---	20	< 0.50	2.2
RPD(%)		**5.1%**	**---**	**N/C**	**2.8%**	**---**	**---**	**28.0%**	**---**	**---**	**---**	**21.3%**	**20.6%**	**---**	**---**	**20.6%**	**---**	**36.4%**	**N/C**	**---**	**10.5%**	**---**	**9.5%**

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Superscript [#1] denotes values exceeding
(CCME. 2014. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life.

Table 2

Surface Water Analytical Results: Indicator Analysis Parameters

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Anions					Cations							General										Inorganic Nitrogen Compounds							Inorganic Sulphur Compounds	Ion Balance	Miscellaneous			
			Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Hydroxide (mg/L)	Calcium (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Fluoride (mg/L)	Alkalinity (Total; as $CaCO_3$) (mg/L)	Alkalinity (PP; as $CaCO_3$) (mg/L)	Colour (color unit)	Electrical Conductivity (uS/cm)	Hardness (Total; as $CaCO_3$) (mg/L)	pH (pH Units)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	Ammonia (Total; as N) (mg/L)	Nitrate (mg/L)	Nitrate (as N) (mg/L)	Nitrite (mg/L)	Nitrite (as N) (mg/L)	Nitrite-plus-Nitrate (as N) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Sulphide (as H2S) (mg/L)	Ion Balance % Difference (%)	Biochemical Oxygen Demand (mg/L)	Chemical Oxygen Demand (mg/L)	Dissolved Organic Carbon (mg/L)	Total Organic Carbon (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			---	---	120	---	---	---	0.3	---	---	---	---	0.12	---	---	---	---	---	(6.5 - 9)	---	---	---	0.20	---	2.9	---	0.06	---	---	---	---	---	---	---	---
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			---	---	---	---	---	None required	---	---	0.12	---	---	1.5	---	---	---	---	---	---	---	---	1	None required	45	10	3	1	---	---	---	---	---	---	---	---

http://st-ts.ccme.ca/?chems=all&chapters=1 accessed Aug 22, 2014.)

Chloride:

Guideline based on chronic exposure

Ammonia (Total; as N):

Guideline for total ammonia is dependent on pH and temperature of surface water. Guideline based on Temperature of 15°C and pH of 8.5 based on conservative assessment of upstream data

Nitrate (as N):

Guideline based on long term exposure

Nitrite (as N):

Standard is for NO_2 as N, equivalent standard for NO_2 is 0.197 mg/L.

7. Superscript [#2] denotes values exceeding

(Health Canada. 2022. Guidelines for Canadian Drinking Water Quality. Summary Table. Maximum Acceptable Concentration.
Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
September 2022.)

Calcium:

Guideline value not necessary. Calcium contributes to hardness.

Turbidity:

Not specifically an MAC, rather a treatment limit guideline value specific groundwater not under direct influence of surface water. Groundwater that is not under the direct influence of surface water are considered less vulnerable to faecal contamination (HC 2012). A less stringent value for turbidity may be acceptable if it is demonstrated that the system has a history of acceptable microbiological quality and that a higher turbidity value will not compromise disinfection.

Health Canada (2012). Guidelines for Canadian Drinking Water Quality: Guideline Technical Document - Turbidity. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Canada. December 2012.

Ammonia (Total; as N):

Guideline value not necessary. No adverse effects at levels found in drinking water. To help prevent nitrification, limit excess free ammonia entering the distribution system to below 0.1 mg/L and preferably below 0.05 mg/L as N.

8. Superscript [#3] - Sample analyzed past hold time. Sample analysis is recommended within 48 hours of sampling.
9. Superscript [#4] - Method blank exceeds 0.2 mg/L stipulated in Reference Method. No other Quality Control measures affected.
10. Superscript [#5] - Method blank exceeds 0.2 mg/L stipulated in Reference Method. No other Quality Control measures affected
11. Superscript [#6] - COD < DOC: Both values fall within the method uncertainty for duplicates and are likely equivalent. COD < TOC: Both values fall within the method uncertainty for duplicates and are likely equivalent.
12. Superscript [#7] - Sample was past hold time when received.
13. Superscript [#8] - Detection limit raised based on sample volume used for analysis.
14. Superscript [#9] - Detection limits raised due to sample matrix.
15. Superscript [#10] - Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
16. Superscript [#11] - Sample incubation time was outside method specifications. This may increase the uncertainty associated with these results.
17. Superscript [#12] - Sample was originally processed within hold time. Data quality required investigation. Re-analysis was completed past recommended hold time.
18. Superscript [#13] - Method blank exceeds 0.2 mg/L stipulated in Reference Method. No other Quality Control measures affected.Sample analyzed past hold time. Sample analysis is recommended within 48 hours of sampling.
19. Superscript [#14] - Sample analyzed past hold time. Sample analysis is recommended within 48 hours of sampling. Method blank exceeds 0.2 mg/L stipulated in Reference Method. No other Quality Control measures affected.
20. Superscript [#15] - Detection limits raised due to dilution to bring analyte within the calibrated range.
21. Superscript [#16] - Detection limits raised due to matrix interference.
22. Superscript [#17] - Matrix spike exceeds acceptance limits due to matrix interference.
23. Denotes a Key Indicator Parameter
24. Highlighting indicates exceedance of UCL
25. Highlighting indicates value below LCL

Chloride

Table 3

Surface Water Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	m&p-Xylene (mg/L)	o-Xylene (mg/L)	Xylenes (Total) (mg/L)	PHC F1 (C_6-C_{10}) (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)	PHC F3 (C_{16}-C_{34}) (mg/L)	PHC F4 (C_{34}-C_{50}) (mg/L)	Oil and Grease (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.37**	**0.002**	**0.09**	---	---	---	---	---	---	---	---	---
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**0.005**	**0.06**	**0.14**	---	---	**0.09**	---	---	---	---	---	---
NW AEMP V5														
MACKENZIE RIVER														
Mackenzie Upstream Data UCL			N/C	N/C	N/C	---	---	N/C	---	---	---	---	---	---
Mackenzie Upstream Data LCL			N/C	N/C	N/C	---	---	N/C	---	---	---	---	---	---
DOWNSTREAM														
AEMP-DS-02 (Marine Dock)	17-Aug-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	21-Aug-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	16-Sep-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	---
	16-Oct-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	23-Jun-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	6.0
	13-Aug-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	17-Oct-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	03-Jun-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	28-Aug-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	03-Oct-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	12
	10-Jun-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	4.0
	24-Jul-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	18-Sep-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	06-Jun-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
	18-Aug-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
	17-Sep-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	31-Mar-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	12-Jun-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	06-Aug-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	4.0
	25-Sep-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	09-Mar-2023	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	5.0
	25-Jul-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	18-Aug-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	24-Sep-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
AEMP-DS-03 (Island 3)	16-Sep-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	16-Oct-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	23-Jun-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
	14-Aug-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0

Table 3

Surface Water Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	m&p-Xylene (mg/L)	o-Xylene (mg/L)	Xylenes (Total) (mg/L)	PHC F1 (C_6-C_{10}) (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)	PHC F3 (C_{16}-C_{34}) (mg/L)	PHC F4 (C_{34}-C_{50}) (mg/L)	Oil and Grease (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.37**	**0.002**	**0.09**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**0.005**	**0.06**	**0.14**	**---**	**---**	**0.09**	**---**	**---**	**---**	**---**	**---**	**---**
	18-Oct-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	10-Jun-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	26-Aug-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	01-Oct-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	12-Jun-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	4.0
	28-Jul-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	22-Sep-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	4.0
	07-Jun-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
(Duplicate)	07-Jun-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	19-Aug-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	18-Sep-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	31-Mar-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	14-Jun-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	6.0
	06-Aug-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
(Duplicate)	06-Aug-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	5.0
	25-Sep-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	7.0
	09-Mar-2023	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	4.0
	25-Jul-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	3.0
	19-Aug-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	0.23	< 0.20	< 2.0
	25-Sep-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
AEMP-DS-04 (Refinery)	21-Aug-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	< 2.0
(Duplicate)	21-Aug-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	16-Sep-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	16-Oct-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	23-Jun-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	10
	13-Aug-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	17-Oct-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
(Duplicate)	17-Oct-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
	03-Jun-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
	25-Aug-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	03-Oct-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	10-Jun-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	24-Jul-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
(Duplicate)	24-Jul-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0

Table 3

Surface Water Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	m&p-Xylene (mg/L)	o-Xylene (mg/L)	Xylenes (Total) (mg/L)	PHC F1 (C_6-C_{10}) (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)	PHC F3 (C_{16}-C_{34}) (mg/L)	PHC F4 (C_{34}-C_{50}) (mg/L)	Oil and Grease (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.37**	**0.002**	**0.09**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**0.005**	**0.06**	**0.14**	**---**	**---**	**0.09**	**---**	**---**	**---**	**---**	**---**	**---**
	18-Sep-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	4.0
(Duplicate)	18-Sep-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	06-Jun-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
	18-Aug-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
	17-Sep-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	12-Jun-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	06-Aug-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
(Duplicate)	06-Aug-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	24-Sep-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	5.0
(Duplicate)	24-Sep-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	7.0
	11-Mar-2023	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	26-Jul-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
(Duplicate)	26-Jul-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	18-Aug-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	0.33	< 0.20	< 2.0
	24-Sep-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
AEMP-DS-05 (Radar)	23-Jun-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	8.0
	14-Aug-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	18-Oct-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	10-Jun-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	26-Aug-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 3.8 [#11]
	01-Oct-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	12-Jun-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	28-Jul-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	22-Sep-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	07-Jun-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	19-Aug-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
(Duplicate)	19-Aug-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	18-Sep-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	10-Aug-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	11-Mar-2023	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
	25-Jul-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	19-Aug-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	26-Sep-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	3.0
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0

Table 3

Surface Water Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	m&p-Xylene (mg/L)	o-Xylene (mg/L)	Xylenes (Total) (mg/L)	PHC F1 (C_6-C_{10}) (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)	PHC F3 (C_{16}-C_{34}) (mg/L)	PHC F4 (C_{34}-C_{50}) (mg/L)	Oil and Grease (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.37**	**0.002**	**0.09**	---	---	---	---	---	---	---	---	---
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**0.005**	**0.06**	**0.14**	---	---	**0.09**	---	---	---	---	---	---
(Duplicate)	10-Mar-2023	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	4.0
	24-Jul-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	21-Aug-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	03-Oct-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
UPSTREAM														
AEMP-US-01 (Midway)	12-Mar-2023	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	25-Jul-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	19-Aug-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	26-Sep-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
AEMP-US-02 (10 mile)	23-Jun-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	9.0
	14-Aug-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
(Duplicate)	14-Aug-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	18-Oct-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	10-Jun-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	4.0
	26-Aug-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 3.6 [#11]
	01-Oct-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	12-Jun-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	28-Jul-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	22-Sep-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	07-Jun-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	19-Aug-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	18-Sep-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	10-Aug-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	4.0
	12-Mar-2023	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	25-Jul-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	19-Aug-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	24-Sep-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
AEMP-US-03 (Norman Wells Upstream)	09-Mar-2023	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	4.0

Table 3

Surface Water Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	m&p-Xylene (mg/L)	o-Xylene (mg/L)	Xylenes (Total) (mg/L)	PHC F1 (C_6-C_{10}) (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)	PHC F3 (C_{16}-C_{34}) (mg/L)	PHC F4 (C_{34}-C_{50}) (mg/L)	Oil and Grease (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.37**	**0.002**	**0.09**	---	---	---	---	---	---	---	---	---
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**0.005**	**0.06**	**0.14**	---	---	**0.09**	---	---	---	---	---	---
Bosworth Creek														
Bosworth Upstream Data UCL			N/C	N/C	N/C	---	---	N/C	---	---	---	---	---	---
Bosworth Upstream Data LCL			N/C	N/C	N/C	---	---	N/C	---	---	---	---	---	---
DOWNSTREAM														
AEMP-DS-01 (Lower Bosworth Creek)	18-Aug-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	16-Sep-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	---
(Duplicate)	16-Sep-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	16-Oct-2017	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	23-Jun-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	12-Aug-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	16-Oct-2018	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	2.0
	03-Jun-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
(Duplicate)	03-Jun-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	28-Aug-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	03-Oct-2019	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	2.0
	10-Jun-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	6.0
	24-Jul-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	18-Sep-2020	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	06-Jun-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
	18-Aug-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	3.0
	19-Sep-2021	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	11-Jun-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 2.0
	06-Aug-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	8.0
	26-Sep-2022	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	7.0
	26-Jul-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	18-Aug-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
(Duplicate)	18-Aug-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	25-Sep-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
(Duplicate)	25-Sep-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
UPSTREAM														
AEMP-US-04 (Upper Bosworth Creek)	26-Jul-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	18-Aug-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0
	24-Sep-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 2.0

Table 3

Surface Water Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	m&p-Xylene (mg/L)	o-Xylene (mg/L)	Xylenes (Total) (mg/L)	PHC F1 (C_6-C_{10}) (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)	PHC F3 (C_{16}-C_{34}) (mg/L)	PHC F4 (C_{34}-C_{50}) (mg/L)	Oil and Grease (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.37**	**0.002**	**0.09**	---	---	---	---	---	---	---	---	---
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**0.005**	**0.06**	**0.14**	---	---	**0.09**	---	---	---	---	---	---
Relative Percent Difference (RPD) Report														
AEMP-DS-04 (Refinery)	26-Jul-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 0.20
(Duplicate)	26-Jul-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 0.20
RPD(%)			---	---	---	---	---	---	---	---	---	---	---	---
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 0.20
(Duplicate)	10-Mar-2023	Grab	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	---	---	< 0.20
RPD(%)			---	---	---	---	---	---	---	---	---	---	---	---
AEMP-DS-01 (Lower Bosworth Creek)	18-Aug-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 0.20
(Duplicate)	18-Aug-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 0.20
RPD(%)			---	---	---	---	---	---	---	---	---	---	---	---
AEMP-DS-01 (Lower Bosworth Creek)	25-Sep-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	---
(Duplicate)	25-Sep-2023	PDB	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	---
RPD(%)			---	---	---	---	---	---	---	---	---	---	---	---

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Superscript [#1] denotes values exceeding
   (CCME. 2014. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life. http://st-ts.ccme.ca/?chems=all&chapters=1 accessed Aug 22, 2014.)
7. Superscript [#2] denotes values exceeding
   (Health Canada. 2022. Guidelines for Canadian Drinking Water Quality. Summary Table. Maximum Acceptable Concentration. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario. September 2022.)
8. Denotes a Key Indicator Parameter
9. N/C denotes not calculated as dataset does not meet minimum detections criterion

Table 4

Surface Water Analytical Results: Total Metals and Trace Elements

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Calcium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Potassium (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Sodium (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			0.1	---	0.005	---	---	1.5	0.00009	---	0.0089	---	0.0026	0.3	0.0036	---	---	---	0.000026	0.073	0.103	---	---	0.001	---	0.00025	---	---	0.0008	---	---	0.015	---	0.03
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			---	0.006	0.01	2	---	5	0.007	None required	0.05	---	2	---	0.005	---	---	0.12	0.001	---	---	---	---	0.05	---	---	---	7	---	---	---	0.02	---	---
Federal Environmental Quality Guidelines [#3]			---	---	---	---	---	---	---	---	0.005	0.0011	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.5	---	---	---	---	0.12	---
NW AEMP V5																																		
MACKENZIE RIVER																																		
Mackenzie Upstream Data UCL			2.9	---	0.0024	0.11	---	---	0.00022	---	0.0058	---	0.0070	5.2	---	---	---	---	---	0.0015	0.0091	---	---	0.00067	---	---	---	---	---	---	---	0.0012	---	0.031
Mackenzie Upstream Data LCL			0.003	---	0.0002	0.038	---	---	0.00002	---	0.0010	---	0.0010	0.06	---	---	---	---	---	0.0009	0.0007	---	---	0.0002	---	---	---	---	---	---	---	0.0006	---	0.003
DOWNSTREAM																																		
AEMP-DS-02 (Marine Dock)	17-Aug-2017	Grab	0.65 [#1]	< 0.00060	0.0011	0.066	< 0.0010	< 0.020	0.000071	39	0.0011	0.00079	0.0025	1.2 [#1]	0.00077	< 0.020	12	0.031	0.0000038	0.0012	0.0037	< 0.10	1.1	0.00052	2.6	< 0.00010	7.3	0.25	< 0.00020	< 0.0010	0.011	0.00094	0.0032	0.011
	21-Aug-2017	Grab	0.50 [#1]	< 0.00060	0.00079	0.056	< 0.0010	< 0.020	0.000035	33	< 0.0010	0.00056	0.0020	0.98 [#1]	0.00054	< 0.020	10	0.024	0.0000026	0.00095	0.0027	< 0.10	1.1	0.00031	2.2	< 0.00010	8.3	0.24	< 0.00020	< 0.0010	0.011	0.00072	0.0019	0.0057
	16-Sep-2017	Grab	1.2 [#1]	< 0.00060	0.0015	0.085	< 0.0010	< 0.020	0.000092 [#1]	39	0.0022	0.0016	0.0037 [#1]	3.2 [#1]	0.0017 [#1]	< 0.020	14	0.077	0.0000026	0.00095	0.0051	< 0.10	1.2	0.00026	3.0	< 0.00010	9.4	0.24	< 0.00020	< 0.0010	0.016	0.00074	0.0043	0.016
	16-Oct-2017	Grab	0.33 [#1]	< 0.00060	0.00056	0.048	< 0.0010	< 0.020	0.000029	31	< 0.0010	0.00039	0.0013	0.74 [#1]	0.00040	< 0.020	11	0.020	< 0.0000020	0.00077	0.0020	< 0.10	0.99	0.00033	2.1	< 0.00010	9.2	0.23	< 0.00020	< 0.0010	0.0069	0.00060	0.0026	0.0040
	23-Jun-2018	Grab	0.80 [#1]	< 0.00060	0.00098	0.063	< 0.0010	< 0.020	0.000066	31	0.0014	0.0011	0.0031 [#1]	1.6 [#1]	0.00089	< 0.020	9.5	0.038	0.0000030	0.0011	0.0043	< 0.10	1.0	0.00028	2.3	< 0.00010	7.3	0.20	< 0.00020	< 0.0010	0.010	0.00073	0.0026	0.011
	13-Aug-2018	Grab	0.73 [#1]	< 0.00060	0.00083	0.057	< 0.0010	< 0.020	0.000087	35	< 0.0010	0.00072	0.0023	1.1 [#1]	0.00060	< 0.020	11	0.028	0.0000039	0.0010	0.0034	< 0.10	1.0	0.00034	2.6	< 0.00010	9.2	0.26	< 0.00020	< 0.0010	0.015	0.00074	0.0021	0.011
	17-Oct-2018	Grab	0.12 [#1]	< 0.00060	0.00029	0.041	< 0.0010	< 0.020	< 0.000020	29	< 0.0010	< 0.00030	0.00095	0.19	< 0.00020	< 0.020	10	0.0069	< 0.0000020	0.00075	0.0012	< 0.10	0.94	< 0.00020	1.6	< 0.00010	9.4	0.28	< 0.00020	< 0.0010	0.0020	0.00052	< 0.0010	< 0.0030
	03-Jun-2019	Grab	1.7 [#1]	< 0.00060	0.0017	0.086	< 0.0010	< 0.020	0.00012 [#1]	37	0.0031	0.0021 [#3]	0.0048 [#1]	4.0 [#1]	0.0021 [#1]	< 0.020	13	0.092	0.0000080	0.0012	0.0065	< 0.10	1.4	0.00039	3.7	< 0.00010	7.9	0.31	< 0.00020	< 0.0010	0.019	0.00076	0.0046	0.021
	28-Aug-2019	Grab	0.59 [#1]	< 0.00060	0.00052	0.056	< 0.0010	< 0.020	0.000023	35	< 0.0010	0.00037	0.0015	0.86 [#1]	0.00042	< 0.020	11	0.018	< 0.0000020	0.00091	0.0018	< 0.10	1.1	0.00032	2.9	< 0.00010	8.8	0.29	< 0.00020	< 0.0010	0.015 [#3]	0.00069	0.0024	0.0044
	03-Oct-2019	Grab	0.38 [#1]	< 0.00060	0.00064	0.054	< 0.0010	< 0.020	0.000031	33	< 0.0010	0.00039	0.0015	0.87 [#1]	0.00041	< 0.020	10	0.015	0.0000020	0.00092	0.0023	< 0.10	1.1	0.00037	3.1	< 0.00010	8.9	0.27	< 0.00020	< 0.0010	0.0074	0.00060	0.0018	0.0051
	10-Jun-2020	Grab	3.7 [#1]	< 0.00060	0.0032	0.14	< 0.0010	< 0.020	0.00023 [#1]	35	0.0058 [#3]	0.0030 [#3]	0.0074 [#1]	6.8 [#1]	0.0036 [#1]	< 0.020	10	0.13 [#2]	< 0.000019 [#4]	0.0013	0.0096	0.15	2.4	0.00043	13	< 0.00010	6.0	0.20	< 0.00020	< 0.0010	0.086	0.00092	0.011	0.030 [#1]
	24-Jul-2020	Grab	1.9 [#1]	< 0.00060	0.0013	0.074	< 0.0010	< 0.020	0.000063	34	0.0030	0.0013 [#3]	0.0035 [#1]	2.4 [#1]	0.0012 [#1]	< 0.020	9.9	0.047	< 0.000019 [#4]	0.00095	0.0040	0.10	1.1	0.00031	3.2	< 0.00010	6.7	0.20	< 0.00020	< 0.0010	0.044	0.00075	0.0051	0.012
	18-Sep-2020	Grab	0.58 [#1]	< 0.00060	0.00085	0.061	< 0.0010	< 0.020	0.000047	34	0.0012	0.00055	0.0037 [#1]	1.1 [#1]	0.00053	< 0.020	9.2	0.025	< 0.0000019	0.00094	0.0062	< 0.10	1.1	0.00029	3.7	< 0.00010	7.7	0.19	< 0.00020	0.0018	0.014	0.00087	0.0019	0.0060
	06-Jun-2021	Grab	3.4 [#1]	< 0.00060	0.0021	0.074	< 0.0010	< 0.020	0.00010 [#1]	33	0.0057 [#3]	0.0016 [#3]	0.0041 [#1]	3.2 [#1]	0.0017 [#1]	< 0.020	9.5	0.065	0.0000053	0.0011	0.0059	< 0.10	1.6	0.00038	4.1	< 0.00010	6.7	0.17	< 0.00020	< 0.0010	0.15	0.00068	0.0086	0.018
	18-Aug-2021	Grab	4.4 [#1]	< 0.00060	0.0037	0.13	< 0.0010	< 0.020	0.00021 [#1]	39	0.0069 [#3]	0.0043 [#3]	0.010 [#1]	8.5 [#1]	0.0043 [#1]	< 0.020	13	0.15 [#2]	0.000013	0.0015	0.013	0.17	2.3	0.00049	6.9	< 0.00010	7.5	0.23	< 0.00020	< 0.0010	0.044	0.0010	0.013	0.095 [#1]
	17-Sep-2021	Grab	0.46 [#1]	< 0.00060	0.00061	0.049	< 0.0010	< 0.020	0.000030	33	0.0011	0.00042	0.0016	0.85 [#1]	0.00040	< 0.020	9.9	0.021	< 0.0000019	0.00086	0.0020	< 0.10	1.0	0.00030	2.6	< 0.00010	7.5	0.21	< 0.00020	< 0.0010	0.0083	0.00061	0.0019	< 0.0030
	31-Mar-2022	Grab	0.027	< 0.00060	0.00026	0.034	< 0.0010	< 0.020	0.000038	36	< 0.0010	< 0.00030	0.0021	0.061	0.0051 [#1,2]	< 0.020	10	0.0055	0.0000032	0.00055	0.0011	0.16	1.0	< 0.00020	1.6	< 0.00010	9.5	0.22	< 0.00020	< 0.0010	< 0.0010	0.00036	< 0.0010	0.023
	12-Jun-2022	Grab	3.3 [#1]	< 0.00060	0.0036	0.13	< 0.0010	< 0.020	0.00027 [#1]	43	0.0057 [#3]	0.0040 [#3]	0.0095 [#1]	9.0 [#1]	0.0040 [#1]	< 0.020	11	0.16 [#2]	0.000023	0.0027	0.014	0.19	2.0	0.00073	6.1	< 0.00010	5.3	0.20	< 0.00020	< 0.0010	0.039	0.0011	0.010	0.10 [#1]
	06-Aug-2022	Grab	1.7 [#1]	< 0.00060	0.0019	0.11	< 0.0010	< 0.020	0.00014 [#1]	39	0.0025	0.0018 [#3]	0.0048 [#1]	4.2 [#1]	0.0022 [#1]	< 0.020	12	0.090	< 0.0000019	0.0012	0.0060	< 0.10	1.9	0.00036	7.1	< 0.00010	8.4	0.26	< 0.00020	< 0.0010	0.027	0.00077	0.0050	0.074 [#1]
	25-Sep-2022	Grab	0.49 [#1]	< 0.00060	0.00073	0.056	< 0.0010	< 0.020	0.000042	33	< 0.0010	< 0.00030	0.0020	1.0 [#1]	0.00054	< 0.020	11	0.024	< 0.0000019	0.00095	0.0023	< 0.10	1.2	0.00022	2.5	< 0.00010	8.7	0.22	< 0.00020	< 0.0010	0.014	0.00063	0.0021	0.0062
	09-Mar-2023	Grab	0.038	< 0.00060	0.00023	0.036	< 0.0010	< 0.020	0.000033	26	0.0011	< 0.00030	0.0013	< 0.060	0.00029	< 0.020	9.1	< 0.0040	< 0.0000019	0.00057	0.0012	< 0.10	0.85	< 0.00020	1.6	< 0.00010	8.8	0.21	< 0.00020	0.0013	< 0.0010	0.00047	0.0017	0.0042
	25-Jul-2023	Grab	0.61 [#1]	< 0.00060	0.00076	0.057	< 0.0010	< 0.020	0.000050	35	0.0011	0.00045	0.0020	0.59 [#1]	0.00045	< 0.020	10	0.017	< 0.0000019	0.0014	0.0023	< 0.10	1.0	0.00045	2.6	< 0.00010	8.9	0.25	< 0.00020	< 0.0010	0.014	0.0011	0.0020	0.0054
	18-Aug-2023	Grab	1.7 [#1]	< 0.00060	0.0012	0.081	< 0.0010	0.039	0.000089	36	0.0028	0.00097	0.0030 [#1]	2.1 [#1]	0.0011 [#1]	< 0.020	11	0.042	0.0000044	0.0012	0.0042	< 0.10	1.5	0.00042	6.7	< 0.00010	8.4	0.24	< 0.00020	< 0.0010	0.051	0.00084	0.0053	0.012
	24-Sep-2023	Grab	0.16 [#1]	< 0.00060	0.00035	0.046	< 0.0010	< 0.020	< 0.000020	33	< 0.0010	< 0.00030	0.0011	0.23	< 0.00020	< 0.020	11	0.0099	< 0.0000019	0.00094	0.0011	< 0.10	0.92	0.00031	1.6	< 0.00010	9.1	0.26	< 0.00020	< 0.0010	0.0024	0.00069	< 0.0010	< 0.0030
AEMP-DS-03 (Island 3)	16-Sep-2017	Grab	0.52 [#1]	< 0.00060	0.00065	0.061	< 0.0010	< 0.020	0.000040	38	0.0010	0.00054	0.0020	0.88 [#1]	0.00048	< 0.020	11	0.022	< 0.0000020	0.0011	0.0029	< 0.10	1.1	0.00034	2.4	< 0.00010	9.4	0.23	< 0.00020	< 0.0010	0.0082	0.00083	0.0026	0.023
	16-Oct-2017	Grab	0.33 [#1]	< 0.00060	0.00050	0.053	< 0.0010	< 0.020	0.000050	37	< 0.0010	0.00034	0.0017	0.50 [#1]	0.00034	< 0.020	11	0.015	< 0.0000020	0.0011	0.0026	< 0.10	1.1	0.00039	2.1	< 0.00010	9.1	0.24	< 0.00020	< 0.0010	0.0083	0.00080	0.0020	0.0045
	23-Jun-2018	Grab	1.5 [#1]	< 0.00060	0.0015	0.073	< 0.0010	< 0.020	0.00015 [#1]	37	0.0028	0.0025 [#3]	0.0055 [#1]	2.3 [#1]	0.0016 [#1]	< 0.020	11	0.054	0.0000049	0.0016	0.0086	< 0.10	1.2	0.00060	2.9	< 0.00010	6.4	0.17	< 0.00020	< 0.0010	0.018	0.0011	0.0040	0.026
	14-Aug-2018	Grab	2.1 [#1]	< 0.00060	0.0016	0.099	< 0.0010	< 0.020	0.00042 [#1]	51	0.0022	0.0033 [#3]	0.0064 [#1]	3.3 [#1]	0.0023 [#1]	< 0.020	15	0.13 [#2]	0.000010	0.0010	0.011	0.17	1.3	0.00048	4.3	< 0.00010	7.5	0.27	< 0.00020	< 0.0010	0.024	0.0011	0.0054	0.056 [#1]
	18-Oct-2018	Grab	0.45 [#1]	< 0.00060	0.00070	0.059	< 0.0010	< 0.020	0.000065	32	< 0.0010	0.00053	0.0021	1.0 [#1]	0.00063	< 0.020	10	0.028	0.0000047	0.00076	0.0025	< 0.10	1.1	0.00030	2.1	< 0.00010	9.4	0.22	< 0.00020	< 0.0010	0.0079	0.00057	0.0016	0.0070
	10-Jun-2019	Grab	2.1 [#1]	0.00094	0.0023	0.10	< 0.0010	< 0.020	0.00015 [#1]	39	0.0038	0.0024 [#3]	0.0078 [#1]	5.0 [#1]	0.0026 [#1]	< 0.020	11	0.11	0.0000089	0.0013	0.0087	0.11	1.6	0.00045	4.2	< 0.00010	6.3	0.19	< 0.00020	< 0.0010	0.028	0.00086	0.0059	0.045 [#1]
	26-Aug-2019	Grab	1.9 [#1]	< 0.00060	0.0011	0.077	< 0.0010	< 0.020	0.000084	42	0.0028	0.0012 [#3]	0.0034 [#1]	2.2 [#1]	0.0010 [#1]	< 0.020	12	0.040	0.0000033	0.0011	0.0049	< 0.10	1.5	0.00062	5.5	< 0.00010	8.3	0.27	< 0.00020	< 0.0010	0.086	0.0011	0.0055	0.013
	01-Oct-2019	Grab	2.0 [#1]	< 0.00060	0.0017	0.11	< 0.0010	< 0.020	0.00012 [#1]	39	0.0037	0.0015 [#3]	0.0050 [#1]	3.4 [#1]	0.0018 [#1]	< 0.020	12	0.047	0.0000074	0.0014	0.0066	< 0.10	1.5	0.00061	3.3	< 0.00010	9.2	0.25	< 0.00020	< 0.0010	0.037	0.00097	0.0060	0.017
	12-Jun-2020	Grab	5.3 [#1]	< 0.00060	0.0050 [#1]	0.19	< 0.0010	< 0.020	0.00036 [#1]	51	0.0089 [#1,2]	0.0060 [#3]	0.013 [#1]	12 [#1]	0.0061 [#1,2]	< 0.020	15	0.22 [#2]	0.000021 [#4]	0.0018	0.020	0.24	2.3	0.00066	8.8	< 0.00010	5.2	0.24	< 0.00020	< 0.0010	0.045	0.0012	0.014	0.078 [#1]
	28-Jul-2020	Grab	1.7 [#1]	< 0.00060	0.0020	0.11	< 0.0010	< 0.020	0.00020 [#1]	44	0.0074 [#3]	0.0021 [#3]	0.0060 [#1]	3.6 [#1]	0.0021 [#1]	< 0.020	12	0.086	0.000020 [#4]	0.0013	0.0079	< 0.10	1.1	0.00062	3.7	< 0.00010	6.0	0.21	< 0.00020	< 0.0010	0.029	0.00098	0.0056	0.025
	22-Sep-2020	Grab	0.86 [#1]	0.0019	0.00092	0.061	< 0.0010	< 0.020	0.000074	40	0.0012	0.00065	0.0026 [#1]	1.3 [#1]	0.00066	< 0.020	11	0.029	0.000026 [#1,4]	0.0011	0.0044	< 0.10	1.2	0.00036	3.3	< 0.00010	7.3	0.21	< 0.00020	< 0.0010	0.019	0.00090	0.0042	0.0076
	07-Jun-2021	Grab	3.4 [#1]	< 0.00060	0.0022	0.10	< 0.0010	< 0.020	0.00019 [#1]	39	0.0059 [#3]	0.0022 [#3]	0.0059 [#1]	3.8 [#1]	0.0022 [#1]	< 0.020	11	0.088	0.0000048	0.0012	0.0089	0.11	1.6	0.00051	3.9	< 0.00010	6.2	0.18	< 0.00020	< 0.0010	0.084	0.00098	0.0091	0.029
(Duplicate)	07-Jun-2021	Grab	3.7 [#1]	< 0.00060	0.0021	0.098	< 0.0010	< 0.020	0.00014 [#1]	37	0.0067 [#3]	0.0020 [#3]	0.0061 [#1]	3.3 [#1]	0.0021 [#1]	< 0.020	10	0.075	< 0.0000019	0.0011	0.0084	< 0.10	1.5	0.00054	3.7	< 0.00010	6.2	0.18	< 0.00020	< 0.0010	0.091	0.00092	0.0087	0.026
	19-Aug-2021	Grab	3.9 [#1]	< 0.00060	0.0032	0.14	< 0.0010	0.022	0.00023 [#1]	46	0.0062 [#3]	0.0039 [#3]	0.0091 [#1]	8.5 [#1]	0.0035 [#1]	< 0.020	14	0.16 [#2]	0.0000042	0.0014	0.013	0.17	2.1	0.00046	6.4	< 0.00010	6.6	0.23	< 0.00020	< 0.0010	0.041	0.00094	0.010	0.083 [#1]
	18-Sep-2021	Grab	1.2 [#1]	0.00063	0.0015	0.071	< 0.0010	< 0.020	0.00013 [#1]	38	0.0028	0.0013 [#3]	0.0041 [#1]	2.4 [#1]	0.0013 [#1]	< 0.020	11	0.048	0.0000031	0.0012	0.0060	< 0.10	1.3	0.00043	3.4	< 0.00010	7.5	0.22	< 0.00020	< 0.0010	0.018	0.00091	0.0042	0.092 [#1]
	31-Mar-2022	Grab	0.10 [#1]	< 0.00060	0.00047	0.059	< 0.0010	< 0.020	0.000024	42	< 0.0010	< 0.00030	0.0023	0.67 [#1]	< 0.00020	< 0.020	12	0.012	0.0000022	0.0011	0.0015	< 0.10	1.3	0.00037	2.9	< 0.00010	12	0.27	< 0.00020	< 0.0010	0.0020	0.00081	< 0.0010	< 0.0030
	14-Jun-2022	Grab	7.9 [#1]	< 0.00060	0.0068 [#1]	0.24	< 0.0010	< 0.020	0.00050 [#1]	55	0.013 [#1,3]	0.0087 [#3]	0.019 [#1]	16 [#1]	0.0082 [#1,2]	< 0.020	16	0.34 [#2]	0.000034 [#1]	0.0018	0.026	0.33	2.4	0.00081	9.0	< 0.00010	4.0	0.20	< 0.00020	< 0.0010	0.14	0.0013	0.024	0.087 [#1]
	06-Aug-2022	Grab	0.97 [#1]	< 0.00060	0.0012	0.085	< 0.0010	< 0.020	0.000074	41	0.0018	0.00097	0.0033 [#1]	2.3 [#1]	0.0011 [#1]	< 0.020	12	0.051	0.0000068	0.0012	0.0041	< 0.10	1.6	0.00046	5.3	< 0.00010	7.6	0.23	< 0.00020	< 0.0010	0.014	0.00081	0.0029	0.080 [#1]
(Duplicate)	06-Aug-2022	Grab	0.95 [#1]	< 0.00060	0.0012	0.086	< 0.0010	< 0.020	0.000089	41	0.0015	0.00094	0.0031 [#1]	2.3 [#1]	0.0011 [#1]	< 0.020	12	0.050	0.0000055	0.0012	0.0041	< 0.10	1.6	0.00046	5.7	< 0.00010	7.7	0.23	< 0.00020	< 0.0010	0.016	0.00084	0.0030	0.064 [#1]
	25-Sep-2022	Grab	0.46 [#1]	< 0.00060	0.00067	0.057	< 0.0010	< 0.020	0.000047	39	< 0.0010	< 0.00030	0.0022	0.71 [#1]	0.00045	< 0.020	9.9	0.020	< 0.0000019	0.0011	0.0025	< 0.10	1.2	0.00040	3.0	< 0.00010	8.9	0.22	< 0.00020	< 0.0010	0.011	0.00076	0.0015	0.0050
	09-Mar-2023	Grab	0.17 [#1]	< 0.00060	0.00091	0.069	< 0.0010	< 0.020	0.000097 [#1]	45	0.040 [#1,3]	0.00055	0.0036 [#1]	0.47 [#1]	0.00063	< 0.020	12	0.011	< 0.0000019	0.0027	0.022	< 0.10	1.2	0.00067	2.5	< 0.00010	14	0.32	< 0.00020	< 0.0010	0.0026	0.0013	< 0.0010	0.0090
	25-Jul-2023	Grab	0.88 [#1]	< 0.00060	0.00080	0.064	< 0.0010	< 0.020	0.000054	41	0.0013	0.00051	0.0020	1.0 [#1]	0.00054	< 0.020	12	0.026	< 0.0000019	0.0011	0.0026	< 0.10	1.2	0.00046	3.5	< 0.00010	8.0	0.24	< 0.00020	< 0.0010	0.024	0.00092	0.0020	0.0072
	19-Aug-2023	Grab	2.0 [#1]	< 0.00060	0.0013	0.087	< 0.0010	< 0.020	0.00010 [#1]	44	0.0027	0.0010	0.0037 [#1]	2.2 [#1]	0.0012 [#1]	< 0.020	12	0.045	0.000012	0.0013	0.0046	< 0.10	1.5	0.00056	5.0	< 0.00010	8.1	0.25	< 0.00020	< 0.0010	0.079	0.0011	0.0052	0.016
	25-Sep-2023	Grab	0.23 [#1]	< 0.00060	0.00031	0.059	< 0.0010	< 0.020	0.000038	42	< 0.0010	< 0.00030	0.0013	0.32 [#1]	< 0.00020	< 0.020	13	0.011	< 0.0000019	0.0011	0.0017	< 0.10	1.0	0.00040	2.2	< 0.00010	9.9	0.28	< 0.00020	< 0.0010	0.0031	0.00087	< 0.0010	< 0.0030
AEMP-DS-04 (Refinery)	21-Aug-2017	Grab	0.62 [#1]	< 0.00060	0.00083	0.058	< 0.0010	< 0.020	0.000060	33	0.0011	0.00069	0.0023	1.2 [#1]	0.00063	< 0.020	10	0.029	0.0000024	0.00097	0.0030	< 0.10	1.1	0.00034	2.4	< 0.00010	8.1	0.23	< 0.00020	< 0.0010	0.0089	0.00074	0.0022	0.0082
(Duplicate)	21-Aug-2017	Grab	0.67 [#1]	< 0.00060	0.00093	0.059	< 0.0010	< 0.020	0.000053	33	0.0013	0.00077	0.0025	1.3 [#1]	0.00074	< 0.020	11	0.031	0.0000026	0.0010	0.0032	< 0.10	1.1	0.00038	2.4	< 0.00010	8.2	0.23	< 0.00020	< 0.0010	0.011	0.00079	0.0024	0.0078
	16-Sep-2017	Grab	0.28 [#1]	< 0.00060	0.00056	0.047	< 0.0010	< 0.020	0.000028	30	< 0.0010	0.00034	0.0013	0.67 [#1]	0.00039	< 0.020	10	0.018	< 0.0000020	0.00076	0.0018	< 0.10	0.89	< 0.00020	1.9	< 0.00010	9.0	0.20	< 0.00020	< 0.0010	0.0038	0.00057	0.0017	0.0042

Table 4

Surface Water Analytical Results: Total Metals and Trace Elements

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Calcium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Potassium (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Sodium (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.1**	**---**	**0.005**	**---**	**---**	**1.5**	**0.00009**	**---**	**0.0089**	**---**	**0.0026**	**0.3**	**0.0036**	**---**	**---**	**---**	**0.000026**	**0.073**	**0.103**	**---**	**---**	**0.001**	**---**	**0.00025**	**---**	**---**	**0.0008**	**---**	**---**	**0.015**	**---**	**0.03**
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**---**	**0.006**	**0.01**	**2**	**---**	**5**	**0.007**	**None required**	**0.05**	**---**	**2**	**---**	**0.005**	**---**	**---**	**0.12**	**0.001**	**---**	**---**	**---**	**---**	**0.05**	**---**	**---**	**---**	**7**	**---**	**---**	**---**	**0.02**	**---**	**---**
Federal Environmental Quality Guidelines [#3]			**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**0.005**	**0.0011**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**2.5**	**---**	**---**	**---**	**---**	**0.12**	**---**
	16-Oct-2017	Grab	**0.54 [#1]**	< 0.00060	0.00086	0.056	< 0.0010	< 0.020	0.000057	29	0.0010	0.00050	0.0020 [#1]	**0.80 [#1]**	0.00058	< 0.020	10	0.048	< 0.0000020	0.00095	0.0026	< 0.10	1.1	0.00028	1.9	< 0.00010	8.8	0.22	< 0.00020	< 0.0010	0.023	0.00075	0.0038	0.0064
	23-Jun-2018	Grab	**1.1 [#1]**	< 0.00060	0.0013	0.060	< 0.0010	< 0.020	**0.000098 [#1]**	29	0.0022	**0.0015 [#3]**	**0.0042 [#1]**	**1.6 [#1]**	**0.0014 [#1]**	< 0.020	8.9	0.038	0.0000033	0.0014	0.0059	< 0.10	1.1	0.00042	2.4	< 0.00010	7.2	0.16	< 0.00020	< 0.0010	0.017	0.00094	0.0040	0.014
	13-Aug-2018	Grab	**1.4 [#1]**	< 0.00060	0.0018	0.093	< 0.0010	< 0.020	**0.00017 [#1]**	39	0.0019	**0.0017 [#3]**	**0.0044 [#1]**	**3.0 [#1]**	**0.0019 [#1]**	< 0.020	12	0.079	0.000010	0.00098	0.0060	0.12	1.2	0.00040	3.2	< 0.00010	9.0	0.23	< 0.00020	< 0.0010	0.019	0.00081	0.0043	0.021
	17-Oct-2018	Grab	**0.34 [#1]**	< 0.00060	0.00060	0.052	< 0.0010	< 0.020	0.000040	28	< 0.0010	0.00042	0.0018	**0.66 [#1]**	0.00047	< 0.020	9.1	0.024	< 0.0000020	0.00091	0.0020	< 0.10	1.0	< 0.00020	2.1	< 0.00010	9.5	0.21	< 0.00020	< 0.0010	0.013	0.00059	< 0.0010	0.0039
(Duplicate)	17-Oct-2018	Grab	**0.34 [#1]**	< 0.00060	0.00046	0.053	< 0.0010	< 0.020	0.000038	28	< 0.0010	0.00040	0.0015	**0.72 [#1]**	0.00047	< 0.020	9.2	0.026	< 0.0000020	0.00078	0.0020	< 0.10	1.0	< 0.00020	2.2	< 0.00010	9.7	0.21	< 0.00020	< 0.0010	0.0069	0.00054	< 0.0010	0.0038
	03-Jun-2019	Grab	**3.5 [#1]**	< 0.00060	**0.0028**	0.11	< 0.0010	< 0.020	**0.00015 [#1]**	37	**0.0062 [#3]**	**0.0036 [#3]**	**0.0083 [#1]**	**7.5 [#1]**	**0.0034 [#1]**	< 0.020	12	**0.15 [#2]**	0.000013	0.0014	0.012	0.15	1.9	0.00031	5.5	< 0.00010	9.8	0.20	< 0.00020	< 0.0010	0.12	0.00088	0.0096	**0.035 [#1]**
	25-Aug-2019	Grab	**0.81 [#1]**	< 0.00060	0.00061	0.051	< 0.0010	< 0.020	0.000028	31	0.0011	0.00047	0.0017	**0.89 [#1]**	0.00046	< 0.020	9.9	0.018	< 0.0000020	0.00082	0.0024	< 0.10	1.1	0.00035	3.0	< 0.00010	8.3	0.22	< 0.00020	< 0.0010	0.013	0.00065	0.0017	0.0060
	03-Oct-2019	Grab	**4.6 [#1]**	< 0.00060	**0.0062 [#1]**	**0.34**	< 0.0010	0.021	**0.00048 [#1]**	70	**0.0093 [#1]**	**0.0069 [#3]**	**0.014 [#1]**	**16 [#1]**	**0.0077 [#1,2]**	< 0.020	24	**0.36 [#2]**	0.000021	**0.0019**	0.021	0.51	2.2	0.00063	9.0	< 0.00010	8.6	0.27	< 0.00020	< 0.0010	0.059	0.0012	0.015	**0.072 [#1]**
	10-Jun-2020	Grab	**4.3 [#1]**	< 0.00060	0.0034	**0.13**	< 0.0010	< 0.020	**0.00024 [#1]**	35	**0.0070 [#3]**	**0.0034 [#3]**	**0.0081 [#1]**	**7.1 [#1]**	**0.0040 [#1]**	< 0.020	11	**0.14 [#2]**	0.000020 [#4]	0.0015	0.011	0.17	1.6	0.00050	5.0	< 0.00010	6.0	0.20	< 0.00020	< 0.0010	0.11	0.00092	0.013	**0.033 [#1]**
	24-Jul-2020	Grab	**1.8 [#1]**	< 0.00060	0.0014	0.073	< 0.0010	< 0.020	0.000087	34	0.0033	0.00092	**0.0036 [#1]**	**2.6 [#1]**	**0.0015 [#1]**	< 0.020	9.7	0.051	< 0.000019 [#4]	0.00096	0.0047	< 0.10	1.1	0.00040	3.2	< 0.00010	6.5	0.19	< 0.00020	< 0.0010	0.038	0.00072	0.0056	0.0091
(Duplicate)	24-Jul-2020	Grab	**2.0 [#1]**	< 0.00060	0.0013	0.075	< 0.0010	< 0.020	**0.00012 [#1]**	34	0.0032	**0.0011 [#3]**	**0.0034 [#1]**	**2.6 [#1]**	**0.0014 [#1]**	< 0.020	10	0.051	< 0.000019 [#4]	0.0012	0.0049	< 0.10	1.1	0.00039	3.2	< 0.00010	6.6	0.20	< 0.00020	< 0.0010	0.039	0.00072	0.0048	0.0094
	18-Sep-2020	Grab	**0.60 [#1]**	< 0.00060	0.00069	0.060	< 0.0010	< 0.020	0.000037	34	0.0012	0.00043	0.0023	**1.0 [#1]**	0.00046	< 0.020	9.0	0.024	< 0.0000019	0.00075	0.0027	< 0.10	1.1	0.00027	3.0	< 0.00010	7.4	0.18	< 0.00020	0.0012	0.046	0.00063	0.0017	0.0053
(Duplicate)	18-Sep-2020	Grab	**0.53 [#1]**	< 0.00060	0.00070	0.058	< 0.0010	< 0.020	0.000055	34	0.0013	0.00057	**0.0039 [#1]**	**0.98 [#1]**	0.00060	< 0.020	9.1	0.024	< 0.0000019	0.0010	0.0033	< 0.10	1.2	0.00023	2.7	< 0.00010	7.7	0.18	< 0.00020	0.0061	0.014	0.0012	0.0019	0.0056
	06-Jun-2021	Grab	**3.2 [#1]**	< 0.00060	0.0021	0.079	< 0.0010	< 0.020	**0.00011 [#1]**	33	**0.0057 [#3]**	**0.0016 [#3]**	**0.0045 [#1]**	**3.5 [#1]**	**0.0017 [#1]**	< 0.020	9.6	0.069	0.0000060	0.00099	0.0064	< 0.10	1.6	0.00042	4.3	< 0.00010	6.6	0.17	< 0.00020	< 0.0010	0.082	0.00065	0.010	0.020
	18-Aug-2021	Grab	**4.5 [#1]**	< 0.00060	**0.0037**	**0.13**	< 0.0010	< 0.020	**0.00020 [#1]**	39	**0.0073 [#3]**	**0.0042 [#3]**	**0.010 [#1]**	**8.5 [#1]**	**0.0043 [#1]**	< 0.020	12	**0.15 [#2]**	0.000012	**0.0016**	0.015	0.17	2.3	0.00041	7.2	< 0.00010	7.3	0.22	< 0.00020	< 0.0010	0.041	0.0010	0.013	**0.088 [#1]**
	17-Sep-2021	Grab	**0.63 [#1]**	< 0.00060	0.00083	0.053	< 0.0010	< 0.020	0.000048	33	0.0014	0.00048	0.0022	**1.2 [#1]**	0.00062	< 0.020	9.6	0.028	< 0.0000019	0.00087	0.0024	< 0.10	1.1	0.00030	3.0	< 0.00010	7.1	0.18	< 0.00020	< 0.0010	0.014	0.00068	0.0026	0.0040
	12-Jun-2022	Grab	**5.1 [#1]**	< 0.00060	**0.0067 [#1]**	**0.18**	< 0.0010	< 0.020	**0.00045 [#1]**	44	**0.0091 [#1,2]**	0.0066	**0.015 [#1]**	**14 [#1]**	**0.0069 [#1,2]**	< 0.020	13	**0.25 [#2]**	**0.000032 [#1]**	**0.0068**	0.023	0.28	2.4	**0.00095**	8.0	< 0.00010	6.1	0.19	0.00030	< 0.0010	0.055	**0.0019**	0.017	**0.16 [#1]**
	06-Aug-2022	Grab	**8.5 [#1]**	< 0.00060	**0.0093 [#1]**	**0.39**	< 0.0010	0.023	**0.00071 [#1]**	75	**0.014 [#1,3]**	**0.010 [#3]**	**0.021 [#1]**	**24 [#1]**	**0.012 [#1,2]**	< 0.020	23	**0.53 [#2]**	< 0.0000019	**0.0025**	0.030	0.61	3.1	**0.00099**	12	0.00015	8.1	0.29	< 0.00020	< 0.0010	0.089	**0.0016**	0.026	**0.17 [#1]**
(Duplicate)	06-Aug-2022	Grab	**7.7 [#1]**	< 0.00060	**0.0083 [#1]**	**0.37**	< 0.0010	0.022	**0.00066 [#1]**	73	**0.013 [#1,3]**	**0.0096 [#3]**	**0.019 [#1]**	**21 [#1]**	**0.011 [#1,2]**	< 0.020	22	**0.49 [#2]**	< 0.0000019	**0.0023**	0.028	0.57	2.9	**0.00092**	11	0.00012	8.0	0.28	< 0.00020	< 0.0010	0.079	**0.0016**	0.023	**0.16 [#1]**
	24-Sep-2022	Grab	**3.8 [#1]**	< 0.00060	**0.0045**	**0.16**	< 0.0010	< 0.020	**0.00033 [#1]**	45	**0.0070 [#3]**	**0.0044 [#3]**	**0.013 [#1]**	**8.6 [#1]**	**0.0050 [#1,2]**	< 0.020	13	**0.22 [#2]**	0.000020	**0.0016**	0.014	0.19	2.0	0.00057	5.9	< 0.00010	8.2	0.21	< 0.00020	< 0.0010	0.054	0.0011	0.012	**0.086 [#1]**
(Duplicate)	24-Sep-2022	Grab	**3.8 [#1]**	< 0.00060	**0.0046**	**0.17**	< 0.0010	0.021	**0.00035 [#1]**	47	**0.0071 [#3]**	**0.0047 [#3]**	**0.014 [#1]**	**8.9 [#1]**	**0.0052 [#1,2]**	< 0.020	14	**0.23 [#2]**	**0.000029 [#1]**	**0.0017**	0.019	0.21	2.0	0.00058	6.1	< 0.00010	8.4	0.22	< 0.00020	< 0.0010	0.053	0.0011	0.012	**0.081 [#1]**
	11-Mar-2023	Grab	0.020	< 0.00060	0.00022	0.035	< 0.0010	0.025	0.000026	25	< 0.0010	< 0.00030	0.0018	< 0.060	< 0.00020	< 0.020	8.9	< 0.0040	< 0.0000019	0.00060	0.00071	< 0.10	0.79	0.00022	1.5	< 0.00010	8.3	0.22	< 0.00020	< 0.0010	< 0.0010	0.00044	< 0.0010	< 0.0030
	26-Jul-2023	Grab	**0.40 [#1]**	< 0.00060	0.00063	0.054	< 0.0010	< 0.020	0.000031	36	< 0.0010	0.00030	0.0018	**0.55 [#1]**	0.00031	< 0.020	10	0.017	< 0.0000019	0.0011	0.0016	< 0.10	1.0	0.00033	2.4	< 0.00010	8.4	0.22	< 0.00020	< 0.0010	0.0078	0.00076	0.0010	0.0047
(Duplicate)	26-Jul-2023	Grab	**0.45 [#1]**	< 0.00060	0.00054	0.055	< 0.0010	< 0.020	0.000037	36	< 0.0010	0.00036	0.0014	**0.63 [#1]**	0.00045	< 0.020	11	0.018	< 0.0000019	0.00099	0.0018	< 0.10	1.1	0.00032	2.5	< 0.00010	8.5	0.23	< 0.00020	< 0.0010	0.0063	0.00075	0.0011	0.0042
	18-Aug-2023	Grab	**1.9 [#1]**	< 0.00060	0.0014	0.087	< 0.0010	< 0.020	**0.000095 [#1]**	36	0.0031	**0.0011 [#3]**	**0.0036 [#1]**	**2.4 [#1]**	**0.0014 [#1]**	< 0.020	11	0.051	0.0000057	0.0012	0.0047	< 0.10	1.5	0.00045	5.6	< 0.00010	8.0	0.23	< 0.00020	< 0.0010	0.056	0.00090	0.0059	0.013
	24-Sep-2023	Grab	**0.30 [#1]**	< 0.00060 [#5]	0.00044	0.055	< 0.0010	< 0.020	0.000032	33	< 0.0010	0.00034	0.0013	**0.55 [#1]**	< 0.00020	< 0.020	10	0.015	< 0.0000019	0.00098	0.0016	< 0.10	1.1	0.00028	1.8	< 0.00010	8.9	0.23	< 0.00020	< 0.0010	0.0065	0.00075	< 0.0010	0.0041
AEMP-DS-05 (Radar)	23-Jun-2018	Grab	**0.88 [#1]**	< 0.00060	0.00099	0.066	< 0.0010	< 0.020	0.000085	32	0.0019	**0.0014 [#3]**	**0.0036 [#1]**	**1.7 [#1]**	0.0010 [#1]	< 0.020	9.3	0.042	0.0000036	0.00095	0.0049	< 0.10	1.1	0.00036	2.6	< 0.00010	6.6	0.16	< 0.00020	< 0.0010	0.018	0.00079	0.0028	0.011
	14-Aug-2018	Grab	**1.2 [#1]**	< 0.00060	0.00086	0.065	< 0.0010	< 0.020	**0.00013 [#1]**	37	0.0012	**0.0013 [#3]**	**0.0029 [#1]**	**1.5 [#1]**	0.00097	< 0.020	11	0.043	0.0000043	0.00092	0.0044	< 0.10	1.2	0.00036	3.3	< 0.00010	7.6	0.22	< 0.00020	< 0.0010	0.017	0.00080	0.0031	0.016
	18-Oct-2018	Grab	**1.0 [#1]**	< 0.00060	0.0011	0.071	< 0.0010	< 0.020	0.000071	32	0.0018	**0.0011 [#3]**	**0.0031 [#1]**	**2.1 [#1]**	**0.0012 [#1]**	< 0.020	11	0.049	0.0000038	0.00089	0.0040	< 0.10	1.2	0.00031	2.5	< 0.00010	9.9	0.27	< 0.00020	< 0.0010	0.016	0.00059	0.0035	0.012
	10-Jun-2019	Grab	**2.1 [#1]**	0.00098	0.0023	0.10	< 0.0010	< 0.020	**0.00016 [#1]**	38	0.0038	**0.0027 [#3]**	**0.0079 [#1]**	**5.4 [#1]**	**0.0028 [#1]**	< 0.020	11	0.12 [#2]	0.0000092	0.0012	0.0086	0.13	1.6	0.00040	4.2	< 0.00010	6.4	0.18	< 0.00020	< 0.0010	0.032	0.00076	0.0063	**0.038 [#1]**
	26-Aug-2019	Grab	**1.5 [#1]**	< 0.00060	0.0010	0.074	< 0.0010	< 0.020	0.000063	39	0.0025	**0.0011 [#3]**	**0.0031 [#1]**	**2.1 [#1]**	0.00098	< 0.020	11	0.039	0.0000036	0.0011	0.0046	< 0.10	1.4	0.00047	5.0	< 0.00010	8.0	0.24	< 0.00020	< 0.0010	0.043	0.0011	0.0050	0.0096
	01-Oct-2019	Grab	**1.6 [#1]**	0.0015	0.0018	0.11	< 0.0010	0.023	**0.00014 [#1]**	36	0.0028	**0.0025 [#3]**	**0.0078 [#1]**	**6.7 [#1]**	**0.0025 [#1]**	< 0.020	11	0.086	0.0000092	0.0014	0.0090	0.10	1.7	0.00048	3.9	< 0.00010	9.8	0.24	< 0.00020	< 0.0010	0.020	0.00098	0.0048	**0.044 [#1]**
	12-Jun-2020	Grab	**8.1 [#1]**	< 0.00060	**0.0081 [#1]**	**0.33**	< 0.0010	< 0.020	**0.00062 [#1]**	69	**0.014 [#1,3]**	**0.0094 [#3]**	**0.021 [#1]**	**21 [#1]**	**0.011 [#1,2]**	< 0.020	21	**0.41 [#2]**	< 0.000019 [#4]	**0.0025**	0.031	0.50	2.5	0.00074	12	0.00013	5.6	0.27	< 0.00020	< 0.0010	0.074	**0.0015**	0.023	**0.11 [#1]**
	28-Jul-2020	Grab	**1.3 [#1]**	< 0.00060	0.0014	0.072	< 0.0010	0.021	**0.000097 [#1]**	36	0.0037	**0.0012 [#3]**	**0.0045 [#1]**	**2.3 [#1]**	**0.0012 [#1]**	< 0.020	9.8	0.049	< 0.000019 [#4]	0.0013	0.0061	< 0.10	1.1	0.00052	3.2	0.00014	6.1	0.18	< 0.00020	< 0.0010	0.017	0.00089	0.0048	0.012
	22-Sep-2020	Grab	**0.67 [#1]**	0.0020	0.00094	0.058	< 0.0010	< 0.020	0.000056	36	< 0.0010	0.00063	0.0022	**1.2 [#1]**	0.00067	< 0.020	9.7	0.031	0.0000022	0.00085	0.0032	< 0.10	1.1	0.00044	2.8	< 0.00010	7.0	0.18	< 0.00020	< 0.0010	0.017	0.00076	0.0033	0.0067
	07-Jun-2021	Grab	**2.2 [#1]**	< 0.00060	0.0018	0.082	< 0.0010	< 0.020	**0.00012 [#1]**	38	**0.0052 [#1]**	**0.0016 [#3]**	**0.0045 [#1]**	**3.3 [#1]**	**0.0017 [#1]**	< 0.020	10	0.067	< 0.0000019	0.0011	0.0069	< 0.10	1.6	0.00041	4.0	< 0.00010	7.1	0.17	< 0.00020	< 0.0010	0.075	0.00095	0.0068	0.020
	19-Aug-2021	Grab	**2.9 [#1]**	< 0.00060	**0.0026**	**0.13**	< 0.0010	0.030	**0.00019 [#1]**	42	0.0046	**0.0030 [#3]**	**0.0075 [#1]**	**6.8 [#1]**	**0.0031 [#1]**	< 0.020	12	**0.13 [#2]**	0.0000086	0.0013	0.011	0.15	2.0	0.00044	7.7 [#6]	< 0.00010	7.0	0.21	< 0.00020	< 0.0010	0.036	0.00088	0.0079	**0.080 [#1]**
(Duplicate)	19-Aug-2021	Grab	**3.4 [#1]**	< 0.00060	**0.0030**	**0.13**	< 0.0010	0.028	**0.00021 [#1]**	43	**0.0052 [#2]**	**0.0033 [#3]**	**0.0084 [#1]**	**7.3 [#1]**	**0.0034 [#1]**	< 0.020	12	**0.14 [#2]**	0.0000095	0.0014	0.011	0.15	2.2	0.00054	8.2	< 0.00010	7.2	0.22	< 0.00020	< 0.0010	0.043	0.00094	0.0094	**0.12 [#1,3]**
	18-Sep-2021	Grab	**0.78 [#1]**	0.0010	0.0011	0.068	< 0.0010	< 0.020	0.000058	36	0.0023	0.00086	**0.0034 [#1]**	**1.7 [#1]**	0.00091	< 0.020	11	0.037	0.0000037	0.0011	0.0060	< 0.10	1.2	0.00052	3.1	< 0.00010	7.7	0.20	< 0.00020	< 0.0010	0.013	0.00085	0.0028	**0.11 [#1]**
	10-Aug-2022	Grab	**0.91 [#1]**	< 0.00060	0.0011	0.081	< 0.0010	0.020	0.000069	34	0.0014	0.0010	**0.0028 [#1]**	**2.3 [#1]**	**0.0012 [#1]**	< 0.020	10	0.051	0.0000041	0.00087	0.0039	< 0.10	1.4	0.00032	4.9	< 0.00010	7.0	0.20	< 0.00020	< 0.0010	0.015	0.00071	0.0030	**0.053 [#1]**
	11-Mar-2023	Grab	0.034	< 0.00060	0.00036	0.039	< 0.0010	< 0.020	0.000037	29	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	9.9	< 0.0040	< 0.0000019	0.00092	0.00073	< 0.10	0.89	< 0.00020	1.6	< 0.00010	9.6	0.27	< 0.00020	< 0.0010	0.0015	0.00082	< 0.0010	0.0044
	25-Jul-2023	Grab	**0.51 [#1]**	< 0.00060	0.00069	0.057	< 0.0010	< 0.020	0.000041	37	< 0.0010	0.00043	0.0016	**0.78 [#1]**	0.00044	< 0.020	11	0.023	< 0.0000019	0.0010	0.0036	< 0.10	1.1	0.00041	2.6	< 0.00010	8.1	0.22	< 0.00020	< 0.0010	0.010	0.00079	0.0013	0.0051
	19-Aug-2023	Grab	**1.4 [#1]**	< 0.00060	0.0013	0.078	< 0.0010	< 0.020	0.000081	39	0.0023	0.00073	**0.0028 [#1]**	**1.6 [#1]**	0.00094	< 0.020	11	0.034	0.0000047	0.0012	0.0037	< 0.10	1.4	0.00048	4.2	< 0.00010	8.3	0.23	< 0.00020	< 0.0010	0.034	0.0010	0.0042	0.0091
	26-Sep-2023	Grab	**1.4 [#1]**	< 0.00060	0.00095	0.075	< 0.0010	< 0.020	0.000079	40	0.0023	0.00092	**0.0027 [#1]**	**2.0 [#1]**	0.00099	< 0.020	12	0.051	0.0000021	0.0011	0.0037	< 0.10	1.5	0.00036	4.5	< 0.00010	9.2	0.24	< 0.00020	< 0.0010	0.031	0.00089	0.0033	0.011
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	Grab	**0.13 [#1]**	< 0.00060	0.00043	0.060	< 0.0010	< 0.020	0.000046	43	< 0.0010	< 0.00030	**0.0033 [#1]**	0.12	0.00023	< 0.020	11	< 0.0040	< 0.0000019	0.0013	0.0023	< 0.10	1.2	0.00055	2.3	< 0.00010	14	0.30	< 0.00020	< 0.0010	0.0025	0.0010	0.0018	< 0.0030
(Duplicate)	10-Mar-2023	Grab	**0.13 [#1]**	< 0.00060	0.00034	0.060	< 0.0010	< 0.020	0.000025	44	< 0.0010	< 0.00030	**0.0027 [#1]**	0.12	0.00022	< 0.020	12	< 0.0040	< 0.0000019	0.0010	0.0016	< 0.10	1.2	0.00050	2.3	< 0.00010	14	0.29	< 0.00020	< 0.0010	0.0034	0.00099	0.0017	0.0032
	24-Jul-2023	Grab	**1.3 [#1]**	< 0.00060	0.00093	0.075	< 0.0010	< 0.020	**0.000098 [#1]**	44	0.0022	0.00086	**0.0027 [#1]**	**1.4 [#1]**	0.00088	< 0.020	14	0.035	< 0.0000019	0.0012	0.0035	< 0.10	1.2	0.00053	3.5	< 0.00010	9.2	0.27	< 0.00020	< 0.0010	0.021	0.0011	0.0035	0.010
	21-Aug-2023	Grab	**2.3 [#1]**	< 0.00060	0.0014	0.098	< 0.0010	0.020	**0.00010 [#1]**	50	0.0034	**0.0013 [#3]**	**0.0032 [#1]**	**2.4 [#1]**	**0.0012 [#1]**	< 0.020	17	0.051	0.0000035	0.0013	0.0052	< 0.10	1.7	0.00065	5.9	< 0.00010	9.5	0.29	< 0.00020	< 0.0010	0.060	0.0011	0.0072	0.016
	03-Oct-2023	Grab	**0.98 [#1]**	< 0.00060	0.00069	0.068	< 0.0010	< 0.020	**0.00014 [#1]**	50	< 0.0010	**0.0020 [#3]**	**0.0028 [#1]**	**1.3 [#1]**	0.00045	< 0.020	20	0.028	< 0.0000019	0.0011	0.0063	< 0.10	1.1	0.00050	3.1	< 0.00010	12	0.27	< 0.00020	< 0.0010	0.0081	0.00099	0.0020	0.017
UPSTREAM																																		
AEMP-US-01 (Midway)	12-Mar-2023	Grab	**1.6 [#1]**	< 0.00060	0.0014	0.073	< 0.0010	< 0.020	0.000072	23	0.0029	**0.0013 [#3]**	**0.0027 [#1]**	**2.6 [#1]**	**0.0017 [#1]**	< 0.020	9.5	0.069	0.0000046	0.00057	0.0039	< 0.10	1.4	< 0.00020	5.0	< 0.00010	7.8	0.18	< 0.00020	< 0.0010	0.062	0.00059	0.0051	0.016
	25-Jul-2023	Grab	**0.39 [#1]**	< 0.00060	0.00048	0.051	< 0.0010	< 0.020	0.000033	34	< 0.0010	< 0.00030	0.0013	**0.48 [#1]**	0.00028	< 0.020	10	0.014	< 0.0000019	0.00095	0.0015	< 0.10	1.1	0.00031	2.4	< 0.00010	8.7	0.22	< 0.00020	< 0.0010	0.0093	0.00068	< 0.0010	0.0031
	19-Aug-2023	Grab	**0.70 [#1]**	0.00075	0.00071	0.054	< 0.0010	< 0.020	0.000048	30	0.0013	0.00036	0.0017	**0.78 [#1]**	0.00056	< 0.020	9.8	0.018	0.0000028	0.00090	0.0021	< 0.10	1.0	0.00035	2.6	< 0.00010	8.5	0.21	< 0.00020	< 0.0010	0.016	0.00071	0.0023	0.0050
	26-Sep-2023	Grab	0.079	< 0.00060	0.00026	0.035	< 0.0010	< 0.020	< 0.000020	24	< 0.0010	< 0.00030	< 0.0010	0.11	< 0.00020	< 0.020	8.9	0.0045	< 0.0000019	0.00058	0.00071	< 0.10	0.82	< 0.00020	1.3	< 0.00010	7.7	0.18	< 0.00020	< 0.0010	0.0019	0.00048	< 0.0010	< 0.0030
AEMP-US-02 (10 mile)	23-Jun-2018	Grab	**0.93 [#1]**	< 0.00060	0.0011	0.061	< 0.0010	< 0.020	0.000080	32	0.0018	**0.0012 [#3]**	**0.0036 [#1]**	**1.5 [#1]**	0.00093	< 0.020	8.7	0.031	0.0000033	0.0011	0.0050	< 0.10	1.1	0.00041	2.5	< 0.00010	6.1	0.15	< 0.00020	< 0.0010	0.024	0.00085	0.0027	0.011
	14-Aug-2018	Grab	**1.6 [#1]**	< 0.00060	0.0013	0.077	< 0.0010	< 0.020	**0.00015 [#1]**	40	0.0014	**0.0016 [#3]**	**0.0037 [#1]**	**2.0 [#1]**	**0.0012 [#1]**	< 0.020	12	0.052	0.0000068	0.0011	0.0057	< 0.10	1.3	0.00047	4.1	< 0.00010	7.8	0.24	< 0.00020	< 0.0010	0.029	0.00084	0.0035	0.021

Table 4

Surface Water Analytical Results: Total Metals and Trace Elements

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Calcium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Potassium (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Sodium (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.1**	**---**	**0.005**	**---**	**---**	**1.5**	**0.00009**	**---**	**0.0089**	**---**	**0.0026**	**0.3**	**0.0036**	**---**	**---**	**---**	**0.000026**	**0.073**	**0.103**	**---**	**---**	**0.001**	**---**	**0.00025**	**---**	**---**	**0.0008**	**---**	**---**	**0.015**	**---**	**0.03**
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**---**	**0.006**	**0.01**	**2**	**---**	**5**	**0.007**	**None required**	**0.05**	**---**	**2**	**---**	**0.005**	**---**	**---**	**0.12**	**0.001**	**---**	**---**	**---**	**---**	**0.05**	**---**	**---**	**---**	**7**	**---**	**---**	**---**	**0.02**	**---**	**---**
Federal Environmental Quality Guidelines [#3]			**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**0.005**	**0.0011**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**2.5**	**---**	**---**	**---**	**---**	**0.12**	**---**
(Duplicate)	14-Aug-2018	Grab	**1.4 [#1]**	< 0.00060	0.0011	0.076	< 0.0010	< 0.020	**0.00015 [#1]**	40	0.0016	**0.0015 [#3]**	**0.0036 [#1]**	**2.1 [#1]**	**0.0011 [#1]**	< 0.020	12	0.052	0.0000052	0.0011	0.0054	< 0.10	1.3	0.00042	3.8	< 0.00010	7.7	0.23	< 0.00020	< 0.0010	0.068	0.00086	0.0037	0.020
	18-Oct-2018	Grab	**0.44 [#1]**	< 0.00060	0.00069	0.057	< 0.0010	< 0.020	0.000053	28	< 0.0010	0.00047	0.0016	**0.89 [#1]**	0.00057	< 0.020	9.6	0.028	< 0.0000020	0.00079	0.0031	< 0.10	0.98	< 0.00020	1.9	< 0.00010	9.5	0.22	< 0.00020	< 0.0010	0.014	0.00057	0.0016	0.0055
	10-Jun-2019	Grab	**2.0 [#1]**	0.00096	0.0021	0.098	< 0.0010	< 0.020	**0.00015 [#1]**	38	0.0033	**0.0024 [#3]**	**0.0074 [#1]**	**4.8 [#1]**	**0.0026 [#1]**	< 0.020	10	0.11	0.0000090	0.0012	0.0081	0.11	1.5	0.00038	4.0	< 0.00010	6.2	0.18	< 0.00020	< 0.0010	0.028	0.00087	0.0056	**0.042 [#1]**
	26-Aug-2019	Grab	**1.7 [#1]**	< 0.00060	0.0013	0.076	< 0.0010	< 0.020	0.000083	40	0.0026	0.0010	**0.0031 [#1]**	**2.2 [#1]**	**0.0011 [#1]**	< 0.020	11	0.042	< 0.0000020	0.0011	0.0043	< 0.10	1.5	0.00053	5.2	< 0.00010	8.1	0.24	< 0.00020	< 0.0010	0.028	0.00097	0.0048	0.013
	01-Oct-2019	Grab	**1.6 [#1]**	< 0.00060	0.0011	0.085	< 0.0010	< 0.020	0.000086	37	0.0026	0.0010	**0.0043 [#1]**	**2.3 [#1]**	**0.0014 [#1]**	< 0.020	11	0.028	0.0000061	0.0012	0.0051	< 0.10	1.4	0.00050	3.1	< 0.00010	8.9	0.24	< 0.00020	< 0.0010	0.039	0.00095	0.0050	0.012
	12-Jun-2020	Grab	**4.7 [#1]**	< 0.00060	0.0039	0.16	< 0.0010	< 0.020	**0.00028 [#1]**	45	**0.0074 [#3]**	**0.0049 [#3]**	**0.012 [#1]**	**11 [#1]**	**0.0051 [#1,2]**	< 0.020	13	**0.18 [#2]**	0.000024 [#4]	0.0019	0.017	0.19	2.0	0.00061	7.8	< 0.00010	5.2	0.22	< 0.00020	< 0.0010	0.044	0.0011	0.013	**0.079 [#1]**
	28-Jul-2020	Grab	**1.1 [#1]**	< 0.00060	0.0017	0.084	< 0.0010	< 0.020	**0.00012 [#1]**	39	0.0032	**0.0013 [#3]**	**0.0042 [#1]**	**2.8 [#1]**	**0.0016 [#1]**	< 0.020	10	0.064	< 0.000019 [#4]	0.0011	0.0063	< 0.10	1.0	0.00067	3.3	< 0.00010	6.0	0.19	< 0.00020	< 0.0010	0.020	0.00083	0.0037	0.012
	22-Sep-2020	Grab	**0.76 [#1]**	0.00087	0.00099	0.060	< 0.0010	< 0.020	0.000065	39	0.0021	0.00075	**0.0028 [#1]**	**1.2 [#1]**	0.00075	< 0.020	10	0.032	0.0000023	0.0012	0.0039	< 0.10	1.1	0.00050	3.0	0.00013	7.2	0.19	< 0.00020	< 0.0010	0.016	0.00094	0.0038	0.0077
	07-Jun-2021	Grab	**2.7 [#1]**	< 0.00060	0.0016	0.081	< 0.0010	0.020	0.000088	38	0.0044	**0.0015 [#3]**	**0.0050 [#1]**	**3.3 [#1]**	**0.0017 [#1]**	< 0.020	10	0.064	0.0000029	0.00099	0.0066	< 0.10	1.6	0.00032	4.2	< 0.00010	7.1	0.17	< 0.00020	< 0.0010	0.069	0.00079	0.0075	0.017
	19-Aug-2021	Grab	**3.0 [#1]**	< 0.00060	0.0027	0.12	< 0.0010	0.048	**0.00018 [#1]**	41	0.0045	0.0029	**0.0073 [#1]**	**6.6 [#1]**	**0.0030 [#1]**	< 0.020	12	0.12 [#2]	0.000011	0.0015	0.0098	0.13	2.1	0.00052	7.9	< 0.00010	6.9	0.21	< 0.00020	0.0013	0.031	0.0011	0.0082	**0.099 [#1]**
	18-Sep-2021	Grab	**1.7 [#1]**	< 0.00060	0.0013	0.075	< 0.0010	< 0.020	0.000062	37	0.0033	0.0010	**0.0032 [#1]**	**1.9 [#1]**	0.0010 [#1]	< 0.020	11	0.039	0.0000038	0.0011	0.0046	< 0.10	1.6	0.00042	5.9	< 0.00010	7.5	0.21	< 0.00020	< 0.0010	0.040	0.00091	0.0053	0.0098
	10-Aug-2022	Grab	**0.84 [#1]**	< 0.00060	0.0010	0.075	< 0.0010	< 0.020	0.000077	35	< 0.0010	0.00076	0.0024	**1.6 [#1]**	0.00088	< 0.020	10	0.037	0.0000034	0.00086	0.0033	< 0.10	1.3	0.00030	4.6	< 0.00010	7.2	0.21	< 0.00020	< 0.0010	0.015	0.00076	0.0024	0.0097
	12-Mar-2023	Grab	**0.037 [#1]**	< 0.00060	< 0.00020	0.036	< 0.0010	< 0.020	< 0.000020	24	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	8.6	< 0.0040	< 0.0000019	0.00060	0.00078	< 0.10	0.77	< 0.00020	1.5	< 0.00010	8.2	0.20	< 0.00020	< 0.0010	< 0.0010	0.00050	< 0.0010	< 0.0030
	25-Jul-2023	Grab	**0.23 [#1]**	< 0.00060	0.00048	0.052	< 0.0010	< 0.020	0.000029	38	< 0.0010	< 0.00030	0.0012	0.30 [#1]	0.00022	< 0.020	11	0.014	< 0.0000019	0.0012	0.0015	< 0.10	1.0	0.00037	2.0	< 0.00010	8.8	0.24	< 0.00020	< 0.0010	0.0050	0.00083	< 0.0010	< 0.0030
	19-Aug-2023	Grab	**1.5 [#1]**	< 0.00060	0.0012	0.078	< 0.0010	< 0.020	0.000067	37	0.0026	0.00087	**0.0027 [#1]**	**1.7 [#1]**	0.00098	< 0.020	11	0.040	0.0000025	0.0013	0.0045	< 0.10	1.4	0.00045	4.4	< 0.00010	8.4	0.24	< 0.00020	< 0.0010	0.046	0.00098	0.0048	0.0095
	24-Sep-2023	Grab	**0.96 [#1]**	< 0.00060	0.00095	0.072	< 0.0010	< 0.020	0.000063	36	0.0015	0.00084	**0.0026 [#1]**	**1.6 [#1]**	0.00097	< 0.020	12	0.040	< 0.0000019	0.0014	0.0052	< 0.10	1.2	0.00038	2.8	< 0.00010	9.9	0.26	< 0.00020	< 0.0010	0.017	0.0010	0.0024	0.0093
AEMP-US-03 (Norman Wells Upstream)	09-Mar-2023	Grab	0.027	< 0.00060	0.00024	0.035	< 0.0010	< 0.020	0.000023	26	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	9.1	< 0.0040	< 0.0000019	0.00057	0.00071	< 0.10	0.80	< 0.00020	1.5	< 0.00010	8.6	0.21	< 0.00020	< 0.0010	< 0.0010	0.00046	0.0010	< 0.0030
BOSWORTH CREEK																																		
Bosworth Upstream Data UCL			0.138	---	0.00042	0.089	---	---	0.0001	---	0.005	---	0.0010	0.30	---	---	---	---	---	0.0023	0.0013	---	---	0.00039	---	---	---	---	---	---	---	0.0015	---	0.015
Bosworth Upstream Data LCL			0.003	---	0.0002	0.066	---	---	N/C	---	N/C	---	0.00014	0.06	---	---	---	---	---	0.0014	0.0004	---	---	0.00003	---	---	---	---	---	---	---	0.0011	---	N/C
DOWNSTREAM																																		
AEMP-DS-01 (Lower Bosworth Creek)	17-Aug-2017	Grab	0.039	< 0.00060	0.00026	0.085	< 0.0010	0.031	0.000020	74	< 0.0010	< 0.00030	0.00092	0.11	< 0.00020	< 0.020	27	0.0098	0.0000021	0.0018	0.00079	< 0.10	1.1	0.00021	2.1	< 0.00010	22	1.3	< 0.00020	< 0.0010	0.0032	0.0010	0.0014	< 0.0030
	16-Sep-2017	Grab	0.031	< 0.00060	0.00032	0.082	< 0.0010	0.024	< 0.000020	73	< 0.0010	< 0.00030	0.00064	0.096	< 0.00020	< 0.020	29	0.0087	< 0.0000020	0.0017	0.00077	< 0.10	1.0	< 0.00020	2.1	< 0.00010	19	1.3	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
(Duplicate)	16-Sep-2017	Grab	0.032	< 0.00060	0.00027	0.080	< 0.0010	0.023	< 0.000020	72	< 0.0010	< 0.00030	0.00035	0.10	< 0.00020	< 0.020	28	0.0084	< 0.0000020	0.0018	0.00078	< 0.10	0.98	< 0.00020	2.1	< 0.00010	19	1.2	< 0.00020	< 0.0010	< 0.0010	0.0011	0.0013	< 0.0030
	16-Oct-2017	Grab	**0.23 [#1]**	< 0.00060	0.00040	0.079	< 0.0010	0.022	0.000027	75	< 0.0010	< 0.00030	0.00074	**0.57 [#1]**	0.00030	< 0.020	31	0.020	< 0.0000020	0.0019	**0.0014**	< 0.10	1.1	0.00025	2.3	< 0.00010	20	1.4	< 0.00020	< 0.0010	0.0039	0.0012	0.0020	< 0.0030
	23-Jun-2018	Grab	0.047	< 0.00060	0.00036	0.086	< 0.0010	0.029	< 0.000020	76	< 0.0010	< 0.00030	0.00073	0.12	< 0.00020	< 0.020	27	0.0085	< 0.0000020	**0.0027**	0.0012	< 0.10	1.1	0.00031	2.0	< 0.00010	18	1.3	< 0.00020	< 0.0010	< 0.0010	**0.0016**	< 0.0010	< 0.0030
	12-Aug-2018	Grab	0.030	< 0.00060	0.00026	0.073	< 0.0010	0.023	< 0.000020	72	< 0.0010	< 0.00030	0.00033	0.11	< 0.00020	< 0.020	28	0.0091	0.0000025	0.0018	0.0010	< 0.10	0.93	< 0.00020	2.1	< 0.00010	14	1.3	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	16-Oct-2018	Grab	**0.20 [#1]**	< 0.00060	0.00024	0.074	< 0.0010	0.027	0.000031	78	< 0.0010	< 0.00030	0.00071	**0.50 [#1]**	0.00026	< 0.020	31	0.017	0.0000020	0.0019	0.0013	< 0.10	1.1	0.00031	2.3	< 0.00010	18	1.5	< 0.00020	< 0.0010	0.0038	0.0013	< 0.0010	< 0.0030
	03-Jun-2019	Grab	0.081	< 0.00060	0.00032	0.076	< 0.0010	0.022	< 0.000020	67	< 0.0010	< 0.00030	0.00076	0.18	< 0.00020	< 0.020	25	0.0078	< 0.0000020	0.0016	0.00089	< 0.10	1.1	< 0.00020	1.8	< 0.00010	15	1.1	< 0.00020	< 0.0010	0.0012	0.0011	< 0.0010	< 0.0030
(Duplicate)	03-Jun-2019	Grab	0.078	< 0.00060	0.00027	0.077	< 0.0010	0.022	< 0.000020	68	< 0.0010	< 0.00030	0.00061	0.19	< 0.00020	< 0.020	25	0.0081	< 0.0000020	0.0017	0.00079	< 0.10	1.0	< 0.00020	1.8	< 0.00010	15	1.1	< 0.00020	< 0.0010	0.0022	0.0011	< 0.0010	< 0.0030
	28-Aug-2019	Grab	0.079	< 0.00060	0.00023	0.083	< 0.0010	0.023	< 0.000020	79	< 0.0010	< 0.00030	0.00047	0.17	< 0.00020	< 0.020	28	0.0087	< 0.0000020	0.0018	0.00083	< 0.10	1.1	< 0.00020	2.1	< 0.00010	17	1.2	< 0.00020	< 0.0010	0.077	0.0011	< 0.0010	< 0.0030
	03-Oct-2019	Grab	0.020	< 0.00060	< 0.00020	0.075	< 0.0010	0.029	< 0.000020	79	< 0.0010	< 0.00030	0.00051	0.082	< 0.00020	< 0.020	28	0.0078	< 0.0000020	0.0016	0.0010	< 0.10	1.0	0.00032	1.8	< 0.00010	19	1.4	< 0.00020	< 0.0010	0.0010	0.0012	< 0.0010	< 0.0030
	10-Jun-2020	Grab	0.082	< 0.00060	0.00038	0.081	< 0.0010	< 0.020	< 0.000020	72	< 0.0010	< 0.00030	0.00067	0.29	< 0.00020	< 0.020	26	0.0067	< 0.0000019	**0.0026**	0.00091	< 0.10	1.0	< 0.00020	2.2	< 0.00010	13	1.2	< 0.00020	< 0.0010	0.0024	0.0015	< 0.0010	< 0.0030
	24-Jul-2020	Grab	0.024	< 0.00060	< 0.00020	0.081	< 0.0010	0.029	< 0.000020	81	0.0010	< 0.00030	0.00063	0.12	< 0.00020	< 0.020	28	0.0078	< 0.0000019	0.0019	< 0.00050	< 0.10	0.89	< 0.00020	1.9	< 0.00010	22	1.4	< 0.00020	< 0.0010	< 0.0010	0.0013	< 0.0010	0.0033
	18-Sep-2020	Grab	0.016	< 0.00060	0.00031	0.082	< 0.0010	0.025	< 0.000020	82	< 0.0010	< 0.00030	0.00058	0.074	< 0.00020	< 0.020	28	0.0074	0.0000024	0.0018	0.00094	< 0.10	1.2	0.00020	1.9	< 0.00010	19	1.4	< 0.00020	0.0020	< 0.0010	0.0014	< 0.0010	< 0.0030
	06-Jun-2021	Grab	0.095	< 0.00060	0.00036	0.072	< 0.0010	0.024	0.000034	72	0.0019	< 0.00030	0.00093	0.18	< 0.00020	< 0.020	26	0.0086	< 0.0000019	0.0018	0.0013	< 0.10	0.95	0.00024	2.1	< 0.00010	15	1.2	< 0.00020	< 0.0010	0.0042	0.0012	< 0.0010	< 0.0030
	18-Aug-2021	Grab	0.012	< 0.00060	< 0.00020	0.078	< 0.0010	0.036	< 0.000020	78	< 0.0010	< 0.00030	0.00045	0.070	< 0.00020	< 0.020	30	0.0076	< 0.0000019	0.0020	0.00071	< 0.10	1.2	< 0.00020	2.3	< 0.00010	26	1.5	< 0.00020	< 0.0010	< 0.0010	0.0013	< 0.0010	< 0.0030
	19-Sep-2021	Grab	0.012	< 0.00060	0.00028	0.080	< 0.0010	0.040	< 0.000020	86	< 0.0010	< 0.00030	0.00047	0.065	< 0.00020	< 0.020	32	0.0078	< 0.0000019	0.0019	0.00058	< 0.10	1.1	0.00024	2.2	< 0.00010	31	1.6	< 0.00020	< 0.0010	0.0012	0.0011	< 0.0010	0.0043
	11-Jun-2022	Grab	0.038	< 0.00060	0.00020	0.072	< 0.0010	0.025	< 0.000020	65	< 0.0010	< 0.00030	< 0.0010	0.11	< 0.00020	< 0.020	23	0.0076	< 0.0000019	0.0018	0.00088	< 0.10	0.91	< 0.00020	1.8	< 0.00010	16	1.2	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	06-Aug-2022	Grab	0.019	< 0.00060	0.00024	0.081	< 0.0010	0.033	< 0.000020	74	< 0.0010	< 0.00030	< 0.0010	0.063	< 0.00020	< 0.020	27	0.0060	< 0.0000019	0.0017	0.00073	< 0.10	1.1	< 0.00020	2.2	< 0.00010	23	1.4	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	0.0078
	26-Sep-2022	Grab	0.018	< 0.00060	< 0.00020	0.068	< 0.0010	0.032	< 0.000020	80	< 0.0010	< 0.00030	< 0.0010	0.066	< 0.00020	< 0.020	28	0.0067	< 0.0000019	0.0018	0.00066	< 0.10	1.1	0.00024	2.1	< 0.00010	26	1.3	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	26-Jul-2023	Grab	0.029	< 0.00060	0.00022	0.086	< 0.0010	0.044	< 0.000020	88	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	33	0.0077	< 0.0000019	0.0020	0.00082	< 0.10	1.3	< 0.00020	2.5	< 0.00010	28	1.5	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	18-Aug-2023	Grab	0.043	< 0.00060	0.00036	0.083	< 0.0010	0.039	< 0.000020	83	< 0.0010	< 0.00030	< 0.0010	0.095	< 0.00020	< 0.020	31	0.0085	< 0.0000019	0.0021	0.00060	< 0.10	1.2	< 0.00020	2.4	< 0.00010	30	1.5	< 0.00020	< 0.0010	< 0.0010	0.0013	< 0.0010	< 0.0030
(Duplicate)	18-Aug-2023	Grab	0.040	< 0.00060	0.00035	0.083	< 0.0010	0.040	< 0.000020	84	< 0.0010	< 0.00030	< 0.0010	0.10	< 0.00020	< 0.020	31	0.0084	< 0.0000019	0.0021	**0.0023**	< 0.10	1.2	< 0.00020	2.4	< 0.00010	31	1.5	< 0.00020	< 0.0010	< 0.0010	0.0012	< 0.0010	< 0.0030
	25-Sep-2023	Grab	0.024	< 0.00060	< 0.00020	0.084	< 0.0010	0.041	< 0.000020	86	< 0.0010	< 0.00030	< 0.0010	0.084	< 0.00020	< 0.020	36	0.0079	< 0.0000019	0.0017	0.00067	< 0.10	1.2	< 0.00020	2.6	< 0.00010	27	1.6	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
(Duplicate)	25-Sep-2023	Grab	0.018	< 0.00060	0.00025	0.085	< 0.0010	0.037	< 0.000020	83	< 0.0010	< 0.00030	< 0.0010	0.13	< 0.00020	< 0.020	32	0.0090	< 0.0000019	**0.0024**	< 0.00050	< 0.10	1.2	0.00024	2.5	< 0.00010	27	1.6	< 0.00020	< 0.0010	< 0.0010	0.0015	< 0.0010	< 0.0030
UPSTREAM																																		
AEMP-US-04 (Upper Bosworth Creek)	26-Jul-2023	Grab	0.024	< 0.00060	0.00025	0.080	< 0.0010	0.040	< 0.000020	83	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	31	0.0066	< 0.0000019	0.0019	0.00071	< 0.10	1.2	0.00022	2.4	< 0.00010	25	1.5	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	18-Aug-2023	Grab	0.033	< 0.00060	< 0.00020	0.077	< 0.0010	0.040	< 0.000020	80	< 0.0010	< 0.00030	< 0.0010	0.068	< 0.00020	< 0.020	29	0.0081	< 0.0000019	0.0021	0.00072	< 0.10	1.1	0.00025	2.3	< 0.00010	27	1.4	< 0.00020	< 0.0010	< 0.0010	0.0012	< 0.0010	< 0.0030
	24-Sep-2023	Grab	**0.22 [#1]**	< 0.00060	0.00030	0.083	< 0.0010	0.030	< 0.000020	82	< 0.0010	< 0.00030	< 0.0010	0.45 [#1]	< 0.00020	< 0.020	32	0.023	< 0.0000019	0.0021	0.0011	< 0.10	1.2	0.00022	2.9	< 0.00010	25	1.5	< 0.00020	< 0.0010	0.0028	0.0014	< 0.0010	< 0.0030
Relative Percent Difference (RPD) Report																																		
AEMP-DS-04 (Refinery)	26-Jul-2023	Grab	**0.40 [#1]**	< 0.00060	0.00063	0.054	< 0.0010	< 0.020	0.000031	36	< 0.0010	0.00030	0.0018	**0.55 [#1]**	0.00031	< 0.020	10	0.017	< 0.0000019	0.0011	0.0016	< 0.10	1.0	0.00033	2.4	< 0.00010	8.4	0.22	< 0.00020	< 0.0010	0.0078	0.00076	0.0010	0.0047
(Duplicate)	26-Jul-2023	Grab	**0.45 [#1]**	< 0.00060	0.00054	0.055	< 0.0010	< 0.020	0.000037	36	< 0.0010	0.00036	0.0014	**0.63 [#1]**	0.00045	< 0.020	11	0.018	< 0.0000019	0.00099	0.0018	< 0.10	1.1	0.00032	2.5	< 0.00010	8.5	0.23	< 0.00020	< 0.0010	0.0063	0.00075	0.0011	0.0042
RPD(%)			**11.8%**	**---**	**15.4%**	**1.8%**	**---**	**---**	**17.6%**	**0.0%**	**---**	**18.2%**	**25.0%**	**13.6%**	**36.8%**	**---**	**9.5%**	**5.7%**	**---**	**10.5%**	**11.8%**	**---**	**9.5%**	**3.1%**	**4.1%**	**---**	**1.2%**	**4.4%**	**---**	**---**	**21.3%**	**1.3%**	**9.5%**	**11.2%**
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	Grab	**0.13 [#1]**	< 0.00060	0.00043	0.060	< 0.0010	< 0.020	0.000046	43	< 0.0010	< 0.00030	**0.0033 [#1]**	0.12	0.00023	< 0.020	11	< 0.0040	< 0.0000019	0.0013	0.0023	< 0.10	1.2	0.00055	2.3	< 0.00010	14	0.30	< 0.00020	< 0.0010	0.0025	0.0010	0.0018	< 0.0030

Table 4

Surface Water Analytical Results: Total Metals and Trace Elements

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Calcium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Potassium (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Sodium (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.1**	**---**	**0.005**	**---**	**---**	**1.5**	**0.00009**	**---**	**0.0089**	**---**	**0.0026**	**0.3**	**0.0036**	**---**	**---**	**---**	**0.000026**	**0.073**	**0.103**	**---**	**---**	**0.001**	**---**	**0.00025**	**---**	**---**	**0.0008**	**---**	**---**	**0.015**	**---**	**0.03**
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**---**	**0.006**	**0.01**	**2**	**---**	**5**	**0.007**	**None required**	**0.05**	**---**	**2**	**---**	**0.005**	**---**	**---**	**0.12**	**0.001**	**---**	**---**	**---**	**---**	**0.05**	**---**	**---**	**---**	**7**	**---**	**---**	**---**	**0.02**	**---**	**---**
Federal Environmental Quality Guidelines [#3]			**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**0.005**	**0.0011**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**2.5**	**---**	**---**	**---**	**---**	**0.12**	**---**
(Duplicate)	10-Mar-2023	Grab	**0.13 [#1]**	< 0.00060	0.00034	0.060	< 0.0010	< 0.020	0.000025	44	< 0.0010	< 0.00030	**0.0027 [#1]**	0.12	0.00022	< 0.020	12	< 0.0040	< 0.0000019	0.0010	0.0016	< 0.10	1.2	0.00050	2.3	< 0.00010	14	0.29	< 0.00020	< 0.0010	0.0034	0.00099	0.0017	0.0032
RPD(%)			**0.0%**	**---**	**23.4%**	**0.0%**	**---**	**---**	**---**	**2.3%**	**---**	**---**	**20.0%**	**0.0%**	**4.4%**	**---**	**8.7%**	**---**	**---**	**26.1%**	**35.9%**	**---**	**0.0%**	**9.5%**	**0.0%**	**---**	**0.0%**	**3.4%**	**---**	**---**	**30.5%**	**1.0%**	**5.7%**	**---**
AEMP-DS-01 (Lower Bosworth Creek)	18-Aug-2023	Grab	0.043	< 0.00060	0.00036	0.083	< 0.0010	0.039	< 0.000020	83	< 0.0010	< 0.00030	< 0.0010	0.095	< 0.00020	< 0.020	31	0.0085	< 0.0000019	0.0021	0.00060	< 0.10	1.2	< 0.00020	2.4	< 0.00010	30	1.5	< 0.00020	< 0.0010	< 0.0010	0.0013	< 0.0010	< 0.0030
(Duplicate)	18-Aug-2023	Grab	0.040	< 0.00060	0.00035	0.083	< 0.0010	0.040	< 0.000020	84	< 0.0010	< 0.00030	< 0.0010	0.10	< 0.00020	< 0.020	31	0.0084	< 0.0000019	0.0021	0.0023	< 0.10	1.2	< 0.00020	2.4	< 0.00010	31	1.5	< 0.00020	< 0.0010	< 0.0010	0.0012	< 0.0010	< 0.0030
RPD(%)			**7.2%**	**---**	**2.8%**	**0.0%**	**---**	**2.5%**	**---**	**1.2%**	**---**	**---**	**---**	**5.1%**	**---**	**---**	**0.0%**	**1.2%**	**---**	**0.0%**	**---**	**---**	**0.0%**	**---**	**0.0%**	**---**	**3.3%**	**0.0%**	**---**	**---**	**---**	**8.0%**	**---**	**---**
AEMP-DS-01 (Lower Bosworth Creek)	25-Sep-2023	Grab	0.024	< 0.00060	< 0.00020	0.084	< 0.0010	0.041	< 0.000020	86	< 0.0010	< 0.00030	< 0.0010	0.084	< 0.00020	< 0.020	36	0.0079	< 0.0000019	0.0017	0.00067	< 0.10	1.2	< 0.00020	2.6	< 0.00010	27	1.6	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
(Duplicate)	25-Sep-2023	Grab	0.018	< 0.00060	0.00025	0.085	< 0.0010	0.037	< 0.000020	83	< 0.0010	< 0.00030	< 0.0010	0.13	< 0.00020	< 0.020	32	0.0090	< 0.0000019	0.0024	< 0.00050	< 0.10	1.2	0.00024	2.5	< 0.00010	27	1.6	< 0.00020	< 0.0010	< 0.0010	0.0015	< 0.0010	< 0.0030
RPD(%)			**28.6%**	**---**	**---**	**1.2%**	**---**	**10.3%**	**---**	**3.6%**	**---**	**---**	**---**	**43.0%**	**---**	**---**	**11.8%**	**13.0%**	**---**	**34.1%**	**---**	**---**	**0.0%**	**---**	**3.9%**	**---**	**0.0%**	**0.0%**	**---**	**---**	**---**	**30.8%**	**---**	**---**

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Superscript [#1]denotes values exceeding
   (CCME. 2014. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life.
   http://st-ts.ccme.ca/?chems=all&chapters=1 accessed Aug 22, 2014.)
   Aluminum:
   Standard varies with pH.
   Based on upstream pH >= 6.5 = 0.1 mg/L
   Boron:
   Guideline based on long term exposure
   Cadmium:
   Guideline based on long term exposure
   Chromium (Total):
   Limit is for Chromium(III).
   Cobalt:
   Guideline is based on a hardness of 110mg/L
   Copper:
   Guideline is hardness dependent. Presented guideline based on 25th percentile upstream hardness of 110 mg/L.
   Lead:
   Guideline is hardness dependent. Presented guideline based on 25th percentile upstream hardness of 110 mg/L.
   Mercury:
   Guideline for Inorganic mercury
   Nickel:
   Guideline is hardness dependent. Presented guideline based on 25th percentile upstream hardness of 110 mg/L.
   Silver:
   Guideline based on long term exposure
   Uranium:
   Guideline based on long term exposure
7. Superscript [#2]denotes values exceeding
   (Health Canada. 2022. Guidelines for Canadian Drinking Water Quality. Summary Table. Maximum Acceptable Concentration.
   Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
   September 2022.)
   Calcium:
   Guideline value not necessary. Calcium contributes to hardness.
   Chromium (Total):
   MAC established for total chromium to protect from Chromium (VI).
8. Superscript [#3] - Duplicate exceeds acceptance criteria due to sample non homogeneity. Reanalysis yields similar results.
9. Superscript [#4] - Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
10. Superscript [#5] - Matrix Spike exceeds acceptance limits due to matrix interference. Reanalysis yields similar results.
11. Superscript [#6] - Matrix spike exceeds acceptance limits due to probable matrix interference.

Table 5

Surface Water Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.1**	**---**	**0.005**	**---**	**---**	**1.5**	**0.00009**	**0.0089**	**---**	**0.0026**	**0.3**	**0.0036**	**---**	**---**	**0.000026**	**0.073**	**0.103**	**---**	**0.001**	**---**	**0.00025**	**---**	**0.0008**	**---**	**---**	**0.015**	**---**	**0.03**
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**---**	**0.006**	**0.01**	**2**	**---**	**5**	**0.007**	**0.05**	**---**	**2**	**---**	**0.005**	**---**	**0.12**	**0.001**	**---**	**---**	**---**	**0.05**	**---**	**---**	**7**	**---**	**---**	**---**	**0.02**	**---**	**---**
Federal Environmental Quality Guidelines [#3]			**---**	**---**	**---**	**---**	**---**	**---**	**---**	**0.005**	**0.0011**	**---**	**---**	**0.0025**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**2.5**	**---**	**---**	**---**	**---**	**0.12**	**---**
NW AEMP V5																														
MACKENZIE RIVER																														
Mackenzie Upstream Data UCL			2.869	---	0.0024	0.111	---	---	0.00022	0.0058	---	0.0070	5.24	---	---	---	---	0.0015	0.00912	---	0.00067	---	---	---	---	---	---	0.0012	---	0.0309
Mackenzie Upstream Data LCL			0.003	---	0.0002	0.038	---	---	0.00002	0.0010	---	0.0010	0.06	---	---	---	---	0.0009	0.00066	---	0.0002	---	---	---	---	---	---	0.00057	---	0.0030
DOWNSTREAM																														
AEMP-DS-02 (Marine Dock)	17-Aug-2017	Grab	0.067	< 0.00060	0.00043	0.051	< 0.0010	< 0.020	0.000030	< 0.0010	< 0.00030	0.0019	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0012	0.0015	< 0.10	0.00044	1.9	< 0.00010	0.25	< 0.00020	< 0.0010	< 0.0010	0.00085	0.0011	0.0049
	21-Aug-2017	Grab	0.035	< 0.00060	0.00035	0.044	< 0.0010	< 0.020	0.000032	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00086	0.0011	< 0.10	0.00026	1.6	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00065	< 0.0010	< 0.0030
	16-Sep-2017	Grab	0.033	< 0.00060	0.00027	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	0.0041	< 0.0000020	0.00070	0.0010	< 0.10	< 0.00020	1.5	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00053	< 0.0010	< 0.0030
	16-Oct-2017	Grab	0.015	< 0.00060	0.00035	0.036	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0010	< 0.060	< 0.00020	< 0.020	0.0049	< 0.0000020	0.00070	0.0011	< 0.10	0.00025	1.4	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00054	< 0.0010	< 0.0030
	23-Jun-2018	Grab	**0.13 [#1]**	< 0.00060	0.00031	0.047	< 0.0010	< 0.020	0.000023	< 0.0010	< 0.00030	**0.0030 [#1]**	0.20	0.00026	< 0.020	0.011	0.0000026	0.00079	0.0012	< 0.10	0.00021	1.4	< 0.00010	0.18	< 0.00020	< 0.0010	0.0010	0.00050	< 0.0010	0.0078
	13-Aug-2018	Grab	0.048	< 0.00060	0.00036	0.044	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00086	0.0017	< 0.10	0.00022	1.5	< 0.00010	0.26	< 0.00020	< 0.0010	< 0.0010	0.00067	< 0.0010	< 0.0030
	17-Oct-2018	Grab	0.0097	< 0.00060	0.00023	0.039	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00077	0.00099	< 0.10	< 0.00020	1.4	< 0.00010	0.28	< 0.00020	< 0.0010	< 0.0010	0.00055	< 0.0010	< 0.0030
	03-Jun-2019	Grab	0.018	< 0.00060	0.00029	0.040	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	0.0048	< 0.0000020	0.00081	0.00096	< 0.10	0.00028	1.4	< 0.00010	0.28	< 0.00020	< 0.0010	< 0.0010	0.00056	< 0.0010	< 0.0030
	28-Aug-2019	Grab	0.022	< 0.00060	0.00024	0.042	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00079	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00091	0.00088	< 0.10	0.00021	1.5	< 0.00010	0.31	< 0.00020	< 0.0010	< 0.0010	0.00066	< 0.0010	< 0.0030
	03-Oct-2019	Grab	0.014	< 0.00060	0.00039	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0021	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00091	0.00086	< 0.10	0.00026	1.4	< 0.00010	0.27	< 0.00020	< 0.0010	0.0012	0.00057	< 0.0010	0.0098
	10-Jun-2020	Grab	0.013	< 0.00060	0.00044	0.041	< 0.0010	< 0.020	0.000021	0.0038	< 0.00030	**0.0062 [#1]**	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0015	0.0034	< 0.10	0.00039	1.5	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00055	< 0.0010	< 0.0030
	24-Jul-2020	Grab	0.018	< 0.00060	0.00026	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00086	0.0012	< 0.10	< 0.00020	1.5	< 0.00010	0.19	< 0.00020	0.0028	< 0.0010	0.00062	< 0.0010	< 0.0030
	18-Sep-2020	Grab	0.015	< 0.00060	0.00023	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00075	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00066	0.0013	< 0.10	0.00027	1.7	< 0.00010	0.19	< 0.00020	< 0.0010	< 0.0010	0.00056	< 0.0010	< 0.0030
	06-Jun-2021	Grab	0.015	< 0.00060	0.00041	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0017	0.066	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00066	0.0015	< 0.10	0.00027	1.8	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00035	< 0.0010	< 0.0030
	18-Aug-2021	Grab	0.025	< 0.00060	0.00034	0.042	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	0.000011	0.00086	0.0014	< 0.10	0.00022	1.5	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00061	< 0.0010	< 0.0030
	22-Aug-2021	Grab	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0000019	---	---	---	---	---	---	---	---	---	---	---	---	---
	17-Sep-2021	Grab	0.014	< 0.00060	0.00035	0.045	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	**0.0031 [#1]**	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00075	0.00093	< 0.10	0.00020	1.5	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00057	< 0.0010	< 0.0030
	31-Mar-2022	Grab	0.019	< 0.00060	0.00026	0.032	< 0.0010	< 0.020	**0.00016 [#1]**	< 0.0010	< 0.00030	0.0013	< 0.060	0.00021	< 0.020	< 0.0040	< 0.0000019	0.00055	0.00063	< 0.10	< 0.00020	1.5	< 0.00010	0.21	< 0.00020	< 0.0010	0.0018	0.00049	< 0.0010	0.0042
	12-Jun-2022	Grab	0.016	< 0.00060	0.00033	0.033	< 0.0010	< 0.020	0.000023	< 0.0010	< 0.00030	0.0017	0.064	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0020	0.0024	< 0.10	0.00051	1.6	< 0.00010	0.16	< 0.00020	< 0.0010	0.0011	0.00076	< 0.0010	< 0.0030
	06-Aug-2022	Grab	**0.12 [#1]**	< 0.00060	0.00053	0.057	< 0.0010	< 0.020	0.000030	< 0.0010	0.00032	0.0024	**0.34 [#1]**	0.00058	< 0.020	0.030	< 0.0000019	0.00080	0.0017	< 0.10	0.00024	2.0	< 0.00010	0.24	< 0.00020	< 0.0010	0.0027	0.00061	< 0.0010	0.0057
	25-Sep-2022	Grab	0.011	< 0.00060	0.00029	0.049	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	**0.0031 [#1]**	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0018	0.0013	< 0.10	0.00022	1.4	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00057	< 0.0010	0.0031
	09-Mar-2023	Grab	0.0033	< 0.00060	0.00030	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	0.00052	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00053	0.0011	< 0.10	< 0.00020	1.4	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00013	< 0.0010	0.0064
	25-Jul-2023	Grab	0.023	< 0.00060	0.00032	0.048	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0014	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000020	0.00083	0.0012	< 0.10	0.00024	1.6	< 0.00010	0.26	< 0.00020	< 0.0010	< 0.0010	0.00061	< 0.0010	< 0.0030
	18-Aug-2023	Grab	0.021	< 0.00060	0.00034	---	< 0.0010	---	< 0.000020	< 0.0010	< 0.00030	0.0016	< 0.060	< 0.00020	---	< 0.0040	< 0.0000019	0.0011	0.00099	---	0.00029	---	< 0.00010	---	< 0.00020	< 0.0010	< 0.0010	0.00063	< 0.0010	< 0.0030
	24-Sep-2023	Grab	0.021	< 0.00060	0.00032	0.050	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00083	0.00099	< 0.10	0.00024	1.4	< 0.00010	0.29	< 0.00020	< 0.0010	< 0.0010	0.00065	< 0.0010	< 0.0030
AEMP-DS-03 (Island 3)	16-Sep-2017	Grab	0.051	< 0.00060	0.00025	0.047	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00092	0.0014	< 0.10	0.00035	1.8	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00072	< 0.0010	< 0.0030
	16-Oct-2017	Grab	0.024	< 0.00060	0.00028	0.047	< 0.0010	< 0.020	0.000022	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0010	0.0017	< 0.10	0.00034	1.7	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00076	< 0.0010	< 0.0030
	23-Jun-2018	Grab	0.047	< 0.00060	0.00036	0.044	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00097	0.0011	< 0.10	0.00029	1.6	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00065	< 0.0010	< 0.0030
	14-Aug-2018	Grab	0.090	< 0.00060	0.00028	0.048	< 0.0010	< 0.020	0.000023	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000031	0.00090	0.0015	< 0.10	0.00034	1.6	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00083	< 0.0010	< 0.0030
	18-Oct-2018	Grab	0.0060	< 0.00060	0.00031	0.047	< 0.0010	0.020	< 0.000020	< 0.0010	< 0.00030	0.00088	< 0.060	< 0.00020	< 0.020	0.0093	< 0.0000020	0.00075	0.00092	< 0.10	< 0.00020	1.4	< 0.00010	0.27	< 0.00020	< 0.0010	< 0.0010	0.00056	< 0.0010	< 0.0030
	10-Jun-2019	Grab	0.020	< 0.00060	0.00021	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00085	0.0014	< 0.10	0.00026	1.7	< 0.00010	0.18	< 0.00020	< 0.0010	< 0.0010	0.00066	< 0.0010	< 0.0030
	26-Aug-2019	Grab	0.047	< 0.00060	0.00020	0.048	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0012	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00094	0.0014	< 0.10	0.00036	1.8	< 0.00010	0.27	< 0.00020	< 0.0010	< 0.0010	0.00084	< 0.0010	< 0.0030
	01-Oct-2019	Grab	0.032	< 0.00060	0.00033	0.051	< 0.0010	< 0.020	0.000021	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0011	0.0017	< 0.10	0.00057	1.8	< 0.00010	0.24	< 0.00020	< 0.0010	0.0011	0.00078	< 0.0010	0.0057
	12-Jun-2020	Grab	0.023	< 0.00060	0.00030	0.042	< 0.0010	< 0.020	0.000022	< 0.0010	< 0.00030	0.0019	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000038	0.00090	0.0017	< 0.10	0.00034	1.9	< 0.00010	0.19	< 0.00020	< 0.0010	< 0.0010	0.0012	< 0.0010	< 0.0030
	28-Jul-2020	Grab	0.0084	< 0.00060	0.00032	0.045	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.00020	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0013	0.0014	< 0.10	0.00047	1.8	< 0.00010	0.20	< 0.00020	< 0.0010	< 0.0010	0.00083	0.0020	0.0084
	22-Sep-2020	Grab	0.026	< 0.00060	0.00039	0.044	< 0.0010	< 0.020	0.000026	< 0.0010	< 0.00030	0.0023	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0010	0.0015	< 0.10	0.00032	1.9	< 0.00010	0.20	< 0.00020	< 0.0010	< 0.0010	0.00074	< 0.0010	< 0.0030
	07-Jun-2021	Grab	0.034	< 0.00060	0.00025	0.045	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00078	0.0015	< 0.10	0.00024	2.0	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00053	< 0.0010	< 0.0030
(Duplicate)	07-Jun-2021	Grab	0.026	< 0.00060	0.00026	0.045	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0016	0.070	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00074	0.0018	< 0.10	0.00031	2.1	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00046	< 0.0010	< 0.0030
	19-Aug-2021	Grab	0.036	< 0.00060	0.00032	0.045	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	**0.0045 [#1]**	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00094	0.0018	< 0.10	0.00044	1.8	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00075	< 0.0010	0.0050
	18-Sep-2021	Grab	0.044	< 0.00060	0.00049	0.047	< 0.0010	< 0.020	0.000021	< 0.0010	< 0.00030	0.0014	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000020	0.00096	0.0017	< 0.10	0.00035	1.8	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00081	< 0.0010	< 0.0030
	31-Mar-2022	Grab	0.0054	< 0.00060	0.00040	0.061	< 0.0010	< 0.020	< 0.000020	0.0017	< 0.00030	**0.0027 [#1]**	< 0.060	**0.019 [#1,2,3]**	< 0.020	< 0.0040	0.0000051	0.0012	0.0017	< 0.10	0.00035	2.5	< 0.00010	0.29	< 0.00020	< 0.0010	< 0.0010	0.00082	< 0.0010	0.013
	14-Jun-2022	Grab	0.022	< 0.00060	0.00030	0.039	< 0.0010	< 0.020	0.000025	< 0.0010	< 0.00030	0.0016	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000022	0.00082	0.0015	< 0.10	0.00026	1.6	< 0.00010	0.16	< 0.00020	0.0033	< 0.0010	0.00062	< 0.0010	< 0.0030
	06-Aug-2022	Grab	0.039	< 0.00060	0.00038	0.053	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000024	0.0010	0.0015	< 0.10	0.00035	1.9	< 0.00010	0.23	< 0.00020	< 0.0010	0.0011	0.00070	< 0.0010	0.0037
(Duplicate)	06-Aug-2022	Grab	0.038 [#1]	< 0.00060	0.00031	0.051	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0023	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0011	0.0016	< 0.10	0.00039	2.0	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00068	< 0.0010	0.0079
	25-Sep-2022	Grab	0.029 [#1]	< 0.00060	0.00032	0.051	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	**0.0031 [#1]**	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0011	0.0016	< 0.10	0.00035	1.6	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00071	< 0.0010	0.0068
	09-Mar-2023	Grab	0.0075	< 0.00060	0.00046	0.066	< 0.0010	< 0.020	0.000024	0.0010	< 0.00030	0.0018	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0011	0.0058	< 0.10	0.00048	2.1	< 0.00010	0.32	< 0.00020	< 0.0010	< 0.0010	0.00079	< 0.0010	0.0036

Table 5

Surface Water Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.1**	**---**	**0.005**	**---**	**---**	**1.5**	**0.00009**	**0.0089**	**---**	**0.0026**	**0.3**	**0.0036**	**---**	**---**	**0.000026**	**0.073**	**0.103**	**---**	**0.001**	**---**	**0.00025**	**---**	**0.0008**	**---**	**---**	**0.015**	**---**	**0.03**
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**---**	**0.006**	**0.01**	**2**	**---**	**5**	**0.007**	**0.05**	**---**	**2**	**---**	**0.005**	**---**	**0.12**	**0.001**	**---**	**---**	**---**	**0.05**	**---**	**---**	**7**	**---**	**---**	**---**	**0.02**	**---**	**---**
Federal Environmental Quality Guidelines [#3]			**---**	**---**	**---**	**---**	**---**	**---**	**---**	**0.005**	**0.0011**	**---**	**---**	**0.0025**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**2.5**	**---**	**---**	**---**	**---**	**0.12**	**---**
	25-Jul-2023	Grab	0.039	< 0.00060	0.00031	0.050	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0011	0.0011	< 0.10	0.00037	1.6	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00083	< 0.0010	< 0.0030
	19-Aug-2023	Grab	0.036	< 0.00060	0.00032	0.051	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0023	< 0.060	< 0.00020	< 0.020	0.0044	< 0.0000019	0.0011	0.0016	< 0.10	0.00051	1.7	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00092	< 0.0010	< 0.0030
	25-Sep-2023	Grab	0.030	< 0.00060	0.00026	0.052	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0011	0.0017	< 0.10	0.00038	1.6	< 0.00010	0.28	< 0.00020	< 0.0010	< 0.0010	0.00082	< 0.0010	< 0.0030
AEMP-DS-04 (Refinery)	21-Aug-2017	Grab	0.033	< 0.00060	0.00034	0.043	< 0.0010	< 0.020	0.000028	< 0.0010	< 0.00030	0.0012	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00084	0.0011	< 0.10	0.00032	1.5	< 0.00010	0.22	< 0.00020	0.0010	< 0.0010	0.00065	< 0.0010	< 0.0030
(Duplicate)	21-Aug-2017	Grab	0.030	< 0.00060	0.00036	0.042	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0014	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00083	0.00089	< 0.10	0.00032	1.5	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00059	< 0.0010	< 0.0030
	16-Sep-2017	Grab	0.026	< 0.00060	0.00022	0.040	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00075	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00072	0.0011	< 0.10	0.00022	1.4	< 0.00010	0.22	< 0.00020	0.0019	< 0.0010	0.00054	< 0.0010	< 0.0030
	16-Oct-2017	Grab	0.012	< 0.00060	0.00036	0.044	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00070	< 0.060	< 0.00020	< 0.020	0.022	< 0.0000020	0.00082	0.0010	< 0.10	< 0.00020	1.4	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00060	< 0.0010	< 0.0030
	23-Jun-2018	Grab	0.028	< 0.00060	0.00025	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0012	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000031	0.00081	0.0010	< 0.10	< 0.00020	1.4	< 0.00010	0.16	< 0.00020	< 0.0010	< 0.0010	0.00053	< 0.0010	< 0.0030
	13-Aug-2018	Grab	0.048	< 0.00060	0.00027	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000022	0.00076	0.0014	< 0.10	0.00026	1.4	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00062	< 0.0010	< 0.0030
	17-Oct-2018	Grab	0.0077	< 0.00060	0.00044	0.046	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00092	< 0.060	< 0.00020	< 0.020	0.013	< 0.0000020	0.00081	0.00086	< 0.10	0.00025	1.3	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00050	< 0.0010	< 0.0030
(Duplicate)	17-Oct-2018	Grab	0.0088	< 0.00060	0.00046	0.048	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00081	< 0.060	< 0.00020	< 0.020	0.018	< 0.0000020	0.00087	0.00091	< 0.10	0.00024	1.4	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00048	< 0.0010	< 0.0030
	03-Jun-2019	Grab	0.016	< 0.00060	0.00033	0.037	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	0.0098	0.0000020	0.00089	0.0012	< 0.10	0.00023	1.4	< 0.00010	0.19	< 0.00020	0.0018	< 0.0010	0.00060	< 0.0010	< 0.0030
	25-Aug-2019	Grab	0.022	< 0.00060	0.00030	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00084	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00085	0.00092	< 0.10	0.00024	1.5	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00069	< 0.0010	< 0.0030
	03-Oct-2019	Grab	0.014	< 0.00060	0.00043	0.062	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00070	< 0.060	< 0.00020	< 0.020	0.029	< 0.0000020	0.00081	0.0025	< 0.10	0.00022	1.4	< 0.00010	0.20	< 0.00020	< 0.0010	< 0.0010	0.00057	< 0.0010	< 0.0030
	10-Jun-2020	Grab	0.012	< 0.00060	0.00030	0.036	< 0.0010	< 0.020	0.000023	0.0042	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00084	0.0039	< 0.10	0.00030	1.5	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00058	0.0013	< 0.0030
	24-Jul-2020	Grab	0.018	< 0.00060	0.00026	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00097	0.0013	< 0.10	< 0.00020	1.5	< 0.00010	0.19	< 0.00020	0.0020	< 0.0010	0.00068	< 0.0010	< 0.0030
(Duplicate)	24-Jul-2020	Grab	0.018	< 0.00060	0.00025	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0012	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00062	0.0010	< 0.10	0.00021	1.5	< 0.00010	0.19	< 0.00020	< 0.0010	< 0.0010	0.00063	< 0.0010	< 0.0030
	18-Sep-2020	Grab	0.016	< 0.00060	0.00029	0.040	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00072	0.0022	< 0.10	0.00022	1.8	< 0.00010	0.19	< 0.00020	< 0.0010	< 0.0010	0.00053	< 0.0010	< 0.0030
(Duplicate)	18-Sep-2020	Grab	0.017	< 0.00060	0.00031	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00076	0.0012	< 0.10	0.00027	1.7	< 0.00010	0.18	< 0.00020	< 0.0010	< 0.0010	0.00057	< 0.0010	< 0.0030
	06-Jun-2021	Grab	0.094	< 0.00060	0.00055	0.044	< 0.0010	< 0.020	< 0.000020	0.0014	< 0.00030	0.0017	0.17	< 0.00020	< 0.020	0.0073	< 0.0000019	0.00060	0.0016	< 0.10	0.00025	2.0	< 0.00010	0.17	< 0.00020	< 0.0010	0.0020	0.00040	< 0.0010	< 0.0030
	18-Aug-2021	Grab	0.026	< 0.00060	0.00038	0.043	< 0.0010	0.054	< 0.000020	< 0.0010	< 0.00030	0.0016	< 0.060	< 0.00020	< 0.020	0.0044	---	0.00083	0.0013	< 0.10	0.00030	1.5	< 0.00010	0.19	< 0.00020	< 0.0010	< 0.0010	0.00064	< 0.0010	< 0.0030
	22-Aug-2021	Grab	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0000019	---	---	---	---	---	---	---	---	---	---	---	---	---
	17-Sep-2021	Grab	0.014	< 0.00060	0.00030	0.044	< 0.0010	0.042	< 0.000020	< 0.0010	< 0.00030	0.0012	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00068	0.00095	< 0.10	0.00022	1.5	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00052	< 0.0010	< 0.0030
	12-Jun-2022	Grab	0.013	< 0.00060	0.00033	0.043	< 0.0010	< 0.020	0.000026	< 0.0010	< 0.00030	**0.0030** [#1]	0.076	< 0.00020	< 0.020	0.0059	< 0.0000019	0.0034	0.0020	< 0.10	0.00034	1.6	< 0.00010	0.16	< 0.00020	0.0016	0.0013	0.0011	< 0.0010	< 0.0030
	06-Aug-2022	Grab	0.011	< 0.00060	0.00050	0.054	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	0.067	< 0.0000019	0.0011	0.0012	< 0.10	0.00028	1.6	< 0.00010	0.20	< 0.00020	< 0.0010	0.0011	0.00062	< 0.0010	< 0.0030
(Duplicate)	06-Aug-2022	Grab	0.014	< 0.00060	0.00066	0.055	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	0.069	< 0.0000019	0.0010	0.0011	< 0.10	0.00030	1.5	< 0.00010	0.20	< 0.00020	< 0.0010	< 0.0010	0.00067	< 0.0010	< 0.0030
	24-Sep-2022	Grab	0.0060	< 0.00060	0.00055	0.065	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	0.068	< 0.0000019	0.00089	0.0011	< 0.10	0.00026	1.4	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00062	< 0.0010	< 0.0030
(Duplicate)	24-Sep-2022	Grab	0.0071	< 0.00060	0.00058	0.065	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	0.073	< 0.0000019	0.00089	0.00092	< 0.10	0.00026	1.4	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00061	< 0.0010	< 0.0030
	11-Mar-2023	Grab	0.0044	< 0.00060	0.00023	0.035	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00054	< 0.00050	< 0.10	< 0.00020	1.3	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00040	< 0.0010	< 0.0030
	26-Jul-2023	Grab	0.026	< 0.00060	0.00027	0.047	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00097	0.00095	< 0.10	0.00027	1.5	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00069	< 0.0010	0.0044
(Duplicate)	26-Jul-2023	Grab	0.029	< 0.00060	0.00033	0.046	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0018	< 0.060	0.00034	< 0.020	< 0.0040	< 0.0000019	0.0010	0.0016	< 0.10	0.00031	1.4	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00073	< 0.0010	0.0077
	18-Aug-2023	Grab	0.022	< 0.00060	0.00034	---	< 0.0010	---	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	---	0.0040	< 0.0000019	0.00086	0.00083	---	0.00034	---	< 0.00010	---	< 0.00020	< 0.0010	< 0.0010	0.00066	< 0.0010	< 0.0030
	24-Sep-2023	Grab	0.017	< 0.00060	0.00028	0.043	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00081	0.0011	< 0.10	0.00022	1.3	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00064	< 0.0010	< 0.0030
AEMP-DS-05 (Radar)	23-Jun-2018	Grab	0.037	< 0.00060	0.00027	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0011	0.0011	< 0.10	0.00027	1.5	< 0.00010	0.15	< 0.00020	< 0.0010	< 0.0010	0.00059	< 0.0010	0.0031
	14-Aug-2018	Grab	0.068	< 0.00060	0.00037	0.044	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	0.0043	0.0000022	0.00084	0.0017	< 0.10	0.00024	1.5	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00067	< 0.0010	< 0.0030
	18-Oct-2018	Grab	0.0074	< 0.00060	0.00021	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00099	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00076	0.00097	< 0.10	< 0.00020	1.4	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00053	< 0.0010	< 0.0030
	10-Jun-2019	Grab	0.014	< 0.00060	0.00025	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0016	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00076	0.0011	< 0.10	0.00024	1.5	< 0.00010	0.16	< 0.00020	< 0.0010	< 0.0010	0.00055	< 0.0010	< 0.0030
	26-Aug-2019	Grab	0.038	< 0.00060	< 0.00020	0.046	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00079	0.0013	< 0.10	0.00033	1.8	< 0.00010	0.25	< 0.00020	< 0.0010	< 0.0010	0.00079	< 0.0010	< 0.0030
	01-Oct-2019	Grab	0.023	< 0.00060	0.00024	0.042	< 0.0010	0.020	0.000027	< 0.0010	0.00092	0.0023	**0.91** [#1]	< 0.00020	< 0.020	0.054	< 0.0000020	0.00085	0.0030	< 0.10	0.00032	1.7	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00062	< 0.0010	0.011
	12-Jun-2020	Grab	0.017	< 0.00060	0.00029	0.040	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0016	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000043	0.00088	0.0014	< 0.10	0.00042	1.6	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00063	< 0.0010	< 0.0030
	28-Jul-2020	Grab	0.030	< 0.00060	0.00041	0.044	< 0.0010	0.020	< 0.000020	0.0010	< 0.00030	**0.0033** [#1]	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0013	0.00097	< 0.10	0.00044	1.7	< 0.00010	0.18	< 0.00020	< 0.0010	< 0.0010	0.00076	< 0.0010	0.0035
	22-Sep-2020	Grab	0.020	< 0.00060	0.00030	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0012	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00099	0.0014	< 0.10	0.00035	1.8	< 0.00010	0.18	< 0.00020	< 0.0010	< 0.0010	0.00068	< 0.0010	< 0.0030
	07-Jun-2021	Grab	0.018	< 0.00060	0.00057	0.041	< 0.0010	< 0.020	0.000025	0.0014	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00090	0.0012	< 0.10	0.00039	1.7	< 0.00010	0.15	< 0.00020	< 0.0010	< 0.0010	0.00055	< 0.0010	< 0.0030
	19-Aug-2021	Grab	0.034	< 0.00060	0.00036	0.045	< 0.0010	0.051	< 0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00084	0.0014	< 0.10	0.00034	1.6	< 0.00010	0.19	< 0.00020	< 0.0010	0.0013	0.00059	< 0.0010	< 0.0030
(Duplicate)	19-Aug-2021	Grab	0.058	< 0.00060	0.00035	0.046	< 0.0010	0.044	< 0.000020	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00085	0.0015	< 0.10	0.00031	1.7	< 0.00010	0.19	< 0.00020	< 0.0010	0.0047	0.00056	< 0.0010	< 0.0030
	18-Sep-2021	Grab	0.034	< 0.00060	0.00045	0.045	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00090	0.0015	< 0.10	0.00035	1.7	< 0.00010	0.20	< 0.00020	< 0.0010	< 0.0010	0.00077	< 0.0010	< 0.0030
	10-Aug-2022	Grab	0.019	< 0.00060	0.00030	0.045	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00083	0.0010	< 0.10	< 0.00020	1.5	< 0.00010	0.20	< 0.00020	< 0.0010	< 0.0010	0.00059	< 0.0010	< 0.0030
	11-Mar-2023	Grab	< 0.0030	< 0.00060	< 0.00020	0.039	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00053	< 0.00050	< 0.10	0.00022	1.4	< 0.00010	0.29	< 0.00020	< 0.0010	< 0.0010	0.00048	< 0.0010	0.0086
	25-Jul-2023	Grab	0.028	< 0.00060	0.00038	0.047	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	**0.0028** [#1]	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00094	0.0012	< 0.10	0.00033	1.7	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00067	< 0.0010	< 0.0030
	19-Aug-2023	Grab	0.025	< 0.00060	0.00026	0.046	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00089	0.00096	< 0.10	0.00038	1.6	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00074	< 0.0010	< 0.0030
	26-Sep-2023	Grab	0.023	< 0.00060	0.00028	0.045	< 0.0010	0.022	0.000021	< 0.0010	< 0.00030	< 0.0010	0.10	< 0.00020	< 0.020	0.0080	< 0.0000019	0.00094	0.0012	< 0.10	0.00030	1.5	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00072	< 0.0010	< 0.0030
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	Grab	0.0036	< 0.00060	0.00024	0.063	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00095	0.0011	< 0.10	< 0.00020	2.0	< 0.00010	0.32	< 0.00020	< 0.0010	< 0.0010	0.00079	< 0.0010	0.0058

Table 5

Surface Water Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.1**	**---**	**0.005**	**---**	**---**	**1.5**	**0.00009**	**0.0089**	**---**	**0.0026**	**0.3**	**0.0036**	**---**	**---**	**0.000026**	**0.073**	**0.103**	**---**	**0.001**	**---**	**0.00025**	**---**	**0.0008**	**---**	**---**	**0.015**	**---**	**0.03**
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**---**	**0.006**	**0.01**	**2**	**---**	**5**	**0.007**	**0.05**	**---**	**2**	**---**	**0.005**	**---**	**0.12**	**0.001**	**---**	**---**	**---**	**0.05**	**---**	**---**	**7**	**---**	**---**	**---**	**0.02**	**---**	**---**
Federal Environmental Quality Guidelines [#3]			**---**	**---**	**---**	**---**	**---**	**---**	**---**	**0.005**	**0.0011**	**---**	**---**	**0.0025**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**2.5**	**---**	**---**	**---**	**---**	**0.12**	**---**
(Duplicate)	10-Mar-2023	Grab	0.0044	< 0.00060	0.00023	0.063	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0022	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0011	0.0017	< 0.10	0.00037	2.1	< 0.00010	0.32	< 0.00020	< 0.0010	< 0.0010	0.00080	< 0.0010	< 0.0030
	24-Jul-2023	Grab	0.052	< 0.00060	0.00032	0.056	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	0.0048	< 0.0000019	0.0015	0.0012	< 0.10	0.00039	1.5	< 0.00010	0.28	< 0.00020	< 0.0010	< 0.0010	0.00081	< 0.0010	< 0.0030
	21-Aug-2023	Grab	0.051	< 0.00060	0.00031	0.059	< 0.0010	0.028	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0011	0.0011	< 0.10	0.00050	1.6	< 0.00010	0.26	< 0.00020	< 0.0010	< 0.0010	0.00093	< 0.0010	< 0.0030
	03-Oct-2023	Grab	0.048	< 0.00060	0.00021	0.062	< 0.0010	< 0.020	0.000023	< 0.0010	< 0.00030	**0.0026 [#1]**	< 0.060	< 0.00020	< 0.020	0.0059	< 0.0000019	0.00086	0.0028	< 0.10	0.00059	1.5	< 0.00010	0.28	< 0.00020	< 0.0010	< 0.0010	0.00075	< 0.0010	0.0032
UPSTREAM																														
AEMP-US-01 (Midway)	12-Mar-2023	Grab	0.018	< 0.00060	0.00021	0.034	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00057	< 0.00050	< 0.10	< 0.00020	1.3	< 0.00010	0.18	< 0.00020	< 0.0010	< 0.0010	0.00037	< 0.0010	< 0.0030
	25-Jul-2023	Grab	0.024	< 0.00060	0.00032	0.056	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00082	0.0013	< 0.10	0.00024	1.7	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00063	< 0.0010	< 0.0030
	19-Aug-2023	Grab	0.0087	< 0.00060	< 0.00020	0.015	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00030	< 0.00050	< 0.10	< 0.00020	< 0.50	< 0.00010	0.065	< 0.00020	< 0.0010	< 0.0010	0.00023	< 0.0010	< 0.0030
	26-Sep-2023	Grab	0.010	< 0.00060	< 0.00020	0.034	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00055	0.00068	< 0.10	< 0.00020	1.1	< 0.00010	0.19	< 0.00020	< 0.0010	< 0.0010	0.00044	< 0.0010	< 0.0030
AEMP-US-02 (10 mile)	23-Jun-2018	Grab	0.045	< 0.00060	0.00025	0.044	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00094	0.0012	< 0.10	0.00029	1.5	< 0.00010	0.16	< 0.00020	< 0.0010	< 0.0010	0.00062	< 0.0010	< 0.0030
	14-Aug-2018	Grab	0.074	< 0.00060	< 0.00020	0.047	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00097	0.0017	< 0.10	0.00036	1.6	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00076	< 0.0010	< 0.0030
(Duplicate)	14-Aug-2018	Grab	**0.24 [#1]**	< 0.00060	0.00050	0.054	< 0.0010	< 0.020	0.000065	< 0.0010	0.00050	0.0019	0.28	0.00034	< 0.020	0.018	0.0000021	0.00090	0.0024	< 0.10	0.00037	2.0	< 0.00010	0.22	< 0.00020	< 0.0010	0.0027	0.00077	< 0.0010	0.0079
	18-Oct-2018	Grab	0.0061	< 0.00060	0.00030	0.048	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00081	< 0.060	< 0.00020	< 0.020	0.0099	< 0.0000020	0.00077	0.00079	< 0.10	< 0.00020	1.4	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00050	< 0.0010	< 0.0030
	10-Jun-2019	Grab	0.017	< 0.00060	0.00021	0.040	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0022	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00090	0.0013	< 0.10	0.00026	1.6	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00065	< 0.0010	< 0.0030
	26-Aug-2019	Grab	0.039	< 0.00060	< 0.00020	0.047	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0012	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00077	0.0012	< 0.10	0.00038	1.8	< 0.00010	0.25	< 0.00020	0.0019	< 0.0010	0.00078	< 0.0010	< 0.0030
	01-Oct-2019	Grab	0.026	< 0.00060	0.00028	0.048	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0014	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0011	0.0018	< 0.10	0.00048	1.8	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00082	< 0.0010	< 0.0030
	12-Jun-2020	Grab	0.017	< 0.00060	0.00023	0.040	< 0.0010	< 0.020	0.000021	< 0.0010	< 0.00030	0.0019	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00089	0.0015	< 0.10	0.00042	1.7	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00069	< 0.0010	< 0.0030
	28-Jul-2020	Grab	0.029	< 0.00060	0.00031	0.042	< 0.0010	< 0.020	0.000026	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0012	0.0016	< 0.10	0.00054	1.7	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00086	< 0.0010	< 0.0030
	22-Sep-2020	Grab	0.066	< 0.00060	0.00044	0.048	< 0.0010	< 0.020	0.000020	< 0.0010	< 0.00030	0.0015	0.17	< 0.00020	< 0.020	0.0077	< 0.0000019	0.00089	0.0021	< 0.10	0.00039	2.4	< 0.00010	0.19	< 0.00020	< 0.0010	0.0015	0.00071	< 0.0010	< 0.0030
	07-Jun-2021	Grab	0.024	< 0.00060	0.00054	0.041	< 0.0010	< 0.020	< 0.000020	0.0012	< 0.00030	0.0014	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00081	0.0012	< 0.10	0.00035	1.8	< 0.00010	0.15	< 0.00020	< 0.0010	0.0027	0.00055	< 0.0010	< 0.0030
	19-Aug-2021	Grab	0.029	< 0.00060	0.00042	0.049	< 0.0010	< 0.020	0.000029	< 0.0010	< 0.00030	**0.0042 [#1]**	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00090	0.0018	< 0.10	< 0.00020	1.8	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00069	< 0.0010	0.0042
	18-Sep-2021	Grab	0.026	< 0.00060	0.00041	0.043	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	**0.0046 [#1]**	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00092	0.0017	< 0.10	0.00025	1.7	< 0.00010	0.19	< 0.00020	< 0.0010	< 0.0010	0.00071	< 0.0010	< 0.0030
	10-Aug-2022	Grab	0.022	< 0.00060	0.00029	0.051	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	**0.0028 [#1]**	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00082	0.0011	< 0.10	0.00026	1.8	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00068	< 0.0010	0.0031
	12-Mar-2023	Grab	< 0.0030	< 0.00060	0.00020	0.048	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	**0.0037 [#1]**	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00053	< 0.00050	< 0.10	< 0.00020	1.3	< 0.00010	0.20	< 0.00020	< 0.0010	< 0.0010	0.00043	< 0.0010	0.0040
	25-Jul-2023	Grab	0.035	< 0.00060	0.00032	0.046	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0023	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0011	0.0011	< 0.10	0.00034	1.6	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00078	< 0.0010	< 0.0030
	19-Aug-2023	Grab	0.018	< 0.00060	0.00040	0.050	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	0.0075	< 0.0000019	0.0011	0.00096	< 0.10	0.00038	1.4	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00073	< 0.0010	< 0.0030
	24-Sep-2023	Grab	0.017	< 0.00060	0.00027	0.055	< 0.0010	0.021	< 0.000020	< 0.0010	< 0.00030	**0.0026 [#1]**	0.091	< 0.00020	< 0.020	0.018	0.0000026	0.0012	0.0016	< 0.10	0.00028	1.3	< 0.00010	0.28	< 0.00020	< 0.0010	< 0.0010	0.00079	< 0.0010	< 0.0030
AEMP-US-03 (Norman Wells Upstream)	09-Mar-2023	Grab	0.012	< 0.00060	< 0.00020	0.036	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00051	0.00074	< 0.10	< 0.00020	1.4	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00041	< 0.0010	< 0.0030
BOSWORTH CREEK																														
Bosworth Upstream Data UCL			0.138	---	0.000425	0.0891	---	---	N/C	N/C	---	0.001018	0.2966	---	---	---	---	0.002295	0.001299	---	0.000385	---	---	---	---	---	---	0.001471	---	N/C
Bosworth Upstream Data LCL			0.003	---	0.0002	0.0664	---	---	N/C	N/C	---	0.000136	0.06	---	---	---	---	0.001448	0.000407	---	3.39E-05	---	---	---	---	---	---	0.0011	---	N/C
DOWNSTREAM																														
AEMP-DS-01 (Lower Bosworth Creek)	18-Aug-2017	Grab	< 0.0030	< 0.00060	< 0.00020	0.087	< 0.0010	0.027	< 0.000020	< 0.0010	< 0.00030	0.00086	< 0.060	< 0.00020	< 0.020	0.0077	< 0.0000020	0.0019	0.00088	< 0.10	< 0.00020	2.1	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.00099	< 0.0010	< 0.0030
	16-Sep-2017	Grab	0.0054	< 0.00060	0.00020	0.077	< 0.0010	0.026	< 0.000020	< 0.0010	< 0.00030	0.00042	< 0.060	< 0.00020	< 0.020	0.0081	0.0000023	0.0017	0.00069	< 0.10	< 0.00020	2.0	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
(Duplicate)	16-Sep-2017	Grab	0.0051	< 0.00060	< 0.00020	0.076	< 0.0010	0.026	< 0.000020	< 0.0010	< 0.00030	0.00037	< 0.060	< 0.00020	< 0.020	0.0078	0.0000021	0.0017	0.00074	< 0.10	< 0.00020	2.0	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	16-Oct-2017	Grab	0.0033	< 0.00060	0.00021	0.072	< 0.0010	0.024	< 0.000020	< 0.0010	< 0.00030	0.00042	< 0.060	< 0.00020	< 0.020	0.0091	< 0.0000020	0.0018	0.00077	< 0.10	< 0.00020	2.1	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	23-Jun-2018	Grab	< 0.0030	< 0.00060	0.00023	0.085	< 0.0010	0.028	< 0.000020	< 0.0010	< 0.00030	0.00045	< 0.060	< 0.00020	< 0.020	0.0058	< 0.0000020	0.0019	0.00074	< 0.10	< 0.00020	2.0	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	12-Aug-2018	Grab	< 0.0030	< 0.00060	< 0.00020	0.078	< 0.0010	0.029	< 0.000020	< 0.0010	< 0.00030	0.00062	< 0.060	< 0.00020	< 0.020	0.0079	0.0000020	0.0017	0.00078	< 0.10	0.00024	2.1	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	16-Oct-2018	Grab	0.0060	< 0.00060	< 0.00020	0.068	< 0.0010	0.027	< 0.000020	< 0.0010	< 0.00030	0.00092	< 0.060	< 0.00020	< 0.020	0.0046	< 0.0000020	0.0019	< 0.00050	< 0.10	< 0.00020	2.0	< 0.00010	1.5	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	03-Jun-2019	Grab	0.0033	< 0.00060	0.00023	0.072	< 0.0010	0.021	< 0.000020	< 0.0010	< 0.00030	0.00086	< 0.060	< 0.00020	< 0.020	0.0050	< 0.0000020	0.0017	0.00060	< 0.10	< 0.00020	1.6	< 0.00010	1.1	< 0.00020	< 0.0010	< 0.0010	0.00098	< 0.0010	< 0.0030
(Duplicate)	03-Jun-2019	Grab	0.0035	< 0.00060	0.00020	0.071	< 0.0010	0.021	< 0.000020	< 0.0010	< 0.00030	0.00047	< 0.060	< 0.00020	< 0.020	0.0049	< 0.0000020	0.0016	0.00058	< 0.10	< 0.00020	1.6	< 0.00010	1.1	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	28-Aug-2019	Grab	< 0.0030	< 0.00060	< 0.00020	0.076	< 0.0010	0.024	< 0.000020	< 0.0010	< 0.00030	0.0014	< 0.060	< 0.00020	< 0.020	0.0069	< 0.0000020	0.0016	< 0.00050	< 0.10	< 0.00020	1.9	< 0.00010	1.3	< 0.00020	0.0047	< 0.0010	0.0011	< 0.0010	< 0.0030
	03-Oct-2019	Grab	< 0.0030	< 0.00060	< 0.00020	0.076	< 0.0010	0.029	< 0.000020	< 0.0010	< 0.00030	0.00059	< 0.060	< 0.00020	< 0.020	0.0069	< 0.0000020	0.0018	0.00062	< 0.10	0.00020	2.1	< 0.00010	1.4	< 0.00020	0.0020	< 0.0010	0.0012	< 0.0010	0.0055
	10-Jun-2020	Grab	0.0039	< 0.00060	0.00030	0.080	< 0.0010	0.032	< 0.000020	< 0.0010	< 0.00030	0.00061	< 0.060	< 0.00020	< 0.020	0.0043	< 0.0000019	0.0018	0.0026	< 0.10	0.00021	1.9	< 0.00010	1.2	< 0.00020	< 0.0010	< 0.0010	0.0012	0.0012	< 0.0030
	24-Jul-2020	Grab	0.0037	< 0.00060	< 0.00020	0.082	< 0.0010	0.034	< 0.000020	< 0.0010	< 0.00030	0.00098	0.062	0.00041	< 0.020	0.0075	< 0.0000019	0.0019	0.00087	< 0.10	0.00026	1.9	< 0.00010	1.4	< 0.00020	0.0018	< 0.0010	0.0015	< 0.0010	< 0.0030
	18-Sep-2020	Grab	0.0042	< 0.00060	0.00021	0.075	< 0.0010	0.029	< 0.000020	< 0.0010	< 0.00030	0.00064	< 0.060	< 0.00020	< 0.020	0.0062	< 0.0000019	0.0018	< 0.00050	< 0.10	< 0.00020	1.9	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0012	< 0.0010	< 0.0030
	06-Jun-2021	Grab	< 0.0030	< 0.00060	0.00045	0.074	< 0.0010	0.023	< 0.000020	0.0015	< 0.00030	0.00069	< 0.060	< 0.00020	< 0.020	0.0063	< 0.0000019	0.0014	0.0011	< 0.10	0.00021	1.9	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.00092	< 0.0010	< 0.0030
	18-Aug-2021	Grab	0.0041	< 0.00060	0.00022	0.079	< 0.0010	0.037	< 0.000020	< 0.0010	< 0.00030	**0.0032 [#1]**	< 0.060	< 0.00020	< 0.020	0.0058	---	0.0018	0.00072	< 0.10	< 0.00020	2.0	< 0.00010	1.5	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	0.0057
	22-Aug-2021	Grab	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0000019	---	---	---	---	---	---	---	---	---	---	---	---	---
	19-Sep-2021	Grab	< 0.0030	< 0.00060	< 0.00020	0.079	< 0.0010	0.048	< 0.000020	< 0.0010	< 0.00030	**0.0028 [#1]**	< 0.060	< 0.00020	< 0.020	0.0072	< 0.0000019	0.0017	< 0.00050	< 0.10	< 0.00020	2.0	< 0.00010	1.6	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	0.0036
	11-Jun-2022	Grab	0.018	< 0.00060	0.00021	0.073	< 0.0010	0.027	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	0.0076	< 0.0000019	0.0015	0.0015	< 0.10	< 0.00020	1.7	< 0.00010	1.2	< 0.00020	0.0021	< 0.0010	0.00090	< 0.0010	< 0.0030
	06-Aug-2022	Grab	< 0.0030	< 0.00060	0.00035	0.082	< 0.0010	0.036	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	0.0061	< 0.0000019	0.0018	0.00053	< 0.10	< 0.00020	2.2	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	26-Sep-2022	Grab	< 0.0030	< 0.00060	< 0.00020	0.073	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	0.0055	< 0.0000019	0.0035	0.00052	< 0.10	< 0.00020	1.8	< 0.00010	1.5	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030

Table 5

Surface Water Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.1**	**---**	**0.005**	**---**	**---**	**1.5**	**0.00009**	**0.0089**	**---**	**0.0026**	**0.3**	**0.0036**	**---**	**---**	**0.000026**	**0.073**	**0.103**	**---**	**0.001**	**---**	**0.00025**	**---**	**0.0008**	**---**	**---**	**0.015**	**---**	**0.03**
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			**---**	**0.006**	**0.01**	**2**	**---**	**5**	**0.007**	**0.05**	**---**	**2**	**---**	**0.005**	**---**	**0.12**	**0.001**	**---**	**---**	**---**	**0.05**	**---**	**---**	**7**	**---**	**---**	**---**	**0.02**	**---**	**---**
Federal Environmental Quality Guidelines [#3]			**---**	**---**	**---**	**---**	**---**	**---**	**---**	**0.005**	**0.0011**	**---**	**---**	**0.0025**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**2.5**	**---**	**---**	**---**	**---**	**0.12**	**---**
	26-Jul-2023	Grab	0.0057	< 0.00060	0.00025	0.087	< 0.0010	0.044	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	0.0063	< 0.0000019	0.0018	0.00068	< 0.10	< 0.00020	2.6	< 0.00010	1.6	< 0.00020	< 0.0010	< 0.0010	0.00099	< 0.0010	< 0.0030
	18-Aug-2023	Grab	0.0038	< 0.00060	0.00023	0.081	< 0.0010	0.039	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	0.0073	< 0.0000019	0.0018	< 0.00050	< 0.10	0.00020	2.0	< 0.00010	1.5	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
(Duplicate)	18-Aug-2023	Grab	0.0037	< 0.00060	0.00025	0.081	< 0.0010	0.034	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	0.0075	< 0.0000019	0.0017	< 0.00050	< 0.10	0.00025	2.0	< 0.00010	1.5	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	25-Sep-2023	Grab	0.0054	< 0.00060	< 0.00020	< 0.010	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	< 0.00020	< 0.00050	< 0.10	< 0.00020	< 0.50	< 0.00010	< 0.020	< 0.00020	< 0.0010	< 0.0010	< 0.00010	< 0.0010	< 0.0030
(Duplicate)	25-Sep-2023	Grab	0.0066	0.00081	< 0.00020	< 0.050	< 0.0010	< 0.10	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.30	< 0.00020	< 0.10	< 0.020	< 0.0000019	< 0.00020	< 0.00050	< 0.50	< 0.00020	< 2.5	< 0.00010	< 0.10	< 0.00020	< 0.0010	< 0.0010	< 0.00010	< 0.0010	< 0.0030
UPSTREAM																														
AEMP-US-04 (Upper Bosworth Creek)	26-Jul-2023	Grab	0.0051	< 0.00060	0.00023	0.082	< 0.0010	0.038	< 0.000020	< 0.0010	< 0.00030	0.0014	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000032	0.0018	0.00092	< 0.10	< 0.00020	2.4	< 0.00010	1.5	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	18-Aug-2023	Grab	0.0053	< 0.00060	< 0.00020	---	< 0.0010	---	< 0.000020	< 0.0010	< 0.00030	0.0016	< 0.060	< 0.00020	---	0.0062	< 0.0000019	0.0017	0.00070	---	< 0.00020	---	< 0.00010	---	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	24-Sep-2023	Grab	0.0077	< 0.00060	< 0.00020	0.083	< 0.0010	0.035	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	0.0052	< 0.0000019	0.0018	0.00070	< 0.10	< 0.00020	2.6	< 0.00010	1.6	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
Relative Percent Difference (RPD) Report																														
AEMP-DS-04 (Refinery)	26-Jul-2023	Grab	0.026	< 0.00060	0.00027	0.047	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00097	0.00095	< 0.10	0.00027	1.5	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00069	< 0.0010	0.0044
(Duplicate)	26-Jul-2023	Grab	0.029	< 0.00060	0.00033	0.046	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0018	< 0.060	0.00034	< 0.020	< 0.0040	< 0.0000019	0.0010	0.0016	< 0.10	0.00031	1.4	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00073	< 0.0010	0.0077
RPD(%)			**10.9%**	**---**	**20.0%**	**2.2%**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**3.0%**	**---**	**---**	**13.8%**	**6.9%**	**---**	**4.4%**	**---**	**---**	**---**	**5.6%**	**---**	**---**
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	Grab	0.0036	< 0.00060	0.00024	0.063	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.00095	0.0011	< 0.10	< 0.00020	2.0	< 0.00010	0.32	< 0.00020	< 0.0010	< 0.0010	0.00079	< 0.0010	0.0058
(Duplicate)	10-Mar-2023	Grab	0.0044	< 0.00060	0.00023	0.063	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0022	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	0.0011	0.0017	< 0.10	0.00037	2.1	< 0.00010	0.32	< 0.00020	< 0.0010	< 0.0010	0.00080	< 0.0010	< 0.0030
RPD(%)																														
AEMP-DS-01 (Lower Bosworth Creek)	18-Aug-2023	Grab	0.0038	< 0.00060	0.00023	0.081	< 0.0010	0.039	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	0.0073	< 0.0000019	0.0018	< 0.00050	< 0.10	0.00020	2.0	< 0.00010	1.5	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
(Duplicate)	18-Aug-2023	Grab	0.0037	< 0.00060	0.00025	0.081	< 0.0010	0.034	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	0.0075	< 0.0000019	0.0017	< 0.00050	< 0.10	0.00025	2.0	< 0.00010	1.5	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
RPD(%)			**2.7%**	**---**	**8.3%**	**0.0%**	**---**	**13.7%**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**2.7%**	**---**	**5.7%**	**---**	**---**	**22.2%**	**0.0%**	**---**	**0.0%**	**---**	**---**	**---**	**0.0%**	**---**	**---**
AEMP-DS-01 (Lower Bosworth Creek)	25-Sep-2023	Grab	0.0054	< 0.00060	< 0.00020	< 0.010	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000019	< 0.00020	< 0.00050	< 0.10	< 0.00020	< 0.50	< 0.00010	< 0.020	< 0.00020	< 0.0010	< 0.0010	< 0.00010	< 0.0010	< 0.0030
(Duplicate)	25-Sep-2023	Grab	0.0066	0.00081	< 0.00020	< 0.050	< 0.0010	< 0.10	< 0.000020	< 0.0010	< 0.00030	< 0.0010	< 0.30	< 0.00020	< 0.10	< 0.020	< 0.0000019	< 0.00020	< 0.00050	< 0.50	< 0.00020	< 2.5	< 0.00010	< 0.10	< 0.00020	< 0.0010	< 0.0010	< 0.00010	< 0.0010	< 0.0030
RPD(%)			**20.0%**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Superscript [#1] denotes values exceeding
   (CCME. 2014. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life.
   http://st-ts.ccme.ca/?chems=all&chapters=1 accessed Aug 22, 2014.)

Aluminum:
Standard varies with pH.
Based on upstream pH >= 6.5 = 0.1 mg/L

Boron:
Guideline based on long term exposure

Cadmium:
Guideline based on long term exposure

Chromium (Total):
Limit is for Chromium(III).

Cobalt:
Guideline is based on a hardness of 110mg/L

Copper:
Guideline is hardness dependent. Presented guideline based on 25th percentile upstream hardness of 110 mg/L.

Lead:
Guideline is hardness dependent. Presented guideline based on 25th percentile upstream hardness of 110 mg/L.

Mercury:
Guideline for Inorganic mercury

Nickel:
Guideline is hardness dependent. Presented guideline based on 25th percentile upstream hardness of 110 mg/L.

Silver:
Guideline based on long term exposure

Uranium:
Guideline based on long term exposure

Table 5

Surface Water Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			0.1	---	0.005	---	---	1.5	0.00009	0.0089	---	0.0026	0.3	0.0036	---	---	0.000026	0.073	0.103	---	0.001	---	0.00025	---	0.0008	---	---	0.015	---	0.03
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			---	0.006	0.01	2	---	5	0.007	0.05	---	2	---	0.005	---	0.12	0.001	---	---	---	0.05	---	---	7	---	---	---	0.02	---	---
Federal Environmental Quality Guidelines [#3]			---	---	---	---	---	---	---	0.005	0.0011	---	---	0.0025	---	---	---	---	---	---	---	---	---	2.5	---	---	---	---	0.12	---

7. Superscript [#2] denotes values exceeding
(Health Canada. 2022. Guidelines for Canadian Drinking Water Quality. Summary Table. Maximum Acceptable Concentration. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario. September 2022.)

Chromium (Total):
MAC established for total chromium to protect from Chromium (VI).

8. Denotes a Key Indicator Parameter
9. N/C denotes not calculated as dataset does not meet minimum detections criterion
10. Superscript [#3] denotes values exceeding
(ECCC. 2021. Federal Environmental Quality Guidelines Summary Table. Environment and Climate Change Canada, Ottawa, Ontario, January 2021.)

Table 6

Surface Water Analytical Results: Polycyclic Aromatic Hydrocarbons (PAHs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Polycyclic aromatic hydrocarbons (PAHs)|Carcinogenic								Polycyclic aromatic hydrocarbons (PAHs)|Non-Carcinogenic															
			Benzo(a)Anthracene (mg/L)	Benzo(b,j)Fluoranthene (mg/L)	Benzo(k)Fluoranthene (mg/L)	Benzo(g,h,i)Perylene (mg/L)	Benzo(a)Pyrene (mg/L)	Chrysene (mg/L)	Dibenzo(a,h)Anthracene (mg/L)	Indeno(1,2,3-c,d)Pyrene (mg/L)	Acenaphthene (mg/L)	Acenaphthylene (mg/L)	Acridine (mg/L)	Anthracene (mg/L)	Benzo(c)Phenanthrene (mg/L)	Benzo(e)Pyrene (mg/L)	Biphenyl (mg/L)	Fluoranthene (mg/L)	Fluorene (mg/L)	2-Methylnaphthalene (mg/L)	Naphthalene (mg/L)	Perylene (mg/L)	Phenanthrene (mg/L)	Pyrene (mg/L)	Retene (mg/L)	Quinoline (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			0.000018	---	---	---	0.000015	---	---	---	0.0058	---	0.0044	0.000012	---	---	---	0.00004	0.003	---	0.0011	---	0.0004	0.000025	---	0.0034
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			---	---	---	---	0.00004	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Federal Environmental Quality Guidelines [#3]			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.15
NW AEMP V5																										
MACKENZIE RIVER																										
DOWNSTREAM																										
AEMP-DS-02 (Marine Dock)	10-Jun-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	24-Jul-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	18-Sep-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	06-Jun-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	18-Aug-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	12-Jun-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	06-Aug-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	25-Sep-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	09-Mar-2023	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	25-Jul-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	18-Aug-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	18-Aug-2023	SPMD	0.000000091	0.000000054	0.000000024	0.000000052	N/D	0.000001328	N/D	N/D	0.000000692	0.000000189	N/A	0.000000537	N/A	0.000000189	0.000005813	0.000001393	0.000002465	0.000006362	0.000007659	0.000000251	0.000017421	0.000001906	N/A	N/A
	24-Sep-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	24-Sep-2023	SPMD	0.000000159	0.000000122	0.000000025	0.000000084	0.000000027	0.000003253	0.000000014	N/D	0.000001129	0.000000157	N/A	0.000000301	N/A	0.000000388	0.000005191	0.000001317	0.000005038	0.000020804	0.000012121	0.000000381	0.000035883	0.000002869	N/A	N/A
(Duplicate)	24-Sep-2023	SPMD	N/D	N/D	N/D	0.000000006	N/D	0.000000162	N/D	N/D	0.000000255	0.000000074	N/A	0.000000092	N/A	0.000000020	0.000002470	0.000000205	0.000000768	0.000002748	0.000003976	0.000000027	0.000004823	0.000000267	N/A	N/A
AEMP-DS-03 (Island 3)	12-Jun-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	28-Jul-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	22-Sep-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	07-Jun-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
(Duplicate)	07-Jun-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	19-Aug-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	18-Sep-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	14-Jun-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	06-Aug-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
(Duplicate)	06-Aug-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	25-Sep-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	09-Mar-2023	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	25-Jul-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	19-Aug-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	19-Aug-2023	SPMD	0.000000007	0.000000006	N/D	0.000000013	N/D	0.000000103	N/D	N/D	0.000000423	0.000000061	N/A	0.000000077	N/A	0.000000031	0.000001366	0.000000325	0.000000451	0.000000805	0.000003887	0.000000065	0.000002661	0.000000280	N/A	N/A
	25-Sep-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	25-Sep-2023	SPMD	0.000000013	0.000000018	N/D	0.000000026	N/D	0.000000181	N/D	0.000000007	0.000000458	0.000000183	N/A	0.000000143	N/A	0.000000059	0.000002288	0.000000831	0.000000947	0.000001208	0.000007505	0.000000178	0.000007906	0.000000573	N/A	N/A
AEMP-DS-04 (Refinery)	10-Jun-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	24-Jul-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
(Duplicate)	24-Jul-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	18-Sep-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
(Duplicate)	18-Sep-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	0.0000089	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	0.000048	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	0.000069	< 0.000020	---	< 0.00020
	06-Jun-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	18-Aug-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	12-Jun-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	06-Aug-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
(Duplicate)	06-Aug-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	24-Sep-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	0.00011	< 0.00010	< 0.000050	0.000068	< 0.000020	---	< 0.00020
(Duplicate)	24-Sep-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	0.000065	< 0.000020	---	< 0.00020
	11-Mar-2023	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	26-Jul-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
(Duplicate)	26-Jul-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	18-Aug-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	18-Aug-2023	SPMD	0.000000047	0.000000033	N/D	0.000000044	N/D	0.000000660	N/D	N/D	0.000000517	0.000000146	N/A	0.000000241	N/A	0.000000131	0.000005323	0.000000817	0.000001722	0.000003941	0.000005659	0.000000174	0.000011132	0.000000891	N/A	N/A
	24-Sep-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
AEMP-DS-05 (Radar)	12-Jun-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	28-Jul-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	22-Sep-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	07-Jun-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	19-Aug-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
(Duplicate)	19-Aug-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	18-Sep-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	11-Mar-2023	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	25-Jul-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020

Table 6

Surface Water Analytical Results: Polycyclic Aromatic Hydrocarbons (PAHs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Polycyclic aromatic hydrocarbons (PAHs)|Carcinogenic								Polycyclic aromatic hydrocarbons (PAHs)|Non-Carcinogenic															
			Benzo(a)Anthracene (mg/L)	Benzo(b,j)Fluoranthene (mg/L)	Benzo(k)Fluoranthene (mg/L)	Benzo(g,h,j)Perylene (mg/L)	Benzo(a)Pyrene (mg/L)	Chrysene (mg/L)	Dibenzo(a,h)Anthracene (mg/L)	Indeno(1,2,3-c,d)Pyrene (mg/L)	Acenaphthene (mg/L)	Acenaphthylene (mg/L)	Acridine (mg/L)	Anthracene (mg/L)	Benzo(c)Phenanthrene (mg/L)	Benzo(e)Pyrene (mg/L)	Biphenyl (mg/L)	Fluoranthene (mg/L)	Fluorene (mg/L)	2-Methylnaphthalene (mg/L)	Naphthalene (mg/L)	Perylene (mg/L)	Phenanthrene (mg/L)	Pyrene (mg/L)	Retene (mg/L)	Quinoline (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.000018**	---	---	---	**0.000015**	---	---	---	**0.0058**	---	**0.0044**	**0.000012**	---	---	---	**0.00004**	**0.003**	---	**0.0011**	---	**0.0004**	**0.000025**	---	**0.0034**
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			---	---	---	---	**0.00004**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Federal Environmental Quality Guidelines [#3]			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	**0.15**
	19-Aug-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	19-Aug-2023	**SPMD**	0.000000009	0.000000006	0.000000005	0.000000015	N/D	0.000000135	N/D	N/D	0.000000434	0.000000064	N/A	0.000000132	N/A	0.000000032	0.000002138	0.000000417	0.000000628	0.000000796	0.000003765	0.000000072	0.000003559	0.000000358	N/A	N/A
	26-Sep-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	26-Sep-2023	**SPMD**	0.000000037	0.000000037	N/D	0.000000043	N/D	0.000000497	N/D	0.000000012	0.000000399	0.000000206	N/A	0.000000228	N/A	0.000000104	0.000003064	0.000001170	0.000001359	0.000001352	0.000006684	0.000000256	0.000010742	0.000000752	N/A	N/A
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
(Duplicate)	10-Mar-2023	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	24-Jul-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	21-Aug-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	21-Aug-2023	**SPMD**	0.000000021	0.000000027	N/D	0.000000041	N/D	0.000000239	N/D	N/D	0.000000436	0.000000049	N/A	0.000000099	N/A	0.000000084	0.000001441	0.000000541	0.000000618	0.000000793	0.000003608	0.000000185	0.000003458	0.000000506	N/A	N/A
	03-Oct-2023	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
UPSTREAM																										
AEMP-US-01 (Midway)	12-Mar-2023	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	25-Jul-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	19-Aug-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	19-Aug-2023	**SPMD**	0.000000026	0.000000019	0.000000011	0.000000038	0.000000009	0.000000335	N/D	0.000000012	0.000000850	0.000000186	N/A	0.000000317	N/A	0.000000093	0.000006429	0.000001084	0.000001624	0.000001895	0.000008678	0.000000201	0.000008225	0.000000802	N/A	N/A
	26-Sep-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	0.000057	< 0.00020
AEMP-US-02 (10 mile)	12-Jun-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	28-Jul-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	22-Sep-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	07-Jun-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	19-Aug-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	18-Sep-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	12-Mar-2023	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	25-Jul-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	19-Aug-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	24-Sep-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
AEMP-US-03 (Norman Wells Upstream)	09-Mar-2023	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
BOSWORTH CREEK																										
DOWNSTREAM																										
AEMP-DS-01 (Lower Bosworth Creek)	10-Jun-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	24-Jul-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	18-Sep-2020	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	06-Jun-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	18-Aug-2021	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	11-Jun-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	06-Aug-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	26-Sep-2022	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
	26-Jul-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	18-Aug-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
(Duplicate)	18-Aug-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	18-Aug-2023	**SPMD**	0.000000286	0.000000111	0.000000093	0.000000043	0.000000052	0.000001235	N/D	0.000000030	0.000001504	0.000000218	N/A	0.000000691	N/A	0.000000216	0.000014001	0.000005140	0.000003898	0.000004200	0.000010929	0.000000062	0.000018067	0.000003907	N/A	N/A
	25-Sep-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
(Duplicate)	25-Sep-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	25-Sep-2023	**SPMD**	0.000000391	0.000000151	0.000000141	0.000000134	0.000000065	0.000001226	N/D	0.000000056	0.000001434	N/D	N/A	0.000000406	N/A	0.000000242	0.000003587	0.000004794	0.000001929	0.000002326	0.000006567	0.000000075	0.000009896	0.000004222	N/A	N/A
UPSTREAM																										
AEMP-US-04 (Upper Bosworth Creek)	26-Jul-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	18-Aug-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	18-Aug-2023	**SPMD**	0.000000070	0.000000066	N/D	0.000000040	N/D	0.000000711	N/D	N/D	0.000000720	0.000000183	N/A	0.000000296	N/A	0.000000151	0.000011303	0.000001124	0.000002638	0.000002728	0.000009931	0.000000030	0.000011811	0.000000765	N/A	N/A
	24-Sep-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
	24-Sep-2023	**SPMD**	0.000000123	0.000000068	0.000000033	0.000000039	N/D	0.000001262	N/D	N/D	0.000000664	0.000000061	N/A	0.000000119	N/A	0.000000247	0.000003488	0.000001225	0.000001166	0.000001479	0.000005430	N/D	0.000008556	0.000000853	N/A	N/A
QA/QC DATA																										
TRIP BLANK	21-Aug-2023	**SPMD**	N/D	N/D	N/D	N/D	N/D	0.000000005	N/D	N/D	0.000000150	N/D	N/A	0.000000013	N/A	N/D	0.000000627	0.000000101	0.000000052	0.000001037	0.000003631	N/A	0.000000407	0.000000027	N/A	N/A
FIELD BLANK	21-Aug-2023	**SPMD**	N/D	N/D	N/D	N/D	N/D	0.000000007	N/D	N/D	0.000000150	N/D	N/A	0.000000008	N/A	N/D	0.000001451	0.000000053	0.000000078	0.000002158	0.000007509	N/A	0.000000483	0.000000024	N/A	N/A
DAY ZERO	2023	**SPMD**	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	0.000000069	N/D	N/A	0.000000012	N/A	N/D	0.000000416	0.000000046	N/D	0.000000704	0.000002030	N/A	0.000000302	0.000000021	N/A	N/A
Relative Percent Difference (RPD) Report																										
AEMP-DS-04 (Refinery)	26-Jul-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
(Duplicate)	26-Jul-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
RPD(%)			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Table 6

Surface Water Analytical Results: Polycyclic Aromatic Hydrocarbons (PAHs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	Polycyclic aromatic hydrocarbons (PAHs)|Carcinogenic								Polycyclic aromatic hydrocarbons (PAHs)|Non-Carcinogenic															
			Benzo(a)Anthracene (mg/L)	Benzo(b,j)Fluoranthene (mg/L)	Benzo(k)Fluoranthene (mg/L)	Benzo(g,h,i)Perylene (mg/L)	Benzo(a)Pyrene (mg/L)	Chrysene (mg/L)	Dibenzo(a,h)Anthracene (mg/L)	Indeno(1,2,3-c,d)Pyrene (mg/L)	Acenaphthene (mg/L)	Acenaphthylene (mg/L)	Acridine (mg/L)	Anthracene (mg/L)	Benzo(c)Phenanthrene (mg/L)	Benzo(e)Pyrene (mg/L)	Biphenyl (mg/L)	Fluoranthene (mg/L)	Fluorene (mg/L)	2-Methylnaphthalene (mg/L)	Naphthalene (mg/L)	Perylene (mg/L)	Phenanthrene (mg/L)	Pyrene (mg/L)	Retene (mg/L)	Quinoline (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]			**0.000018**	---	---	---	**0.000015**	---	---	---	**0.0058**	---	**0.0044**	**0.000012**	---	---	---	**0.00004**	**0.003**	---	**0.0011**	---	**0.0004**	**0.000025**	---	**0.0034**
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			---	---	---	---	**0.00004**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Federal Environmental Quality Guidelines [#3]			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	**0.15**
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
(Duplicate)	10-Mar-2023	Grab	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	---	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	---	< 0.00020
RPD(%)			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
AEMP-DS-01 (Lower Bosworth Creek)	18-Aug-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
(Duplicate)	18-Aug-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
RPD(%)			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
AEMP-DS-02 (Marine Dock)	24-Sep-2023	**SPMD**	0.000000159	0.000000122	0.000000025	0.000000084	0.000000027	0.000003253	0.000000014	N/D	0.000001129	0.000000157	N/A	0.000000301	N/A	0.000000388	0.000005191	0.000001317	0.000005038	0.000020804	0.000012121	0.000000381	0.000035883	0.000002869	N/A	N/A
(Duplicate)	24-Sep-2023	**SPMD**	N/D	N/D	N/D	0.000000006	N/D	0.000000162	N/D	N/D	0.000000255	0.000000074	N/A	0.000000092	N/A	0.000000020	0.000002470	0.000000205	0.000000768	0.000002748	0.000003976	0.000000027	0.000004823	0.000000267	N/A	N/A
RPD(%)			---	---	---	**173**	---	**181**	---	---	**126**	**72**	---	**107**	---	**180**	**71**	**146**	**147**	**153**	**101**	**174**	**153**	**166**	---	---
AEMP-DS-01 (Lower Bosworth Creek)	25-Sep-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
(Duplicate)	25-Sep-2023	PDB	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	< 0.000020	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.000050	< 0.00020
RPD(%)			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Superscript [#1]denotes values exceeding
   (CCME. 2014. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life.
   http://st-ts.ccme.ca/?chems=all&chapters=1 accessed Aug 22, 2014.)
7. Superscript [#2]denotes values exceeding
   (Health Canada. 2022. Guidelines for Canadian Drinking Water Quality. Summary Table. Maximum Acceptable Concentration.
   Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
   September 2022.)
8. Superscript [#3] denotes values exceeding
(ECCC. 2021. Federal Environmental Quality Guidelines Summary Table. Environment and Climate Change Canada, Ottawa, Ontario, January 2021.)
9. N/D indicates SPMD measured parameter below detection limit. Detection limits are given as per sample and have not been converted to a concentration. Detection limits are determined for each sample and analyte
10.. N/A indicates concentration coneversion not available.

Table 7

Surface Water Analytical Results: Alkylated Polycyclic Aromatic Hydrocarbons (PAHs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	1-Methylnaphthalene (µg/L)	2-Methylnaphthalene (mg/L)	2-Methylnaphthalene (µg/L)	C1benzo(b)kfluoranthene/benzoapyrene (µg/L)	C1-Substituted Acenaphthene (µg/L)	C1-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C1-Substituted Biphenyl (µg/L)	C1-Substituted Dibenzothiophene (µg/L)	C1-Substituted Fluoranthene/Pyrene (µg/L)	C1-Substituted Fluorene (µg/L)	C1-Substituted Naphthalene (µg/L)	C1-Substituted Phenanthrene/Anthracene (µg/L)	C2benzo(b)kfluoranthene/benzoapyrene (µg/L)	C2-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C2-Substituted Biphenyl (µg/L)	C2-Substituted Dibenzothiophene (µg/L)	C2-Substituted Fluoranthene/Pyrene (µg/L)	C2-Substituted Fluorene (µg/L)	C2-Substituted Naphthalene (µg/L)	C2-Substituted Phenanthrene/Anthracene (µg/L)	C3-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C3-Substituted Dibenzothiophene (µg/L)	C3-Substituted Fluoranthene/Pyrene (µg/L)	C3-Substituted Fluorene (µg/L)	C3-Substituted Naphthalene (µg/L)	C3-Substituted Phenanthrene/Anthracene (µg/L)	C4-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C4-Substituted Dibenzothiophene (µg/L)	C4-Substituted Fluoranthene/Pyrene (µg/L)	C4-Substituted Naphthalene (µg/L)	C4-Substituted Phenanthrene/Anthracene (µg/L)	1,2-dimethylnaphthalene (µg/L)	2,6-Dimethylnaphthalene (µg/L)	2,3,5-trimethylnaphthalene (µg/L)	Dibenzothiophene (µg/L)	2-methylphenanthrene (µg/L)	1-Methylphenanthrene (µg/L)	3,6-dimethylphenanthrene (µg/L)
CCME CEQG Freshwater Aquatic Life [#1]			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
NW AEMP V5																																									
MACKENZIE RIVER																																									
DOWNSTREAM																																									
AEMP-DS-02 (Marine Dock)	25-Jul-2023	PDB	< 0.10	< 0.0001	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	0.033	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	0.085	< 0.020	< 0.050	< 0.10	0.098	< 0.0085	0.048	< 0.020	0.073	< 0.10	0.14	< 0.0085	< 0.020	< 0.020	< 0.10	0.050	---	---	---	---	---	---	---	---
	18-Aug-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	18-Aug-2023	**SPMD**	0.0079	---	---	---	---	---	0.0337	0.0072	0.0104	0.0225	0.049	---	---	---	0.06914	---	0.0371	0.0441	0.0792	---	0.04913	---	0.0524	---	0.0624	---	---	---	0.0723	0.0898	---	0.0031	0.008	0.0163	0.0052	0.012	0.0128	0.0038
	24-Sep-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	0.032	< 0.020	< 0.050	< 0.10	0.057	< 0.0075	< 0.0085	< 0.020	0.081	< 0.020	< 0.050	< 0.10	0.083	< 0.0085	0.040	< 0.020	0.087	< 0.10	0.092	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	24-Sep-2023	**SPMD**	0.0225	---	---	---	---	---	0.0387	0.0124	0.0122	0.0738	0.0388	---	---	---	0.15955	---	0.082	0.1729	0.1683	---	0.11514	---	0.1108	---	0.141	---	---	---	0.1499	0.1601	---	0.0083	0.0332	0.0398	0.0171	0.0323	0.009	0.0099
(Duplicate)	24-Sep-2023	**SPMD**	0.0034	---	---	---	---	---	0.0052	0.0022	0.002	0.0112	0.0059	---	---	---	0.0231	---	0.0126	0.026	0.0264	---	0.01757	---	0.0163	---	0.0011	---	---	---	0.0235	0.0318	---	0.0011	0.0047	0.0029	0.0015	0.0022	0.0014	0.0005
AEMP-DS-03 (Island 3)	25-Jul-2023	PDB	< 0.10	< 0.0001	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	19-Aug-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	19-Aug-2023	**SPMD**	0.0009	---	---	---	---	---	0	0.001	0.001	0.003	0.003	---	---	---	0.00093	---	0.0022	0.0029	0.0032	---	0	---	0.0021	---	0.0022	---	---	---	0.0046	0.016	---	0.0002	0.0004	0.0007	8E-05	0.0004	0.0011	7E-05
	25-Sep-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	25-Sep-2023	**SPMD**	0.0016	---	---	---	---	---	8E-05	0.0009	0.0008	0.0051	0.0017	---	---	---	0.00157	---	0.0024	0.0048	0.0038	---	0.00131	---	0.0018	---	0.0023	---	---	---	0.0037	0.012	---	0.0004	0.0006	0.0009	0.0002	0.0009	0.0008	0.0002
AEMP-DS-04 (Refinery)	11-Mar-2023	Grab	< 0.10	< 0.0001	< 0.10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	26-Jul-2023	PDB	< 0.10	< 0.0001	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
(Duplicate)	26-Jul-2023	PDB	< 0.10	< 0.0001	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	18-Aug-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	0.047	< 0.020	0.024	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	0.036	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	18-Aug-2023	**SPMD**	0.006	---	---	---	---	---	0.022	0.0043	0.0071	0.0169	0.0317	---	---	---	0.04558	---	0.0262	0.0355	0.0491	---	0.0363	---	0.0323	---	0.0423	---	---	---	0.0529	0.0686	---	0.0021	0.0064	0.0097	0.0027	0.0062	0.0084	0.0018
	24-Sep-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
AEMP-DS-05 (Radar)	11-Mar-2023	Grab	< 0.10	< 0.0001	< 0.10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	25-Jul-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	19-Aug-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	19-Aug-2023	**SPMD**	0.001	---	---	---	---	---	0.0008	0.0016	0.0015	0.0033	0.0051	---	---	---	0.00243	---	0.004	0.0043	0.0074	---	0.003	---	0.0041	---	0.0066	---	---	---	0.0073	0.0297	---	0.0003	0.0006	0.001	0.0001	0.0006	0.0019	0.0001
	26-Sep-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	0.012	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	0.034	< 0.020	0.047	0.031	< 0.050	< 0.10	0.062	0.010	0.044	0.078	0.058	< 0.10	0.14	< 0.0085	0.022	0.042	< 0.10	0.074	---	---	---	---	---	---	---	---
	26-Sep-2023	**SPMD**	0.0017	---	---	---	---	---	0.0007	0.0021	0.0011	0.0054	0.0029	---	---	---	0.00791	---	0.0047	0.0067	0.0136	---	0.01186	---	0.0072	---	0.0177	---	---	---	0.006	0.0377	---	0.0005	0.001	0.0015	0.0003	0.0019	0.0011	0.0006
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	Grab	< 0.10	< 0.0001	< 0.10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
(Duplicate)	10-Mar-2023	Grab	< 0.10	< 0.0001	< 0.10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	24-Jul-2023	PDB	< 0.10	< 0.0001	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	21-Aug-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050								
	21-Aug-2023	**SPMD**	0.0012	---	---	---	---	---	0.0002	0.0008	0.0009	0.0031	0.0025	---	---	---	0.00086	---	0.0018	0.0031	0.0029	---	0.00114	---	0.0015	---	0.0022	---	---	---	0.0038	0.0139	---	0.0003	0.0004	0.0011	0.0001	0.0006	0.0009	0.0001
	03-Oct-2023	Grab	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
UPSTREAM																																									
AEMP-US-01 (Midway)	12-Mar-2023	Grab	< 0.10	< 0.0001	< 0.10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	25-Jul-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	19-Aug-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	19-Aug-2023	**SPMD**	0.0025	---	---	---	---	---	0	0.0022	0.0031	0.0076	0.0074	---	---	---	0.00204	---	0.0059	0.0081	0.0089	---	0.0023	---	0.0053	---	0.0126	---	---	---	0.01	0.054	---	0.0007	0.0011	0.0024	0.0002	0.0014	0.003	0.0003
	26-Sep-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
AEMP-US-02 (10 mile)	12-Mar-2023	Grab	< 0.10	< 0.0001	< 0.10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	25-Jul-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	19-Aug-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	24-Sep-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
AEMP-US-03 (Norman Wells Upstream)	09-Mar-2023	Grab	< 0.10	< 0.0001	< 0.10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---								
BOSWORTH CREEK																																									
DOWNSTREAM																																									
AEMP-DS-01 (Lower Bosworth Creek)	26-Jul-2023	PDB	< 0.10	< 0.0001	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	18-Aug-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
(Duplicate)	18-Aug-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	18-Aug-2023	**SPMD**	0.0046	---	---	---	---	---	0.0034	0.0035	0.0052	0.0129	0.0091	---	---	---	0.0118	---	0.0124	0.0134	0.0134	---	0.0113	---	0.0124	---	0.0155	---	---	---	0.0221	0.0572	---	0.0017	0.0019	0.0047	0.0007	0.0028	0.0033	0.0009
	25-Sep-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
(Duplicate)	25-Sep-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	25-Sep-2023	**SPMD**	0.0024	---	---	---	---	---	0.0009	0.0012	0.0013	0.0055	0.0009	---	---	---	0.00601	---	0.0049	0.0082	0.0045	---	0.00624	---	0.0055	---	0.0063	---	---	---	0.0102	0.0156	---	0.0014	0.0012	0.0033	0.0008	0.0018	0.0003	0.0009
UPSTREAM																																									
AEMP-US-04 (Upper Bosworth Creek)	26-Jul-2023	PDB	< 0.10	< 0.0001	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	18-Aug-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	18-Aug-2023	**SPMD**	0.0035	---	---	---	---	---	0.0014	0.0017	0.0025	0.009	0.0067	---	---	---	0.00675	---	0.0057	0.008	0.01	---	0.01035	---	0.0071	---	0.0192	---	---	---	0.011	0.048	---	0.0011	0.0011	0.0034	0.0004	0.002	0.0025	0.0006
	24-Sep-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---	---
	24-Sep-2023	**SPMD**	0.0016	---	---	---	---	---	0.0004	0.0013	0.0005	0.004	0.0017	---	---	---	0.00857	---	0.0038	0.0056	0.0098	---	0.01193	---	0.0065	---	0.0177	---	---	---	0.01	0.041	---	0.0007	0.0008	0.0034	0.0004	0.0028	0.0005	0.0013

Table 7

Surface Water Analytical Results: Alkylated Polycyclic Aromatic Hydrocarbons (PAHs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	1-Methylnaphthalene (µg/L)	2-Methylnaphthalene (mg/L)	2-Methylnaphthalene (µg/L)	C1benzo)kfluoranthene/benzoapyrene (µg/L)	C1-Substituted Acenaphthene (µg/L)	C1-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C1-Substituted Biphenyl (µg/L)	C1-Substituted Dibenzothiophene (µg/L)	C1-Substituted Fluoranthene/Pyrene (µg/L)	C1-Substituted Fluorene (µg/L)	C1-Substituted Naphthalene (µg/L)	C1-Substituted Phenanthrene/Anthracene (µg/L)	C2benzo)kfluoranthene/benzoapyrene (µg/L)	C2-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C2-Substituted Biphenyl (µg/L)	C2-Substituted Dibenzothiophene (µg/L)	C2-Substituted Fluoranthene/Pyrene (µg/L)	C2-Substituted Fluorene (µg/L)	C2-Substituted Naphthalene (µg/L)	C2-Substituted Phenanthrene/Anthracene (µg/L)	C3-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C3-Substituted Dibenzothiophene (µg/L)	C3-Substituted Fluoranthene/Pyrene (µg/L)	C3-Substituted Fluorene (µg/L)	C3-Substituted Naphthalene (µg/L)	C3-Substituted Phenanthrene/Anthracene (µg/L)	C4-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C4-Substituted Dibenzothiophene (µg/L)	C4-Substituted Fluoranthene/Pyrene (µg/L)	C4-Substituted Naphthalene (µg/L)	C4-Substituted Phenanthrene/Anthracene (µg/L)	1,2-dimethylnaphthalene (µg/L)	2,6-Dimethylnaphthalene (µg/L)	2,3,5-trimethylnaphthalene (µg/L)	Dibenzothiophene (µg/L)	2-methylphenanthrene (µg/L)	1-Methylphenanthrene (µg/L)	3,6-dimethylphenanthrene (µg/L)
CCME CEQG Freshwater Aquatic Life [#1]			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Relative Percent Difference (RPD) Report																																									
AEMP-DS-04 (Refinery)	26-Jul-2023	PDB	< 0.10	< 0.00010	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---
(Duplicate)	26-Jul-2023	PDB	< 0.10	< 0.00010	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---
RPD(%)			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
AEMP-DS-06 (Fort Good Hope)	10-Mar-2023	Grab	< 0.10	< 0.00010	< 0.10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
(Duplicate)	10-Mar-2023	Grab	< 0.10	< 0.00010	< 0.10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RPD(%)			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
AEMP-DS-01 (Lower Bosworth Creek)	18-Aug-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---
(Duplicate)	18-Aug-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---
RPD(%)			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
AEMP-DS-02 (Marine Dock)	24-Sep-2023	**SPMD**	0.0225	---	---	---	---	---	0.0387	0.0124	0.0122	0.0738	0.0388	---	---	---	0.15955	---	0.082	0.1729	0.1683	---	0.11514	---	0.1108	---	0.141	---	---	---	0.1499	0.1601	---	0.0083	0.0332	0.0398	0.0171	0.0323	0.009	0.0099
(Duplicate)	24-Sep-2023	**SPMD**	0.0034	---	---	---	---	---	0.0052	0.0022	0.002	0.0112	0.0059	---	---	---	0.0231	---	0.0126	0.026	0.0264	---	0.01757	---	0.0163	---	0.0011	---	---	---	0.0235	0.0318	---	0.0011	0.0047	0.0029	0.0015	0.0022	0.0014	0.0005
RPD(%)			**147**	---	---	---	---	---	**152**	**139**	**145**	**147**	**147**	---	---	---	**149**	---	**147**	**148**	**146**	---	**147**	---	**149**	---	**197**	---	---	---	**146**	**134**	---	**153**	**151**	**172**	**167**	**174**	**145**	**180**
AEMP-DS-01 (Lower Bosworth Creek)	25-Sep-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---
(Duplicate)	25-Sep-2023	PDB	< 0.10	---	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	< 0.050	---	---	---	---	---	---	---
RPD(%)			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Superscript [#1] denotes values exceeding
   (CCME. 2014. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life.
   http://st-ts.ccme.ca/?chems=all&chapters=1 accessed Aug 22, 2014.)

Nitrate (as N):
Guideline based on long term exposure
Nitrite (as N):
Standard is for NO_2 as N, equivalent standard for NO_2 is 0.197 mg/L.
Chloride:
Guideline based on chronic exposure
Aluminum:
Standard varies with pH.
pH < 6.5 = 0.005 mg/L
pH >= 6.5 = 0.1 mg/L
Lead:
Guideline is hardness dependent. Presented guideline set to lower limit.
Mercury:
Guideline for Inorganic mercury
Nickel:
Guideline is hardness dependent. Presented guideline set to lower limit.
Silver:
Guideline based on long term exposure
Boron:
Guideline based on long term exposure
Cadmium:
Guideline based on long term exposure
Chromium:
Limit is for Chromium(III).
Copper:
Guideline is hardness dependent. Presented guideline set to lower limit.
Uranium:
Guideline based on long term exposure
Ammonia as N:
Guideline for total ammonia is dependent on pH and temperature of surface water. Guideline based on Temperature of 10oC and pH of 7

7. Superscript [#2] denotes values exceeding
   (Health Canada. 2022. Guidelines for Canadian Drinking Water Quality. Summary Table. Maximum Acceptable Concentration.
   Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
   September 2022.)

Chromium:
MAC established for total chromium to protect from Chromium (VI).
Calcium:
Guideline value not necessary. Calcium contributes to hardness.

Table 7

Surface Water Analytical Results: Alkylated Polycyclic Aromatic Hydrocarbons (PAHs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Type	1-Methylnaphthalene (µg/L)	2-Methylnaphthalene (mg/L)	2-Methylnaphthalene (µg/L)	C1benzo]kfluoranthene/benzoapyrene (µg/L)	C1-Substituted Acenaphthene (µg/L)	C1-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C1-Substituted Biphenyl (µg/L)	C1-Substituted Dibenzothiophene (µg/L)	C1-Substituted Fluoranthene/Pyrene (µg/L)	C1-Substituted Fluorene (µg/L)	C1-Substituted Naphthalene (µg/L)	C1-Substituted Phenanthrene/Anthracene (µg/L)	C2benzo]kfluoranthene/benzoapyrene (µg/L)	C2-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C2-Substituted Biphenyl (µg/L)	C2-Substituted Dibenzothiophene (µg/L)	C2-Substituted Fluoranthene/Pyrene (µg/L)	C2-Substituted Fluorene (µg/L)	C2-Substituted Naphthalene (µg/L)	C2-Substituted Phenanthrene/Anthracene (µg/L)	C3-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C3-Substituted Dibenzothiophene (µg/L)	C3-Substituted Fluoranthene/Pyrene (µg/L)	C3-Substituted Fluorene (µg/L)	C3-Substituted Naphthalene (µg/L)	C3-Substituted Phenanthrene/Anthracene (µg/L)	C4-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C4-Substituted Dibenzothiophene (µg/L)	C4-Substituted Fluoranthene/Pyrene (µg/L)	C4-Substituted Naphthalene (µg/L)	C4-Substituted Phenanthrene/Anthracene (µg/L)	1,2-dimethylnaphthalene (µg/L)	2,6-Dimethylnaphthalene (µg/L)	2,3,5-trimethylnaphthalene (µg/L)	Dibenzothiophene (µg/L)	2-methylphenanthrene (µg/L)	1-Methylphenanthrene (µg/L)	3,6-dimethylphenanthrene (µg/L)
CCME CEQG Freshwater Aquatic Life [#1]			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Canadian Drinking Water Quality Guidelines 2022 - MAC [#2]			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Ammonia as N:

Guideline value not necessary. No adverse effects at levels found in drinking water. To help prevent nitrification, limit excess free ammonia entering the distribution system to below 0.1 mg/L and preferably below 0.05 mg/L as N.

Turbidity:

Not specifically an MAC, rather a treatment limit guideline value specific groundwater not under direct influence of surface water. Groundwater that is not under the direct influence of surface water are considered less vulnerable to faecal contamination (HC 2012). A less stringent value for turbidity may be acceptable if it is demonstrated that the system has a history of acceptable microbiological quality and that a higher turbidity value will not compromise disinfection. Health Canada (2012). Guidelines for Canadian Drinking Water Quality: Guideline Technical Document - Turbidity. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Canada. December 2012.

8. Superscript [#3] - Sample analyzed past hold time. Sample analysis is recommended within 48 hours of sampling.
9. Superscript [#4] - Method blank exceeds 0.2 mg/L stipulated in Reference Method. No other Quality Control measures affected.
10. Superscript [#5] - Method blank exceeds 0.2 mg/L stipulated in Reference Method. No other Quality Control measures affected
11. Superscript [#6] - COD < DOC: Both values fall within the method uncertainty for duplicates and are likely equivalent. COD < TOC: Both values fall within the method uncertainty for duplicates and are likely equivalent.
12. Superscript [#7] - Sample was past hold time when received.
13. Superscript [#8] - Duplicate exceeds acceptance criteria due to sample non homogeneity. Reanalysis yields similar results.
14. Superscript [#9] - Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
15. Superscript [#10] - Detection limits raised due to sample matrix.
16. Superscript [#11] - Detection limit raised based on sample volume used for analysis.
17. Superscript [#12] - Sample incubation time was outside method specifications. This may increase the uncertainty associated with these results.
18. Superscript [#13] - Sample was originally processed within hold time. Data quality required investigation. Re-analysis was completed past recommended hold time.
19. Superscript [#14] - Method blank exceeds 0.2 mg/L stipulated in Reference Method. No other Quality Control measures affected.Sample analyzed past hold time. Sample analysis is recommended within 48 hours of sampling.
20. Superscript [#15] - Sample analyzed past hold time. Sample analysis is recommended within 48 hours of sampling. Method blank exceeds 0.2 mg/L stipulated in Reference Method. No other Quality Control measures affected.
21. Superscript [#16] - Detection limits raised due to dilution to bring analyte within the calibrated range.
22. Superscript [#17] - Matrix Spike exceeds acceptance limits due to matrix interference. Reanalysis yields similar results.
23. Superscript [#18] - Detection limits raised due to matrix interference.
24. Superscript [#19] - Matrix spike exceeds acceptance limits due to matrix interference.
25. Superscript [#20] - Detection limit raised due to sample matrix
26. Superscript [#21] - Matrix spike exceeds acceptance limits due to probable matrix interference.

Project Number: 417085-49223

Physical Parameters of Slimy Sculpin collected from Bosworth Creek in 2023

	Collection Date	Fish #	Sex	Lab Sample ID	Analysis Type[1]	Total Length	Weight	Liver Weight	Hepatosomatic Index (HSI)	Gonad Weight	Gonadosomatic Index (GSI)	Fulton's Condition Factor	Comments/Pathology Notes
	(d/m/yr)					*(mm)*	*(g)*	*(g)*		*(g)*			
AMEP-FS-01 (Upstream)													
Slimy Sculpin	**29-Sep-23**	**1**	F	AEMP-01-FS-01	Metals; Protein	82	4.565	0.105	2.3	0.088	1.9	0.83	
	29-Sep-23	**2**	F	AEMP-01-FS-02	Metals; Protein	83	4.628	0.075	1.6	0.092	2.0	0.81	
	29-Sep-23	**3**	F	AEMP-01-FS-03	Metals; Protein	61	2.070	0.039	1.9	0.032	1.5	0.91	
	29-Sep-23	**4**	U	AEMP-01-FS-04	---	55	1.714	0.018	1.1	---	---	1.03	
	29-Sep-23	**5**	F	AEMP-01-FS-05	Metals; Protein	62	2.147	0.057	2.7	0.035	1.6	0.90	
	29-Sep-23	**6**	F	AEMP-01-FS-06	Metals; Protein	61	1.807	0.035	1.9	0.041	2.3	0.80	
	01-Oct-23	**7**	M	AEMP-01-FS-07	Metals; Protein	72	3.820	0.065	1.7	0.089	2.3	1.02	
	01-Oct-23	**8**	F	AEMP-01-FS-08	Metals; Protein	59	1.798	0.060	3.3	0.042	2.3	0.88	
	01-Oct-23	**9**	F	AEMP-01-FS-09	Metals; Protein	60	1.788	0.053	3.0	0.034	1.9	0.83	
	01-Oct-23	**10**	F	AEMP-01-FS-10	Metals; Protein	63	1.882	0.033	1.8	0.034	1.8	0.75	
	01-Oct-23	**11**	M	AEMP-01-FS-11	Metals; Protein	76	3.692	0.057	1.5	0.021	0.6	0.84	Parasite observed in peritoneal cavity. Removed from gonad vs body weight statistical comparison as outlier.
	01-Oct-23	**12**	U	AEMP-01-FS-12	---	60	1.865	0.033	1.8	---	---	0.86	
	01-Oct-23	**13**	F	AEMP-01-FS-13	Metals; Protein	57	1.672	0.034	2.0	0.029	1.7	0.90	
	01-Oct-23	**14**	F	AEMP-01-FS-14	Metals; Protein	60	1.576	0.030	1.9	0.031	2.0	0.73	
	01-Oct-23	---	F	---	PAHs	55	1.381	0.032	2.3	---	---	0.83	
	01-Oct-23	---	U	---	PAHs	50	1.090	0.011	1.0	---	---	0.87	Two parasites in the peritoneal cavity, tissue weight without parasites was measured (0.838 g)
	01-Oct-23	---	F	---	PAHs	61	1.726	0.025	1.4	0.021	1.2	0.76	
	01-Oct-23	---	U	---	PAHs	51	1.021	---	---	0.008	0.8	0.77	Liver too small for accurate weight measurement
	01-Oct-23	---	U	---	PAHs	52	1.034	0.017	1.6	---	---	0.74	
	01-Oct-23	---	U	---	PAHs	49	0.850	0.014	1.6	---	---	0.72	
	01-Oct-23	---	U	---	PAHs	47	0.862	0.008	0.9	---	---	0.83	
	01-Oct-23	---	U	---	PAHs	46	0.689	0.006	0.9	---	---	0.71	
	01-Oct-23	**15**	M	AEMP-01-FS-15	Metals; Protein	90	7.300	0.089	1.2	0.009	0.1	1.00	Two parasites in the peritoneal cavity, tissue weight without parasites was measured (5.503 g). Removed from gonad vs body weight statistical comparison as outlier.
	01-Oct-23	---	F	---	PAHs	61	1.881	0.041	2.2	0.039	2.1	0.83	
	01-Oct-23	**15**	M	AEMP-01-FS-16	Metals	48	0.784	0.009	1.1	0.002	0.3	0.71	
	02-Oct-23	---	F	---	PAHs	72	3.425	0.106	3.1	0.046	1.3	0.92	
	02-Oct-23	---	F	---	PAHs	61	1.889	0.063	3.3	0.036	1.9	0.83	
	02-Oct-23	**17**	M	AEMP-01-FS-17	Metals; Protein	72	3.215	0.029	0.9	0.065	2.0	0.86	
	02-Oct-23	---	F	---	PAHs	61	2.081	0.022	1.1	0.005	0.2	0.92	Removed from gonad vs body weight statistical comparison as outlier.
	02-Oct-23	**18**	M	AEMP-01-FS-18	Metals; Protein	60	1.344	0.021	1.6	0.002	0.1	0.62	Some liver may have been lost during dissection. Removed from gonad vs body weight statistical comparison as outlier.
	02-Oct-23	---	U	---	PAHs	52	1.043	0.010	1.0	---	---	0.74	
	02-Oct-23	---	F	---	PAHs	59	1.684	0.028	1.7	0.020	1.2	0.82	
	02-Oct-23	---	F	---	PAHs	56	1.475	0.022	1.5	0.022	1.5	0.84	
	02-Oct-23	---	F	---	PAHs	64	1.683	0.038	2.3	0.036	2.1	0.64	
	02-Oct-23	---	F	---	PAHs	55	1.401	0.023	1.6	0.004	0.3	0.84	
	02-Oct-23	**19**	M	AEMP-01-FS-19	Metals; Protein	50	1.010	0.013	1.3	---	---	0.81	
	02-Oct-23	**20**	M	AEMP-01-FS-20	Metals; Protein	48	0.809	0.011	1.4	0.017	2.1	0.73	
	02-Oct-23	---	F	---	PAHs	59	1.836	0.050	2.7	0.037	2.0	0.89	
	02-Oct-23	---	F	---	PAHs	54	1.376	0.026	1.9	0.006	0.4	0.87	Removed from gonad vs body weight statistical comparison as outlier.
	02-Oct-23	---	F	---	PAHs	82	4.032	0.119	3.0	0.085	2.1	0.73	

Project Number: 417085-49223

Physical Parameters of Slimy Sculpin collected from Bosworth Creek in 2023

	Collection Date	Fish #	Sex	Lab Sample ID	Analysis Type[1]	Total Length	Weight	Liver Weight	Hepatosomatic Index (HSI)	Gonad Weight	Gonadosomatic Index (GSI)	Fulton's Condition Factor	Comments/Pathology Notes
	(d/m/yr)					*(mm)*	*(g)*	*(g)*		*(g)*			
	02-Oct-23	---	F	---	PAHs	67	2.530	0.044	1.7	0.014	0.6	0.84	Removed from gonad vs body weight statistical comparison as outlier.
	02-Oct-23	---	F	---	PAHs	57	1.490	0.031	2.1	0.028	1.9	0.80	
	02-Oct-23	---	F	---	PAHs	59	1.422	0.027	1.9	0.027	1.9	0.69	
	02-Oct-23	---	F	---	PAHs	60	1.612	0.056	3.5	0.030	1.9	0.75	
	02-Oct-23	---	F	---	PAHs	64	2.146	0.043	2.0	0.037	1.7	0.82	
	02-Oct-23	**21**	M	AEMP-01-FS-21	Metals; Protein	61	1.904	0.027	1.4	0.040	2.1	0.84	
	02-Oct-23	---	F	---	PAHs	72	3.333	0.089	2.7	0.058	1.7	0.89	
	02-Oct-23	**22**	M	AEMP-01-FS-22	Metals; Protein	63	2.000	0.026	1.3	0.036	1.8	0.80	
	02-Oct-23	---	M	---	PAHs	59	1.228	0.010	0.8	0.022	1.8	0.60	
	02-Oct-23	---	U	---	PAHs	50	1.090	0.018	1.7	NA	NA	0.87	
	02-Oct-23	---	F	---	PAHs	55	1.369	0.035	2.6	0.026	1.9	0.82	
	02-Oct-23	---	F	---	PAHs	48	0.893	0.023	2.6	0.016	1.8	0.81	Removed from gonad vs body weight statistical comparison to avoid non-overlapping ranges.
	02-Oct-23	---	F	---	PAHs	51	1.188	0.018	1.5	0.012	1.0	0.90	Removed from gonad vs body weight statistical comparison to avoid non-overlapping ranges.
	02-Oct-23	---	F	---	PAHs	57	1.206	0.013	1.1	0.012	1.0	0.65	Cysts observed in peritoneal cavity. Removed from gonad vs body weight statistical comparison to avoid non-overlapping ranges.
	02-Oct-23	---	U	---	PAHs	35	1.383	---	---	---	---	3.23	Note small size may have influenced condition factor results, treated as outliers but retained in analysis
	02-Oct-23	---	U	---	PAHs	37	1.360	---	---	---	---	2.68	Note small size may have influenced condition factor results; , treated as outliers but retained in analysis
	02-Oct-23	---	M	---	PAHs	53	1.286	0.013	1.0	0.022	1.7	0.86	
	02-Oct-23	---	M	---	PAHs	58	1.665	0.024	1.4	0.041	2.5	0.85	
	02-Oct-23	---	F	---	PAHs	50	0.991	0.014	1.4	0.004	0.4	0.79	
	02-Oct-23	---	M	---	PAHs	45	0.737	0.005	0.7	0.002	0.3	0.81	
Average						**59**	**1.880**	**0.036**	**1.8**	**0.031**	**1.5**	**0.89**	
AEMP-FS-02 (Downstream)													
Slimy Sculpin	**30-Sep-23**	**1**	F	AEMP-02-FS-01	Metals; Protein	82	4.853	0.176	3.6	0.140	2.9	0.88	
	30-Sep-23	**2**	M	AEMP-02-FS-02	Metals; Protein	65	2.243	0.059	2.6	0.052	2.3	0.82	
	30-Sep-23	**3**	M	AEMP-02-FS-03	Metals; Protein	66	2.154	0.025	1.2	0.048	2.2	0.75	
	30-Sep-23	**4**	F	AEMP-02-FS-04	Metals; Protein	65	1.941	0.029	1.5	0.019	1.0	0.71	
	30-Sep-23	**5**	M	AEMP-02-FS-05	Metals; Protein	60	1.753	0.019	1.1	0.034	1.9	0.81	
	30-Sep-23	**6**	M	AEMP-02-FS-06	Metals; Protein	55	1.190	0.021	1.8	0.010	0.8	0.72	
	30-Sep-23	**7**	F	AEMP-02-FS-07	Metals; Protein	82	4.883	0.155	3.2	0.100	2.0	0.89	
	30-Sep-23	**8**	F	AEMP-02-FS-08	Metals; Protein	57	1.657	0.045	2.7	0.023	1.4	0.89	
	30-Sep-23	**9**	F	AEMP-02-FS-09	Metals; Protein	105	10.181	0.293	2.9	0.231	2.3	0.88	Removed from gonad vs body weight statistical comparison to avoid non-overlapping ranges.
	30-Sep-23	**10**	M	AEMP-02-FS-10	Metals; Protein	63	2.125	0.033	1.6	0.039	1.8	0.85	
	30-Sep-23	**11**	M	AEMP-02-FS-11	Metals; Protein	55	1.242	0.016	1.3	0.021	1.7	0.75	
	30-Sep-23	**12**	U	AEMP-02-FS-12	---	54	1.444	0.005	0.3	---	---	0.92	Two parasites in the peritoneal cavity
	30-Sep-23	**13**	U	AEMP-02-FS-13	---	55	1.445	0.019	1.3	---	---	0.87	Parasite observed in peritoneal cavity
	30-Sep-23	**14**	U	AEMP-02-FS-14	---	49	0.937	0.009	1.0	---	---	0.80	
	30-Sep-23	**15**	F	AEMP-02-FS-15	---	51	1.091	0.033	3.0	0.006	0.5	0.82	Removed from gonad vs body weight statistical comparison as outlier.
	30-Sep-23	**16**	M	AEMP-02-FS-16	Metals	50	0.923	0.002	0.2	0.005	0.5	0.74	Insufficient liver tissue for CYP1A analysis, some tissue lost during sampling. Removed from liver vs body weight statistical comparison as outlier.
	30-Sep-23	**17**	U	AEMP-02-FS-17	---	56	1.620	0.023	1.4	---	---	0.92	Parasite observed in peritoneal cavity
	30-Sep-23	**18**	F	AEMP-02-FS-18	Metals; Protein	62	2.176	0.072	3.3	0.045	2.1	0.91	
	30-Sep-23	**19**	F	AEMP-02-FS-19	Metals; Protein	85	4.757	0.131	2.8	0.123	2.6	0.77	

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Physical Parameters of Slimy Sculpin collected from Bosworth Creek in 2023

	Collection Date	Fish #	Sex	Lab Sample ID	Analysis Type[1]	Total Length	Weight	Liver Weight	Hepatosomatic Index (HSI)	Gonad Weight	Gonadosomatic Index (GSI)	Fulton's Condition Factor	Comments/Pathology Notes
	(d/m/yr)					*(mm)*	*(g)*	*(g)*		*(g)*			
	30-Sep-23	**20**	M	AEMP-02-FS-20	Metals	52	1.484	0.013	0.9	0.039	2.6	1.06	
	30-Sep-23	**21**	M	AEMP-02-FS-21	Metals; Protein	56	1.705	0.044	2.6	0.097	5.7	0.97	Only one gonad lobe developed
	30-Sep-23	**22**	F	AEMP-02-FS-22	Metals; Protein	52	1.380	0.015	1.1	0.005	0.4	0.98	Parasite observed in peritoneal cavity. Removed from gonad vs body weight statistical comparison as outlier.
	30-Sep-23	**23**	M	AEMP-02-FS-23	Metals	49	0.918	0.009	1.0	0.002	0.2	0.78	
	30-Sep-23	**24**	U	AEMP-02-FS-24	---	40	0.585	---	---	---	---	0.91	
	01-Oct-23	**---**	M	---	PAHs	71	3.949	0.098	2.5	0.095	2.4	1.10	
	01-Oct-23	**---**	M	---	PAHs	81	5.192	0.107	2.1	0.012	0.2	0.98	Three parasites in the peritoneal cavity, reduced gonad development observed. Removed from gonad vs body weight statistical comparison as outlier.
	01-Oct-23	**25**	F	AEMP-02-FS-25	Metals; Protein	60	1.873	0.025	1.3	0.028	1.5	0.87	
	01-Oct-23	**26**	F	AEMP-02-FS-26	Metals; Protein	82	5.679	0.205	3.6	0.083	1.5	1.03	
	01-Oct-23	**---**	M	---	PAHs	73	3.860	0.072	1.9	0.084	2.2	0.99	
	01-Oct-23	**---**	U	---	PAHs	49	1.005	---	---	---	---	0.85	
	01-Oct-23	**---**	F	---	PAHs	66	2.494	0.047	1.9	0.042	1.7	0.87	
	01-Oct-23	**---**	M	---	PAHs	72	2.982	0.045	1.5	---	---	0.80	
	01-Oct-23	**---**	F	---	PAHs	61	2.024	0.044	2.2	0.037	1.8	0.89	
	01-Oct-23	**---**	M	---	PAHs	56	1.675	0.041	2.4	0.031	1.9	0.95	
	01-Oct-23	**---**	F	---	PAHs	55	1.380	0.029	2.1	---	---	0.83	Parasites in the peritoneal cavity
	01-Oct-23	**---**	U	---	PAHs	54	1.216	0.018	1.5	---	---	0.77	
	01-Oct-23	**---**	F	---	PAHs	59	1.620	0.028	1.7	0.025	1.5	0.79	
	01-Oct-23	**---**	F	---	PAHs	49	1.007	0.018	1.8	0.005	0.5	0.86	
	01-Oct-23	**---**	U	---	PAHs	39	0.328	---	---	---	---	0.55	
Average						**61**	**2.333**	**0.056**	**1.9**	**0.051**	**1.7**	**0.86**	

Notes:
1. --- indicates parameter not analysed.
2. Protein analysis includes measurement of CYP1A protein and total protein content in the liver of individual fish, metals were analyzed in whole body samples submitted individually to the laboratory, and polycyclic aromatic hydrocarbons (PAHs) were analyzed as whole body composite samples.
3. Sample ID - Refers to the laboratory analysis identifier used for each sample during chemical analysis.

Table 9

Summary Statistics for Fish Health Metrics Measured in Bosworth Creek Slimy Sculpin in 2023

Project #: 417085-49223

Monitoring Station	Parameter	Units	Basic Analysis							
			Count	Min (units)	Median (units)	Max (units)	Range (units)	Average (units)	Standard Deviation (units)	Standard Error (units)
AEMP-FS-01										
Female	Length	mm	31	48	61	83	35	62.2	8.3	1.5
	Weight	g	31	0.893	1.798	4.628	3.735	2.071	0.943	0.169
	Condition	---	31	0.64	0.83	0.92	0.28	0.82	0.08	0.01
	Hepatosomatic Index (HSI)	---	31	1.06	2.03	3.47	2.41	2.20	0.65	0.12
	Gonadosomatic Index (GSI)	---	31	0.24	1.81	2.34	2.10	1.63	0.53	0.09
Male	Length	mm	11	48	61	90	42	64.7	11.9	3.6
	Weight	g	11	0.809	1.904	7.300	6.491	2.569	1.878	0.566
	Condition	---	11	0.60	0.84	1.02	0.42	0.82	0.13	0.04
	Hepatosomatic Index (HSI)	---	11	0.81	1.36	1.70	0.89	1.30	0.28	0.09
	Gonadosomatic Index (GSI)	---	11	0.12	1.80	2.46	2.34	1.56	0.86	0.26
AEMP-FS-02										
Female	Length	mm	14	51	64	105	54	69.2	15.5	4.1
	Weight	g	14	1.091	2.100	10.181	9.090	3.329	2.505	0.669
	Condition	---	14	0.71	0.88	1.03	0.32	0.87	0.08	0.02
	Hepatosomatic Index (HSI)	---	14	1.09	2.74	3.63	2.54	2.49	0.86	0.23
	Gonadosomatic Index (GSI)	---	14	0.36	1.61	2.88	2.52	1.65	0.71	0.19
Male	Length	mm	14	50	62	81	31	62.5	9.2	2.5
	Weight	g	14	0.923	1.939	5.192	4.269	2.320	1.240	0.331
	Condition	---	14	0.72	0.83	1.10	0.38	0.88	0.13	0.03
	Hepatosomatic Index (HSI)	---	14	0.22	1.66	2.63	2.41	1.68	0.72	0.19
	Gonadosomatic Index (GSI)	---	13	0.23	1.94	5.69	5.46	2.03	1.33	0.37

Table 10

Statistical Comparison Summary for Bosworth Creek Slimy Sculpin Health Metrics in 2023

Project #: 417085-49223

	Parameter	Parametric (ANOVA/ANCOVA) Analysis							Linear Reggression Statistics									Permutation Analysis	
		Degrees of Freedom (k-1) (k-1)	Degrees of Freedom (n-1) (n-1)	F-Statistic (Site Parameter)	Site Parameter Significance p-value	Percent Difference (%)	Power[1] 1-β	Transformation/Violoation	y-Intercept parameter (β_0)	Covariate Effect Parameter (β_1)	Covariate Significance (β_1) p-value	Site Effect Parameter (β_2)	Site Effect Significance (β_2) p-value	Covariate:Site Interaction Effect Parameter (β_3)	Site Interaction Significance p-value	Adjusted R-Square r^2	Residual Standard Error	Z- Statistic	p-value
2023 One-way Analysis of Variance (ANOVA)																			
Female	Length	1	43	3.93	0.054	11.3	---	Normality	---	---	---	---	---	---	---	---	---	-1.92	0.053
	Weight	1	43	4.87	**0.033**	60.7	---	Normality	---	---	---	---	---	---	---	---	---	-2.33	**0.013**
	Condition	1	43	4.36	**0.043**	6.1	1.00	None	---	---	---	---	---	---	---	---	---	---	---
	Hepatosomatic Index (HSI)	1	43	1.55	0.220	13.2	0.99	None	---	---	---	---	---	---	---	---	---	---	---
	Gonadosomatic Index (GSI)	1	43	0.01	0.914	1.3	---	Normality	---	---	---	---	---	---	---	---	---	-0.11	0.915
	CYP1A Protein Content	1	17	0.85	0.368	6.9	0.74	None	---	---	---	---	---	---	---	---	---	---	---
	Total Protein Content	1	17	0.26	0.615	4.9	0.30	None	---	---	---	---	---	---	---	---	---	---	---
Male	Length	1	23	0.28	0.602	-3.4	0.39	None	---	---	---	---	---	---	---	---	---	---	---
	Weight	1	23	0.01	0.922	-9.7	0.06	Log10	---	---	---	---	---	---	---	---	---	---	---
	Condition	1	23	1.13	0.300	7.3	0.92	None	---	---	---	---	---	---	---	---	---	---	---
	Hepatosomatic Index (HSI)	1	23	2.74	0.111	**29.5**	1.00	None	---	---	---	---	---	---	---	---	---	---	---
	Gonadosomatic Index (GSI)	1	23	1.01	0.325	**30.1**	---	Normality	---	---	---	---	---	---	---	---	---	-1.01	0.350
	CYP1A Protein Content	1	14	4.39	0.055	51.7	1.00	None	---	---	---	---	---	---	---	---	---	---	---
	Total Protein Content	1	14	1.55	0.233	-20.7	0.86	None	---	---	---	---	---	---	---	---	---	---	---
2023 Analysis of Covariance (ANCOVA)																			
Female	Body Weight (Length Covariate)	1	42	5.11	**0.029**	5.7	1.00	Log10(x + 1)	-3.474	2.195	**<2E-16**	0.024	**0.03**	---	---	0.96	0.032	---	---
	Liver Weight (Body Weight Covariate)	1	42	0.02	0.876	1.7	1.00	Log10	-1.749	1.252	**1.13E-15**	0.007	0.88	---	---	0.80	0.138	---	---
	Gonad Weight (Body Weight Covariate)	1	33	0.03	0.855	**-29.2% (Small fish)** 21.2% (Big fish)	1.00	Log10(x +1)	-0.016	0.068	**5.30E-09**	-0.017	**0.02**	0.032	**0.02**	0.85	0.005	---	---
Male	Body Weight (Length Covariate)	1	22	1.97	0.175	8.5	1.00	Log10	-5.859	3.425	**8.18E-15**	0.035	0.18	---	---	0.93	0.062	---	---
	Liver Weight (Body Weight Covariate)	1	21	5.03	**0.036**	**32.9**	1.00	Log10	-1.944	1.144	**4.36E-09**	0.123	**0.04**	---	---	0.81	0.134	---	---
	Gonad Weight (Body Weight Covariate)	1	17	0.19	0.668	-8.2	0.95	Log10	-1.796	1.410	**5.69E-06**	-0.037	0.67	---	---	**0.68**	0.187	---	---

Notes: 1. Superscript 1 - Effect size for ANOVA power analysis is based on within group and between group variance; Effect size for ANCOVA power analysis based on $f^2 = r^2/1-r^2$

X	2. Yellow highlighting denotes p-values below the chosen cutoff of α=0.05 and denotes a significant difference for the associated comparison
X	3. Blue highlighting denotes percent difference values that exceed the associated critical effect size (CES) which includes: Condition = 10%, HSI/GSI = 25%
X	4. Green highlighting denotes p-values below the chosen cutoff of α = 0.05 for covariate regression analyses. Lower values indicate stronger relationship between covariates and improved site comparison confidence.
X	5. R-square equals the cutoff of 0.80 that is preferable for robust site comparisons for ANCOVA analysis (Environment Canada 2012)
X	6. R-square is below the cutoff of 0.80 that is preferred for robust site comparisons for ANCOVA analyses (Environment Canada 2012)

Table 11

Whole Body Tissue Residue Analytical Results: Metals and Trace Elements

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Name	% Moisture (%)	Aluminum (mg/kg)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Boron (mg/kg)	Cadmium (mg/kg)	Calcium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Lithium (mg/kg)	Magnesium (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Phosphorus (mg/kg)	Potassium (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Sodium (mg/kg)	Strontium (mg/kg)	Thallium (mg/kg)	Tin (mg/kg)	Titanium (mg/kg)	Uranium (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
BOSWORTH CREEK SLIMY SCULPIN																																	
AEMP-FS-01	23-Oct-2023	AEMP-01-FS-01	78.4	4.3	< 0.002	< 0.251	0.475	0.064	0.034	1569	0.64	0.07	1.5	36	0.012	0.017	1069	1.8	1.2	0.019	0.324	10452	17794	3.2	< 0.001	4650	2.5	0.017	0.546	1.2	< 0.001	0.043	55
	23-Oct-2023	AEMP-01-FS-02	77.8	2.7	< 0.002	< 0.251	0.29	< 0.062	< 0.03	1352	0.576	0.049	1.2	25	0.007	0.011	1106	2.4	1	0.009	0.233	8895	13548	3.3	< 0.001	3486	2.1	0.022	0.412	0.952	< 0.001	< 0.034	43
	23-Oct-2023	AEMP-01-FS-03	78.2	3.9	< 0.002	0.351	0.343	< 0.062	0.034	1561	0.758	0.112	1.5	32	0.014	0.017	1071	2	0.913	0.019	1	8979	12680	5.1	< 0.001	3827	2.2	0.024	0.836	1.2	< 0.001	0.043	41
	23-Oct-2023	AEMP-01-FS-05	78.0	4.3	< 0.002	< 0.251	0.29	0.064	< 0.03	1589	0.637	0.068	1.5	30	0.012	0.014	862	1.6	0.741	0.019	0.467	9394	14433	6.4	< 0.001	3516	2.3	0.038	0.692	1.1	< 0.001	< 0.034	50
	23-Oct-2023	AEMP-01-FS-06	77.3	2.2	< 0.002	< 0.251	0.435	0.064	< 0.03	1364	0.622	0.052	1.2	26	0.007	0.017	890	1.4	0.997	0.009	0.348	9830	17156	5.5	< 0.001	4093	1.9	0.017	0.312	1.2	< 0.001	< 0.034	56
	23-Oct-2023	AEMP-01-FS-07	79.9	3.3	0.002	< 0.251	0.523	0.064	< 0.03	1485	0.589	0.051	1.5	25	0.005	0.023	1121	2.2	1	0.013	0.478	10913	17790	5.8	< 0.001	4235	2.6	0.027	1.1	1.1	< 0.001	0.036	59
	23-Oct-2023	AEMP-01-FS-08	77.2	1.8	< 0.002	< 0.251	0.211	0.064	< 0.03	1493	0.598	0.04	1.8	30	0.005	0.017	1097	1.9	0.724	0.009	0.238	10768	18865	4.5	< 0.001	3795	2.2	0.026	0.332	1	< 0.001	< 0.034	36
	23-Oct-2023	AEMP-01-FS-09	74.8	1.6	< 0.002	< 0.251	0.659	0.073	< 0.03	1650	0.74	0.057	1.7	38	0.007	0.014	1120	3.1	0.623	0.019	0.823	8286	10958	5.1	< 0.001	3209	3.4	0.027	0.847	1.1	< 0.001	< 0.034	34
	23-Oct-2023	AEMP-01-FS-10	78.5	1.6	< 0.002	< 0.251	0.237	0.092	< 0.03	1384	0.589	0.032	1.2	32	0.007	0.014	917	1.9	0.701	0.009	0.524	7234	12682	5.7	< 0.001	2930	1.7	0.023	0.309	0.952	< 0.001	< 0.034	47
	23-Oct-2023	AEMP-01-FS-11	79.2	2.2	< 0.002	< 0.251	0.194	< 0.062	< 0.03	1537	0.69	0.056	1	29	0.006	0.021	1238	1.9	1.4	0.012	0.858	8885	14142	4.1	< 0.001	3330	2.2	0.04	0.54	0.958	< 0.001	0.035	48
	23-Oct-2023	AEMP-01-FS-13	78.8	2.5	< 0.002	0.656	0.36	0.104	< 0.03	1524	0.623	0.043	1.2	27	0.005	0.021	1112	2	0.991	0.012	0.379	8878	15627	4.4	< 0.001	3881	2.3	0.042	0.234	0.958	< 0.001	0.042	39
	23-Oct-2023	AEMP-01-FS-14	74.6	6.8	< 0.002	< 0.251	0.693	0.104	0.037	1667	0.647	0.077	1.9	36	0.013	0.021	1122	5.9	0.946	0.024	0.535	8721	14752	5.4	< 0.001	3122	2.8	0.033	0.267	1	< 0.001	0.046	64
	23-Oct-2023	AEMP-01-FS-15	77.9	5.7	0.002	< 0.251	0.43	0.083	< 0.03	1578	0.732	0.071	1.4	38	0.01	0.018	1142	2.3	1.6	0.024	1.1	8965	14344	4.3	< 0.001	3571	2.5	0.041	0.949	0.958	< 0.001	0.051	83
	23-Oct-2023	AEMP-01-FS-16	72.8	10	0.005	0.308	0.721	0.094	0.111	1962	1.1	0.139	2.2	81	0.021	0.037	1036	2.7	0.914	0.047	2.6	9196	12510	10	0.008	5119	5	0.024	2.9	1.4	< 0.001	0.091	91
	23-Oct-2023	AEMP-01-FS-17	78.9	3.1	0.003	< 0.251	0.444	0.166	0.056	1426	0.623	0.078	1.4	26	0.01	0.015	928	4.8	1.3	0.024	0.65	10078	14280	4.6	< 0.001	4203	2.5	0.041	0.535	0.958	< 0.001	0.037	61
	23-Oct-2023	AEMP-01-FS-18	78.5	108	< 0.002	< 0.251	3.2	0.178	0.037	1908	0.778	0.104	1.9	93	0.049	0.071	1015	6	0.64	0.035	1.6	8365	13262	8	0.004	3774	4.8	0.047	0.48	2.1	0.003	0.156	43
	23-Oct-2023	AEMP-01-FS-19	75.4	43	< 0.002	< 0.251	2.6	0.146	0.148	1815	0.926	0.179	1.8	91	0.028	0.055	1041	6.7	0.495	0.035	2.6	9049	15505	6.8	0.004	4314	3.8	0.041	0.341	2.1	0.002	0.147	91
	23-Oct-2023	AEMP-01-FS-20	77.7	6.6	< 0.002	< 0.251	0.333	0.062	0.056	1577	0.696	0.099	1.4	51	0.01	0.024	810	1.3	0.733	0.024	1.2	9075	15383	4.7	0.004	4574	2.4	0.036	0.698	0.958	< 0.001	0.052	60
	23-Oct-2023	AEMP-FS-01-21	79.2	8.7	< 0.002	< 0.251	0.388	0.062	0.056	1422	0.663	0.102	1.8	56	0.018	0.031	812	2.2	1.1	0.047	0.908	10208	16818	5.8	< 0.001	5623	2.5	0.04	0.642	1.3	< 0.001	0.055	73
	23-Oct-2023	AEMP-FS-01-22	78.3	5.2	< 0.002	< 0.251	0.499	0.083	0.037	1448	0.538	0.06	1.4	34	0.008	0.021	777	2.4	0.772	0.024	0.368	8268	14130	9.6	< 0.001	3538	2.2	0.03	0.09	1	< 0.001	< 0.034	81
AEMP-FS-02	23-Oct-2023	AEMP-02-FS-01	79.5	2.5	< 0.002	< 0.251	0.277	0.062	0.037	1534	0.577	0.073	1.2	25	0.01	0.021	1063	1.2	1.4	0.012	0.49	10284	13230	3.6	< 0.001	3823	2.9	0.031	0.461	0.851	< 0.001	0.052	53
	23-Oct-2023	AEMP-02-FS-02	77.6	5.1	0.003	< 0.251	0.444	0.062	0.037	1658	0.625	0.095	1.4	44	0.013	0.018	1091	1.4	0.749	0.035	0.412	8781	14789	4	0.004	3344	2.8	0.052	0.381	1.1	< 0.001	0.055	79
	23-Oct-2023	AEMP-02-FS-03	79.9	4.7	0.003	< 0.251	0.582	0.073	0.093	1677	0.708	0.141	1.5	51	0.015	0.018	833	2.9	0.914	0.047	1.1	10522	16810	7	0.004	4722	3.3	0.058	1.2	1.1	< 0.001	0.07	82
	23-Oct-2023	AEMP-02-FS-04	78.6	2	< 0.002	0.298	0.333	< 0.062	< 0.03	1243	0.546	0.035	1.2	24	0.005	0.014	698	1.2	0.907	0.012	0.178	8217	17383	4.7	< 0.001	4616	1.8	0.02	0.621	0.851	< 0.001	< 0.034	50
	23-Oct-2023	AEMP-02-FS-05	79.6	3.6	< 0.002	< 0.251	0.36	0.078	< 0.03	1834	0.586	0.093	1.4	24	0.005	0.021	1177	1.7	0.669	0.024	0.345	8326	10779	5.5	< 0.001	2975	2.9	0.047	0.177	0.851	< 0.001	< 0.034	54
	23-Oct-2023	AEMP-02-FS-06	79	15	< 0.002	0.383	0.651	0.12	0.13	1992	0.76	0.272	2.7	54	0.018	0.027	1027	4.2	0.698	0.071	1.6	9403	14210	5.4	0.008	4254	5.2	0.035	1.5	1.2	< 0.001	0.1	85
	23-Oct-2023	AEMP-02-FS-07	78.8	3.3	< 0.002	< 0.251	0.43	< 0.062	< 0.03	1405	0.66	0.041	1.4	29	< 0.004	0.013	925	1.7	1.3	0.012	0.55	8611	12313	3.4	< 0.001	3140	2.1	0.041	0.744	1.1	< 0.001	0.046	39
	23-Oct-2023	AEMP-02-FS-08	77.0	3.8	< 0.002	< 0.251	0.637	0.117	0.052	1716	0.736	0.163	2	34	0.011	0.029	1000	3.8	0.869	0.024	1.1	8691	12272	9.3	0.004	3950	3.1	0.037	0.643	0.982	< 0.001	0.063	59
	23-Oct-2023	AEMP-02-FS-09	79.9	1.5	< 0.002	< 0.251	0.296	0.064	< 0.03	1466	0.599	0.047	1.2	29	< 0.004	0.013	1105	1.4	1.6	0.012	0.432	8156	11937	2.7	< 0.001	3821	2.4	0.032	0.447	0.982	< 0.001	0.043	51
	23-Oct-2023	AEMP-02-FS-10	78.2	3.8	< 0.002	0.325	0.459	0.117	0.104	1591	0.854	0.238	1.9	56	0.017	0.023	912	2.4	0.938	0.073	2.2	9346	15282	5.3	0.004	5047	3.1	0.062	1.1	1.1	< 0.001	0.081	82
	23-Oct-2023	AEMP-02-FS-11	78.5	3.7	0.005	0.31	0.444	0.117	< 0.03	1329	0.661	0.092	1.6	45	0.011	0.029	888	1.9	1.1	0.024	0.581	10013	17470	7.2	< 0.001	5484	1.9	0.029	1.5	0.982	< 0.001	0.053	75
	23-Oct-2023	AEMP-02-FS-16	81.2	5.5	0.003	< 0.251	0.355	0.138	0.042	1571	0.596	0.06	2	43	0.011	0.026	735	1.2	1.1	0.024	0.247	10073	15197	7.9	< 0.001	5361	2.5	0.022	1.1	1	< 0.001	0.052	84
	23-Oct-2023	AEMP-02-FS-18	77.4	3.8	< 0.002	< 0.251	0.563	0.074	0.052	1512	0.714	0.079	1.4	33	0.006	0.016	940	2.3	1.1	0.012	0.852	7831	12545	4	< 0.001	3812	2.8	0.032	1.1	0.859	< 0.001	0.045	41
	23-Oct-2023	AEMP-02-FS-19	78.2	2.5	< 0.002	< 0.251	0.267	< 0.062	< 0.03	1267	0.571	0.054	1.1	24	0.007	0.016	865	1.6	1	0.024	0.383	8412	14254	3	< 0.001	4050	1.6	0.046	0.41	0.859	< 0.001	0.035	40
	23-Oct-2023	AEMP-02-FS-20	79.3	3.1	< 0.002	< 0.251	0.385	0.127	0.042	1490	0.596	0.079	1.4	30	0.013	0.016	761	1.2	1	0.024	0.556	8063	13334	9.8	< 0.001	4187	2.6	0.027	0.789	0.859	< 0.001	< 0.034	69
	23-Oct-2023	AEMP-FS-02-21	74.0	9.8	< 0.002	< 0.251	0.474	0.095	< 0.03	1455	0.733	0.081	1.5	41	0.008	0.026	840	2	0.76	0.024	1.2	8616	16001	4.7	< 0.001	4090	2.3	0.03	1.2	1.1	< 0.001	0.064	44
	23-Oct-2023	AEMP-FS-02-22	78.0	14	< 0.002	< 0.251	1.3	0.17	0.084	1508	0.641	0.086	1.8	65	0.028	0.034	590	2.5	0.979	0.037	1.1	12096	19745	8.4	< 0.001	5988	3.3	0.025	1.1	1.4	< 0.001	0.075	64
	23-Oct-2023	AEMP-FS-02-23	77.4	3.6	< 0.002	< 0.251	0.474	0.122	0.042	1347	0.623	0.077	1.8	52	0.006	0.016	585	1.1	1	0.037	0.679	8224	12549	5.9	< 0.001	4634	2.4	0.026	0.69	0.859	< 0.001	0.039	74
	23-Oct-2023	AEMP-FS-02-25	76.3	5	< 0.002	< 0.251	0.267	0.074	< 0.03	1375	0.705	0.077	1.2	41	0.011	0.016	718	2	0.534	0.037	0.964	7639	11158	4.6	< 0.001	3455	1.8	0.026	0.772	0.859	< 0.001	0.049	47
	23-Oct-2023	AEMP-FS-02-26	76.9	3.9	< 0.002	< 0.251	0.326	0.074	0.042	1478	0.749	0.075	1	28	0.011	0.016	947	3.8	0.749	0.024	1.2	8117	12388	4.3	< 0.001	3071	2.2	0.04	0.894	0.737	< 0.001	0.041	38

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.

Table 12

Summary Statistics for Metal Tissue Concentrations in Bosworth Creek Slimy Sculpin in 2023

Project #: 417085-49223

Monitoring Station	Parameter	Units	Basic Analysis							
			Percent detection (%)	Min (units)	Median (units)	Max (units)	Range (units)	Average (units)	Standard Deviation (units)	Standard Error (units)
AEMP-FS-01										
	% Moisture	%	100	72.8	78.1	79.9	7.1	77.6	1.8	0.4
	Aluminum	mg/kg dw	100	1.6	4.1	108.0	106.4	11.4	24.4	5.5
	Antimony	mg/kg dw	20	---	---	---	---	---	---	---
	Arsenic	mg/kg dw	15	---	---	---	---	---	---	---
	Barium	mg/kg dw	100	0.194	0.433	3.200	3.006	0.666	0.784	0.175
	Boron	mg/kg dw	85	0.031	0.069	0.178	0.147	0.083	0.041	0.009
	Cadmium	mg/kg dw	50	0.015	0.025	0.148	0.133	0.038	0.035	0.008
	Calcium	mg/kg dw	100	1352	1549	1962	610	1566	169	38
	Chromium	mg/kg dw	100	0.538	0.644	1.100	0.562	0.688	0.131	0.029
	Cobalt	mg/kg dw	100	0.032	0.069	0.179	0.147	0.077	0.036	0.008
	Copper	mg/kg dw	100	1.00	1.50	2.20	1.20	1.53	0.30	0.07
	Iron	mg/kg dw	100	25	33	93	68	42	22	5
	Lead	mg/kg dw	100	0.005	0.010	0.049	0.044	0.013	0.010	0.002
	Lithium	mg/kg dw	100	0.011	0.020	0.071	0.060	0.024	0.015	0.003
	Magnesium	mg/kg dw	100	777	1055	1238	461	1014	131	29
	Manganese	mg/kg dw	100	1.30	2.20	6.70	5.40	2.83	1.64	0.37
	Mercury	mg/kg dw	100	0.495	0.930	1.600	1.105	0.940	0.280	0.063
	Molybdenum	mg/kg dw	100	0.009	0.019	0.047	0.038	0.022	0.012	0.003
	Nickel	mg/kg dw	100	0.233	0.593	2.600	2.367	0.862	0.695	0.155
	Phosphorus	mg/kg dw	100	7234	9014	10913	3679	9222	921	206
	Potassium	mg/kg dw	100	10958	14389	18865	7907	14833	2052	459
	Selenium	mg/kg dw	100	3.20	5.25	10.00	6.80	5.62	1.83	0.41
	Silver	mg/kg dw	20	---	---	---	---	---	---	---
	Sodium	mg/kg dw	100	2930	3811	5623	2693	3940	680	152
	Strontium	mg/kg dw	100	1.70	2.45	5.00	3.30	2.70	0.89	0.20
	Thallium	mg/kg dw	100	0.017	0.032	0.047	0.030	0.032	0.009	0.002
	Tin	mg/kg dw	100	0.090	0.538	2.900	2.810	0.653	0.590	0.132
	Titanium	mg/kg dw	100	0.952	1.050	2.100	1.148	1.175	0.342	0.076
	Uranium	mg/kg dw	10	---	---	---	---	---	---	---
	Vanadium	mg/kg dw	65	0.017	0.040	0.156	0.139	0.048	0.040	0.009
	Zinc	mg/kg dw	100	34.0	55.5	91.0	57.0	57.8	17.9	4.0
AEMP-FS-02										
	% Moisture	%	100	74.0	78.4	81.2	7.2	78.3	1.6	0.4
	Aluminum	mg/kg dw	100	1.5	3.8	15.0	13.5	5.0	3.7	0.8
	Antimony	mg/kg dw	20	---	---	---	---	---	---	---
	Arsenic	mg/kg dw	20	---	---	---	---	---	---	---
	Barium	mg/kg dw	100	0.267	0.437	1.300	1.033	0.466	0.229	0.051
	Boron	mg/kg dw	100	0.031	0.076	0.170	0.139	0.089	0.038	0.009
	Cadmium	mg/kg dw	60	0.015	0.040	0.130	0.115	0.044	0.034	0.008
	Calcium	mg/kg dw	100	1243	1499	1992	749	1522	187	42
	Chromium	mg/kg dw	100	0.546	0.651	0.854	0.308	0.662	0.080	0.018
	Cobalt	mg/kg dw	100	0.035	0.079	0.272	0.237	0.098	0.062	0.014
	Copper	mg/kg dw	100	1.00	1.40	2.70	1.70	1.54	0.40	0.09

Table 12

Summary Statistics for Metal Tissue Concentrations in Bosworth Creek Slimy Sculpin in 2023

Project #: 417085-49223

Monitoring Station	Parameter	Units	Basic Analysis							
			Percent detection (%)	Min (units)	Median (units)	Max (units)	Range (units)	Average (units)	Standard Deviation (units)	Standard Error (units)
	Iron	mg/kg dw	100	24	38	65	41	39	12	3
	Lead	mg/kg dw	90	0.002	0.011	0.028	0.026	0.011	0.006	0.001
	Lithium	mg/kg dw	100	0.013	0.018	0.034	0.021	0.020	0.006	0.001
	Magnesium	mg/kg dw	100	585	900	1177	592	885	168	37
	Manganese	mg/kg dw	100	1.10	1.80	4.20	3.10	2.08	0.94	0.21
	Mercury	mg/kg dw	100	0.534	0.959	1.600	1.066	0.968	0.257	0.058
	Molybdenum	mg/kg dw	100	0.012	0.024	0.073	0.061	0.029	0.018	0.004
	Nickel	mg/kg dw	100	0.178	0.630	2.200	2.022	0.808	0.506	0.113
	Phosphorus	mg/kg dw	100	7639	8614	12096	4457	8971	1125	252
	Potassium	mg/kg dw	100	10779	13772	19745	8966	14182	2383	533
	Selenium	mg/kg dw	100	2.70	5.00	9.80	7.10	5.54	2.08	0.47
	Silver	mg/kg dw	25	---	---	---	---	---	---	---
	Sodium	mg/kg dw	100	2975	4070	5988	3013	4191	836	187
	Strontium	mg/kg dw	100	1.60	2.55	5.20	3.60	2.65	0.79	0.18
	Thallium	mg/kg dw	100	0.020	0.032	0.062	0.042	0.036	0.012	0.003
	Tin	mg/kg dw	100	0.177	0.781	1.500	1.323	0.841	0.374	0.084
	Titanium	mg/kg dw	100	0.737	0.982	1.400	0.663	0.982	0.159	0.036
	Uranium	mg/kg dw	0	---	---	---	---	---	---	---
	Vanadium	mg/kg dw	85	0.017	0.051	0.100	0.083	0.051	0.021	0.005
	Zinc	mg/kg dw	100	38.0	56.5	85.0	47.0	60.5	16.9	3.8

Table 13

Whole Body Tissue Residue Analytical Results: Polycyclic Aromatic Hydrocarbons (PAHs)

PROJECT No.: 417085-49223				Polycyclic aromatic hydrocarbons (PAHs)|Carcinogenic								Polycyclic aromatic hydrocarbons (PAHs)|Non-Carcinogenic										
Sampling Location	Date (dd-mmm-yyyy)	% Moisture (%)	% Lipid (%)	Benzo(a)Anthracene (ng/g)	Benzo(b)Fluoranthene (ng/g)	Benzo(j,k)Fluoranthene (ng/g)	Benzo(g,h,i)Perylene (ng/g)	Benzo(a)Pyrene (ng/g)	Chrysene (ng/g)	Dibenzo(a,h)Anthracene (ng/g)	Indeno(1,2,3-c,d)Pyrene (ng/g)	Acenaphthene (ng/g)	Acenaphthylene (ng/g)	Anthracene (ng/g)	Benzo(e)Pyrene (ng/g)	Dibenzothiophene (ng/g)	Fluoranthene (ng/g)	Fluorene (ng/g)	Naphthalene (ng/g)	Perylene (ng/g)	Phenanthrene (ng/g)	Pyrene (ng/g)
UNSPECIFIED																						
AEMP-FS-01	02-Oct-2023	74.8	3.74	< 0.0342	< 0.0436	< 0.0534	< 0.0355	< 0.0746	0.119	< 0.0398	< 0.0375	0.165	< 0.0209	< 0.0504	< 0.073	0.14	0.084	0.254	1.06	< 0.0714	0.882	0.111
AEMP-FS-02	01-Oct-2023	74.3	3.65	0.048	< 0.0532	< 0.0639	0.075	< 0.087	0.271	< 0.0215	0.024	0.217	0.036	0.061	0.146	0.202	0.327	0.261	1.02	< 0.0853	1.21	0.322

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.

Table 14

Whole Body Tissue Residue Analytical Results: Alkylated Polycyclic Aromatic Hydrocarbons (PAHs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	% Moisture (%)	% Lipid (%)	2-Methylanthracene (ng/g)	C1-Substituted Acenaphthene (ng/g)	7-Methylbenzo[a]Pyrene (ng/g)	1-Methylchrysene (ng/g)	5- & 6-Methylchrysene (ng/g)	C1-Substituted Benzo[a]anthracene/Chrysene (ng/g)	5,9-Dimethylchrysene (ng/g)	C2-Substituted Benzo[a]anthracene/Chrysene (ng/g)	C3-Substituted Benzo[a]anthracene/Chrysene (ng/g)	C4-Substituted Benzo[a]anthracene/Chrysene (ng/g)	C1-Substituted Benzofluoranthenes/Pyrenes (ng/g)	C2-Substituted Benzofluoranthenes/Pyrenes (ng/g)	2-Methylfluorene (ng/g)	C1-Substituted Fluorene (ng/g)	1,7-Dimethylfluorene (ng/g)	C2-Substituted Fluorene (ng/g)	C3-Substituted Fluorene (ng/g)	3-Methylfluoranthene/Benzo[a]Fluorene (ng/g)	C1-Substituted Fluoranthene/Pyrene (ng/g)	C2-Substituted Fluoranthene/Pyrene (ng/g)	C3-Substituted Fluoranthene/Pyrene (ng/g)
UNSPECIFIED																								
AEMP-FS-01	02-Oct-2023	74.8	3.74	< 0.0808	< 0.0318	< 0.0539	< 0.0503	< 0.0487	0.252	< 0.0989	0.451	< 0.0683	0.196	< 0.0539	< 0.0583	0.061	0.315	0.114	0.699	1.84	< 0.0769	< 0.0769	0.344	0.33
AEMP-FS-02	01-Oct-2023	74.3	3.65	< 0.0882	< 0.0536	< 0.0815	0.084	0.055	0.554	< 0.0818	0.764	0.147	0.132	0.21	0.108	0.062	0.338	0.095	1.04	2.1	0.165	0.435	0.589	0.183

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.

Table 14

Whole Body Tissue Residue Analytical Results: Alkylated Polycyclic Aromatic Hydrocarbons (PAHs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	C4-Substituted Fluoranthene/Pyrene (ng/g)	1-Methylnaphthalene (ng/g)	2-Methylnaphthalene (ng/g)	C1-Substituted Naphthalene (ng/g)	1,2-Dimethylnaphthalene (ng/g)	2,6-Dimethylnaphthalene (ng/g)	C2-Substituted Naphthalene (ng/g)	2,3,6-Trimethylnaphthalene (ng/g)	1,6,7-Trimethylnaphthalene (ng/g)	C3-Substituted Naphthalene (ng/g)	1,4,6,7-Tetramethylnaphthalene (ng/g)	C4-Substituted Naphthalene (ng/g)	1-Methylphenanthrene (ng/g)	3-Methylphenanthrene (ng/g)	9/4-Methylphenanthrene (ng/g)	2-Methylphenanthrene (ng/g)	C1-Substituted Phenanthrene/Anthracene (ng/g)	1,7-Dimethylphenanthrene (ng/g)	1,8-Dimethylphenanthrene (ng/g)	2,6-Dimethylphenanthrene (ng/g)	3,6-Dimethylphenanthrene (ng/g)	C2-Substituted Phenanthrene/Anthracene (ng/g)	1,2,6-Trimethylphenanthrene (ng/g)	C3-Substituted Phenanthrene/Anthracene (ng/g)	C4-Substituted Phenanthrene/Anthracene (ng/g)	2- & 3-Methyldibenzothiophene (ng/g)
UNSPECIFIED																											
AEMP-FS-01	02-Oct-2023	0.087	0.559	0.67	1.23	0.184	0.418	2.57	0.685	0.551	2.16	0.314	1.17	0.188	0.134	0.289	0.16	0.424	0.238	< 0.121	< 0.121	< 0.124	1.22	0.107	3.06	12.8	< 0.0601
AEMP-FS-02	01-Oct-2023	0.205	0.688	0.801	1.49	0.248	0.595	3.35	1.02	0.773	3.19	0.384	1.81	0.38	0.284	0.53	0.307	1.19	0.418	0.095	0.077	0.157	2.23	< 0.107	2.49	13.4	0.224

NOTES:

Table 14

Whole Body Tissue Residue Analytical Results: Alkylated Polycyclic Aromatic Hydrocarbons (PAHs)

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	C1-Substituted Dibenzothiophene (ng/g)	2,4-Dimethyldibenzothiophene (ng/g)	4,6-Dimethyldibenzothiophene (ng/g)	C2-Substituted Dibenzothiophene (ng/g)	C3-Substituted Dibenzothiophene (ng/g)	C4-Substituted Dibenzothiophene (ng/g)
UNSPECIFIED							
AEMP-FS-01	02-Oct-2023	0.23	< 0.118	0.15	0.828	0.953	0.594
AEMP-FS-02	01-Oct-2023	0.617	0.125	0.294	1.7	1.6	0.832

NOTES:

Figures

Legend

Flow Direction

N

0 500 1,000
Metres

1:40,000

NAD 1983 UTM Zone 9N

IMPERIAL
NORMAN WELLS
AQUATICS EFFECTS MONITORING PROGRAM

SITE LOCATION MAP

Date:	Drawn by:	Edited by:	App'd by:
25-APR-24	SC	KR	CM

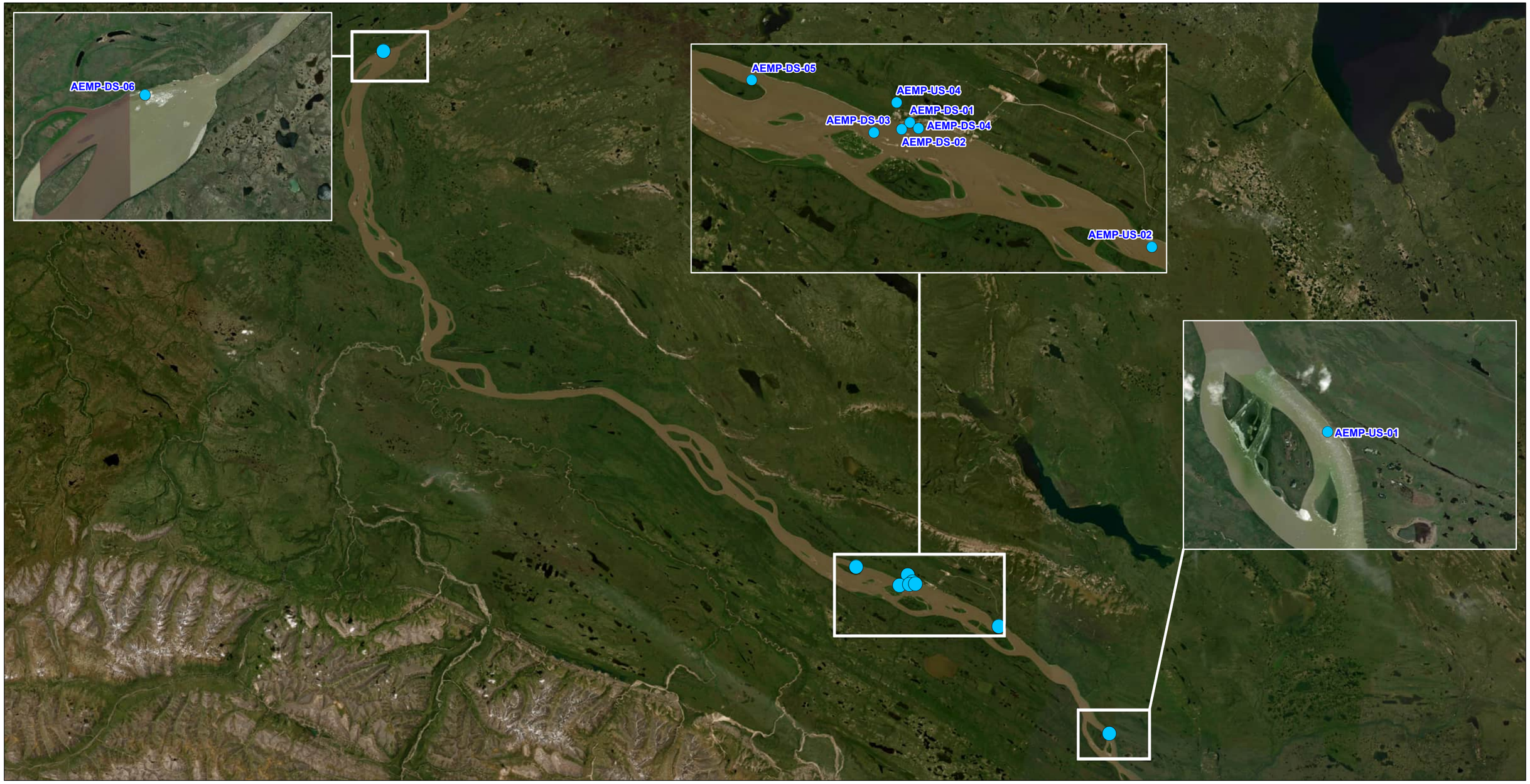
Project No.	FIG No	REV
417085-49223-23200	1	0

"This drawing is prepared solely for the use of our customers as specified in the accompanying report. Worley Canada Services Ltd. assumes no liability to any other party for any representations contained in this drawing."

PLOT DATE & TIME: 4/29/2024 3:12:36 PM
SAVE DATE & TIME: 4/29/2024 2:01:08 PM
USER NAME: Kenneth W Ritchie
ISSUING OFFICE: BURNABY GIS

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

FILE LOCATION: N:\PROJECTS\ImperialOil\NormanWells\MXDs\417085-50325\SiteLocation.mxd



Water Sampling Location

0 10 20
Kilometres
1:700,000
NAD 1983 UTM Zone 9N

N

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NORMAN WELLS
AQUATIC EFFECTS MONITORING PROGRAM

AEMP WATER SAMPLING LOCATIONS

Date: 04-APR-24	Drawn by: KR	Edited by: KR	App'd by: CM
Imperial		Project No. 417085-49223-23200	
		2	REV 0

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FILE LOCATION: N:\PROJECTS\ImperialOil\NormanWells\MXDs\417085-49223\23200\Water_Sampling_Locations.mxd

USER NAME: Kenneth.W.Ritchie
ISSUING OFFICE: VANCOUVER, GIS

PLOT DATE & TIME: 4/4/2024 9:38:26 AM
SAVE DATE & TIME: 4/4/2024 9:38:19 AM

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Water Sampling Location

0 2 4
Kilometres
1:180,000
NAD 1983 UTM Zone 9N

N

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NEAR FACILITY AEMP
WATER SAMPLING LOCATIONS

Date: 04-APR-24	Drawn by: KR	Edited by: KR	App'd by: CM
Imperial		Project No. 417085-49223-23200	
		3	REV 0

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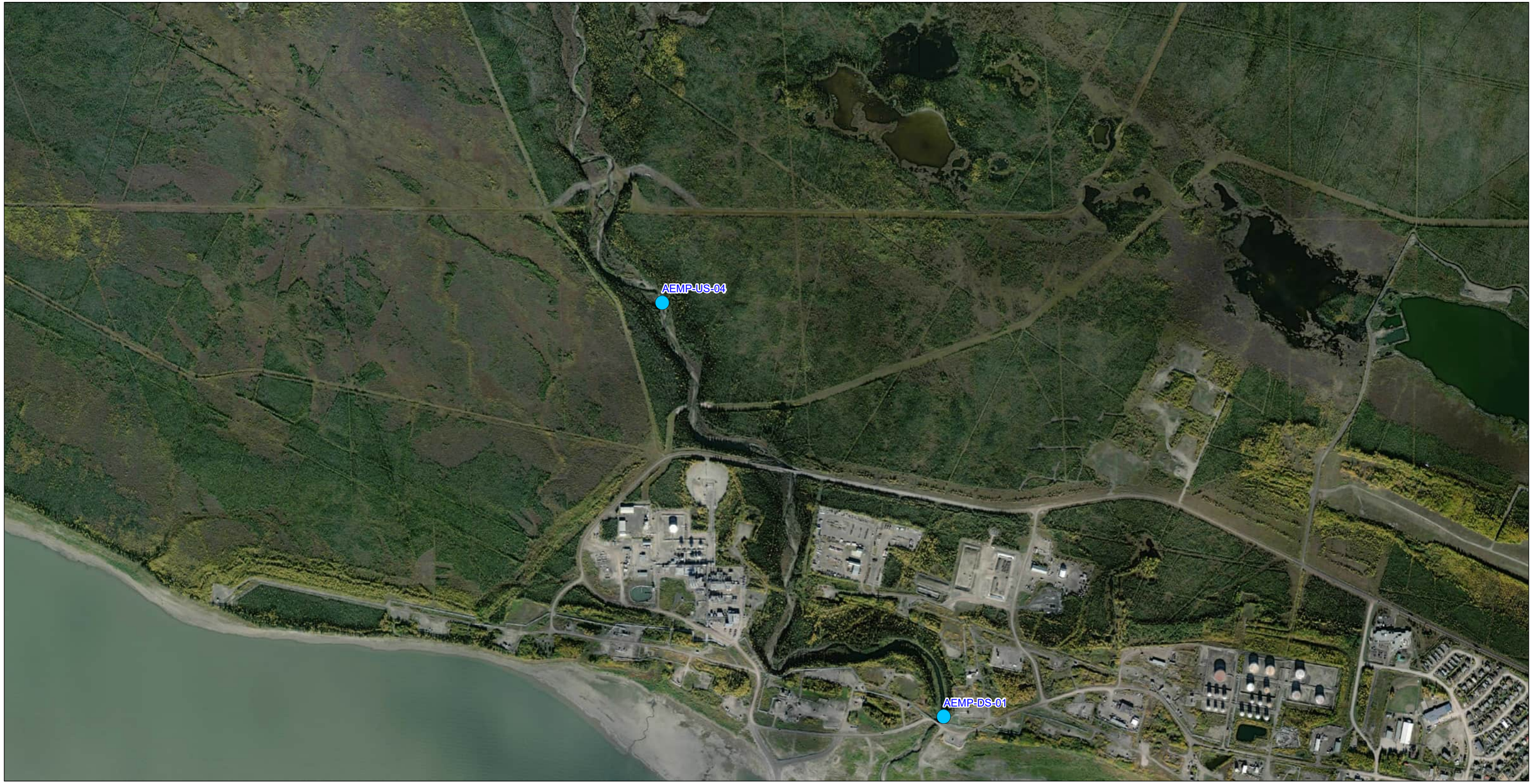
FILE LOCATION: N:\PROJECTS\ImperialOil\NormanWells\MXDs\417085-49223\23200\Near_Facility_Water_Sampling_Locations.mxd

USER NAME: Kenneth.W.Ritchie
ISSUING OFFICE: VANCOUVER GIS

PLOT DATE & TIME: 4/4/2024 9:44:02 AM
SAVE DATE & TIME: 4/4/2024 7:57:18 AM

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Water Sampling Location

0 250 500
Meters
1:12,000
NAD 1983 UTM Zone 9N

N

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AQUATIC EFFECTS MONITORING PROGRAM

BOSWORTH CREEK AEMP
WATER SAMPLING LOCATIONS

Date: 04-APR-24	Drawn by: KR	Edited by: KR	App'd by: CM
Imperial		Project No. 417085-49223-23200	
		4	REV 0

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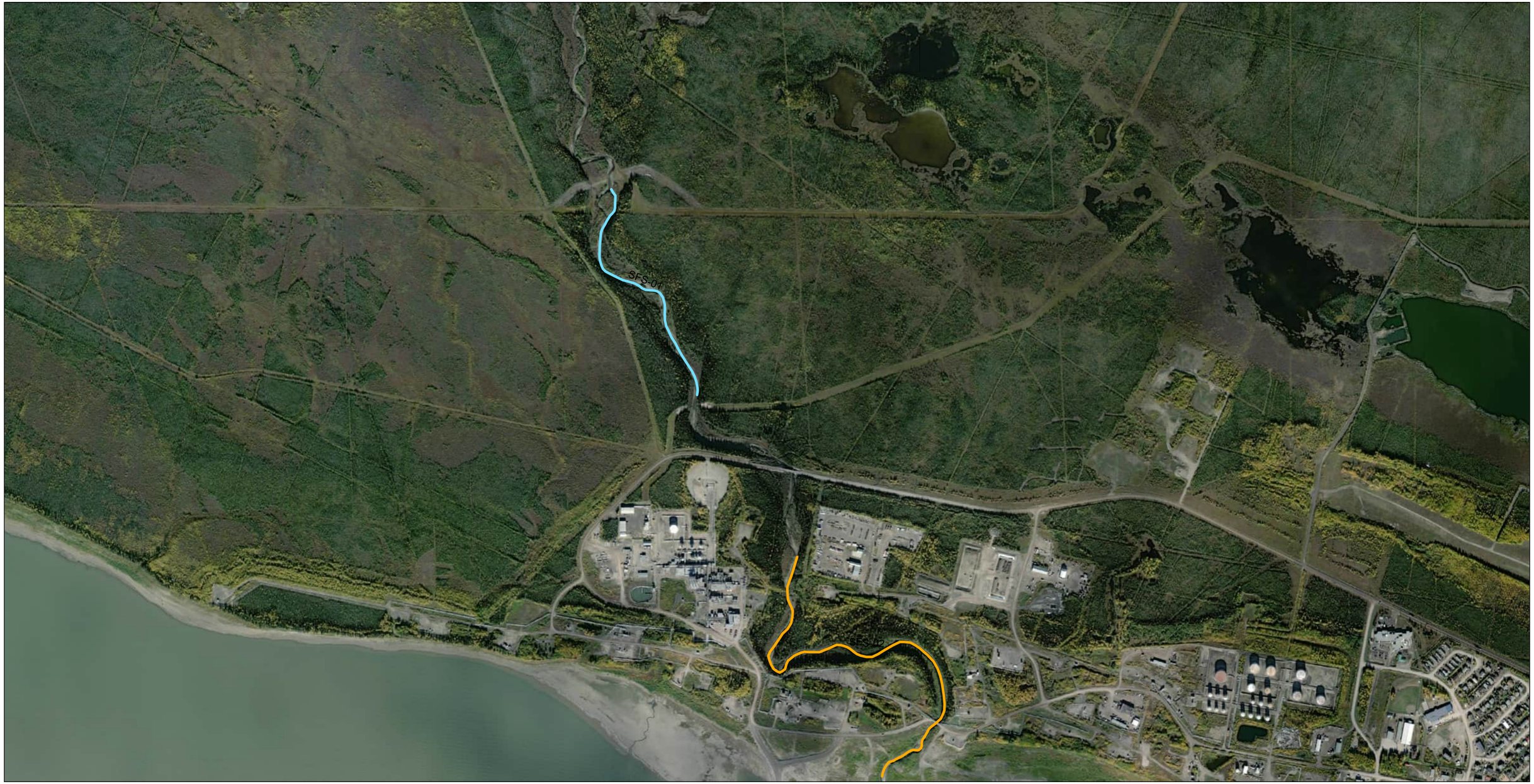
FILE LOCATION: N:\PROJECTS\ImperialOil\NormanWells\MXDs\417085-49223\23200\Bosworth_Creek_Water_Sampling_Locations.mxd

USER NAME: Kenneth.W.Ritchie
ISSUING OFFICE: VANCOOUVER GIS

PLOT DATE & TIME: 4/4/2024 9:46:57 AM
SAVE DATE & TIME: 4/4/2024 7:59:24 AM

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



SFS-01

SFS-02

0 250 500

Meters

1:12,000

NAD 1983 UTM Zone 9N

N

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AQUATIC EFFECTS MONITORING PROGRAM

BOSWORTH CREEK FISH SAMPLING RANGE

Date: 04-APR-24	Drawn by: KR	Edited by: KR	App'd by: CM
Imperial		Project No. 417085-49223-23200	
		5	REV 0

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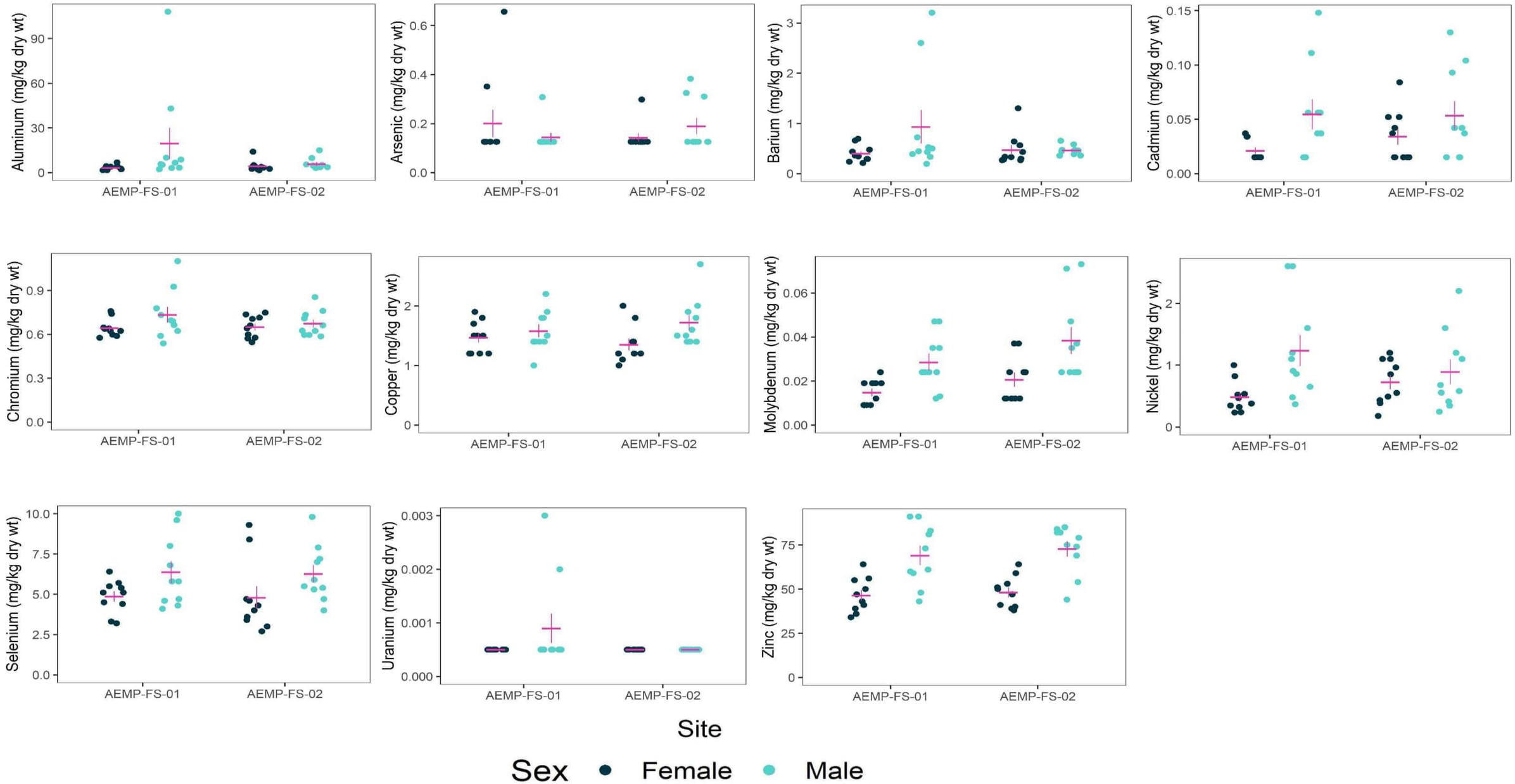
FILE LOCATION: N:\PROJECTS\ImperialOil\NormanWells\MXDs\417085-49223\23200\Bosworth_Creek_Fish_Sampling_Ranges.mxd

USER NAME: Kenneth.W.Ritchie
ISSUING OFFICE: VANCOOUVER GIS

PLOT DATE & TIME: 4/4/2024 9:47:53 AM
SAVE DATE & TIME: 4/4/2024 8:03:42 AM

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



IMPERIAL
AQUATIC EFFECTS MONITORING PROGRAM
NORMAN WELLS, NT

METAL TISSUE CONCENTRATIONS (MG/KG DW) IN SLIMY SCULPIN COLLECTED FROM BOSWORTH CREEK IN 2023

Date: 14-Apr-24	Drawn by: GY	Edited by: CM	App'd by: CM
		WorleyParsons Project No. 417085-49223-22200	
		FIG No. 6	REV 0

Imperial

TRS Advisian

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FILE LOCATION:

FILE DIRECTORY:

Appendix A. Limitations of Liability, Scope of Report and Third Party Reliance

Limitation of Liability, Scope of Report, and Third Party Reliance

This report has been prepared and the work referred to in this report has been undertaken by Tłegǫ́hłı̨ Reclamation Services Advisian (TRSA) for Imperial Oil Limited. It is intended for the sole and exclusive use of Imperial Oil Limited, its affiliated companies and partners and their respective [insurers], agents, employees, and advisors (collectively, "Imperial Oil"). Any use, reliance on or decision made by any person other than Imperial Oil based on this report is the sole responsibility of such other person. Imperial Oil and TRSA make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

The investigation undertaken by TRSA with respect to this report and any conclusions or recommendations made in this report reflect TRSA' s judgment based on the site conditions observed at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. This report has been prepared for the specific application to this site and it is based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the site, substances addressed by the investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions, and recommendations in this report may be necessary.

Other than by Imperial Oil, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of TRSA. Nothing in this report is intended to constitute or provide a legal opinion.

Appendix B. Surface Water Quality Assurance and Quality Control

Appendix B – Surface Water Quality Assurance/Quality Control

B.1 Field QA/QC Program

The surface water field grab sample and PDB QA/QC program for the AEMP consisted of four field duplicate samples. Three trip blank and two field blank sample were also submitted for analysis of PHCs, PAHs and aPAHs as part of the 2023 field program.

Surface water SPMD QA/QC consisted of one field blank sample, one trip blank sample and one time zero degradation blank sample.

For the field duplicate samples, the QA/QC results were evaluated by calculating the relative percent difference (RPD) between the parent and duplicate sample results and comparison of the RPD to designated alert limits.

The RPD is calculated using the following formula:

$$\text{RPD } \% = \left(\frac{|x1-x2|}{(x1+x2)/2}\right) * 100$$

Where x_1 = original field sample
x_2 = blind field duplicate sample

Consistent with laboratory practices and to permit reliable calculations, an RPD is only considered to be statistically relevant when the original and duplicate sample concentrations are at least five times the reportable detection limit (RDL). These limits vary parameter to parameter and sample to sample and are indicated by the laboratory alongside the analytical results in the Certificates of Analysis (Appendix H).

The RPD alert limit for hydrocarbons and PAHs is 80%, the alert limit for all other parameters presented herein is 50% (Imperial 2004).

All PHC sample results were below the laboratory detection limits so RPDs could not be calculated. RPD for all other parameters for all duplicate samples met their alert limit criteria (Tables 2 through 7).

The designated field and trip blank alert limits are >5X the reportable detection limit (RDL) for BTEX, PAH and APAHs and 2X RDL for PHC F1 and F2. Blank results are compared to the alert limits and are presented in Tables B-1, B-2 and B-3 All of the results were below the RDLs.

B.2 Laboratory QA/QC Program

The laboratory QA/QC program consisted of one or more of the following analyses:

- Instrument and extraction surrogate recoveries for samples that were analyzed.
- The analysis of method blank, laboratory duplicate, matrix spike, and/or laboratory control samples for the sample analytical batches that were analyzed.

The laboratory QA/QC results are presented in the laboratory certificates of analysis and data quality checklists (Appendix H) and are summarized in Table B-4.

Nitrogen parameters were often analyzed past method-specific hold times due to limitations in sample shipping and delays due to a Territorial state of emergency, which may increase uncertainty in reported results. This also applies to a few other parameters, as summarized in Table B-4. This does not alter the interpretation of data presented herein. No other data quality issues were noted that would impact the data presented.

No field or laboratory QA/QC issues were identified that would affect the overall conclusions presented in this report. Overall, the results reported are considered to be reliable.

Table B-1: Field and Trip Blank Sample Results - Petroleum Hydrocarbons

PROJECT No.: 417085-49223-22100

Sampling Location	Date (dd-mmm-yyyy)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	m&p-Xylene (mg/L)	o-Xylene (mg/L)	Xylenes (Total) (mg/L)	PHC F1 (C_6-C_{10}) (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)
Laboratory Reportable Detection Limit		**0.00040**	**0.00040**	**0.00040**	**0.00080**	**0.00040**	**0.00089**	**0.10**	**0.10**	**0.10**
Alert Limits		**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**2 x RDL**	**2 x RDL**	**2 x RDL**
QA/QC Samples										
AEMP-DUP3 (Field Blank)	26-July-2023	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-DUP4 (Trip Blank)	26-July-2023	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-DUP3 (Field Blank)	19-Aug-2023	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-DUP4 (Trip Blank)	19-Aug-2023	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-DUP4 (Trip Blank)	03-Oct-2023	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10

NOTES:

1. Highlighting indicates parameters above alert limits

Table B-2: Field and Trip Blank Sample Results - Polycyclic Aromatic Hydrocarbons

PROJECT No.: 417085-49223-22100		Polycyclic aromatic hydrocarbons (PAHs)|Carcinogenic								Polycyclic aromatic hydrocarbons (PAHs)|Non-Carcinogenic														
Sampling Location	Date (dd-mmm-yyyy)	Benzo(a)Anthracene (mg/L)	Benzo(b,j)Fluoranthene (mg/L)	Benzo(k)Fluoranthene (mg/L)	Benzo(g,h,i)Perylene (mg/L)	Benzo(a)Pyrene (mg/L)	Chrysene (mg/L)	Dibenzo(a,h)Anthracene (mg/L)	Indeno(1,2,3-c,d)Pyrene (mg/L)	Acenaphthene (mg/L)	Acenaphthylene (mg/L)	Acridine (mg/L)	Anthracene (mg/L)	Benzo(c)Phenanthrene (mg/L)	Benzo(e)Pyrene (mg/L)	Biphenyl (mg/L)	Fluoranthene (mg/L)	Fluorene (mg/L)	2-Methylnaphthalene (mg/L)	Naphthalene (mg/L)	Perylene (mg/L)	Phenanthrene (mg/L)	Pyrene (mg/L)	Quinoline (mg/L)
Laboratory Reportable Detection Limit		0.0000085	0.0000085	0.0000085	0.0000085	0.0000075	0.0000085	0.0000075	0.0000085	0.0001	0.0001	0.00004	0.0001	0.00005	0.00005	NA	0.0001	0.00005	0.0001	0.0001	0.00005	0.00005	0.00002	0.0002
Alert Limits		**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**
QA/QC Samples - Grab and PDBs																								
AEMP-DUP3 (Field Blank)	26-July-2023	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	N/A	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.00020
AEMP-DUP4 (Trip Blank)	26-July-2023	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	N/A	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.00020
AEMP-DUP3 (Field Blank)	19-Aug-2023	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	N/A	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.00020
AEMP-DUP4 (Trip Blank)	19-Aug-2023	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	N/A	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.00020
AEMP-DUP4 (Trip Blank)	03-Oct-2023	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000085	< 0.0000075	< 0.0000085	< 0.0000075	< 0.0000085	< 0.00010	< 0.00010	< 0.000040	< 0.000010	< 0.000050	< 0.000050	N/A	< 0.000010	< 0.000050	< 0.00010	< 0.00010	< 0.000050	< 0.000050	< 0.000020	< 0.00020
QA/QC Samples - SPMDs																								
TRIP BLANK	21-Aug-2023	N/D	N/D	N/D	N/D	N/D	0.000000005	N/D	N/D	0.000000150	N/D	N/A	0.000000013	N/A	N/D	0.000000627	0.000000101	0.000000052	0.000001037	0.000003631	N/A	0.000000407	0.000000027	N/A
FIELD BLANK	21-Aug-2023	N/D	N/D	N/D	N/D	N/D	0.000000007	N/D	N/D	0.000000150	N/D	N/A	0.000000008	N/A	N/D	0.000001451	0.000000053	0.000000078	0.000002158	0.000007509	N/A	0.000000483	0.000000024	N/A
DAY ZERO	2023	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	0.000000069	N/D	N/A	0.000000012	N/A	N/D	0.000000416	0.000000046	N/D	0.000000704	0.000002030	N/A	0.000000302	0.000000021	N/A

NOTES:

1. Highlighting indicates parameters above alert limits
2. Laboratory RDLS are specific to grab and PSD samples. RDLs for SPMDs are specific to each result and apply to mass detection rather than concentration detection.

Table B-3: Field and Trip Blank Sample Results - Alkylated Polycyclic Aromatic Hydrocarbons

PROJECT No.: 417085-49223-22100

Sampling Location	Date (dd-mmm-yyyy)	1-Methylnaphthalene (µg/L)	2-Methylnaphthalene (µg/L)	2-Methylnaphthalene (µg/L)	C1benzobjkfluoranthene/benzoapyrene (µg/L)	C1-Substituted Acenaphthene (µg/L)	C1-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C1-Substituted Biphenyl (µg/L)	C1-Substituted Dibenzothiophene (µg/L)	C1-Substituted Fluoranthene/Pyrene (µg/L)	C1-Substituted Fluorene (µg/L)	C1-Substituted Naphthalene (µg/L)	C1-Substituted Phenanthrene/Anthracene (µg/L)	C2benzobjkfluoranthene/benzoapyrene (µg/L)	C2-Substituted Benzo[a]anthracene/Chrysene (µg/L)	C2-Substituted Biphenyl (µg/L)	C2-Substituted Dibenzothiophene (µg/L)	C2-Substituted Fluoranthene/Pyrene (µg/L)	C2-Substituted Fluorene (µg/L)
Laboratory Reportable Detection Limit		0.1	0.0001	0.1	0.0075	0.1	0.0085	0.02	0.02	0.02	0.05	0.1	0.05	0.0075	0.0085	0.02	0.0085	0.02	0.05
Alert Limits		**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**
QA/QC Samples - Grab and PDBs																			
AEMP-DUP3 (Field Blank)	26-July-2023	< 0.10	< 0.00010	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.0085	< 0.020	< 0.050
AEMP-DUP4 (Trip Blank)	26-July-2023	< 0.10	< 0.00010	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.0085	< 0.020	< 0.050
AEMP-DUP3 (Field Blank)	19-Aug-2023	< 0.10	< 0.00010	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.0085	< 0.020	< 0.050
AEMP-DUP4 (Trip Blank)	19-Aug-2023	< 0.10	< 0.00010	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.0085	< 0.020	< 0.050
AEMP-DUP4 (Trip Blank)	03-Oct-2023	< 0.10	< 0.00010	< 0.10	< 0.0075	< 0.10	< 0.0085	< 0.020	< 0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0075	< 0.0085	< 0.020	< 0.0085	< 0.020	< 0.050
QA/QC Samples - SPMDs																			
TRIP BLANK	21-Aug-2023	---	---	---	---	---	---	---	N/D	N/D	0.00002	0.00165	0.00003	---	---	---	0.00026	---	0.00000	0.00075
FIELD BLANK	21-Aug-2023	---	---	---	---	---	---	---	N/D	N/D	0.00004	0.00347	0.00010	---	---	---	0.00035	---	0.00010	0.00150
DAY ZERO	2023	---	---	---	---	---	---	---	N/D	N/D	0.00002	0.00109	0.00005	---	---	---	0.00012	---	0.00000	0.00066

NOTES:

1. Highlighting indicates parameters above alert limits
2. Laboratory RDLS are specific to grab and PSD samples. RDLs for SPMDs are specific to each result and apply to mass detection rather than concentration detection.

Table B-3: Field and Trip Blank Sample Results - Alkylated Polycyclic Aromatic Hydrocarbons

PROJECT No.: 417085-49223-22100

Sampling Location	Date	C2-Substituted Naphthalene	C2-Substituted Phenanthrene/Anthracene	C3-Substituted Benzo[a]anthracene/Chrysene	C3-Substituted Dibenzothiophene	C3-Substituted Fluoranthene/Pyrene	C3-Substituted Fluorene	C3-Substituted Naphthalene	C3-Substituted Phenanthrene/Anthracene	C4-Substituted Benzo[a]anthracene/Chrysene	C4-Substituted Dibenzothiophene	C4-Substituted Fluoranthene/Pyrene	C4-Substituted Naphthalene	C4-Substituted Phenanthrene/Anthracene	1,2-dimethylnaphthalene	2,6-Dimethylnaphthalene	2,3,5-trimethylnaphthalene	Dibenzothiophene	2-methylphenanthrene	1-Methylphenanthrene	3,6-dimethylphenanthrene
	(dd-mmm-yyyy)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Laboratory Reportable Detection Limit		0.1	0.05	0.0085	0.02	0.02	0.05	0.1	0.05	0.0085	0.02	0.02	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Alert Limits		**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**	**5 x RDL**
QA/QC Samples - Grab and PDBs																					
AEMP-DUP3 (Field Blank)	26-July-2023	< 0.10	< 0.050	< 0.0085	<0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	0.050	---	---	---	---	---	---	---
AEMP-DUP4 (Trip Blank)	26-July-2023	< 0.10	< 0.050	< 0.0085	<0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	0.050	---	---	---	---	---	---	---
AEMP-DUP3 (Field Blank)	19-Aug-2023	< 0.10	< 0.050	< 0.0085	<0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	0.050	---	---	---	---	---	---	---
AEMP-DUP4 (Trip Blank)	19-Aug-2023	< 0.10	< 0.050	< 0.0085	<0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	0.050	---	---	---	---	---	---	---
AEMP-DUP4 (Trip Blank)	03-Oct-2023	< 0.10	< 0.050	< 0.0085	<0.020	< 0.020	< 0.050	< 0.10	< 0.050	< 0.0085	< 0.020	< 0.020	< 0.10	0.050	---	---	---	---	---	---	---
QA/QC Samples - SPMDs																					
TRIP BLANK	21-Aug-2023	0.00006	---	0.00055	---	0.00003	---	0.00563	---	---	---	0.00007	0.00018	---	---	---	---	---	---	---	---
FIELD BLANK	21-Aug-2023	0.00014	---	0.00058	---	0.00023	---	0.00157	---	---	---	0.00023	0.00021	---	---	---	---	---	---	---	---
DAY ZERO	2023	0.00004	---	0.00018	---	0.00002	---	0.00017	---	---	---	0.00002	0.00005	---	---	---	---	---	---	---	---

NOTES:

Table B-4

Quality Assurance and Quality Control Issues

Lab File Number	Lab Sample ID	Sample Name	Matrix	Test Affected	Cause	Interpretation
C317382	BNK179	AEMP-DS-02	Water	Nitrite; Nitrate+Nitrite; Orthophosphate	Analyzed past hold times - limited shipping options.	Nitrite concentrations below detection limits. Orthophosphate not a major site related parameter and there are no guidelines for comparison. There is no affect on interpretation of results presented.
	BNK180	AEMP-DS-03				
	BNK181	AEMP-US-03				
C357742	BVQ377	AEMP-DS-05	Water	Nitrite; Nitrate+Nitrite; Orthophosphate; Turbidity; True Colour	Analyzed past hold times - limited shipping options.	Nitrite concentrations below detection limits. Orthophosphate not a major site related parameter and there are no gudielines for comparison. Turbidity and True Colour are indicators only. There is no affect on interpretation of results presented.
	BVQ378	AEMP-US-02				
	BVQ379	AEMP-US-01				
C357847	BVQ394	AEMP-DS-04	Water	Nitrite; Nitrate+Nitrite; Turbidity	Analyzed past hold times - limited shipping options.	Nitrite concentrations below detection limits. Orthophosphate not a major site related parameter and there are no guidelines for comparison. Turbidity and True Colour are indicators only. There is no affect on interpretation of results presented.
	BVQ395	AEMP-Dup1				
	BVQ396	AEMP-DS-03		Nitrite; Nitrate+Nitrite; Orthophosphate; Turbidity; True Colour		
C357848	BVQ397	AEMP-DS-06	Water	Nitrite; Nitrate+Nitrite; Orthophosphate; Turbidity; True Colour	Analyzed past hold times - limited shipping options.	Nitrite concentrations near or below detection limits. Orthophosphate not a major site related parameter and there are no guidelines for comparison. Turbidity and True Colour are indicators only. There is no affect on interpretation of results presented.
	BVQ398	AEMP-DS-01				
	BVQ399	AEMP-DS-02				
	BVQ397	AEMP-DS-06		PAH, Alkylated PAHs		PAH analyzed past hold times. All results below RDL
C366008	BXM697	AEMP-DS-06	Water	Nitrite; Nitrate+Nitrite; Orthophosphate; Turbidity; True Colour	Analyzed past hold times - limited shipping options.	Nitrite concentration below detection limits. Orthophosphate not a major site related parameter and there are no guidelines for comparison. Turbidity and True Colour are indicators only. There is no affect on interpretation of results presented.
C365209	BXI565	AEMP-US-04	Water	Nitrite; Nitrate+Nitrite; Orthophosphate; Turbidity; True Colour	Analyzed past hold times - limited shipping options.	Nitrite concentration below detection limits. Orthophosphate not a major site related parameter and there are no guidelines for comparison. Turbidity and True Colour are indicators only. There is no affect on interpretation of results presented.
	BXI566	AEMP-DS-02				
	BXI567	AEMP-DS-04				
C365245	BXI870	AEMP-DS-03	Water	Nitrite; Nitrate+Nitrite; Orthophosphate; Turbidity; True Colour	Analyzed past hold times - limited shipping options.	Nitrite concentration below detection limits. Orthophosphate not a major site related parameter and there are no guidelines for comparison. Turbidity and True Colour are indicators only. There is no affect on interpretation of results presented.
C365246	BXI873	AEMP-DS-05	Water	Nitrite; Nitrate+Nitrite; Orthophosphate; Turbidity; True Colour	Analyzed past hold times - limited shipping options.	Nitrite concentration below detection limits. Orthophosphate not a major site related parameter and there are no guidelines for comparison. Turbidity and True Colour are indicators only. There is no affect on interpretation of results presented.
	BXI874	AEMP-US-01				
	BXI875	AEMP-US-02				
C378730	CAP316	AEMP-DS-03	Water	Nitrite; Nitrate+Nitrite; Orthophosphate; Turbidity; True Colour	Analyzed past hold times - limited shipping options.	Nitrite concentration below detection limits. Orthophosphate not a major site related parameter and there are no guidelines for comparison. Turbidity and True Colour are indicators only. There is no affect on interpretation of results presented.
	CAP317	AEMP-US-01				
	CAP318	AEMP-DS-04				
	CAP316	AEMP-DS-03		BTEX, F1	Analyzed past hold times - limited shipping	BTEX, F1 all below RDL
	CAP318	AEMP-DS-04				
C378736	CAP376	AEMP-DS-01	Water	Nitrite; Nitrate+Nitrite; Orthophosphate; Turbidity; True Colour	Analyzed past hold times - limited shipping options.	Nitrite concentration below detection limits. Orthophosphate not a major site related parameter and there are no guidelines for comparison. Turbidity and True Colour are indicators only. There is no affect on interpretation of results presented.
	CAP377	AEMP-US-04				
	CAP378	AEMP-DS-02				
	CAP377	AEMP-US-04		BTEX, F1		BTEX, F1 all below RDL
	CAP378	AEMP-DS-02				
C378739	CAP396	AEMP-DS-05	Water	Nitrite; Nitrate+Nitrite; Orthophosphate; Turbidity; BTEX, F1	Analyzed past hold times - limited shipping options.	BTEX, F1, Nitrite concentration below detection limits. Orthophosphate not a major site related parameter and there are no guidelines for comparison. Turbidity, alkalinity and TDS are indicators only. There is no affect on interpretation of results presented.
	CAP397	AEMP-Dup1				
	CAP398	AEMP-US-02				
	CAP396	AEMP-DS-05		TDS		
	CAP398	AEMP-US-02		Alkalinity		
C381210	CBI021	AEMP-DS-06	Water	Nitrite; Nitrate+Nitrite; Orthophosphate; Turbidity; True Colour	Analyzed past hold times - limited shipping options.	Nitrite concentration below detection limits. Orthophosphate not a major site related parameter and there are no guidelines for comparison. Turbidity and True Colour are indicators only. There is no affect on interpretation of results presented.

Appendix C. Small-bodied Fish Sampling Laboratory Certificates of Analysis

Enzyme and Protein Assay

Fish Cytochrome P450 1A1(CYP1A1) and Total Protein

Zhongzhi Chen
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Report Prepared for
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CONFIDENTIAL

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REPORT REVIEW AND APPROVAL

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1.0 INTRODUCTION AND OBJECTIVES

The objective of this project was to quantify fish cytochrome P450 1A1 (CYP1A1) and total protein in a collection of slimy sculpin (*Cottus cognatus*) liver samples.

Worley (Advisian) submitted 46 raw slimy sculpin liver samples for analysis in December 2023. Triploid brook trout (*Salvelinus fontinalis*) liver samples (13 samples) were also provided to InnoTech for preliminary testing, method establishment, and verification. The fish cytochrome P450 1A1 (CYP1A1) enzyme-linked immunosorbent assay (ELISA) kits, and Pierce™ BCA (Bicinchoninic acid) Protein Assay kit were procured and shipped to InnoTech Alberta, Vegreville by Worley. More details, including Chain of Custody (COC) and packing slips, can be found in the Appendices. Samples were stored at -80 ˚C until analyses could be completed.

Eight slimy sculpin samples were not analyzed due to low biomass or the absence of a corresponding metals analysis:

- AEMP-01-FS-04
- AEMP-01-FS-12
- AEMP-02-FS-12
- AEMP-02-FS-13
- AEMP-02-FS-14
- AEMP-02-FS-15
- AEMP-02-FS-16
- AEMP-02-FS-17

During analysis, three additional slimy sculpin samples (AEMP-01-FS-16, AEMP-02-FS-20, and AEMP-02-FS-23) were not analyzed due to insufficient biomass. Ultimately, 35 slimy sculpin liver samples were analyzed.

2.0 EXPERIMENTAL

2.1 SAMPLE PREPARATION

Samples were prepared as per CUSABIO's instruction for tissue homogenates (CUSABIO, 2023). Briefly, liver samples were transferred from cryovials to 1.5 mL microcentrifuge tubes and homogenized in 1X phosphate-buffered saline (PBS, pH 7.4, sterile-filtered, Sigma-Aldrich) using a pestle and cordless motor (1 mL PBS per 100 mg tissue). After homogenization, samples were stored at -20 ˚C overnight. The following day, samples were allowed to thaw and then immediately refrozen at -20 ˚C overnight to further disrupt cell membranes. On the third day, the homogenates were again thawed and centrifuged for 5 minutes at 5000 x g and 4 °C. The supernatant from each homogenate was removed for ELISA testing immediately after centrifugation. Aliquots of supernatant (10 µL minimum volume) were stored at -20 ˚C until the total protein assay could be conducted.

Originally, the CYP1A1 assay was to be conducted on an S-9 fraction collected from homogenized liver samples as described in the *Protocols for measuring mixed function oxygenases of fish liver* (Hodson et al., 1991). However, early trials determined that most (32/46 = 69.6%) of the slimy sculpin samples were too small and would yield S-9 volumes insufficient for testing. As a result, CYP1A1 concentrations are provided relative to the total protein content of the sample homogenate supernatant.

2.2 FISH CYTOCHROME P450 1A1 (CYP1A1)

Fish cytochrome P450 1A1 (CYP1A1) concentration was determined using a commercial ELISA kit (CUSABIO, catalogue number CSB-EL006395FI), which was sourced from a local distributor (CEDARLANE Corporation, www.cedarlanelabs.com). The kit uses a mouse monoclonal antibody to detect the CYP1A1 target described at https://www.uniprot.org/uniprotkb/Q6JZS3/ (Personal communication, Shaun Duan, Wuhan Huamei Biotech Co., Ltd., February 23, 2024). The analytical standard for the assay is a recombinant protein produced by Chinese hamster ovary (CHO) cells. The kit claims a detection range of 75 to 1,200 pg/mL.

The assay was conducted as per the manufacturer's protocol (CUSABIO, 2023). A correction (reference) wavelength of 655 nm was used to measure background absorbance and subtracted from the absorbance of 450 nm to get "true" absorbance values using a Benchmark microplate reader (Catalog Number: 170-6850, BIO-RAD). Samples were assayed in triplicate unless otherwise specified. Preliminary experiments with brook trout samples indicated that KCL-HEPES buffer (0.15 M KCl, 0.02 M HEPES, pH 7.5) can be substituted for 1x PBS (pH 7.4) without ill effect.

2.3 TOTAL PROTEIN ASSAY

Samples were assayed for total protein in triplicate using the Pierce™ BCA Protein Assay Kits from ThermoFisher (Catalog Number 23227, 500 mL), as per the manufacturer's instructions (ThermoFisher Scientific, 2020). This kit was expected to be easier and faster to use than the classic Lowry method and produce less variability than the Coomassie dye-binding method (Bradford assay). Ching (2016) obtained good results from the Pierce kit when measuring total protein (Ching, 2016).

The microplate version of the procedure (25 µL sample per microplate well) was used to accommodate the small sample biomass. This procedure resulted in a detection range of 20–2,000 µg/mL. Although lower volumes (10 µL sample per microplate well) can be used, preliminary trials indicated smaller

volumes produced lower test precision and compressed the detection range to 125–2,000 µg/mL. Absorbance was measured at 540 nm on a Benchmark microplate reader. Preliminary trials with triploid brook trout liver samples validated a prolonged (2-hour) incubation time. To facilitate the CYP1A1 assay, 1x PBS (pH 7.4) was used to homogenize liver samples, although preliminary trials indicated that KCl-HEPES could have been used in its place.

3.0 RESULTS

No.	Client Sample ID	CYP1A1 (pg/mL)	Total protein (BCA, ug/mL)	Normalized (pg/mg protein)	Note (ELISA)
1	AEMP-01-FS-01	80	4185	19	
2	AEMP-01-FS-02	82	4962	17	
3	AEMP-01-FS-03	81	5535	15	
4	AEMP-01-FS-06	85	5589	15	
5	AEMP-01-FS-07	78	6709	12	
6	AEMP-01-FS-08	83	4969	17	
7	AEMP-01-FS-09	84	6857	12	
8	AEMP-01-FS-10	95	7253	13	*(2)
9	AEMP-01-FS-11	74	6423	11	#
10	AEMP-01-FS-13	88	5561	16	
11	AEMP-01-FS-14	98	6822	14	*(2)
12	AEMP-01-FS-15	73	6702	11	#, *(2)
13	AEMP-01-FS-17	86	9309	9	*(2)
14	AEMP-01-FS-18	89	5160	17	*(2)
15	AEMP-01-FS-21	73	8477	9	#, *(2)
16	AEMP-01-FS-22	83	12566	7	*(2)
17	AEMP-02-FS-01	100	6246	16	
18	AEMP-02-FS-02	90	4333	21	*(2)
19	AEMP-02-FS-03	120	4814	25	*(2)
20	AEMP-02-FS-04	118	6899	17	*(2)
21	AEMP-02-FS-07	91	5187	17	
22	AEMP-02-FS-08	101	4819	21	
23	AEMP-02-FS-09	87	5241	17	
24	AEMP-02-FS-10	89	6591	13	
25	AEMP-02-FS-18	89	6840	13	*(2)
26	AEMP-02-FS-19	97	4749	20	
27	AEMP-02-FS-21	96	4408	22	
28	AEMP-02-FS-25	89	6159	14	
29	AEMP-02-FS-26	109	6012	18	
30	AEMP-01-FS-19	79	7697	10	*(1)
31	AEMP-01-FS-20	99	14638	7	*(1)
32	AEMP-02-FS-05	84	10152	8	*(1)
33	AEMP-02-FS-06	81	9304	9	*(2)
34	AEMP-02-FS-11	97	8326	12	*(1)
35	AEMP-02-FS-22	120	8832	14	*(1)

* Insufficient sample volume to conduct triplicate assay (replicate numbers indicated in the parentheses), lower replication contributes to a higher uncertainty associated with the CYP1A1 and protein measurements. # Below detection limit (75 pg/mL) for the CYP1A1 measurements.

4.0 RECOMMENDATIONS

Low sample biomass is problematic in the determination of total protein and CYP1A1 concentrations. Samples less than 50 mg may necessitate over-dilution to generate sufficient volume for the assays, producing greater variability in the results. Furthermore, samples under 25 mg are often too small to produce any result at all. A minimum of 100 mg for each tissue sample is recommended for any future testing. If underweight samples must be submitted (i.e., < 50 mg), they should be collected into individually pre-weighed 1.5 mL microcentrifuge tubes. This will reduce sample handling and transfer in the laboratory, thereby minimizing sample loss.

For the CYP1A1 ELISA assay, samples analyzed within 5 days may be stored at 2 – 8 ˚C; otherwise, samples should be stored at -20 ˚C (≤ 1 month) or -80 ˚C (≤ 2 months) to avoid enzyme degradation. Prolonged storage (> 2 months) may degrade/denature the enzyme and should be avoided.

5.0 REFERENCES

Ching, Y., 2016. *Chronic Wasting Disease: Investigations on Prion Shedding and Risk of Transmission to Caribou*.

CUSABIO, 2023. *Fish Cytochrome P450 1A1 (CYP1A1) ELISA Kit*. Web document available online at: https://www.cusabio.com/uploadfile/Ins/CSB-EL006395FI.pdf. Accessed: Mar 5, 2024.

Hodson, P.V., P.J. Kloepper-Sams, K.R. Munkittrick, W.L. Lockhart, D.A. Metner, P.L. Luxon, I.R. Smith, M.M. Gagnon, M. Servos and J.F. Payne, 1991. *Protocols for Measuring Mixed Function Oxygenases of Fish Liver.*

ThermoFisher Scientific, 2020. *PierceTM BCA Protein Assay Kit (23225 and 23227) User Guide*. Web document available online at: https://assets.thermofisher.com/TFS-Assets/LSG/manuals/MAN0011430_Pierce_BCA_Protein_Asy_UG.pdf. Accessed: Mar 5, 2024.

6.0 APPENDICES

TERMS AND CONDITIONS

The attached document entitled "Routine Testing Agreement" (hereafter referred to as the “Agreement”) is subject to the following Terms and Conditions, unless otherwise specified on the Agreement:

1. InnoTech Alberta will perform the Services in accordance with normal professional standards. Commencement of the Services shall constitute acceptance of these terms and conditions.
2. The delivery time for performance of the Services (as set out on the front page of this Agreement) is approximate and may be changed at any time by InnoTech Alberta giving written notice to the Client.
3. InnoTech Alberta will exercise due care and proficiency in testing items submitted by a Client. InnoTech Alberta shall not be responsible for any damage, which is a natural, necessary, or foreseeable result of any testing procedure, and InnoTech Alberta shall not be liable to the Client for any damage or loss caused to the item being tested or for any damage, loss or expense caused by any delay in carrying out the test, unless and to the extent that such damage, loss or expense is a direct result from InnoTech Alberta’s negligence or willful misconduct
4. For the purposes of this Agreement, “Intellectual Property” means all information, data, artistic and literary works, concepts, designs, processes, software, algorithms and inventions, including, without limitation, those that could be the subject of patent, copyright, industrial design, trade secret or other forms of protection. Intellectual Property which was owned by either InnoTech Alberta or the Client prior to the signing of this Agreement remains the property of that party.
5. For the purposes of this Agreement, “Test Results” means the conclusions, information, results or products including compilations, notes, data and reports, but does not include Intellectual Property developed by or utilized by InnoTech Alberta in the fulfillment of its obligations pursuant to this Agreement (e.g. improved research technologies, testing standards, process and improvements to InnoTech Alberta’s previously owned Intellectual Property. All Test Results shall be owned by the Client.
6. All data, reports and other information relating to the Services shall be treated by InnoTech Alberta as the confidential property of the Client, and InnoTech Alberta will use reasonable efforts to ensure that its employees, contractors and agents will not disclose the same to any other person, firm or corporation during the term of this Agreement and for a period of two (2) years after the date of termination of the Agreement, except as required to perform the Services. The obligation of confidentiality set out herein shall not apply to any information that was in InnoTech Alberta’s possession prior to receipt from the Client or which is or becomes part of the public domain through no act or failure on the part of InnoTech Alberta. The obligation of confidentiality set out in this Section shall not prevent the disclosure of information to any level of government having jurisdiction to make lawful demand therefor, or required to be disclosed by any applicable law. Any records required to be maintained by InnoTech Alberta pursuant to this Agreement are subject to the protection and access provisions of the *Freedom of Information and Protection of Privacy Act* (Alberta).
7. The reported results of any InnoTech Alberta tests or evaluations performed on samples or items provided by the Client shall be interpreted as being specific to the sample or item tested. InnoTech Alberta makes no representation that any similar or related untested samples or items would produce the same results.
8. The Client shall not use InnoTech Alberta’s name in any advertising material, sale offer, news releases, public statements or announcements, whether written or oral relating to the Services or the results thereof, without the prior written consent of InnoTech Alberta, which consent may be withheld for any reason.
9. Records, test data, reports and samples, except where shipped to the Client after completion of the Services shall be retained by InnoTech Alberta according to InnoTech Alberta’s approved Records Retention and Disposition Schedule.
10. Prices quoted are in Canadian Dollars unless otherwise stated in writing and are exclusive of any provincial, municipal, harmonized sales tax, use or goods and services tax. The Client shall pay all invoices rendered by InnoTech Alberta to the Client within thirty (30) days from the date of invoice, without deduction or set-off. If the Client fails to pay any amount under this Agreement, such unpaid amount shall bear interest at a rate per month equal to one (1%) percent (or 12.6825% per annum) with interest on overdue interest at the same rate.
11. Prices quoted do not include shipping, insurance or cost of consumables. The Client shall be responsible for all costs incurred by InnoTech Alberta in collecting any item for testing and returning the item to the Client after testing and shall be responsible for all necessary incidental costs incurred by InnoTech Alberta in providing the Services. InnoTech Alberta will not be responsible for any damage or loss to items during shipping and it is the responsibility of the Client to arrange and pay for any insurance it deems necessary.
12. Any test samples or other materials supplied by the Client to InnoTech Alberta may, at InnoTech Alberta’s option, be returned by InnoTech Alberta to the Client. The Client shall:
    (a) be responsible for all costs associated with the handling, transportation and disposal of such materials;
    (b) reimburse InnoTech Alberta for any costs incurred by InnoTech Alberta associated with the handling, transportation and disposal of such materials; and
    (c) indemnify and hold InnoTech Alberta harmless from any and all claims, damages or actions associated with the handling, transportation and disposal of such materials. This indemnity shall survive this Agreement.
13. InnoTech Alberta makes no representation, warranties or conditions, either expressed or implied, statutory or otherwise and does not warrant the quality, state, merchantability or fitness for any purpose of any test results, goods or products to be delivered pursuant to this Agreement. The Client accepts the results of these Services or items tested as is, and acknowledges that any use or interpretation of the information contained is at the Client’s own risk.
14. In no event shall InnoTech Alberta be liable for any indirect or consequential damage or loss suffered by the Client, including loss of anticipated profits.
15. InnoTech Alberta’s entire liability for any loss or damage suffered by the Client related to this Agreement, any breach thereof or any acts or omissions of InnoTech Alberta, its employees or agents, shall not exceed the total amount paid by the Client to InnoTech Alberta pursuant to this Agreement.

16. The Client shall indemnify and hold harmless InnoTech Alberta from any and all claims, demands, actions and costs (including legal costs on a solicitor-client basis) that may arise out of:

    (a) any dangerous defect or content in the item being tested, whether apparent or not, which dangerous defect or content was not disclosed in writing to InnoTech Alberta by the Client at the time the item was submitted for testing;

    (b) differences between those items actually tested and items previously or subsequently produced which are purported to be identical to the item tested; or

    (c) any use of the tested item or any item incorporating the tested item, whether by the Client or a third party following its return to the Client.

    This indemnity shall survive this Agreement.

17. Each party to this Agreement shall, at its own expense and without limiting its liabilities herein, be responsible for insuring its operation in an amount not less than $2,000,000 inclusive per occurrence, insuring against bodily injury, and property damage including loss of use thereof. Further, the Client is responsible for insuring all owned property directly or indirectly related to this Agreement and InnoTech Alberta shall have no liability for any loss or damage to such property.

18. The Client agrees to comply with all with all relevant health, safety and security policies and procedures imposed by InnoTech Alberta, and all applicable Federal and Provincial Health and Safety Acts and Regulations and public health orders, when on InnoTech Alberta's premises. Without limiting the generality of the foregoing such health, safety and security policies and procedures include InnoTech Alberta's COVID-19 Workplace Vaccination Procedure HSE 1-1-21, as updated or amended, and any similar procedures.

19. This Agreement represents the entire agreement between the parties and shall supersede all prior agreements or understandings related to the subject matter hereof. InnoTech Alberta may assign this Agreement to an "affiliated" (as that term is defined at Section 2 of the *Business Corporations Act* (Alberta)) or successor entity on notice to the Client.

20. If a party's performance of any of its obligations under this Agreement (excepting only an obligation to pay) is delayed, rendered impossible or impractical, or prevented in whole or in part due to circumstances beyond its reasonable control, including but not limited to acts of God, war, terrorism, labour disputes, pandemics or epidemics, global health emergencies, or governmental action, that party will not be in breach of this Agreement due to the delay or failure in performance occasioned by such event.

21. In the case of a force majeure event arising under the preceding paragraph, dates or times of performance shall be extended to the extent of delays excused by this section only for the duration of the force majeure event, provided that the party whose performance is impacted provides notice as soon as practicable to the other party of the existence and nature of such delay. During the period of suspension or delay, the party claiming force majeure shall undertake reasonable commercial efforts to minimize and mitigate the extent, effect and period of any such delay or non-performance.

22. This Agreement and rights and parties thereto shall be governed by and construed according to the laws of the Province of Alberta. The parties hereby submit to the exclusive jurisdiction of the Courts of Alberta for all disputes arising out of this Agreement.

SENDER RETAIN THIS COPY / COPIE DE L'EXPÉDITEUR

SENDER ACCOUNT NO. / N° DE COMPTE DE L'EXPÉDITEUR: 3450770

IMPORTANT TELEPHONE: (403)9681545

SENDER (FROM) / EXPÉDITEUR (DE): JORLEY CONSULTING

MO / DY/JR / YR/AN: 12 12 23

STREET ADDRESS / ADRESSE (N° ET RUE): 49 QUARRY PARK BLVD

APT., SUITE / APP., BUREAU:

CITY / VILLE: CALGARY

PROV. / STATE / ÉTAT: AB

POSTAL / ZIP: T2C5H9

RECEIVER (TO) / DESTINATAIRE (À): INNOTECH ALBERTA

STREET ADDRESS / ADRESSE (N° ET RUE): Hwy 16A + 75 ST

APT., SUITE / APP., BUREAU:

CITY / VILLE: VEGREVILLE

PROV. / STATE / ÉTAT: AB

POSTAL / ZIP: T9C1T4

ATTN: (NAME / DEPT.) / À L'ATTENTION DE (NOM / SERVICE): SEAN COFFEY

IMPORTANT TELEPHONE: (780)6328211

DESCRIPTION (INCLUDING DANGEROUS GOODS / INCLUANT MARCHANDISES DANGEREUSES): Dry ice

DG / MD: X

SENDER REFERENCE (IF ANY) / REF. DE L'EXPÉD.: 417085-49223

PICK UP / CUEILLETTE - N° DE CONF.:

SENDER SIGNATURE / SIGNATURE DE L'EXPÉDITEUR: X [signature] X

SEE CONDITIONS OF CARRIAGE ON REVERSE / CONDITIONS DE TRANSPORT AU VERSO

SHIP MODE / MODE DE TRANSPORT

AIR / AÉRIEN: X

GROUND / ROUTIER:

PKG / EMBAL. (CHOOSE / CHOISIR 1 TYPE ONLY / TYPE SEULEMENT; 1 PIECE ONLY / PIÈCE SEULEMENT)

PURO-LETTER:

PURO-PAK:

OTHER / AUTRE: X

SERVICE

9 AM / 9 h:

10:30 AM / 10 h 30:

SAT. / SAM.:

PAYMENT / PAIEMENT

CASH / COMPTANT:

CREDIT CARD / CARTE DE CRÉDIT:

RECEIVER OR THIRD PARTY ACCOUNT NO. / N° DE COMPTE DU DESTINATAIRE OU TIERS

RECEIVER / DESTINATAIRE:

3RD PARTY / TIERS:

SENDER / EXPÉDITEUR:

SHIPMENT / DÉTAILS / EXPÉDITION

#/Nbre PCS (4 MAXIMUM)	WEIGHT / POIDS SUBJ. TO CORR. / SUJET À CORR. KG	LB
1		26

DECLARED VALUE / VALEUR DÉCLARÉE (SURCHARGE APPLIES OVER $100) (SUPPLÉMENT AU-DESSUS DE 100 $)

$ $5,000 MAX. / MAX 5 000 $

SEE CONDITIONS OF CARRIAGE ON REVERSE / CONDITIONS DE TRANSPORT AU VERSO

BILL OF LADING NO / NO DE CONNAISSEMENT NON NÉGOCIABLE / NON NEGOTIABLE: 1542 936 2732

Purolator

purolator.com 1 888 SHIP-123

COURIER INITIALS / INITIALES DU COURRIER: SA

COURIER ROUTE / ITINÉRAIRE DU COURRIER:

MO / DY/JR / YR/AN: 12 12 202

NO./N° TYPE VISA MC AMEX

EXP. DATE D'EXP.

CHARGES / FRAIS / TOTAL AMOUNT / MONTANT TOTAL

THIRD PARTY BILLING NAME & ADDRESS / FACTURATION À UN TIERS (NOM & ADRESSE)

LIMITATION OF LIABILITY – IMPORTANT – PLEASE READ THE AMOUNT OF ANY LOSS OR DAMAGE FOR WHICH THE CARRIER MAY BE LIABLE SHALL NOT EXCEED $2.00 PER POUND (OR $4.41 PER KILOGRAM) COMPUTED ON THE TOTAL WEIGHT OF THE SHIPMENT UNLESS A HIGHER VALUE IS DECLARED ON THE FACE OF THE BILL OF LADING BY THE SENDER. MAXIMUM DECLARED VALUE SHALL NOT EXCEED $5,000. **N.B.** NOTE CAREFULLY CONDITIONS ON BACK HEREOF INCLUDING LIMITATIONS AND EXCLUSIONS OF CARRIER'S LIABILITY, WHICH ARE HEREBY ACCEPTED. **LIMITATION DE RESPONSABILITE – IMPORTANT – LISEZ S.V.P.** LE MONTANT DE TOUTE PERTE OU TOUT DOMMAGE DONT LE TRANSPORTEUR POURRAIT ÊTRE RESPONSABLE NE DOIT PAS EXCÉDER 2,00 $ LA LIVRE (OU 4,41 $ LE KILOGRAMME), CALCULÉ SUR LE POIDS TOTAL DE L'EXPÉDITION, À MOINS QU'UNE VALEUR SUPÉRIEURE NE SOIT ÉTÉ DÉCLARÉE AU LE RECTO DU CONNAISSEMENT PAR L'EXPÉDITEUR. LA VALEUR DÉCLARÉE MAXIMALE NE DOIT PAS DÉPASSER PAS 5 000 $. **N.B.** VEUILLEZ PRENDRE CONNAISSANCE DES CONDITIONS AU VERSO, Y COMPRIS LES LIMITATIONS ET EXCLUSIONS DE RESPONSABILITÉ DU TRANSPORTEUR, QUI SONT ACCEPTÉES PAR LES PRÉSENTES.

PLEASE REFER TO BILL OF LADING NUMBER FOR SHIPMENT STATUS INQUIRIES.
POUR TOUT RENSEIGNEMENT, VEUILLEZ NOUS COMMUNIQUER LE NUMÉRO DE CONNAISSEMENT.

SENDER RETAIN THIS COPY / COPIE DE L'EXPÉDITEUR

TrichAnalytics Inc.	Chain of Custody (COC) for LA-ICP-MS Analysis
[illegible]	

Invoicing		Reporting (if different from invoicing)	
Project Number: 41/085-49223-22200			
Company Name:	Advisian (Worley Canada Services Ltd.)	Company Name:	
Contact Name:	Graham Young	Contact Name:	
Address:	19 Quarry Park Blvd	Address:	
City, Province:	Calgary, Alberta	City, Province:	
Postal Code:	[illegible]	Postal Code:	
Phone:	403-968-1545	Phone:	
Email:	[illegible]	Email:	canada.chemistry@worley.com; graham.young@advisian.com

Sample Analysis Requested: CYP1A ELISA + Protein

Sample Identification:		Sample Type: Species	Sample Type
✓	1 [illegible]	Slimy Sculpin	Liver
✓	2 [illegible]	Slimy Sculpin	Liver
✓	3 [illegible]	Slimy Sculpin	Liver
	4 [illegible]	Slimy Sculpin	Liver
✓	5 [illegible]	Slimy Sculpin	Liver
✓	6 [illegible]	Slimy Sculpin	Liver
✓	7 [illegible]	Slimy Sculpin	Liver
✓	8 [illegible]	Slimy Sculpin	Liver
✓	9 [illegible]	Slimy Sculpin	Liver
✓	10 [illegible]	Slimy Sculpin	Liver
✓	11 [illegible]	Slimy Sculpin	Liver
✓	12 [illegible]	Slimy Sculpin	Liver
✓	13 [illegible]	Slimy Sculpin	Liver
✓	14 [illegible]	Slimy Sculpin	Liver
✓	15 [illegible]	Slimy Sculpin	Liver
✓	16 [illegible]	Slimy Sculpin	Liver
✓	17 [illegible]	Slimy Sculpin	Liver
✓	18 [illegible]	Slimy Sculpin	Liver
✓	19 [illegible]	Slimy Sculpin	Liver
✓	20 [illegible]	Slimy Sculpin	Liver

Sample(s) Released By: Graham Young	Sample(s) Received By:
Signature: [signature]	Signature:
Date Sent: Dec. 12/23	Date Received:
Sample(s) Returned to Client By: Please Cc alex.haigh@advisian.com when sending invoice	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

46 SS Samples received.

Trace Analytics Inc.	Chain of Custody (COC) for LA ICP MS Analysis

Invoicing		Reporting (if different from Invoicing)	
Project Number: 41/085-49223-22200			
Company Name:	Advisian / Worley Canada Services Ltd.	Company Name:	
Contact Name:	Graham Young	Contact Name:	
Address:	40 Quarry Park Blvd	Address:	
City/Province:	Calgary, Alberta	City/Province:	
Postal Code:	T2C 3H9	Postal Code:	
Phone:	403-568-1545	Phone:	
Email:	[illegible]	Email:	[illegible]

Sample Analysis Requested: CIPIA ELISA - Total Protein

Sample Identification	Sample Type	Sample Type
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver
[illegible]	Slimy Sculpin	Liver

Sample(s) Released By: Graham Young	Sample(s) Received By:
Signature: [signature]	Signature:
Date Sent: Dec. 12/23	Date Received:
Sample(s) Returned to Client By: Please Cc alex.haign@advisian.com when sending invoice	Shipping Conditions: Shipping Container:
Signature:	Date Sent:

TOM-0110.

TrichAnalytics Inc.	Chain of Custody (COC) for LA-ICP-MS Analysis
307 1783 Sean Heights Saanichton, BC, V8M 2B4 Ph: (250) 537-0843	

Invoicing		Reporting (if different from Invoicing)	
Project Number: 417085 49223-22200			
Company Name:	Advisian (Worley Canada Services Ltd.)	Company Name:	
Contact Name:	Graham Young	Contact Name:	
Address:	45 Quarry Park Blvd	Address:	
City, Province:	Calgary, Alberta	City, Province:	
Postal Code:	T2C 5H6	Postal Code:	
Phone:	403-968-1949	Phone:	
Email:	[illegible]	Email:	canadacorcmstay@worley.com; graham.young@advisian.com

Sample Analysis Requested: CYP1A ELISA + Total Protein

Sample Identification	Sample Type: Species	Sample Type: Sample type
AEMP-01-FS-12	Sunfish	Liver
AEMP-01-FS-04	Sunfish	Liver
AEMP-02-FS-05	Sunfish	Liver
AEMP-02-FS-12	Sunfish	Liver
AEMP-02-FS-13	Sunfish	Liver
AEMP-02-FS-17	Sunfish	Liver
AEMP-02-FS-14	Sunfish	Liver
CHBkTR5	BKTR	Liver
EDBkTR8	BKTR	Liver
EDBkTR13	BKTR	Liver
EDBkTR24	BKTR	Liver
CHBkTR10	BKTR	Liver
EDBkTR18	BKTR	Liver (T)
EDBkTR2	BKTR	Liver
EDBkTR20	BKTR	Liver
EDBkTR21	BKTR	Liver
CHBkTR25	BKTR	Liver
CHBkTR14	BKTR	Liver
CHBkTR26	BKTR	Liver
CHBkTR27	BKTR	Liver

Sample(s) Released By: Graham Young	Sample(s) Received By:
Signature: [signature]	Signature:
Date Sent: Dec. 12/23	Date Received:
Sample(s) Returned to Client By: Please Cc alex.haign@advisian.com when sending invoice	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

C017-001.01

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Burlington, Ontario L7L 5R2
Canada

(800) 268-5058 (North America)
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www.cedarlanelabs.com

PACKING SLIP	1098957
CUSTOMER	70029

SOLD TO: / VENDU A:
Worley Consulting
49 Quarry Park Blvd
CALGARY
AB, CANADA
403-968-1545
T2C 5H9

SHIP TO: / EXPEDIE A:
Innotech Alberta
Hwy 16A and 75 St
Vegreville
AB, CANADA
7806328278 Sean Coffey
T9C1T4

ORDER DATE COMMANDE	SHIP DATE EXPEDIEE	SHIP VIA/EXPEDIEE PAR	F.O.B.
01/03/24	01/16/24	FEDEX	BURLINGTON

PURCHASE ORDER NO./NO. DE COMMANDE D'ACHATS	TERMS/TERMES	FUNDS/FONDS	SALES ORDER/NO. DE COMMANDE
VISA	PREPAID	CAN	1098957

Qty Ordered	Qty Shipped	Qty B/O	Catalog No. / No. de Catalogue	Product Description/Description de Produit	
1	1	0	**CSB-EL006395FI-5**	CUSABIO Fish Cytochrome P450 1A1(CYP1A1) ELISA kit	5X96T

If possible, please ship kit so that it arrive after January 2, 2024 because the receiving company is closed during the holidays up to that date. Thank you

madeline.hernandez@cedarlanelabs.com
01/03/2024

RECEIVED
JAN 17 2024
REC BY:

CLAIM: Please provide notification of any errors within 10 business days. Authorized returns must be made within 30 days. Thank you.
For Cedarlane's Terms and Conditions of Purchase and Sale, please see www.cedarlanelabs.com/TermsAndConditions

Packed by: SC

DISPATCH NOTE

Please refer to Order Number 11466605 on all correspondence.

Order Number: 11466605 SO
Order Date: 12/26/2023
Purchase Order Number: VISA6328
Contract Number:
Shipment Number: 1222300503

Account To: 71069136

WORLEY
49 QUARRY PARK BLVD SE
Graham Young
CALGARY
AB
T2C 5H9
CANADA

Life Technologies Inc.

5250 Mainway
Burlington ON L7L 5Z1
CANADA
T 18009556-6288 Ext. 66486
F 18003871007
thermofisher.com

Dispatch To: 71069138

INNOTECH ALBERTA
Vegreville Laboratory
HIGHWAY 16A & 75TH ST
Sean Coffey
VEGREVILLE
AB
T9C 1T4
CANADA

Order Placed By: Graham Young
Phone Number: 780-632-8278
Email Address: graham.young@worley.com

Dispatch Date: 27-DEC-23
Requested Ship Date: 26-Dec-23
Carrier:
Release Number:

Line Number	Catalog Number	Description / Size	Lot Number	Quantity Shipped
1.000	23227	PIERCE BCA PROTEIN ASSAY KIT	YJ375835	1

For instant access to product related documents (COA, TDS & MSDS), please visit our website at http://www.thermofisher.com/support

FedEx - 7082 9508 3344

Notice to Purchaser:

Limited Use Label License No. 358: Research Use Only
The purchase of this product conveys to the purchaser the limited, non transferable right to use the product only to perform internal research for the sole benefit of the purchaser. No right to resell this product or any of its components is conveyed expressly, by implication, or by estoppel. This product is for internal research purposes only and is not for use in commercial applications of any kind, including, without limitation, quality control and commercial services such as reporting the results of purchaser's activities for a fee or other form of consideration. For information on obtaining additional rights, please contact outlicensing@lifetech.com.

CERTAIN PRODUCTS MAY BE COVERED BY OTHER LIMITED USE LABEL LICENSE(S). IF YOU RECEIVE OTHER LIMITED USE LABEL LICENSES SUCH LIMITED USE LABEL LICENSES WILL APPLY. IN ADDITION, THE RESTRICTIONS OF LIMITED USE LABEL LICENSE NO. 358 ON THE PURCHASER TO UTILIZE THE PRODUCT(S) FOR INTERNAL RESEARCH PURPOSES DOES NOT APPLY TO CERTAIN PRODUCTS CONTAINING DISCLAIMERS ON APPLICABLE PRODUCT WEBPAGES AT THERMOFISHER.COM, OR IN PRODUCT LABELING OR PRODUCT MANUALS (PRODUCT LITERATURE). TO THE EXTENT OTHER LIMITED USE LABEL LICENSE(S) AND/OR REGULATORY RESTRICTIONS CONTAINED IN THE PRODUCT LITERATURE CONFLICT WITH LIMITED USE LABEL LICENSE NO. 358, THE OTHER LIMITED USE LABEL LICENSE(S) AND/OR REGULATORY RESTRICTIONS CONTAINED IN SUCH PRODUCT LITERATURE SHALL APPLY.

Patents are issued for limited times. Expiration dates may be determined online at www.uspto.gov or by email to patentexpiration@lifetech.com.

This order comes in shipment Number 1222300503 which is consisting of 1 boxes and gross weight of 1.23 Kg.

These commodities, technologies or software were shipped in accordance with the Export Administration regulations. Export, re-export or diversion contrary to U.S. law is prohibited.

For product Shipping and Storage Conditions, Certificates of Analysis (COA), Technical Data Sheet and Material Safety Data Sheets (MSDS), visit thermofisher.com. Enter your product catalog number in the search bar to access complete product information.

TrichAnalytics
LABORATORY

Tissue Microchemistry Analysis Report

Client: Graham Young
Fisheries Biologist
Advisian (Worley Canada Services Ltd.)
Phone: 403-968-1545
Email: canada.chemistry@worley.com;
graham.young@advisian.com

Date Received:	24 Oct 2023
Date of Analysis:	30 Oct 2023
Final Report Date:	31 Oct 2023
Project No.:	2023-584
Method No.:	MET-002.08

Client Project: 417085-49223-22200

Analytical Request: Fish Muscle Tissue Microchemistry (total metals & moisture) - 40 samples.
See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in parts per million (ppm) dry weight (equivalent to mg/kg).
Samples quantified using DORM-5, NIST-1566b, and NIST-2976 certified reference standards.
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.
All samples were received as whole body small fish. Filleted each fish and only analyzed muscle with no bone/skin.

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio — Date: 31 Oct 2023

[The analytical report shall not be reproduced except in full under the expressed written consent of TrichAnalytics Inc.]

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Advisian

Tissue Analysis Results

		Client ID	AEMP-01-FS-01	AEMP-01-FS-02	AEMP-01-FS-03	AEMP-01-FS-05	AEMP-01-FS-06
		Lab ID	063	064	065	066	067
		Wet Weight (g)	0.1021	0.1128	0.0798	0.0928	0.1132
		Dry Weight (g)	0.0221	0.0250	0.0174	0.0204	0.0257
		Moisture (%)	78.4	77.8	78.2	78.0	77.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.017	0.011	0.017	0.014	0.017
11B	0.062	0.207	0.064	<0.062	<0.062	0.064	0.064
23Na	0.302	1.0	4,650	3,486	3,827	3,516	4,093
24Mg	0.008	0.027	1,069	1,106	1,071	862	890
27Al	0.029	0.097	4.3	2.7	3.9	4.3	2.2
31P	37	123	10,452	8,895	8,979	9,394	9,830
39K	3.0	10	17,794	13,548	12,680	14,433	17,156
44Ca	21	70	1,569	1,352	1,561	1,589	1,364
49Ti	0.148	0.493	1.2	0.952	1.2	1.1	1.2
51V	0.034	0.113	0.043	<0.034	0.043	<0.034	<0.034
52Cr	0.082	0.273	0.640	0.576	0.758	0.637	0.622
55Mn	0.015	0.050	1.8	2.4	2.0	1.6	1.4
57Fe	1.4	4.7	36	25	32	30	26
59Co	0.002	0.007	0.070	0.049	0.112	0.068	0.052
60Ni	0.007	0.023	0.324	0.233	1.0	0.467	0.348
63Cu	0.005	0.017	1.5	1.2	1.5	1.5	1.2
66Zn	0.405	1.4	55	43	41	50	56
75As	0.251	0.837	<0.251	<0.251	0.351	<0.251	<0.251
77Se	0.273	0.910	3.2	3.3	5.1	6.4	5.5
88Sr	0.001	0.003	2.5	2.1	2.2	2.3	1.9
95Mo	0.001	0.003	0.019	0.009	0.019	0.019	0.009
107Ag	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
111Cd	0.030	0.100	0.034	<0.030	0.034	<0.030	<0.030
118Sn	0.035	0.117	0.546	0.412	0.836	0.692	0.312
121Sb	0.002	0.007	<0.002	<0.002	<0.002	<0.002	<0.002
137Ba	0.001	0.003	0.475	0.290	0.343	0.290	0.435
202Hg	0.047	0.157	1.2	1.0	0.913	0.741	0.997
205Tl	0.001	0.003	0.017	0.022	0.024	0.038	0.017
208Pb	0.004	0.013	0.012	0.007	0.014	0.012	0.007
238U	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001

Notes:

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Tissue Analysis Results

		Client ID	AEMP-01-FS-07	AEMP-01-FS-08	AEMP-01-FS-09	AEMP-01-FS-10	AEMP-01-FS-11
		Lab ID	068	069	070	071	072
		Wet Weight (g)	0.1933	0.1010	0.0576	0.0867	0.0894
		Dry Weight (g)	0.0389	0.0230	0.0145	0.0186	0.0186
		Moisture (%)	79.9	77.2	74.8	78.5	79.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.023	0.017	0.014	0.014	0.021
11B	0.062	0.207	0.064	0.064	0.073	0.092	<0.062
23Na	0.302	1.0	4,235	3,795	3,209	2,930	3,330
24Mg	0.008	0.027	1,121	1,097	1,120	917	1,238
27Al	0.029	0.097	3.3	1.8	1.6	1.6	2.2
31P	37	123	10,913	10,768	8,286	7,234	8,885
39K	3.0	10	17,790	18,865	10,958	12,682	14,142
44Ca	21	70	1,485	1,493	1,650	1,384	1,537
49Ti	0.148	0.493	1.1	1.0	1.1	0.952	0.958
51V	0.034	0.113	0.036	<0.034	<0.034	<0.034	0.035
52Cr	0.082	0.273	0.589	0.598	0.740	0.589	0.690
55Mn	0.015	0.050	2.2	1.9	3.1	1.9	1.9
57Fe	1.4	4.7	25	30	38	32	29
59Co	0.002	0.007	0.051	0.040	0.057	0.032	0.056
60Ni	0.007	0.023	0.478	0.238	0.823	0.524	0.858
63Cu	0.005	0.017	1.5	1.8	1.7	1.2	1.0
66Zn	0.405	1.4	59	36	34	47	48
75As	0.251	0.837	<0.251	<0.251	<0.251	<0.251	<0.251
77Se	0.273	0.910	5.8	4.5	5.1	5.7	4.1
88Sr	0.001	0.003	2.6	2.2	3.4	1.7	2.2
95Mo	0.001	0.003	0.013	0.009	0.019	0.009	0.012
107Ag	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
111Cd	0.030	0.100	<0.030	<0.030	<0.030	<0.030	<0.030
118Sn	0.035	0.117	1.1	0.332	0.847	0.309	0.540
121Sb	0.002	0.007	0.002	<0.002	<0.002	<0.002	<0.002
137Ba	0.001	0.003	0.523	0.211	0.659	0.237	0.194
202Hg	0.047	0.157	1.0	0.724	0.623	0.701	1.4
205Tl	0.001	0.003	0.027	0.026	0.027	0.023	0.040
208Pb	0.004	0.013	0.005	0.005	0.007	0.007	0.006
238U	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001

Notes:

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Tissue Analysis Results

		Client ID	AEMP-01-FS-13	AEMP-01-FS-14	AEMP-01-FS-15	AEMP-01-FS-16	AEMP-01-FS-17
		Lab ID	073	074	075	076	077
		Wet Weight (g)	0.0991	0.1015	0.1732	0.0246	0.2161
		Dry Weight (g)	0.0210	0.0258	0.0383	0.0067	0.0456
		Moisture (%)	78.8	74.6	77.9	72.8	78.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.021	0.021	0.018	0.037	0.015
11B	0.062	0.207	0.104	0.104	0.083	0.094	0.166
23Na	0.302	1.0	3,881	3,122	3,571	5,119	4,203
24Mg	0.008	0.027	1,112	1,122	1,142	1,036	928
27Al	0.029	0.097	2.5	6.8	5.7	10	3.1
31P	37	123	8,878	8,721	8,965	9,196	10,078
39K	3.0	10	15,627	14,752	14,344	12,510	14,280
44Ca	21	70	1,524	1,667	1,578	1,962	1,426
49Ti	0.148	0.493	0.958	1.0	0.958	1.4	0.958
51V	0.034	0.113	0.042	0.046	0.051	0.091	0.037
52Cr	0.082	0.273	0.623	0.647	0.732	1.1	0.623
55Mn	0.015	0.050	2.0	5.9	2.3	2.7	4.8
57Fe	1.4	4.7	27	36	38	81	26
59Co	0.002	0.007	0.043	0.077	0.071	0.139	0.078
60Ni	0.007	0.023	0.379	0.535	1.1	2.6	0.650
63Cu	0.005	0.017	1.2	1.9	1.4	2.2	1.4
66Zn	0.405	1.4	39	64	83	91	61
75As	0.251	0.837	0.656	<0.251	<0.251	0.308	<0.251
77Se	0.273	0.910	4.4	5.4	4.3	10	4.6
88Sr	0.001	0.003	2.3	2.8	2.5	5.0	2.5
95Mo	0.001	0.003	0.012	0.024	0.024	0.047	0.024
107Ag	0.001	0.003	<0.001	<0.001	<0.001	0.008	<0.001
111Cd	0.030	0.100	<0.030	0.037	<0.030	0.111	0.056
118Sn	0.035	0.117	0.234	0.267	0.949	2.9	0.535
121Sb	0.002	0.007	<0.002	<0.002	0.002	0.005	0.003
137Ba	0.001	0.003	0.360	0.693	0.430	0.721	0.444
202Hg	0.047	0.157	0.991	0.946	1.6	0.914	1.3
205Tl	0.001	0.003	0.042	0.033	0.041	0.024	0.041
208Pb	0.004	0.013	0.005	0.013	0.010	0.021	0.010
238U	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001

Notes:

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Tissue Analysis Results

		Client ID	AEMP-01-FS-18	AEMP-01-FS-19	AEMP-01-FS-20	AEMP-FS-01-21	AEMP-FS-01-22
		Lab ID	078	079	080	081	082
		Wet Weight (g)	0.0850	0.0487	0.0529	0.0766	0.1124
		Dry Weight (g)	0.0183	0.0120	0.0118	0.0159	0.0244
		Moisture (%)	78.5	75.4	77.7	79.2	78.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.071	0.055	0.024	0.031	0.021
11B	0.062	0.207	0.178	0.146	0.062	0.062	0.083
23Na	0.302	1.0	3,774	4,314	4,574	5,623	3,538
24Mg	0.008	0.027	1,015	1,041	810	812	777
27Al	0.029	0.097	108	43	6.6	8.7	5.2
31P	37	123	8,365	9,049	9,075	10,208	8,268
39K	3.0	10	13,262	15,505	15,383	16,818	14,130
44Ca	21	70	1,908	1,815	1,577	1,422	1,448
49Ti	0.148	0.493	2.1	2.1	0.958	1.3	1.0
51V	0.034	0.113	0.156	0.147	0.052	0.055	<0.034
52Cr	0.082	0.273	0.778	0.926	0.696	0.663	0.538
55Mn	0.015	0.050	6.0	6.7	1.3	2.2	2.4
57Fe	1.4	4.7	93	91	51	56	34
59Co	0.002	0.007	0.104	0.179	0.099	0.102	0.060
60Ni	0.007	0.023	1.6	2.6	1.2	0.908	0.368
63Cu	0.005	0.017	1.9	1.8	1.4	1.8	1.4
66Zn	0.405	1.4	43	91	60	73	81
75As	0.251	0.837	<0.251	<0.251	<0.251	<0.251	<0.251
77Se	0.273	0.910	8.0	6.8	4.7	5.8	9.6
88Sr	0.001	0.003	4.8	3.8	2.4	2.5	2.2
95Mo	0.001	0.003	0.035	0.035	0.024	0.047	0.024
107Ag	0.001	0.003	0.004	0.004	0.004	<0.001	<0.001
111Cd	0.030	0.100	0.037	0.148	0.056	0.056	0.037
118Sn	0.035	0.117	0.480	0.341	0.698	0.642	0.090
121Sb	0.002	0.007	<0.002	<0.002	<0.002	<0.002	<0.002
137Ba	0.001	0.003	3.2	2.6	0.333	0.388	0.499
202Hg	0.047	0.157	0.640	0.495	0.733	1.1	0.772
205Tl	0.001	0.003	0.047	0.041	0.036	0.040	0.030
208Pb	0.004	0.013	0.049	0.028	0.010	0.018	0.008
238U	0.001	0.003	0.003	0.002	<0.001	<0.001	<0.001

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Tissue Analysis Results

		Client ID	AEMP-02-FS-01	AEMP-02-FS-02	AEMP-02-FS-03	AEMP-02-FS-04	AEMP-02-FS-05
		Lab ID	083	084	085	086	087
		Wet Weight (g)	0.2269	0.1137	0.1326	0.1045	0.0917
		Dry Weight (g)	0.0466	0.0255	0.0267	0.0224	0.0187
		Moisture (%)	79.5	77.6	79.9	78.6	79.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.021	0.018	0.018	0.014	0.021
11B	0.062	0.207	0.062	0.062	0.073	<0.062	0.078
23Na	0.302	1.0	3,823	3,344	4,722	4,616	2,975
24Mg	0.008	0.027	1,063	1,091	833	698	1,177
27Al	0.029	0.097	2.5	5.1	4.7	2.0	3.6
31P	37	123	10,284	8,781	10,522	8,217	8,326
39K	3.0	10	13,230	14,789	16,810	17,383	10,779
44Ca	21	70	1,534	1,658	1,677	1,243	1,834
49Ti	0.148	0.493	0.851	1.1	1.1	0.851	0.851
51V	0.034	0.113	0.052	0.055	0.070	<0.034	<0.034
52Cr	0.082	0.273	0.577	0.625	0.708	0.546	0.586
55Mn	0.015	0.050	1.2	1.4	2.9	1.2	1.7
57Fe	1.4	4.7	25	44	51	24	24
59Co	0.002	0.007	0.073	0.095	0.141	0.035	0.093
60Ni	0.007	0.023	0.490	0.412	1.1	0.178	0.345
63Cu	0.005	0.017	1.2	1.4	1.5	1.2	1.4
66Zn	0.405	1.4	53	79	82	50	54
75As	0.251	0.837	<0.251	<0.251	<0.251	0.298	<0.251
77Se	0.273	0.910	3.6	4.0	7.0	4.7	5.5
88Sr	0.001	0.003	2.9	2.8	3.3	1.8	2.9
95Mo	0.001	0.003	0.012	0.035	0.047	0.012	0.024
107Ag	0.001	0.003	<0.001	0.004	0.004	<0.001	<0.001
111Cd	0.030	0.100	0.037	0.037	0.093	<0.030	<0.030
118Sn	0.035	0.117	0.461	0.381	1.2	0.621	0.177
121Sb	0.002	0.007	<0.002	0.003	0.003	<0.002	<0.002
137Ba	0.001	0.003	0.277	0.444	0.582	0.333	0.360
202Hg	0.047	0.157	1.4	0.749	0.914	0.907	0.669
205Tl	0.001	0.003	0.031	0.052	0.058	0.020	0.047
208Pb	0.004	0.013	0.010	0.013	0.015	0.005	0.005
238U	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001

Notes:

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Tissue Analysis Results

		Client ID	AEMP-02-FS-06	AEMP-02-FS-07	AEMP-02-FS-08	AEMP-02-FS-09	AEMP-02-FS-10
		Lab ID	088	089	090	091	092
		Wet Weight (g)	0.0778	0.2173	0.1178	0.2977	0.0824
		Dry Weight (g)	0.0163	0.0460	0.0271	0.0597	0.0180
		Moisture (%)	79.0	78.8	77.0	79.9	78.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.027	0.013	0.029	0.013	0.023
11B	0.062	0.207	0.120	<0.062	0.117	0.064	0.117
23Na	0.302	1.0	4,254	3,140	3,950	3,821	5,047
24Mg	0.008	0.027	1,027	925	1,000	1,105	912
27Al	0.029	0.097	15	3.3	3.8	1.5	3.8
31P	37	123	9,403	8,611	8,691	8,156	9,346
39K	3.0	10	14,210	12,313	12,272	11,937	15,282
44Ca	21	70	1,992	1,405	1,716	1,466	1,591
49Ti	0.148	0.493	1.2	1.1	0.982	0.982	1.1
51V	0.034	0.113	0.100	0.046	0.063	0.043	0.081
52Cr	0.082	0.273	0.760	0.660	0.736	0.599	0.854
55Mn	0.015	0.050	4.2	1.7	3.8	1.4	2.4
57Fe	1.4	4.7	54	29	34	29	56
59Co	0.002	0.007	0.272	0.041	0.163	0.047	0.238
60Ni	0.007	0.023	1.6	0.550	1.1	0.432	2.2
63Cu	0.005	0.017	2.7	1.4	2.0	1.2	1.9
66Zn	0.405	1.4	85	39	59	51	82
75As	0.251	0.837	0.383	<0.251	<0.251	<0.251	0.325
77Se	0.273	0.910	5.4	3.4	9.3	2.7	5.3
88Sr	0.001	0.003	5.2	2.1	3.1	2.4	3.1
95Mo	0.001	0.003	0.071	0.012	0.024	0.012	0.073
107Ag	0.001	0.003	0.008	<0.001	0.004	<0.001	0.004
111Cd	0.030	0.100	0.130	<0.030	0.052	<0.030	0.104
118Sn	0.035	0.117	1.5	0.744	0.643	0.447	1.1
121Sb	0.002	0.007	<0.002	<0.002	<0.002	<0.002	<0.002
137Ba	0.001	0.003	0.651	0.430	0.637	0.296	0.459
202Hg	0.047	0.157	0.698	1.3	0.869	1.6	0.938
205Tl	0.001	0.003	0.035	0.041	0.037	0.032	0.062
208Pb	0.004	0.013	0.018	<0.004	0.011	<0.004	0.017
238U	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001

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Tissue Analysis Results

		Client ID	AEMP-02-FS-11	AEMP-02-FS-16	AEMP-02-FS-18	AEMP-02-FS-19	AEMP-02-FS-20
		Lab ID	093	094	095	096	097
		Wet Weight (g)	0.0601	0.0282	0.1634	0.2757	0.0916
		Dry Weight (g)	0.0129	0.0053	0.0370	0.0601	0.0190
		Moisture (%)	78.5	81.2	77.4	78.2	79.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.029	0.026	0.016	0.016	0.016
11B	0.062	0.207	0.117	0.138	0.074	<0.062	0.127
23Na	0.302	1.0	5,484	5,361	3,812	4,050	4,187
24Mg	0.008	0.027	888	735	940	865	761
27Al	0.029	0.097	3.7	5.5	3.8	2.5	3.1
31P	37	123	10,013	10,073	7,831	8,412	8,063
39K	3.0	10	17,470	15,197	12,545	14,254	13,334
44Ca	21	70	1,329	1,571	1,512	1,267	1,490
49Ti	0.148	0.493	0.982	1.0	0.859	0.859	0.859
51V	0.034	0.113	0.053	0.052	0.045	0.035	<0.034
52Cr	0.082	0.273	0.661	0.596	0.714	0.571	0.596
55Mn	0.015	0.050	1.9	1.2	2.3	1.6	1.2
57Fe	1.4	4.7	45	43	33	24	30
59Co	0.002	0.007	0.092	0.060	0.079	0.054	0.079
60Ni	0.007	0.023	0.581	0.247	0.852	0.383	0.556
63Cu	0.005	0.017	1.6	2.0	1.4	1.1	1.4
66Zn	0.405	1.4	75	84	41	40	69
75As	0.251	0.837	0.310	<0.251	<0.251	<0.251	<0.251
77Se	0.273	0.910	7.2	7.9	4.0	3.0	9.8
88Sr	0.001	0.003	1.9	2.5	2.8	1.6	2.6
95Mo	0.001	0.003	0.024	0.024	0.012	0.024	0.024
107Ag	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
111Cd	0.030	0.100	<0.030	0.042	0.052	<0.030	0.042
118Sn	0.035	0.117	1.5	1.1	1.1	0.410	0.789
121Sb	0.002	0.007	0.005	0.003	<0.002	<0.002	<0.002
137Ba	0.001	0.003	0.444	0.355	0.563	0.267	0.385
202Hg	0.047	0.157	1.1	1.1	1.1	1.0	1.0
205Tl	0.001	0.003	0.029	0.022	0.032	0.046	0.027
208Pb	0.004	0.013	0.011	0.011	0.006	0.007	0.013
238U	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Advisian

Tissue Analysis Results

		Client ID	AEMP-FS-02-21	AEMP-FS-02-22	AEMP-FS-02-23	AEMP-FS-02-25	AEMP-FS-02-26
		Lab ID	098	099	100	101	102
		Wet Weight (g)	0.0923	0.0697	0.0465	0.1112	0.3140
		Dry Weight (g)	0.0240	0.0153	0.0105	0.0264	0.0724
		Moisture (%)	74.0	78.0	77.4	76.3	76.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.026	0.034	0.016	0.016	0.016
11B	0.062	0.207	0.095	0.170	0.122	0.074	0.074
23Na	0.302	1.0	4,090	5,988	4,634	3,455	3,071
24Mg	0.008	0.027	840	590	585	718	947
27Al	0.029	0.097	9.8	14	3.6	5.0	3.9
31P	37	123	8,616	12,096	8,224	7,639	8,117
39K	3.0	10	16,001	19,745	12,549	11,158	12,388
44Ca	21	70	1,455	1,508	1,347	1,375	1,478
49Ti	0.148	0.493	1.1	1.4	0.859	0.859	0.737
51V	0.034	0.113	0.064	0.075	0.039	0.049	0.041
52Cr	0.082	0.273	0.733	0.641	0.623	0.705	0.749
55Mn	0.015	0.050	2.0	2.5	1.1	2.0	3.8
57Fe	1.4	4.7	41	65	52	41	28
59Co	0.002	0.007	0.081	0.086	0.077	0.077	0.075
60Ni	0.007	0.023	1.2	1.1	0.679	0.964	1.2
63Cu	0.005	0.017	1.5	1.8	1.8	1.2	1.0
66Zn	0.405	1.4	44	64	74	47	38
75As	0.251	0.837	<0.251	<0.251	<0.251	<0.251	<0.251
77Se	0.273	0.910	4.7	8.4	5.9	4.6	4.3
88Sr	0.001	0.003	2.3	3.3	2.4	1.8	2.2
95Mo	0.001	0.003	0.024	0.037	0.037	0.037	0.024
107Ag	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
111Cd	0.030	0.100	<0.030	0.084	0.042	<0.030	0.042
118Sn	0.035	0.117	1.2	1.1	0.690	0.772	0.894
121Sb	0.002	0.007	<0.002	<0.002	<0.002	<0.002	<0.002
137Ba	0.001	0.003	0.474	1.3	0.474	0.267	0.326
202Hg	0.047	0.157	0.760	0.979	1.0	0.534	0.749
205Tl	0.001	0.003	0.030	0.025	0.026	0.026	0.040
208Pb	0.004	0.013	0.008	0.028	0.006	0.011	0.011
238U	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Advisian

Tissue QA/QC Relative Percent Difference Results

	Client ID	AEMP-01-FS-07			AEMP-01-FS-15			AEMP-02-FS-01		
	Lab ID	068			075			083		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	0.023	0.020	-	0.018	0.021	-	0.021	0.015	-
11B	0.062	0.064	0.064	-	0.083	0.062	-	0.062	<0.062	-
23Na	0.302	4,235	3,613	16	3,571	4,039	12	3,823	3,631	5.2
24Mg	0.008	1,121	1,147	2.3	1,142	988	15	1,063	933	13
27Al	0.029	3.3	4.0	19	5.7	7.3	25	2.5	2.6	3.9
31P	37	10,913	9,125	18	8,965	10,798	19	10,284	8,930	14
39K	3.0	17,790	13,510	27	14,344	16,558	14	13,230	12,796	3.3
44Ca	21	1,485	1,638	9.8	1,578	1,268	22	1,534	1,397	9.3
49Ti	0.148	1.1	1.2	-	0.958	1.1	-	0.851	0.745	-
51V	0.034	0.036	0.038	-	0.051	0.059	-	0.052	0.049	-
52Cr	0.082	0.589	0.623	-	0.732	0.709	-	0.577	0.557	-
55Mn	0.015	2.2	3.0	31	2.3	2.2	4.4	1.2	1.1	8.7
57Fe	1.4	25	35	33	38	47	21	25	23	8.3
59Co	0.002	0.051	0.065	24	0.071	0.065	8.8	0.073	0.068	7.1
60Ni	0.007	0.478	0.533	11	1.1	0.992	10	0.490	0.457	7.0
63Cu	0.005	1.5	1.7	13	1.4	1.5	6.9	1.2	1.2	0.0
66Zn	0.405	59	56	5.2	83	81	2.4	53	54	1.9
75As	0.251	<0.251	<0.251	-	<0.251	<0.251	-	<0.251	<0.251	-
77Se	0.273	5.8	5.9	1.7	4.3	4.4	2.3	3.6	3.4	5.7
88Sr	0.001	2.6	3.4	27	2.5	2.1	17	2.9	2.2	28
95Mo	0.001	0.013	0.019	38	0.024	0.024	0.0	0.012	0.012	0.0
107Ag	0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001	-
111Cd	0.030	<0.030	0.051	-	<0.030	0.037	-	0.037	0.056	-
118Sn	0.035	1.1	1.6	37	0.949	0.843	12	0.461	0.233	-
121Sb	0.002	0.002	<0.002	-	0.002	<0.002	-	<0.002	<0.002	-
137Ba	0.001	0.523	0.580	10	0.430	0.499	15	0.277	0.222	22
202Hg	0.047	1.0	0.936	6.6	1.6	1.6	0.0	1.4	1.3	7.4
205Tl	0.001	0.027	0.030	11	0.041	0.049	18	0.031	0.030	3.3
208Pb	0.004	0.005	0.010	-	0.010	0.010	-	0.010	0.008	-
238U	0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001	-

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

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Tissue QA/QC Relative Percent Difference Results

	Client ID	AEMP-02-FS-09		
	Lab ID	091		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	0.013	0.016	-
11B	0.062	0.064	0.074	-
23Na	0.302	3,821	4,019	5.1
24Mg	0.008	1,105	1,078	2.5
27Al	0.029	1.5	1.7	13
31P	37	8,156	9,592	16
39K	3.0	11,937	12,654	5.8
44Ca	21	1,466	1,454	0.8
49Ti	0.148	0.982	1.1	-
51V	0.034	0.043	0.055	-
52Cr	0.082	0.599	0.624	-
55Mn	0.015	1.4	1.4	0.0
57Fe	1.4	29	34	16
59Co	0.002	0.047	0.058	21
60Ni	0.007	0.432	0.500	15
63Cu	0.005	1.2	1.3	8.0
66Zn	0.405	51	60	16
75As	0.251	<0.251	<0.251	-
77Se	0.273	2.7	2.7	-
88Sr	0.001	2.4	2.5	4.1
95Mo	0.001	0.012	0.012	0.0
107Ag	0.001	<0.001	<0.001	-
111Cd	0.030	<0.030	0.042	-
118Sn	0.035	0.447	0.590	28
121Sb	0.002	<0.002	0.002	-
137Ba	0.001	0.296	0.355	18
202Hg	0.047	1.6	1.5	6.5
205Tl	0.001	0.032	0.035	9.0
208Pb	0.004	<0.004	0.008	-
238U	0.001	<0.001	<0.001	-

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

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Tissue QA/QC Accuracy and Precision Results

		Sample Group ID	01			02		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	0.391	0.382	98	4.7	0.411	105	6.8
11B	0.062	4.5	4.7	105	1.9	5.1	114	3.2
23Na	0.302	9,200	9,537	104	3.3	9,507	103	1.8
24Mg	0.008	1,030	1,075	104	3.9	1,107	108	4.1
27Al	0.029	197.2	205	104	3.7	226	115	6.6
31P	37	6,230	6,097	98	2.1	6,229	100	2.6
39K	3.0	11,600	12,406	107	2.4	12,256	106	1.7
44Ca	21	2,010	2,116	105	5.8	1,988	99	5.5
49Ti	0.148	12.24	13	105	6.5	12	95	12
51V	0.034	0.347	0.356	102	3.6	0.352	101	4.2
52Cr	0.082	0.515	0.552	107	1.2	0.545	106	3.8
55Mn	0.015	1.06	1.1	104	6.4	1.0	99	9.5
57Fe	1.4	113	115	102	3.8	128	113	2.8
59Co	0.002	0.063	0.071	112	4.1	0.072	114	8.5
60Ni	0.007	0.44	0.513	117	3.3	0.496	113	5.6
63Cu	0.005	3.3	3.5	107	4.7	3.6	110	4.2
66Zn	0.405	28.7	28	98	4.4	30	103	6.1
75As	0.251	13.3	13	99	6.3	13	98	5.4
77Se	0.273	2.4	2.1	88	6.2	2.4	99	6.9
88Sr	0.001	9.87	10	103	8.2	10	102	5.4
95Mo	0.001	0.134	0.125	94	11	0.173	129	9.0
107Ag	0.001	0.135	0.117	87	11	0.158	117	4.0
111Cd	0.030	0.148	0.132	89	8.9	0.182	123	14
118Sn	0.035	0.077	0.075	98	11	0.075	97	15
121Sb	0.002	0.011	0.009	86	12	0.013	118	5.4
137Ba	0.001	8.6	8.6	100	1.8	9.1	106	5.3
202Hg	0.047	0.316	0.308	98	4.1	0.334	106	4.2
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.004	0.058	0.057	98	12	0.061	104	17
238U	0.001	0.0163	0.016	96	8.6	0.018	108	7.6

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-5 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

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Tissue QA/QC Accuracy and Precision Results

Parameter	DL (ppm)	Certified Conc. (ppm)	Sample Group ID 03 Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	0.391	0.425	109	4.1
11B	0.062	4.5	4.9	108	3.7
23Na	0.302	9,200	10,007	109	2.0
24Mg	0.008	1,030	1,116	108	1.9
27Al	0.029	197.2	235	119	8.2
31P	37	6,230	6,381	102	3.5
39K	3.0	11,600	12,539	108	3.4
44Ca	21	2,010	2,002	100	4.2
49Ti	0.148	12.24	13	110	16
51V	0.034	0.347	0.384	111	5.2
52Cr	0.082	0.515	0.555	108	2.2
55Mn	0.015	1.06	1.1	106	4.0
57Fe	1.4	113	126	111	2.0
59Co	0.002	0.063	0.075	120	7.6
60Ni	0.007	0.44	0.508	116	5.7
63Cu	0.005	3.3	3.6	108	4.3
66Zn	0.405	28.7	31	109	2.8
75As	0.251	13.3	14	102	4.0
77Se	0.273	2.4	2.7	111	5.7
88Sr	0.001	9.87	10	103	4.7
95Mo	0.001	0.134	0.167	124	6.3
107Ag	0.001	0.135	0.163	121	4.7
111Cd	0.030	0.148	0.182	123	10
118Sn	0.035	0.077	0.100	130	11
121Sb	0.002	0.011	0.010	91	20
137Ba	0.001	8.6	9.4	110	2.0
202Hg	0.047	0.316	0.369	117	3.4
205Tl	0.001	0.0013	-	-	-
208Pb	0.004	0.058	0.069	119	7.2
238U	0.001	0.0163	0.021	129	0.0

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-5 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

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Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	AEMP-01-FS-01	063	30 Oct 2023
	AEMP-01-FS-02	064	
	AEMP-01-FS-03	065	
	AEMP-01-FS-05	066	
	AEMP-01-FS-06	067	
	AEMP-01-FS-07	068	
	AEMP-01-FS-08	069	
	AEMP-01-FS-09	070	
	AEMP-01-FS-10	071	
02	AEMP-01-FS-11	072	30 Oct 2023
	AEMP-01-FS-13	073	
	AEMP-01-FS-14	074	
	AEMP-01-FS-15	075	
	AEMP-01-FS-16	076	
	AEMP-01-FS-17	077	
	AEMP-01-FS-18	078	
	AEMP-01-FS-19	079	
	AEMP-01-FS-20	080	
	AEMP-FS-01-21	081	
	AEMP-FS-01-22	082	
	AEMP-02-FS-01	083	
	AEMP-02-FS-02	084	
	AEMP-02-FS-03	085	
	AEMP-02-FS-04	086	
	AEMP-02-FS-05	087	
	AEMP-02-FS-06	088	
03	AEMP-02-FS-07	089	30 Oct 2023
	AEMP-02-FS-08	090	
	AEMP-02-FS-09	091	
	AEMP-02-FS-10	092	
	AEMP-02-FS-11	093	
	AEMP-02-FS-16	094	
	AEMP-02-FS-18	095	
	AEMP-02-FS-19	096	
	AEMP-02-FS-20	097	
	AEMP-FS-02-21	098	
	AEMP-FS-02-22	099	
	AEMP-FS-02-23	100	
	AEMP-FS-02-25	101	
	AEMP-FS-02-26	102	

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084	Chain of Custody (COC) for LA-ICP-MS Analysis
Invoicing	Reporting (if different from Invoicing)

Project Number: 417085-49223-22200

Company Name:	Advisian (Worley Canada Services Ltd.)	Company Name:	
Contact Name:	Graham Young	Contact Name:	
Address:	49 Quarry Park Blvd	Address:	
City, Province:	Calgary, Alberta	City, Province:	
Postal Code:	T2C 5H9	Postal Code:	
Phone:	403-968-1545	Phone:	
Email:	advisian.invoices@advisian.com; graham.young@advisian.com	Email:	canada.chemistry@worley.com; graham.young@advisian.com

Sample Analysis Requested

Trich ID		Sample Identification:	Sample Type: Species	Sample type
063	1	AEMP-01-FS-01 ✓	Slimy Sculpin	Whole body
064	2	AEMP-01-FS-02 ✓	Slimy Sculpin	Whole body
065	3	AEMP-01-FS-03 ✓	Slimy Sculpin	Whole body
066	4	AEMP-01-FS-05 ✓	Slimy Sculpin	Whole body
067	5	AEMP-01-FS-06 ✓	Slimy Sculpin	Whole body
068	6	AEMP-01-FS-07 ✓	Slimy Sculpin	Whole body
069	7	AEMP-01-FS-08 ✓	Slimy Sculpin	Whole body
070	8	AEMP-01-FS-09 ✓	Slimy Sculpin	Whole body
071	9	AEMP-01-FS-10 ✓	Slimy Sculpin	Whole body
072	10	AEMP-01-FS-11 ✓	Slimy Sculpin	Whole body
073	11	AEMP-01-FS 13 ✓	Slimy Sculpin	Whole body
074	12	AEMP-01-FS-14 ✓	Slimy Sculpin	Whole body
075	13	AEMP-01-FS-15 ✓	Slimy Sculpin	Whole body
076	14	AEMP-01-FS-16 ✓	Slimy Sculpin	Whole body
077	15	AEMP-01-FS-17 ✓	Slimy Sculpin	Whole body
078	16	AEMP-01-FS-18 ✓	Slimy Sculpin	Whole body
079	17	AEMP-01-FS-19 ✓	Slimy Sculpin	Whole body
080	18	AEMP-01-FS-20 ✓	Slimy Sculpin	Whole body
081	19	AEMP-FS-01-21 ✓	Slimy Sculpin	Whole body
082	20	AEMP-FS-01-22 ✓	Slimy Sculpin	Whole body

Sample(s) Released By: Graham Young	Sample(s) Received By: Alex Wade
Signature:	Signature:
Date Sent: Oct. 23 /23	Date Received: 24 Oct 2023 (Project #: 2023-584)
Sample(s) Returned to Client By: Please Cc alex.haigh@advisian.com when sending invoice	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084		Chain of Custody (COC) for LA-ICP-MS Analysis	
Invoicing		Reporting (if different from Invoicing)	
Project Number: 417085-49223-22200			
Company Name:	Advisian (Worley Canada Services Ltd.)	Company Name:	
Contact Name:	Graham Young	Contact Name:	
Address:	49 Quarry Park Blvd	Address:	
City, Province:	Calgary, Alberta	City, Province:	
Postal Code:	T2C 5H9	Postal Code:	
Phone:	403-968-1545	Phone:	
Email:	advisian.invoices@advisian.com; graham.young@advisian.com	Email:	canada.chemistry@worley.com; graham.young@advisian.com

Sample Analysis Requested

Trich ID		Sample Identification:	Sample Type: Species	Sample type
083	1	AEMP-02-FS-01 ✓	Slimy Sculpin	Whole Body
084	2	AEMP-02-FS-02 ✓	Slimy Sculpin	Whole Body
085	3	AEMP-02-FS-03 ✓	Slimy Sculpin	Whole Body
086	4	AEMP-02-FS-04 ✓	Slimy Sculpin	Whole Body
087	5	AEMP-02-FS-05 ✓	Slimy Sculpin	Whole Body
088	6	AEMP-02-FS-06 ✓	Slimy Sculpin	Whole Body
089	7	AEMP-02-FS-07 ✓	Slimy Sculpin	Whole Body
090	8	AEMP-02-FS-08 ✓	Slimy Sculpin	Whole Body
091	9	AEMP-02-FS-09 ✓	Slimy Sculpin	Whole Body
092	10	AEMP-02-FS-10 ✓	Slimy Sculpin	Whole Body
093	11	AEMP-02-FS-11 ✓	Slimy Sculpin	Whole Body
094	12	AEMP-02-FS-16 ✓	Slimy Sculpin	Whole Body
095	13	AEMP-02-FS-18 ✓	Slimy Sculpin	Whole Body
096	14	AEMP-02-FS-19 ✓	Slimy Sculpin	Whole Body
097	15	AEMP-02-FS-20 ✓	Slimy Sculpin	Whole Body
098	16	AEMP-FS-02-21 ✓	Slimy Sculpin	Whole Body
099	17	AEMP-FS-02-22 ✓	Slimy Sculpin	Whole Body
100	18	AEMP-FS-02-23 ✓	Slimy Sculpin	Whole Body
101	19	AEMP-FS-02-25 ✓	Slimy Sculpin	Whole Body
102	20	AEMP-FS-02-26 ✓	Slimy Sculpin	Whole Body

Sample(s) Released By: Graham Young	Sample(s) Received By: Alex Wade
Signature:	Signature:
Date Sent: Oct. 23/23	Date Received: 24 Oct 2023 (Project #: 2023-584)
Sample(s) Returned to Client By: Please Cc alex.haigh@advisian.com when sending invoice	Shipping Conditions: Shipping Container:
Signature:	Date Sent:

COM-011.01

Appendix D. Small-bodied Fish Sampling Quality Assurance and Quality Control

Table D-1

Quality Control review of Whole Body Tissue Residue Analytical Results: Metals and Trace Elements

PROJECT No.: 417085-49223

Sampling Location	Date (dd-mmm-yyyy)	Sample Name	Aluminum #1 (mg/kg)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium #1 (mg/kg)	Boron (mg/kg)	Cadmium (mg/kg)	Calcium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead #1 (mg/kg)	Lithium (mg/kg)	Magnesium (mg/kg)	Manganese (mg/kg)	Mercury #1 (mg/kg)	Molybdenum #1 (mg/kg)	Nickel (mg/kg)	Phosphorus (mg/kg)	Potassium #1 (mg/kg)	Selenium (mg/kg)	Silver #1 (mg/kg)	Sodium #1 (mg/kg)	Strontium #1 (mg/kg)	Thallium (mg/kg)	Tin #1 (mg/kg)	Titanium (mg/kg)	Uranium (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
BOSWORTH CREEK SLIMY SCULPIN																																
Sample Duplicate Relative Percent Difference (RPD)																																
AEMP-FS-01 (Upstream)	23-Oct-2023	AEMP-FS-01-07	3.3	0.002	<0.251	0.523	0.064	<0.030	1485	0.589	0.051	1.5	25	**0.005**	0.023	1121	2.2	1	0.013	0.478	10913	17790	5.8	<0.001	4235	2.6	0.027	1.1	1.1	<0.001	0.036	59
(Duplicate)	23-Oct-2023	AEMP-FS-01-07	4	<0.002	<0.251	0.58	0.064	0.051	1638	0.623	0.065	1.7	35	**0.01**	0.02	1147	3	0.936	0.019	0.533	9125	13510	5.9	<0.001	3613	3.4	0.03	1.6	1.2	<0.001	0.038	56
RPD(%)			19.2%	---	---	10.3%	0.0%	---	9.8%	5.6%	24.1%	12.5%	33.3%	66.7%	14.0%	2.3%	30.8%	6.6%	37.5%	10.9%	17.8%	27.3%	1.7%	---	15.9%	26.7%	10.5%	37.0%	8.7%	---	5.4%	5.2%
AEMP-FS-01 (Upstream)	23-Oct-2023	AEMP-FS-01-15	5.7	0.002	<0.251	0.43	0.083	<0.030	1578	0.732	0.071	1.4	38	0.01	0.018	1142	2.3	1.6	0.024	1.1	8965	14344	4.3	<0.001	3571	2.5	0.041	0.949	0.958	<0.001	0.051	83
(Duplicate)	23-Oct-2023	AEMP-FS-01-15	7.3	<0.002	<0.251	0.499	0.062	0.037	1268	0.709	0.065	1.5	47	0.01	0.021	988	2.2	1.6	0.024	0.992	10798	16558	4.4	<0.001	4039	2.1	0.049	0.843	1.1	<0.001	0.059	81
RPD(%)			24.6%	---	---	14.9%	29.0%	---	21.8%	3.2%	8.8%	6.9%	21.2%	0.0%	15.4%	14.5%	4.4%	0.0%	0.0%	10.3%	18.5%	14.3%	2.3%	---	12.3%	17.4%	17.8%	11.8%	13.8%	---	14.5%	2.4%
AEMP-FS-02 (Downstream)	23-Oct-2023	AEMP-FS-02-01	2.5	<0.002	<0.251	0.277	0.062	**0.037**	1534	0.577	0.073	1.2	25	0.01	**0.021**	1063	1.2	1.4	0.012	0.49	10284	13230	3.6	<0.001	3823	2.9	0.031	0.461	0.851	<0.001	0.052	53
(Duplicate)	23-Oct-2023	AEMP-FS-02-01	2.6	<0.002	<0.251	0.222	<0.062	**0.056**	1397	0.557	0.068	1.2	23	0.008	**0.015**	933	1.1	1.3	0.012	0.457	8930	12796	3.4	<0.001	3631	2.2	0.03	0.233	0.745	<0.001	0.049	54
RPD(%)			3.9%	---	---	22.0%	---	40.9%	9.3%	3.5%	7.1%	0.0%	8.3%	22.2%	33.3%	13.0%	8.7%	7.4%	0.0%	7.0%	14.1%	3.3%	5.7%	---	5.2%	27.5%	3.3%	65.7%	13.3%	---	5.9%	1.9%
AEMP-FS-02 (Downstream)	23-Oct-2023	AEMP-FS-02-09	1.5	<0.002	<0.251	0.296	0.064	<0.030	1466	0.599	0.047	1.2	29	<0.004	0.013	1105	1.4	1.6	0.012	0.432	8156	11937	2.7	<0.001	3821	2.4	0.032	0.447	0.982	<0.001	0.043	51
(Duplicate)	23-Oct-2023	AEMP-FS-02-09	1.7	0.002	<0.251	0.355	0.074	0.042	1454	0.624	0.058	1.3	34	0.008	0.016	1078	1.4	1.5	0.012	0.5	9592	12654	2.7	<0.001	4019	2.5	0.035	0.59	1.1	<0.001	0.055	60
RPD(%)			12.5%	---	---	18.1%	14.5%	---	0.8%	4.1%	21.0%	8.0%	15.9%	---	20.7%	2.5%	0.0%	6.5%	0.0%	14.6%	16.2%	5.8%	0.0%	---	5.1%	4.1%	9.0%	27.6%	11.3%	---	24.5%	16.2%
Certified Reference Materials (CRM)																																
Sample Group 1		Mean Conc. (mg/kg)	205	0.009	13	8.6	4.7	0.132	2116	0.552	0.071	3.5	115	0.057	0.382	1075	1.1	0.308	0.125	0.513	6097	12406	2.1	0.117	9537	10	---	0.075	13	0.016	0.356	28
		Percent Accuracy	104	86	99	100	105	89	105	107	112	107	102	98	98	104	104	98	94	117	98	107	88	87	104	103	---	98	105	96	102	98
		Precision RPD (%)	3.7	12.0	6.3	1.8	1.9	8.9	5.8	1.2	4.1	4.7	3.8	12.0	4.7	3.9	6.4	4.1	11.0	3.3	2.1	2.4	6.2	11.0	3.3	8.2	---	11.0	6.5	8.6	3.6	4.4
Sample Group 2		Mean Conc. (mg/kg)	226	0.013	13	9.1	5.1	0.182	1988	0.545	0.072	3.6	128	0.061	0.411	1107	1	0.334	0.173	0.496	6229	12256	2.4	0.158	9507	10	---	0.075	12	0.018	0.352	30
		Percent Accuracy	115	118	98	106	114	123	99	106	114	110	113	104	105	108	99	106	129	113	100	106	99	117	103	102	---	97	95	108	101	103
		Precision RPD (%)	6.6	5.4	5.4	5.3	3.2	14.0	5.5	3.8	8.5	4.2	2.8	17.0	6.8	4.1	9.5	4.2	9.0	5.6	2.6	1.7	6.9	4.0	1.8	5.4	---	15.0	12.0	7.6	4.2	6.1
Sample Group 3		Mean Conc. (mg/kg)	235	0.01	14	9.4	4.9	0.182	2002	0.555	0.075	3.6	126	0.069	0.425	1116	1.1	0.369	0.167	0.508	6381	12539	2.7	0.163	10007	10	---	0.1	13	0.021	0.384	31
		Percent Accuracy	119	91	102	110	108	123	100	108	120	108	111	119	109	108	106	117	124	116	102	108	111	121	109	103	---	130	110	129	111	109
		Precision RPD (%)	8.2	20.0	4.0	2.0	3.7	10.0	4.2	2.2	7.6	4.3	2.0	7.2	4.1	1.9	4.0	3.4	6.3	5.7	3.5	3.4	5.7	4.7	2.0	4.7	---	11.0	16.0	0.0	5.2	2.8
Certified Reference Value		Certified Conc. (mg/kg)	197.2	0.011	13.3	8.6	4.5	0.148	2010	0.515	0.063	3.3	113	0.058	0.391	1030	1.06	0.316	0.134	0.44	6230	11600	2.4	0.135	9200	9.87	---	0.077	12.24	0.0163	0.347	28.7
Certified Reference Range		Upper Range limit (mg/kg)	256.36	0.0154	17.29	12.04	6.3	0.1924	2613	0.6695	0.0819	4.29	146.9	0.0754	0.5083	1339	1.378	0.4108	0.1742	0.572	8099	15080	3.12	0.189	11960	12.831	---	0.1078	17.136	0.02119	0.4511	37.31
		Lower Range limit (mg/kg)	138.04	0.0066	9.31	5.16	2.7	0.1036	1407	0.3605	0.0441	2.31	79.1	0.0406	0.2737	721	0.742	0.2212	0.0938	0.308	4361	8120	1.68	0.081	6440	6.909	---	0.0462	7.344	0.01141	0.2429	20.09
Average Laboratory Bias			1.13	0.97	1.00	1.05	1.09	1.12	1.01	1.07	1.15	1.08	1.09	1.07	1.04	1.07	1.01	1.07	1.16	1.15	1.00	1.07	1.00	1.08	1.05	1.01	---	1.08	1.03	1.12	1.05	1.03

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. X Shading indicates that reported values result in quality control metrics greater than or equal to the applicable quality control criteria.
4. **Bold** text indicates that concentrations used to calculate relative percent difference (RPD) values greater than or equal to quality criteria are lower than five times the RDL. Reduced presion for these analyses are most likely related to low concentrations for the associated metal.
5. Quality control limits are adopted from the Guidance Manual for Environmental Site Characterization in support of Environmental and Human Health Risk Assessment: Volume 4 Analytical Methods. Published by the Canadian Council of Ministers of the Environment in 2016.
6. Superscript #1 - The RPD control limit for duplicate analyses is 40% for the associated variable rather than the standard criteria for metals which is 30%.
7. Certified reference material (CRM) used for most metals measured is DORM-5, however reference values for boron, titanium, antimony, barium, and aluminum are based on analysis of the NIST-1566b CRM.
8. Certified reference ranges for most metals measured are based on quality control limit of 70%-130% of the reference value, however, boron, titanium, silver, tin, antimony, and barium reference ranges are based on quality control limits of 60%-140%.
9. Laboratory Bias is calculated as the mean concentration reported among CRM sample groups divided by the certified reference value. Values above 1 indicate potential overestimation bias while values below 1 indicate potential underestimation bias.

Appendix E. Upstream Control Limit Development

Appendix E – Upstream/Background Dataset

As the AEMP is intended to detect changes in water quality between upstream and downstream locations, rather than to determine overall environmental health; comparison to a background (i.e., upstream) dataset is better suited to detecting change as opposed to comparison to a fixed water quality objective.

Upstream background concentrations of KIPs for the 2023 report have been compiled from previously established upstream locations into one upstream range set on a per waterbody basis (i.e., one set for the Mackenzie River and one set for Bosworth Creek).

As there is a limited dataset at this point, available data has been used as follows:

- Mackenzie River
  - Data from AEMP-US-02 (formerly AEMP-10)
    - Data from 2017 to 2023.
- Bosworth Creek
  - Data from former location AEMP-04
    - Data from 2017 to 2022.

Data from newly established upstream locations on each water body (starting sampling in 2023 and 2024) will be added following two years of data collection. This allows to check for consistency without delaying several years before providing meaningful context to results.

E.1 Calculation of Upstream Control Limits

The Background dataset will be used to calculate the Upstream Control Limits for each KIP. Upstream Control Limits will be calculated using the Shewhart (EPA 2009) control chart method outlined below, provided that the data meets the following conditions:

- The data set includes at least eight data points (reduced from eight due to limited sampling).
- Greater than or equal to 50 percent of data are detectable.
- The Background source data set does not include:
  - An increasing trend (determined via Mann-Kendall with modified Sen's Slope test).
  - A decreasing trend (determined via Mann Kendall with modified Sen's Slope test).

- Verified outliers (removed prior to defining baseline data sets).

The equations used to determine the UCL and LCL are as follows (USEPA 2009):

Equation 1: Upper and Lower Control Limit Calculation

$$UCL = \bar{x} + h \cdot s$$

$$LCL = \bar{x} - h \cdot s$$

Where:

$\bar{x} = sample\ mean\ (arithmetic)$

$s = sample\ standard\ deviation$

$h = control\ chart\ factor = 2$

$UCL = Upper\ Control\ Limit$

$LCL = Lower\ Control\ Limit$

E.1.1 Managing Data During Background Establishment

During Background data establishment, the following scenarios may occur that will require consideration in how the data is used:

- Data below the detection limits:
  - In cases where less than 50 percent of the baseline data set are detectable, the UCL is set to five or two times the typical RDL (as applicable) and the LCL will not be calculated (not applicable).
- Outliers:
  - An outlier is defined as a value originating from a different statistical population than the rest of the sample. Outliers have been identified using Tukey's Box Plot Method which is suitable for non-normally distributed data (USEPA 2009);
    - As the dataset is still limited, only extreme outliers identified have been removed.
  - A valid reason for removing an outlier is required before it could be removed from the data set (USEPA 2009). The following are defined as valid reasons for outlier identification and removal from the dataset:
    - Anomalous concentrations recorded during the well stabilization period, defined as the time following drilling and monitoring well installation when geochemical

conditions in the groundwater around the monitoring well are adjusting following the effects of drilling and well installation.

- An error in transcription, dilution or analytical procedure, etc. that could be identified, but the error could not be corrected.
- The value was part of a group of parameters with one-time detections that were not replicated in subsequent follow up verification sampling or any other sampling event.
- Values for multiple parameters in a field duplicate sample were atypical relative to the parent sample and were not confirmed by subsequent monitoring results.
- The value was a one-time detection that was more than one order of magnitude greater than the reportable detection limit.
- One parameter reported over multiple samples from different wells in one sampling event was high biased or low biased.
- The data quality of anomalous KIP concentrations could not be verified due to historically incomplete files.

- Trends in Data:
  - Data for inclusion in the Baseline dataset will be analyzed for trends using a Mann-Kendall (Kendall 1975; Mann 1945) test. Data showing statistically significant trends will be rejected or removed from the dataset.

Trends in upstream data will be assessed on a per location basis to determine if they are indicative of wider environmental changes that should be accounted for in the Background data or if they are location specific. As upstream locations are not site-influenced, trends in upstream data would not be attributable to site related activities. Due to the lack of potential site influence, data may be added to the Background dataset before a trend is observable (data added every two years); if trends are identified after further sampling events then it data may be removed from the dataset.

Data used and associated calculations for UCL and LCL are provided in Tables E-1 through E-4.

Table E-1
Mackenzie River Control Limit Calculations: Major Ion KIPs

	Calcuim	Chloride	Magnesium	Sulphate	TDS
AEMP-10/AEMP-US-02	32	7.3	8.7	38	140
	40	8.6	12	49	180
	40	8.6	12	49	170
	28	11	9.6	33	150
	38	6.2	10	35	170
	40	11	11	50	180
	37	9.9	11	60	230
	45	5.1	13	35	180
	39	6.2	10	52	170
	39	7.1	10	40	200
	38	6.3	10	34	130
	41	7.1	12	40	190
	37	7.5	11	42	200
	35	7.9	10	38	160
	38	11	11	47	150
	37	9.5	11	50	180
	36	11	12	49	220
	24	10	8.6	27	150

25%	36.25	7.1	10	35.75	152.5
75%	39.75	9.975	11.75	49	187.5
IQR	3.5	2.875	1.75	13.25	35
Lower Mild Boundary	31	2.7875	7.375	15.875	100
Upper Mild Boundary	45	14.2875	14.375	68.875	240
Lower Extreme Boundary	25.75	-1.525	4.75	-4	47.5
Upper Extreme Boundary	50.25	18.6	17	88.75	292.5

OUTLIER REMOVED DATASET					
MEAN	37.6	8.4	10.7	42.7	175.0
2 x SD	7.2	3.8	2.3	16.5	51.7
UCL	**45**	**12**	**13**	**59**	**227**
LCL	**30**	**5**	**8**	**26**	**123**

AEMP-10/AEMP-US-02	32	7.3	8.7	38	140
	40	8.6	12	49	180
	40	8.6	12	49	170
	28	11	9.6	33	150
	38	6.2	10	35	170
	40	11	11	50	180
	37	9.9	11	60	230
	45	5.1	13	35	180
	39	6.2	10	52	170
	39	7.1	10	40	200
	38	6.3	10	34	130
	41	7.1	12	40	190
	37	7.5	11	42	200
	35	7.9	10	38	160
	38	11	11	47	150
	37	9.5	11	50	180
	36	11	12	49	220
		10	8.6	27	150

Notes: Only extreme outliers removed

Indicates outlier removed

45 Indicates control limit used

Table E-2
Bosworth Creek Control Limit Calculations: Major Ion KIPs

		Calcuim	Chloride	Magnesium	Sulphate	TDS
AEMP-04		76	24	28	140	440
		73	19	28	130	390
		75	21	30	150	440
		75	21	30	150	420
		76	20	28	140	380
		71	19	26	140	390
		73	14	29	140	400
		79	17	31	160	420
		65	17	24	120	360
		69	13	28	140	360
		78	18	30	150	440
		70	15	25	130	400
		71	16	24	130	380
		30	8.1	9.1	38	160
		80	20	28	170	490
		72	17	26	120	440
		92	30	36	160	480
		84	35	32	190	480
		71	19	27	120	370
		71	18	27	120	360
		75	27	27	150	430
		79	31	31	150	460
	25%	71	17	26.25	130	380
	75%	77.5	21	30	150	440
IQR		6.5	4	3.75	20	60
Lower Mild Boundary		61.25	11	20.625	100	290
Upper Mild Boundary		87.25	27	35.625	180	530
Lower Extreme Boundary		51.5	5	15	70	200
Upper Extreme Boundary		97	33	41.25	210	620

OUTLIER REMOVED DATASET					
MEAN	75.2	18.2	28.4	144.7	418.2
2 x SD	12.2	9.2	5.9	35.1	79.2
UCL	**87**	**27**	**34**	**180**	**497**
LCL	**63**	**9**	**23**	**110**	**339**

AEMP-04	76	24	28	140	440
	73	19	28	130	390
	75	21	30	150	440
	75	21	30	150	420
	76	20	28	140	380
	71	19	26	140	390
	73	14	29	140	400
	79	17	31	160	420
	65	17	24	120	360
	69	13	28	140	360
	78	18	30	150	440
	70	15	25	130	400
	71	16	24	130	380
		8.1			
	80	20	28	170	490
	72	17	26	120	440
	92	30	36	160	480
	84		32	190	480
	71	19	27	120	370
	71	18	27	120	360
	75	27	27	150	430
	79	31	31	150	460

Notes

Only extreme outliers removed

Indicates outlier removed

45 Indicates control limit used

Table E-3
Mackenzie River Control Limit Calculations: Total Metals KIPs

	Aluminum	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Molybdenum	Nickel	Selenium	Uranium	Zinc
AEMP-10/AEMP-US-02	0.93	0.00095	0.036	0.00008	0.001	0.001	0.06	0.0006	0.00078	0.00038	0.0005	0.011
	0.037	0.0002	0.078	0.00002	0.0015	0.0036	1.6	0.0013	0.0045	0.0002	0.00098	0.003
	1.5	0.0012	0.072	0.000067	0.0026	0.0037	1.7	0.0014	0.0052	0.00045	0.001	0.0095
	0.96	0.00048	0.052	0.000063	0.001	0.0036	0.3	0.0012	0.0015	0.00037	0.00083	0.0093
	0.23	0.0011	0.075	0.000029	0.001	0.0016	6.6	0.0011	0.005	0.00041	0.00091	0.003
	3	0.0013	0.075	0.00018	0.0044	0.0074	1.9	0.0011	0.0057	0.00047	0.00076	0.099
	1.7	0.0011	0.06	0.000062	0.0045	0.0031	1.6	0.0011	0.0054	0.00042	0.00094	0.0098
	0.84	0.00069	0.081	0.000077	0.0033	0.0043	1.2	0.00079	0.0031	0.0002	0.00079	0.0097
	1.1	0.0021	0.12	0.00012	0.0032	0.012	3.3	0.0012	0.0081	0.00038	0.0011	0.012
	0.76	0.0013	0.061	0.000065	0.0021	0.0027	2.1	0.0011	0.0043	0.00053	0.00085	0.0077
	2.7	0.0027	0.077	0.000088	0.0014	0.0026	0.89	0.0015	0.0098	0.00052	0.00084	0.017
	1.7	0.0013	0.076	0.000083	0.0016	0.0042	4.8	0.0011	0.0046	0.00042	0.00086	0.013
	1.6	0.001	0.057	0.000086	0.001	0.0028	2.2	0.00086	0.0033	0.0003	0.00057	0.012
	4.7	0.0011	0.098	0.00028	0.0033	0.005	1.5	0.0012	0.0051	0.0005	0.00087	0.079
	1.4	0.0039	0.076	0.00015	0.0018	0.0073	2	0.0019	0.017	0.00061	0.00097	0.02
	0.44	0.0017	0.085	0.000053	0.0026	0.0032	2.3	0.0011	0.0063	0.00067	0.00095	0.0055
	2	0.00099	0.16	0.00015	0.0026	0.0024	11	0.0012	0.0039	0.0005	0.0011	0.042
	1.6	0.0016	0.084	0.00015	0.0074	0.0012	2.8	0.00099	0.0066	0.00032	0.00083	0.021
25%	0.8625	0.0009925	0.06375	0.0000635	0.001425	0.002625	1.525	0.0011	0.004	0.0003725	0.00083	0.00935
75%	1.7	0.001525	0.08325	0.0001425	0.003275	0.004275	2.675	0.0012	0.00615	0.0005	0.000965	0.01925
IQR	0.8375	0.0005325	0.0195	0.000079	0.00185	0.00165	1.15	1E-04	0.00215	0.0001275	0.000135	0.0099
Lower Mild Boundary	-0.39375	0.00019	0.03450	-0.00006	-0.00135	0.00015	-0.20000	0.00095	0.00078	0.00018	0.00063	-0.00550
Upper Mild Boundary	2.95625	0.00232	0.11250	0.00026	0.00605	0.00675	4.40000	0.00135	0.00938	0.00069	0.00117	0.03410
Lower Extreme Boundary	**-1.65**	**-0.0006**	**0.0052**	**-0.0002**	**-0.0041**	**-0.0023**	**-1.9250**	**0.0008**	**-0.0025**	**-0.00001**	**0.0004**	**-0.0204**
Upper Extreme Boundary	**4.21250**	**0.00312**	**0.14175**	**0.00038**	**0.00883**	**0.00923**	**6.12500**	**0.00150**	**0.01260**	**0.00088**	**0.00137**	**0.04895**
OUTLIER REMOVED DATASET												
MEAN	1.323	0.00122	0.074	0.00010	0.0026	0.0035	2.17	0.0012	0.0049	0.00043	0.00087	0.013
2 x SD	1.546	0.00113	0.036	0.00012	0.0032	0.0035	3.08	0.0003	0.0042	0.00024	0.00030	0.018
UCL	**2.869**	**0.00236**	**0.111**	**0.00022**	**0.0058**	**0.0070**	**5.2**	**0.0015**	**0.009**	**0.0007**	**0.001**	**0.031**
LCL	-0.223	0.00009	**0.038**	-0.00002	-0.0006	0.00003	-0.907	**0.0009**	**0.001**	**0.0002**	**0.0006**	-0.005
RDL	**0.003**	**0.0002**	0.010	**0.00002**	**0.0010**	**0.0010**	**0.060**	0.0002	0.001	0.0005	0.0011	**0.003**
AEMP-10/AEMP-US-02	0.93	0.00095	0.036	0.00008	0.001	0.001	0.06		0.00078	0.00038	0.0005	0.011
	0.037	0.0002	0.078	0.00002	0.0015	0.0036	1.6	0.0013	0.0045	0.0002	0.00098	0.003
	1.5	0.0012	0.072	0.000067	0.0026	0.0037	1.7	0.0014	0.0052	0.00045	0.001	0.0095
	0.96	0.00048	0.052	0.000063	0.001	0.0036	0.3	0.0012	0.0015	0.00037	0.00083	0.0093
	0.23	0.0011	0.075	0.000029	0.001	0.0016	6.6	0.0011	0.005	0.00041	0.00091	0.003
	3	0.0013	0.075	0.00018	0.0044	0.0074	1.9	0.0011	0.0057	0.00047	0.00076	
	1.7	0.0011	0.06	0.000062	0.0045	0.0031	1.6	0.0011	0.0054	0.00042	0.00094	0.0098
	0.84	0.00069	0.081	0.000077	0.0033	0.0043	1.2		0.0031	0.0002	0.00079	0.0097
	1.1	0.0021	0.12	0.00012	0.0032		3.3	0.0012	0.0081	0.00038	0.0011	0.012
	0.76	0.0013	0.061	0.000065	0.0021	0.0027	2.1	0.0011	0.0043	0.00053	0.00085	0.0077
	2.7	0.0027	0.077	0.000088	0.0014	0.0026	0.89	0.0015	0.0098	0.00052	0.00084	0.017
	1.7	0.0013	0.076	0.000083	0.0016	0.0042	4.8	0.0011	0.0046	0.00042	0.00086	0.013
	1.6	0.001	0.057	0.000086	0.001	0.0028	2.2	0.00086	0.0033	0.0003	0.00057	0.012
		0.0011	0.098	0.00028	0.0033	0.005	1.5	0.0012	0.0051	0.0005	0.00087	
	1.4		0.076	0.00015	0.0018	0.0073	2			0.00061	0.00097	0.02
	0.44	0.0017	0.085	0.000053	0.0026	0.0032	2.3	0.0011	0.0063	0.00067	0.00095	0.0055
	2	0.00099		0.00015	0.0026	0.0024		0.0012	0.0039	0.0005	0.0011	0.042
	1.6	0.0016	0.084	0.00015	0.0074	0.0012	2.8	0.00099	0.0066	0.00032	0.00083	0.021

Notes:
Only extreme outliers removed
Indicates outlier removed
45 Indicates control limit used

Table E-4
Bosworth Creek Control Limit Calculations: Total Metals KIPs

		Aluminum	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Molybdenum	Nickel	Selenium	Uranium	Zinc
AEMP-04		0.0059	0.0002	0.07	< 0.000020	< 0.0010	0.00058	0.081	0.002	0.00068	< 0.00020	0.0011	< 0.0030
		0.024	0.00023	0.074	< 0.000020	< 0.0010	0.00028	0.062	0.0017	0.00056	0.00022	0.0011	< 0.0030
		0.037	0.00024	0.073	< 0.000020	< 0.0010	0.00046	0.062	0.0018	0.00091	< 0.00020	0.0011	< 0.0030
		0.015	0.0002	0.085	< 0.000020	< 0.0010	< 0.0010	< 0.060	0.0019	< 0.00050	< 0.00020	0.0011	0.0072
		0.0054	0.0002	0.079	< 0.000020	< 0.0010	< 0.0010	0.089	0.0018	0.00082	< 0.00020	0.001	< 0.0030
		0.086	0.00023	0.072	< 0.000020	< 0.0010	< 0.0010	0.2	0.0018	0.00089	0.00025	0.0013	< 0.0030
		0.087	0.0003	0.078	< 0.000020	< 0.0010	0.005	< 0.060	0.0021	0.00089	0.00021	0.0015	< 0.0030
		2.9	0.00031	0.079	0.000095	0.002	0.0013	0.19	0.0018	0.00076	< 0.00020	0.0012	0.018
		0.01	0.00036	0.072	< 0.000020	< 0.0010	0.00047	< 0.060	0.002	0.00084	0.00026	0.0012	< 0.0030
		0.12	0.00027	0.078	< 0.000020	< 0.0010	0.00049	0.21	0.002	0.00088	0.00025	0.0012	< 0.0030
		0.013	0.00044	0.079	< 0.000020	< 0.0010	0.00049	0.14	0.0028	0.0012	0.00028	0.0013	< 0.0030
		0.024	0.00034	0.084	< 0.000020	< 0.0010	0.0049	0.15	0.0023	0.00087	0.00023	0.0013	< 0.0030
		0.019	0.00024	0.089	< 0.000020	< 0.0010	0.0007	0.088	0.0018	0.00074	< 0.00020	0.0013	< 0.0030
		0.084	0.00027	0.076	< 0.000020	< 0.0010	0.0005	0.35	0.0019	0.001	0.00079	0.0011	< 0.0030
		0.087	0.00026	0.072	< 0.000020	< 0.0010	0.0003	0.17	0.0018	0.00091	< 0.00020	0.0012	< 0.0030
		0.09	0.00021	0.076	< 0.000020	< 0.0010	0.00049	0.1	0.0016	0.00084	0.00033	0.0011	< 0.0030
		0.057	0.0002	0.074	< 0.000020	< 0.0010	0.0005	0.069	0.0019	0.00071	0.00025	0.0012	< 0.0030
		0.02	0.00034	0.089	< 0.000020	< 0.0010	0.00081	0.2	0.0021	0.00095	0.00025	0.001	< 0.0030
		0.15	0.0002	0.081	< 0.000020	< 0.0010	0.00066	0.21	0.002	0.00096	0.00025	0.0011	< 0.0030
		0.077	0.0021	0.072	< 0.000020	< 0.0010	0.00041	0.23	0.0013	0.0072	0.00039	0.0013	< 0.0030
		0.099	0.0002	0.072	< 0.000020	< 0.0010	0.00083	3.9	0.0016	0.013	0.0002	0.0013	< 0.0030
		0.013	0.00046	0.086	< 0.000020	0.0054	0.00077	< 0.060	0.0021	0.0014	0.00033	0.0015	< 0.0030
	25%	0.016	0.0002025	0.07225			0.00048	0.08825	0.0018	0.00082	0.00024	0.0011	
	75%	0.087	0.0003325	0.0805			0.00079	0.2075	0.002	0.00096	0.000305	0.0013	
IQR		0.071	0.00013	0.00825			0.00031	0.11925	0.0002	0.00014	0.000065	0.0002	
Lower Mild Boundary		-0.09050	0.00001	0.05988	not calculated	not calculated	0.00002	-0.09063	0.00150	0.00061	0.00014	0.00080	not calculated
Upper Mild Boundary		0.19350	0.00053	0.09288			0.00126	0.38638	0.00230	0.00117	0.00040	0.00160	
Lower Extreme Boundary		**-0.1970**	**-0.0002**	**0.0475**			**-0.0005**	**-0.2695**	**0.0012**	**0.0004**	**0.00005**	**0.0005**	
Upper Extreme Boundary		**0.3000**	**0.0007**	**0.1053**			**0.0017**	**0.5653**	**0.0026**	**0.0014**	**0.0005**	**0.0019**	

OUTLIER REMOVED, NDs Removed DATASET

	Aluminum	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Molybdenum	Nickel	Selenium	Uranium	Zinc
MEAN	0.0535	0.0003	0.0777	not calculated	not calculated	0.0006	0.1296	0.0019	0.0009	0.0002	0.0012	not calculated
2 x SD	**0.0845**	**0.0002**	**0.0114**	not calculated	not calculated	**0.0004**	**0.1670**	**0.0004**	**0.0004**	**0.0002**	**0.0003**	not calculated
UCL	**0.1380**	**0.0004**	**0.0891**	**0.0001**	**0.0050**	**0.0010**	**0.2966**	**0.0023**	**0.0013**	**0.0004**	**0.0015**	**0.0150**
LCL	-0.0310	0.0001	**0.0664**	not calculated	not calculated	**0.0001**	-0.0374	**0.0014**	**0.0004**	**0.00003**	0.0009	not calculated
RDL	**0.003**	**0.0002**	0.010	0.00002	0.001		**0.060**	0.0002		0.0005	**0.0011**	0.003
AEMP-04	0.0059	0.0002	0.07	< 0.000020	< 0.0010	0.00058	0.081	0.002	0.00068	*0.0001*	0.0011	< 0.0030
	0.024	0.00023	0.074	< 0.000020	< 0.0010	0.00028	0.062	0.0017	0.00056	0.00022	0.0011	< 0.0030
	0.037	0.00024	0.073	< 0.000020	< 0.0010	0.00046	0.062	0.0018	0.00091	*0.0001*	0.0011	< 0.0030
	0.015	0.0002	0.085	< 0.000020	< 0.0010	*0.0005*	*0.03*	0.0019	*0.00025*	*0.0001*	0.0011	0.0072
	0.0054	0.0002	0.079	< 0.000020	< 0.0010	*0.0005*	0.089	0.0018	0.00082	*0.0001*	0.001	< 0.0030
	0.086	0.00023	0.072	< 0.000020	< 0.0010	*0.0005*	0.2	0.0018	0.00089	0.00025	0.0013	< 0.0030
	0.087	0.0003	0.078	< 0.000020	< 0.0010		*0.03*	0.0021	0.00089	0.00021	0.0015	< 0.0030
		0.00031	0.079	0.000095	0.002	0.0013	0.19	0.0018	0.00076	*0.0001*	0.0012	0.018
	0.01	0.00036	0.072	< 0.000020	< 0.0010	0.00047	*0.03*	0.002	0.00084	0.00026	0.0012	< 0.0030
	0.12	0.00027	0.078	< 0.000020	< 0.0010	0.00049	0.21	0.002	0.00088	0.00025	0.0012	< 0.0030
	0.013	0.00044	0.079	< 0.000020	< 0.0010	0.00049	0.14		0.0012	0.00028	0.0013	< 0.0030
	0.024	0.00034	0.084	< 0.000020	< 0.0010		0.15	0.0023	0.00087	0.00023	0.0013	< 0.0030
	0.019	0.00024	0.089	< 0.000020	< 0.0010	0.0007	0.088	0.0018	0.00074	*0.0001*	0.0013	< 0.0030
	0.084	0.00027	0.076	< 0.000020	< 0.0010	0.0005	0.35	0.0019	0.001		0.0011	< 0.0030
	0.087	0.00026	0.072	< 0.000020	< 0.0010	0.0003	0.17	0.0018	0.00091	*0.0001*	0.0012	< 0.0030
	0.09	0.00021	0.076	< 0.000020	< 0.0010	0.00049	0.1	0.0016	0.00084	0.00033	0.0011	< 0.0030
	0.057	0.0002	0.074	< 0.000020	< 0.0010	0.0005	0.069	0.0019	0.00071	0.00025	0.0012	< 0.0030
	0.02	0.00034	0.089	< 0.000020	< 0.0010	0.00081	0.2	0.0021	0.00095	0.00025	0.001	< 0.0030
	0.15	0.0002	0.081	< 0.000020	< 0.0010	0.00066	0.21	0.002	0.00096	0.00025	0.0011	< 0.0030
	0.077		0.072	< 0.000020	< 0.0010	0.00041	0.23	0.0013		0.00039	0.0013	< 0.0030
	0.099	0.0002	0.072	< 0.000020	< 0.0010	0.00083		0.0016		0.0002	0.0013	< 0.0030
	0.013	0.00046	0.086	< 0.000020	0.0054	0.00077	*0.03*	0.0021	0.0014	0.00033	0.0015	< 0.0030

Notes: Only extreme outliers removed
[ ] Indicates outlier removed
45 Indicates control limit used

Appendix F. Trend Charts

Table F-1
Mann-Kendall Statistical Analysis (2017-2023) - Molybdenum

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-03 (Island 3)	22	75	0.03	0.0000	3	0.00075	0.000985	0.0013
AEMP-DS-01 (Lwr Bosworth Crk)	21	-28	0.39	0.0000	0	< 0.00020	0.0018	0.0035
AEMP-US-02 (10 mile)	17	19	0.45	0.0000	2	0.00053	0.0009	0.0012
AEMP-DS-05 (Radar)	17	18	0.48	0.0000	2	0.00053	0.00088	0.0013
AEMP-DS-04 (Refinery)	22	25	0.49	0.0000	1	0.00054	0.000825	0.0034
AEMP-DS-06 (Fort Good Hope)	4	-2	0.73	-0.0011	-107	0.00086	0.001025	0.0015
AEMP-US-01 (Midway)	4	-2	0.73	-0.0003	-58	0.00030	0.00056	0.00082
AEMP-DS-02 (Marine Dock)	24	2	0.98	0.0000	0	0.00053	0.00083	0.0020

Table F-2
Mann-Kendall Statistical Analysis (2017-2023) - Nickel

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-03 (Island 3)	22	64	0.06	0.0000	3	0.00092	0.0015	0.0058
AEMP-DS-01 (Lwr Bosworth Crk)	21	-49	0.14	0.0000	-5	< 0.00050	0.00068	0.0026
AEMP-DS-05 (Radar)	17	-20	0.43	0.0000	-2	< 0.00050	0.0012	0.0030
AEMP-DS-04 (Refinery)	22	-27	0.46	0.0000	-2	< 0.00050	0.0011	0.0039
AEMP-DS-06 (Fort Good Hope)	4	3	0.47	0.0016	142	0.0011	0.00115	0.0028
AEMP-US-02 (10 mile)	17	-15	0.56	0.0000	-2	< 0.00050	0.0013	0.0021
AEMP-DS-02 (Marine Dock)	24	-12	0.78	0.0000	0	0.00063	0.00115	0.0034
AEMP-US-01 (Midway)	4	1	1.00	0.0004	85	< 0.00050	0.000465	0.0013

Table F-3
Mann-Kendall Statistical Analysis (2017-2023) - Arsenic

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-03 (Island 3)	22	55	0.12	0.0000	3	0.00020	0.000315	0.00049
AEMP-US-02 (10 mile)	17	35	0.16	0.0000	10	< 0.00020	0.00029	0.00054
AEMP-DS-01 (Lwr Bosworth Crk)	21	30	0.35	0.0000	0	< 0.00020	0.00021	0.00045
AEMP-DS-05 (Radar)	17	20	0.43	0.0000	4	< 0.00020	0.00029	0.00057
AEMP-US-01 (Midway)	4	-3	0.47	-0.0002	-146	< 0.00020	0.000155	0.00032
AEMP-DS-04 (Refinery)	22	18	0.63	0.0000	2	0.00022	0.000315	0.00055
AEMP-DS-06 (Fort Good Hope)	4	-2	0.73	-0.0001	-33	0.00021	0.000275	0.00032
AEMP-DS-02 (Marine Dock)	24	-8	0.86	0.0000	0	0.00023	0.000325	0.00053

Table F-4
Mann-Kendall Statistical Analysis (2017-2023) - Selenium

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-03 (Island 3)	22	69	0.05	0.0000	4	< 0.00020	0.00035	0.00057
AEMP-DS-06 (Fort Good Hope)	4	6	0.08	0.0009	197	< 0.00020	0.000445	0.00059
AEMP-DS-04 (Refinery)	22	35	0.33	0.0000	2	< 0.00020	0.000245	0.00034
AEMP-DS-05 (Radar)	17	18	0.48	0.0000	4	< 0.00020	0.00033	0.00044
AEMP-US-02 (10 mile)	17	-13	0.61	0.0000	-1	< 0.00020	0.00034	0.00054
AEMP-DS-02 (Marine Dock)	24	-3	0.96	0.0000	0	< 0.00020	0.00024	0.00051
AEMP-DS-01 (Lwr Bosworth Crk)	21	1	1.00	0.0000	0	< 0.00020	0.0001	0.00026
AEMP-US-01 (Midway)	4	-1	1.00	0.0000	0	< 0.00020	0.0001	0.00024

Table F-5
Mann-Kendall Statistical Analysis (2017-2023) - Total Dissolved Solids

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-01 (Lwr Bosworth Crk)	21	65	0.05	10.1789	2	320	420.0	510
AEMP-DS-06 (Fort Good Hope)	4	6	0.08	77.7608	35	200	220.0	240
AEMP-DS-03 (Island 3)	22	45	0.21	4.0471	2	110	185.0	250
AEMP-DS-02 (Marine Dock)	24	-34	0.40	-2.3107	-1	96	160.0	210
AEMP-US-02 (10 mile)	17	17	0.50	2.5048	1	130	180.0	230
AEMP-DS-05 (Radar)	17	5	0.86	0.0000	0	88	160.0	200
AEMP-DS-04 (Refinery)	22	1	1.00	0.0000	0	88	165.0	200
AEMP-US-01 (Midway)	4	-1	1.00	-22.1364	-20	96	108.0	150

Table F-6
Mann-Kendall Statistical Analysis (2017-2023) - Sulphate

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-01 (Lwr Bosworth Crk)	21	66	0.04	4.0653	3	110	150.0	190
AEMP-DS-06 (Fort Good Hope)	4	6	0.08	136.8427	179	51	76.5	110
AEMP-DS-03 (Island 3)	21	34	0.31	0.9925	2	32	46.0	60
AEMP-DS-04 (Refinery)	22	30	0.41	0.3983	1	27	36.5	46
AEMP-DS-05 (Radar)	17	20	0.43	1.0198	3	31	38.0	60
AEMP-DS-02 (Marine Dock)	23	-27	0.49	-0.5094	-1	24	40.0	54
AEMP-US-02 (10 mile)	17	13	0.62	0.9179	2	27	40.0	60
AEMP-US-01 (Midway)	4	0	1.00	-9.0759	-29	22	31.5	37

Table F-7
Mann-Kendall Statistical Analysis (2017-2023) - Iron

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-US-02 (10 mile)	34	60	0.11	0.0000	0	< 0.060	0.03	0.17
AEMP-DS-05 (Radar)	34	36	0.35	0.0000	0	< 0.060	0.03	0.91
AEMP-DS-04 (Refinery)	44	44	0.38	0.0000	0	< 0.060	0.03	0.17
AEMP-DS-02 (Marine Dock)	48	48	0.51	0.0000	0	< 0.060	0.03	0.34
AEMP-DS-03 (Island 3)	44	0	1.00	0.0000	0	< 0.060	0.03	< 0.060
AEMP-DS-01 (Lwr Bosworth Crk)	42	0	1.00	0.0000	0	< 0.060	0.03	0.062
AEMP-DS-06 (Fort Good Hope)	8	0	1.00	0.0000	0	< 0.060	0.03	< 0.060
AEMP-US-01 (Midway)	8	0	1.00	0.0000	0	< 0.060	0.03	< 0.060
AEMP-US-04 (Upr Bosworth Crk)	6	0	1.00	0.0000	0	< 0.060	0.03	< 0.060

Table F-8
Mann-Kendall Statistical Analysis (2017-2023) - Calcium

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-04 (Refinery)	22	68	0.05	0.5259	2	26	30.0	34
AEMP-DS-03 (Island 3)	22	48	0.18	0.8887	2	30	37.0	46
AEMP-DS-05 (Radar)	17	28	0.26	0.5511	2	28	32.0	37
AEMP-US-02 (10 mile)	17	21	0.40	0.6357	2	25	34.0	44
AEMP-DS-01 (Lwr Bosworth Crk)	21	20	0.56	0.3469	0	0.33	78.0	83
AEMP-DS-06 (Fort Good Hope)	4	2	0.73	8.2868	19	42	44.5	48
AEMP-DS-02 (Marine Dock)	24	3	0.96	0.0000	0	25	31.5	40
AEMP-US-01 (Midway)	4	0	1.00	-14.3725	-61	9.6	23.5	30

Table F-9
Mann-Kendall Statistical Analysis (2017-2023) - Chromium (Total)

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-03 (Island 3)	22	21	0.25	0.0000	0	< 0.0010	0.0005	0.0017
AEMP-DS-01 (Lwr Bosworth Crk)	21	4	0.80	0.0000	0	< 0.0010	0.0005	0.0015
AEMP-DS-02 (Marine Dock)	24	-3	0.88	0.0000	0	< 0.0010	0.0005	0.0038
AEMP-US-02 (10 mile)	17	2	0.91	0.0000	0	< 0.0010	0.0005	0.0012
AEMP-DS-04 (Refinery)	22	-1	1.00	0.0000	0	< 0.0010	0.0005	0.0042
AEMP-DS-05 (Radar)	17	1	1.00	0.0000	0	< 0.0010	0.0005	0.0014
AEMP-DS-06 (Fort Good Hope)	4	0	1.00	0.0000	0	< 0.0010	0.0005	< 0.0010
AEMP-US-01 (Midway)	4	0	1.00	0.0000	0	< 0.0010	0.0005	< 0.0010

Table F-10
Mann-Kendall Statistical Analysis (2017-2023) - Copper

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-US-02 (10 mile)	17	60	0.01	0.0003	16	0.00081	0.0017	0.0046

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-US-02 (10 mile)	17	60	0.01	0.0003	16	0.00081	0.0017	0.0046
AEMP-DS-03 (Island 3)	22	61	0.09	0.0001	10	< 0.00020	0.0015	0.0045
AEMP-DS-04 (Refinery)	22	-41	0.25	0.0000	-4	< 0.0010	0.00105	0.0030
AEMP-DS-06 (Fort Good Hope)	4	3	0.47	0.0035	315	< 0.0010	0.0011	0.0026
AEMP-DS-01 (Lwr Bosworth Crk)	21	16	0.64	0.0000	2	0.00042	0.00062	0.0032
AEMP-DS-02 (Marine Dock)	24	-10	0.82	0.0000	0	< 0.0010	0.00155	0.0062
AEMP-DS-05 (Radar)	17	-1	1.00	0.0000	0	< 0.0010	0.0015	0.0033
AEMP-US-01 (Midway)	4	-1	1.00	-0.0029	-360	< 0.0010	0.0008	0.0015

Table F-11
Mann-Kendall Statistical Analysis (2017-2023) - Cadmium

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-02 (Marine Dock)	24	-30	0.36	0.0000	0	< 0.000020	0.00001	0.00016
AEMP-DS-06 (Fort Good Hope)	4	3	0.37	0.0000	115	< 0.000020	0.00001	0.000023
AEMP-DS-04 (Refinery)	22	-16	0.47	0.0000	0	< 0.000020	0.00001	0.000028
AEMP-DS-05 (Radar)	17	9	0.61	0.0000	0	< 0.000020	0.00001	0.000027
AEMP-DS-03 (Island 3)	22	-12	0.71	0.0000	0	< 0.000020	0.00001	0.000026
AEMP-DS-01 (Lwr Bosworth Crk)	21	0	1.00	0.0000	0	< 0.000020	0.00001	< 0.000020
AEMP-US-02 (10 mile)	17	0	1.00	0.0000	0	< 0.000020	0.00001	0.000029
AEMP-US-01 (Midway)	4	0	1.00	0.0000	0	< 0.000020	0.00001	< 0.000020

Table F-12
Mann-Kendall Statistical Analysis (2017-2023) - Barium

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-03 (Island 3)	22	73	0.04	0.0010	2	0.039	0.047	0.066
AEMP-US-02 (10 mile)	17	50	0.04	0.0010	2	0.040	0.047	0.055
AEMP-DS-05 (Radar)	17	44	0.07	0.0008	2	0.038	0.044	0.047
AEMP-DS-04 (Refinery)	21	41	0.22	0.0007	2	0.035	0.043	0.065
AEMP-DS-02 (Marine Dock)	23	20	0.61	0.0005	1	0.032	0.041	0.057
AEMP-DS-01 (Lwr Bosworth Crk	21	-4	0.92	0.0000	0	< 0.010	0.077	0.087
AEMP-DS-06 (Fort Good Hope)	4	0	1.00	0.0119	20	0.056	0.0605	0.063
AEMP-US-01 (Midway)	4	-1	1.00	-0.0217	-64	0.015	0.034	0.056

Table F-13
Mann-Kendall Statistical Analysis (2017-2023) - Aluminum

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-04 (Refinery)	22	-52	0.14	-0.0018	-11	0.0044	0.0165	0.094
AEMP-US-02 (10 mile)	17	-33	0.18	-0.0038	-15	< 0.0030	0.026	0.074
AEMP-DS-02 (Marine Dock)	24	-52	0.20	-0.0020	-11	0.0033	0.0185	0.13
AEMP-DS-01 (Lwr Bosworth Crk)	21	32	0.32	0.0000	0	< 0.0030	0.0033	0.018
AEMP-DS-03 (Island 3)	22	-22	0.55	-0.0016	-5	0.0054	0.031	0.090
AEMP-DS-05 (Radar)	17	-14	0.59	-0.0015	-7	< 0.0030	0.023	0.068
AEMP-US-01 (Midway)	4	-2	0.73	-0.0180	-129	0.0087	0.014	0.024
AEMP-DS-06 (Fort Good Hope)	4	0	1.00	0.0326	66	0.0036	0.0495	0.052

Table F-14
Mann-Kendall Statistical Analysis (2017-2023) - Uranium

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-03 (Island 3)	22	39	0.28	0.0000	2	0.00053	0.00077	0.0012
AEMP-DS-01 (Lwr Bosworth Crk)	21	-33	0.31	0.0000	0	< 0.00010	0.0011	0.0015
AEMP-DS-05 (Radar)	17	19	0.45	0.0000	2	0.00048	0.00063	0.00079
AEMP-US-02 (10 mile)	17	19	0.45	0.0000	2	0.00043	0.00071	0.00086
AEMP-DS-04 (Refinery)	22	27	0.46	0.0000	1	0.00040	0.00061	0.0011
AEMP-DS-02 (Marine Dock)	24	13	0.76	0.0000	1	0.00013	0.00057	0.00085
AEMP-DS-06 (Fort Good Hope)	4	0	1.00	0.0000	-1	0.00075	0.0008	0.00093
AEMP-US-01 (Midway)	4	0	1.00	-0.0001	-24	0.00023	0.000405	0.00063

Table F-15
Mann-Kendall Statistical Analysis (2017-2023) - Zinc

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-04 (Refinery)	22	17	0.20	0.0000	0	< 0.0030	0.0015	0.0044
AEMP-US-02 (10 mile)	17	21	0.21	0.0000	0	< 0.0030	0.0015	0.0042
AEMP-DS-03 (Island 3)	22	32	0.28	0.0000	0	< 0.0030	0.0015	0.013
AEMP-DS-05 (Radar)	17	-12	0.53	0.0000	0	< 0.0030	0.0015	0.011
AEMP-DS-01 (Lwr Bosworth Crk)	21	9	0.68	0.0000	0	< 0.0030	0.0015	0.0057
AEMP-DS-02 (Marine Dock)	24	8	0.82	0.0000	0	< 0.0030	0.0015	0.0098
AEMP-DS-06 (Fort Good Hope)	4	-1	1.00	-0.0023	-98	< 0.0030	0.00235	0.0058
AEMP-US-01 (Midway)	4	0	1.00	0.0000	0	< 0.0030	0.0015	< 0.0030

Table F-16
Mann-Kendall Statistical Analysis (2017-2023) - Chloride

Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-01 (Lwr Bosworth Crk	21	81	0.01	2.0768	10	14	20.0	38

Full Mann-Kendall Analysis, Sorted by two-sided p-value

Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-01 (Lwr Bosworth Crk	21	81	0.01	2.0768	10	14	20.0	38
AEMP-US-02 (10 mile)	17	34	0.17	0.4374	6	5.1	7.9	11
AEMP-DS-05 (Radar)	17	30	0.23	0.5331	7	5.4	8.2	12
AEMP-DS-06 (Fort Good Hope)	4	-4	0.30	-14.2327	-136	9.7	10.5	17
AEMP-DS-02 (Marine Dock)	23	29	0.45	0.1002	1	3.9	9.4	12
AEMP-DS-03 (Island 3)	21	18	0.60	0.2772	3	2.7	8.3	17
AEMP-DS-04 (Refinery)	22	-5	0.91	0.0000	0	5.0	9.25	12
AEMP-US-01 (Midway)	4	1	1.00	0.1845	2	9.8	10.5	11

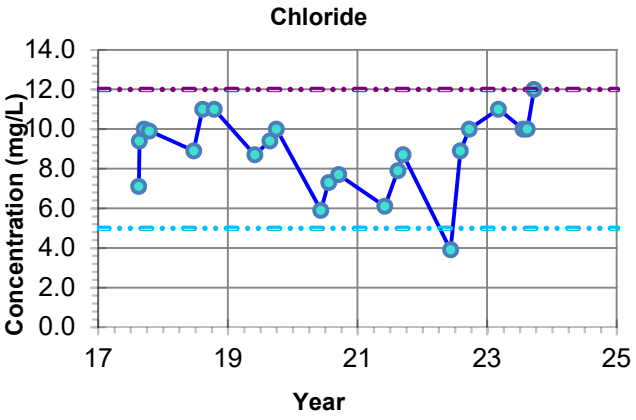
Table F-17
Mann-Kendall Statistical Analysis (2017-2023) - Magnesium

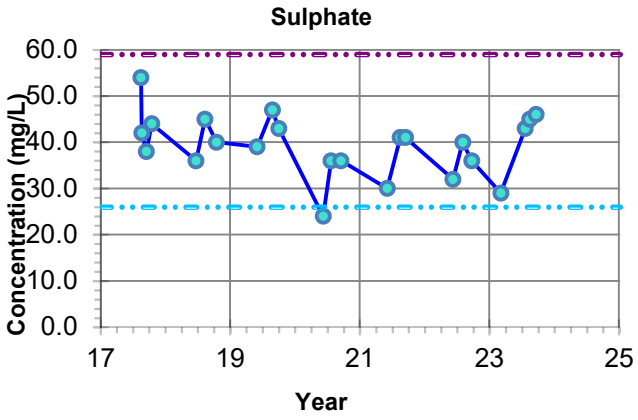
Filtered Trend Results, two-sided p-value < 0.05 And Normalized Slope > ± 10%/Year

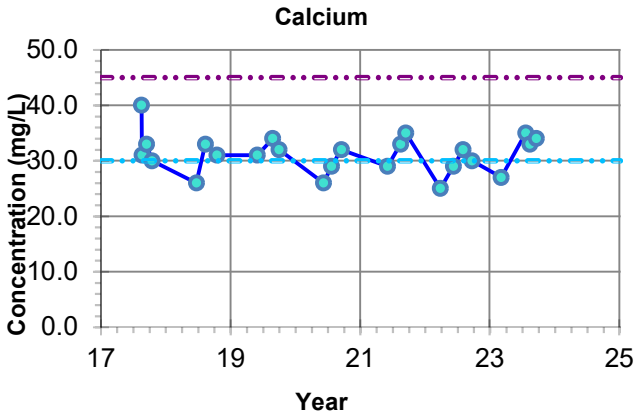
Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)

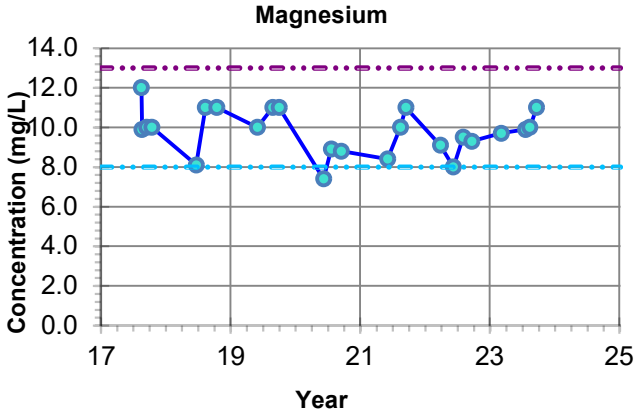
Full Mann-Kendall Analysis, Sorted by two-sided p-value

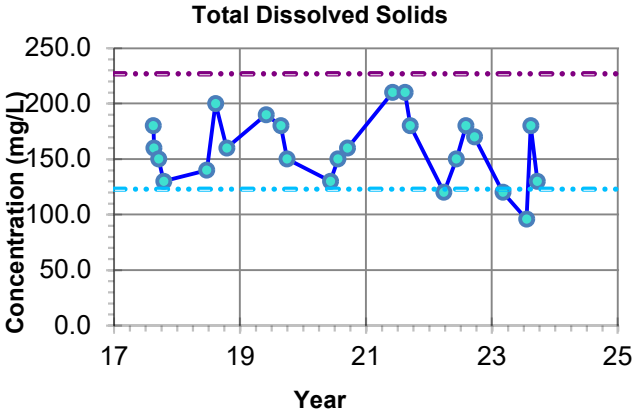
Location	Count	Mann-Kendall S	Two-sided p-value (for MK test)	Slope (mg/L/year)	Normalized Slope (%/year)	Min (mg/L)	Median (mg/L)	Max (mg/L)
AEMP-DS-06 (Fort Good Hope)	4	6	0.08	13.5803	101	12	13.5	20
AEMP-DS-05 (Radar)	17	36	0.14	0.2610	3	7.4	9.3	11
AEMP-US-02 (10 mile)	17	29	0.24	0.1049	1	7.6	9.7	15
AEMP-DS-03 (Island 3)	22	29	0.42	0.0000	0	7.7	11.0	12
AEMP-DS-02 (Marine Dock)	24	-26	0.52	-0.0085	0	7.4	9.95	12
AEMP-DS-04 (Refinery)	22	15	0.69	0.0207	0	7.3	9.5	11
AEMP-DS-01 (Lwr Bosworth Crk)	21	11	0.76	0.0000	0	< 0.20	29.0	32
AEMP-US-01 (Midway)	4	-1	1.00	-0.8696	-10	2.7	8.9	9.2











NOTES:
- Filled symbols denote Sample Values
- Unfilled symbols denote Values < Detection Limit(s)

Upper Control Limit

Lower Control Limit

Imperial Norman Wells
2023 Groundwater Monitoring & Remediation Program

Hydrochemical Control Charts
Mackenzie River: AEMP-DS-02 (Marine Dock)

15-Apr-2024 date	NA edited by	JC drawn by	NA app by	PROJECT NUMBER:	Figure
				417085-49223-23200	F-1

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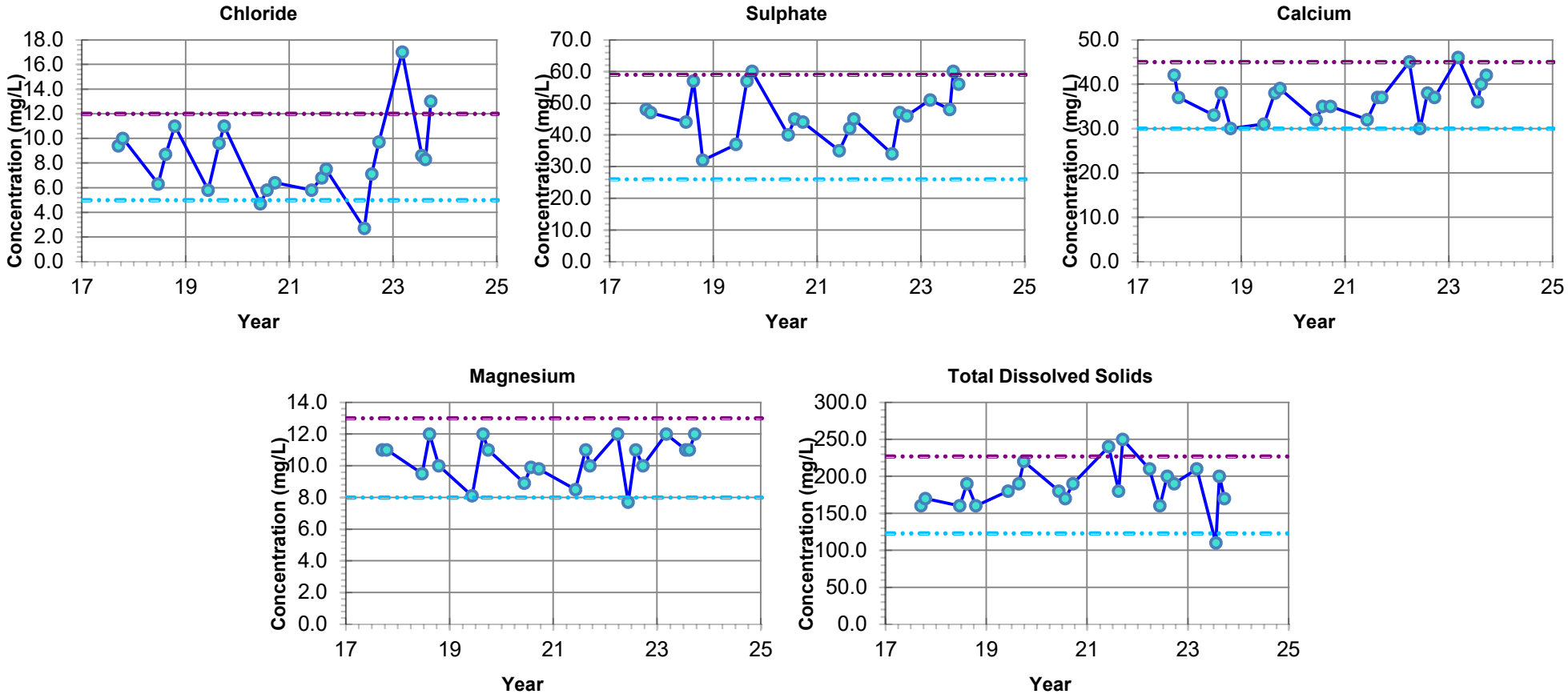

NOTES:
- Filled symbols denote Sample Values
- Unfilled symbols denote Values < Detection Limit(s)

Upper Control Limit

Lower Control Limit

Imperial Norman Wells
2023 Groundwater Monitoring & Remediation Program

Hydrochemical Control Charts
Mackenzie River: AEMP-DS-03 (Island 3)

15-Apr-2024 date	NA edited by	JC drawn by	NA app by	PROJECT NUMBER: 417085-49223-23200	Figure F-2

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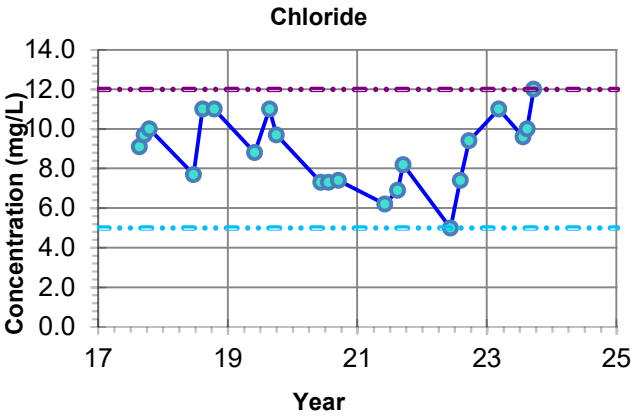

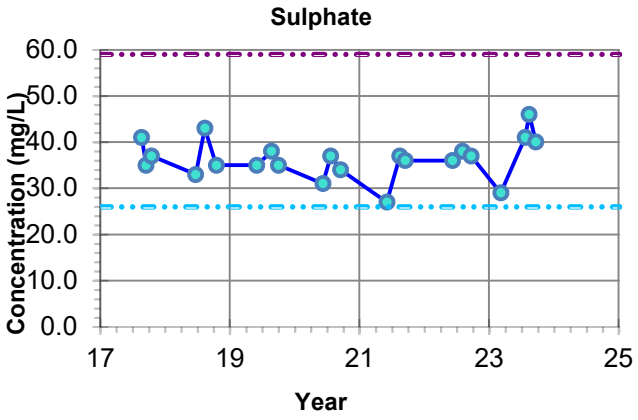

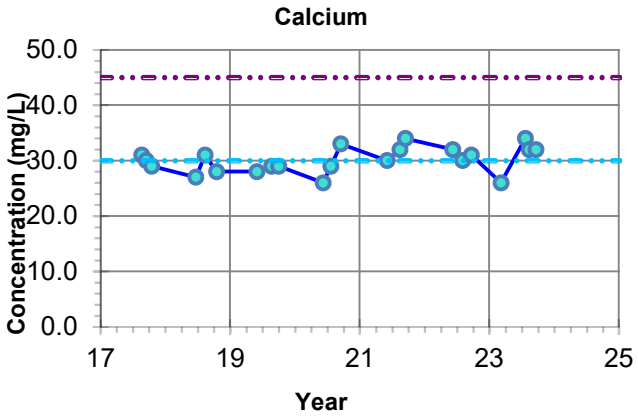

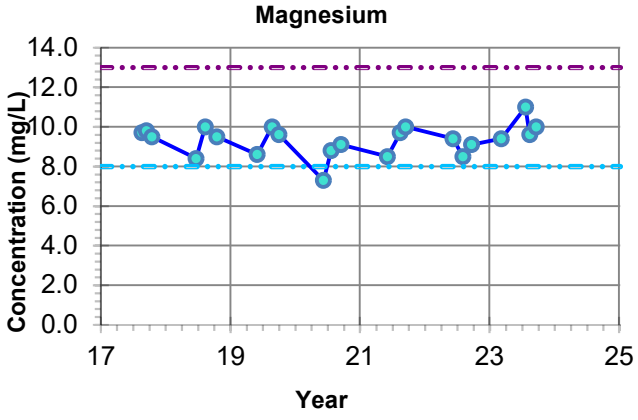

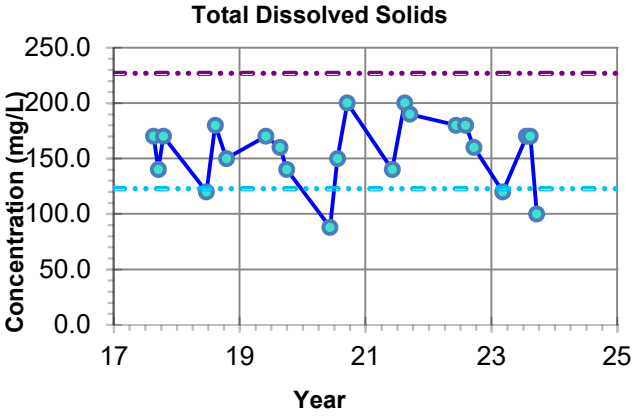

NOTES:
- Filled symbols denote Sample Values
- Unfilled symbols denote Values < Detection Limit(s)

Upper Control Limit

Lower Control Limit

Imperial Norman Wells
2023 Groundwater Monitoring & Remediation Program

Hydrochemical Control Charts
Mackenzie River: AEMP-DS-04 (Refinery)

15-Apr-2024 date	NA edited by	JC drawn by	NA app by	PROJECT NUMBER: 417085-49223-23200	Figure F-3

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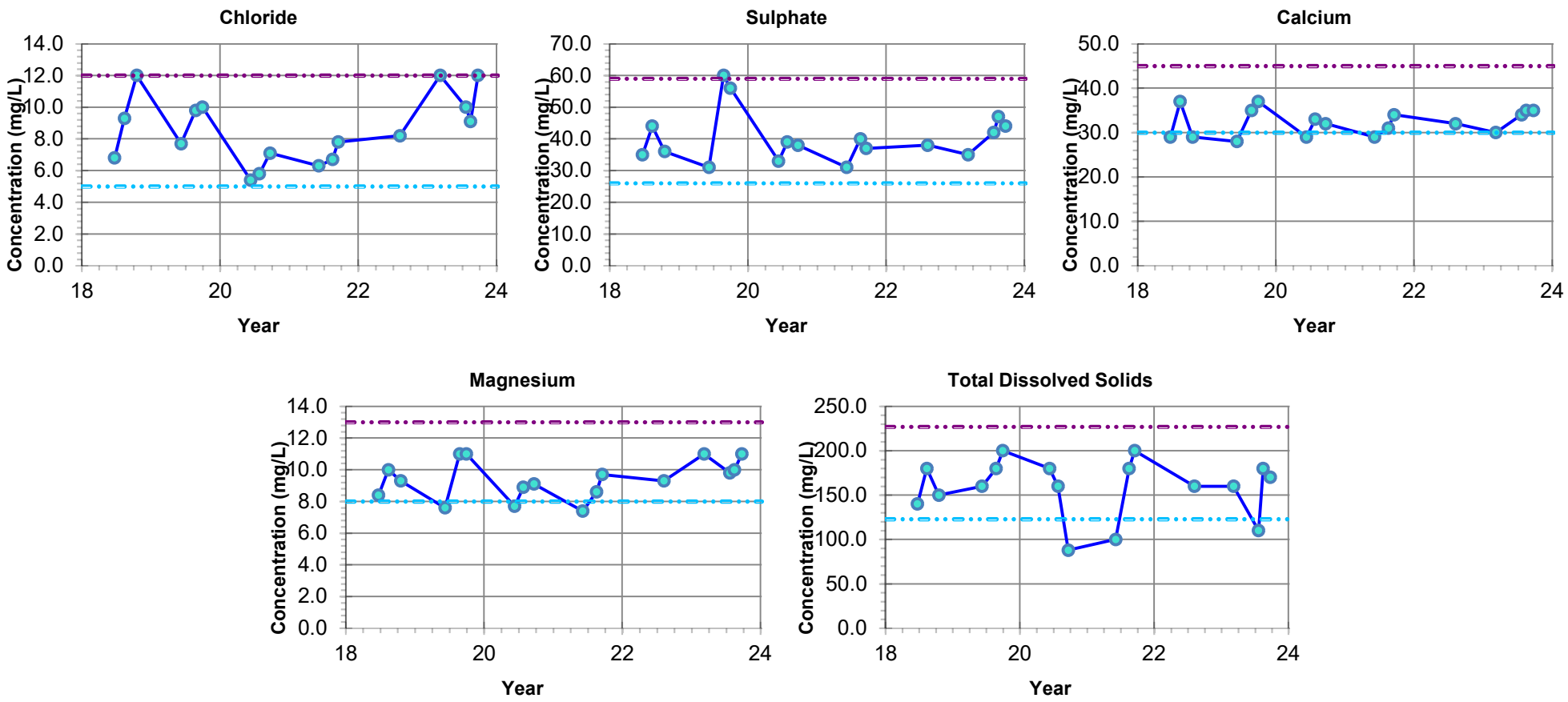
File Path: https://worleyparsons-my.sharepoint.com/personal/jinrong_cui_worley_com/Documents/Desktop/Graphs-2022/417085-49223-



NOTES:
- Filled symbols denote Sample Values
- Unfilled symbols denote Values < Detection Limit(s)

Upper Control Limit

Lower Control Limit

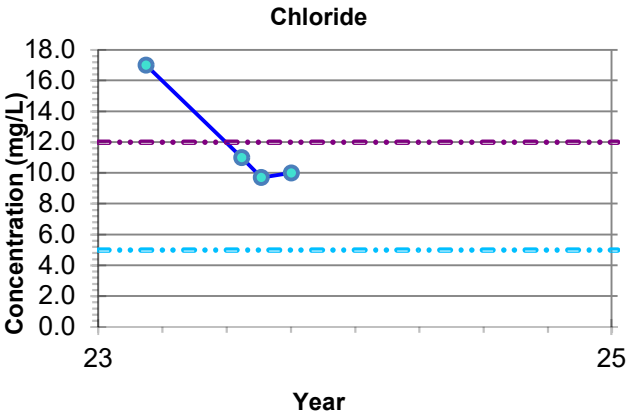
Imperial Norman Wells
2023 Groundwater Monitoring & Remediation Program

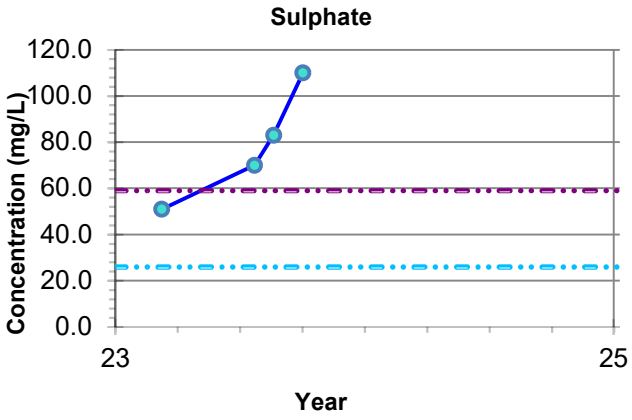
Hydrochemical Control Charts
Mackenzie River: AEMP-DS-05 (Radar)

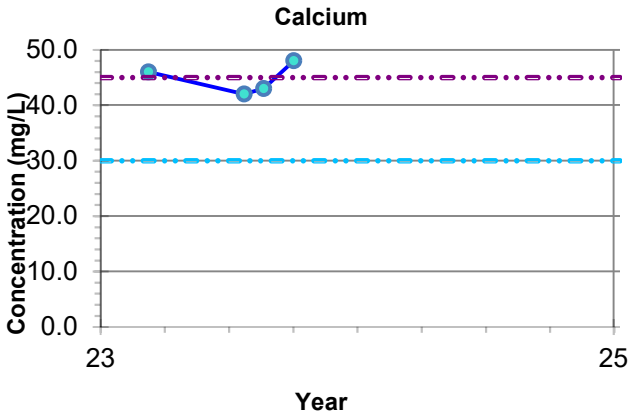
15-Apr-2024 date	NA edited by	JC drawn by	NA app by	PROJECT NUMBER: 417085-49223-23200	Figure F-4

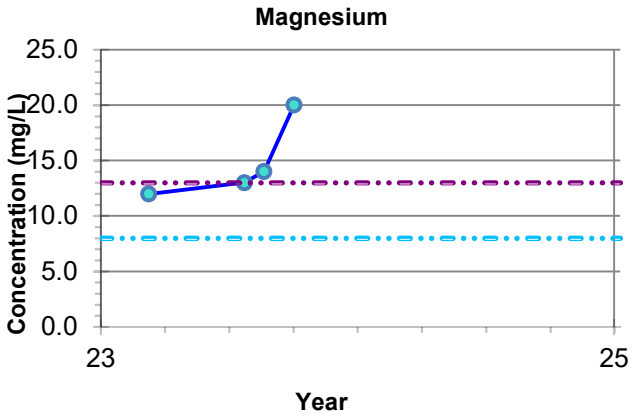
PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS HAS NOT ENTERED INTO A CONTRACT.

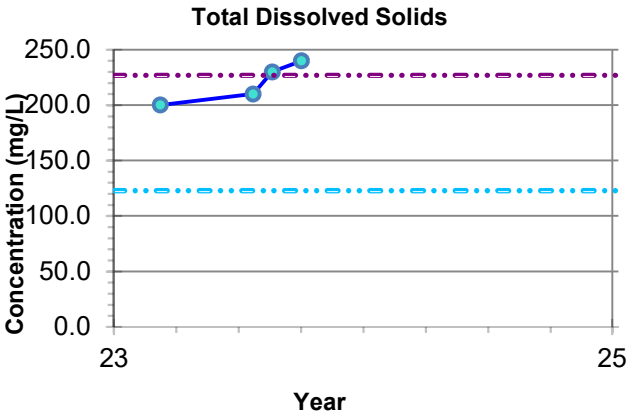
File Path: https://worleyparsons-my.sharepoint.com/personal/jinrong_cui_worley_com/Documents/Desktop/Graphs-2022/417085-49223-











NOTES:
- Filled symbols denote Sample Values
- Unfilled symbols denote Values < Detection Limit(s)

Upper Control Limit

Lower Control Limit

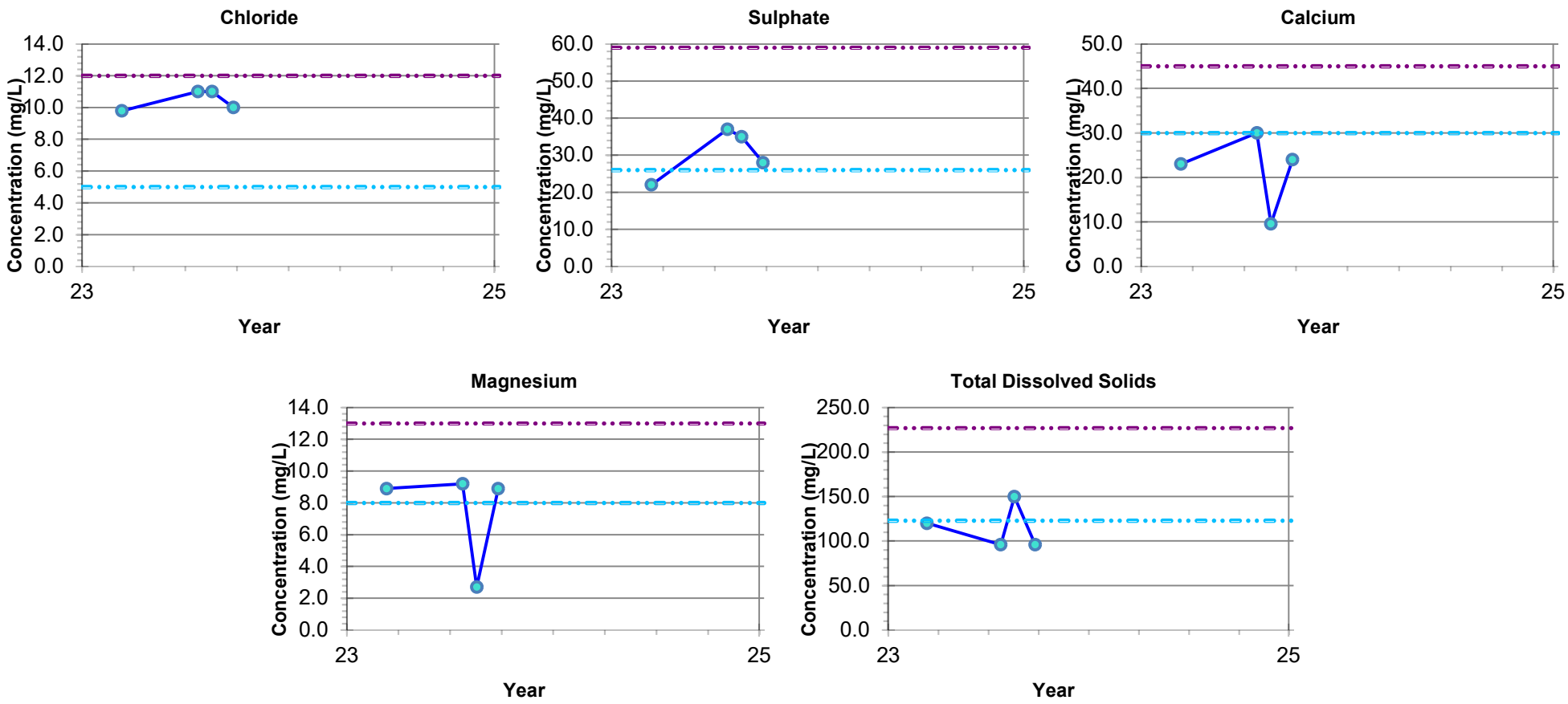
Imperial Norman Wells
2023 Groundwater Monitoring & Remediation Program

Hydrochemical Control Charts
Mackenzie River: AEMP-DS-06 (Fort Good Hope)

15-Apr-2024 date	NA edited by	JC drawn by	NA app by	PROJECT NUMBER: 417085-49223-23200	Figure F-5

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS HAS NOT ENTERED INTO A CONTRACT.

File Path: https://worleyparsons-my.sharepoint.com/personal/jinrong_cui_worley_com/Documents/Desktop/Graphs-2022/417085-49223-



NOTES:
- Filled symbols denote Sample Values
- Unfilled symbols denote Values < Detection Limit(s)

Upper Control Limit

Lower Control Limit

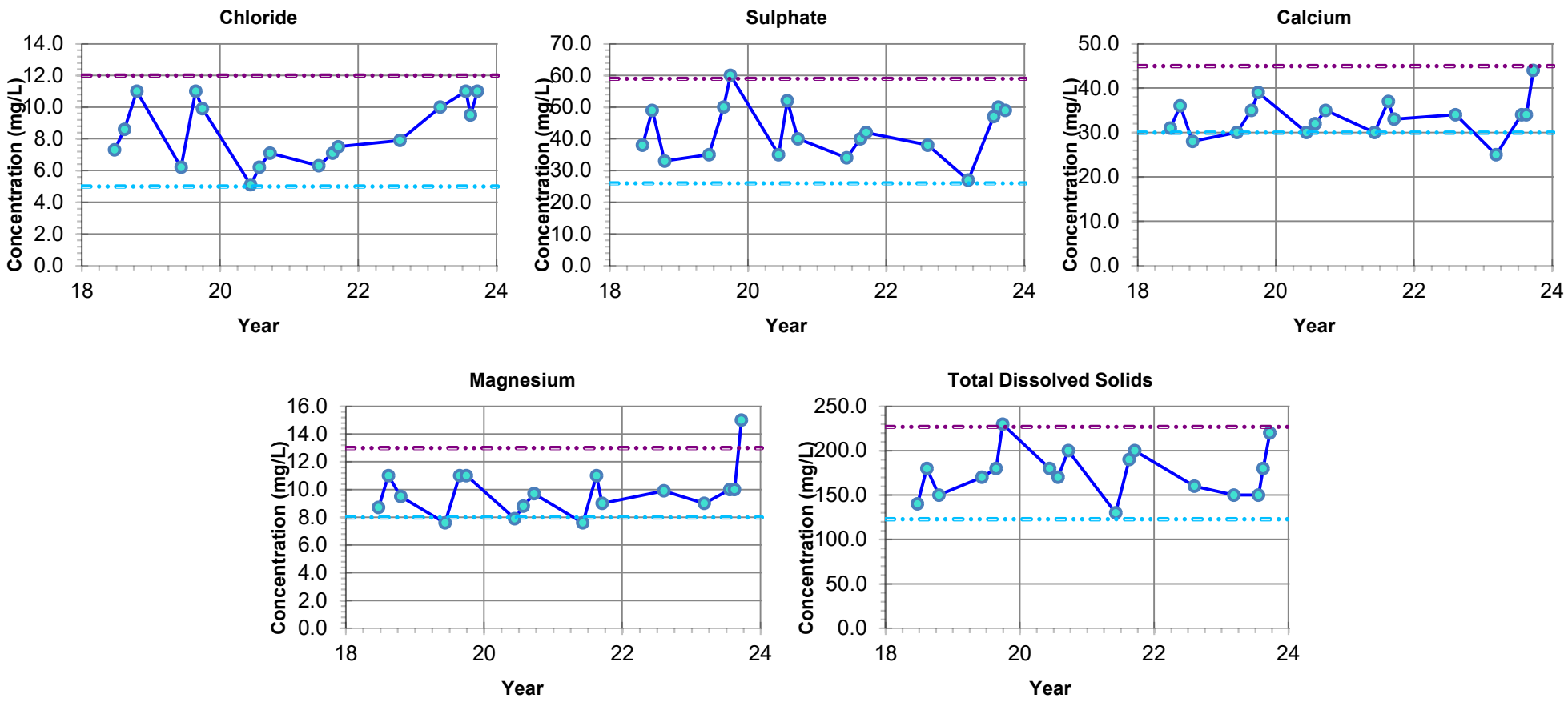
Imperial Norman Wells
2023 Groundwater Monitoring & Remediation Program

Hydrochemical Control Charts
Mackenzie River: AEMP-US-01 (Midway)

15-Apr-2024 date	NA edited by	JC drawn by	NA app by	PROJECT NUMBER: 417085-49223-23200	Figure F-6

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS HAS NOT ENTERED INTO A CONTRACT.

File Path: https://worleyparsons-my.sharepoint.com/personal/jinrong_cui_worley_com/Documents/Desktop/Graphs-2022/417085-49223-



NOTES:
- Filled symbols denote Sample Values
- Unfilled symbols denote Values < Detection Limit(s)

Upper Control Limit

Lower Control Limit

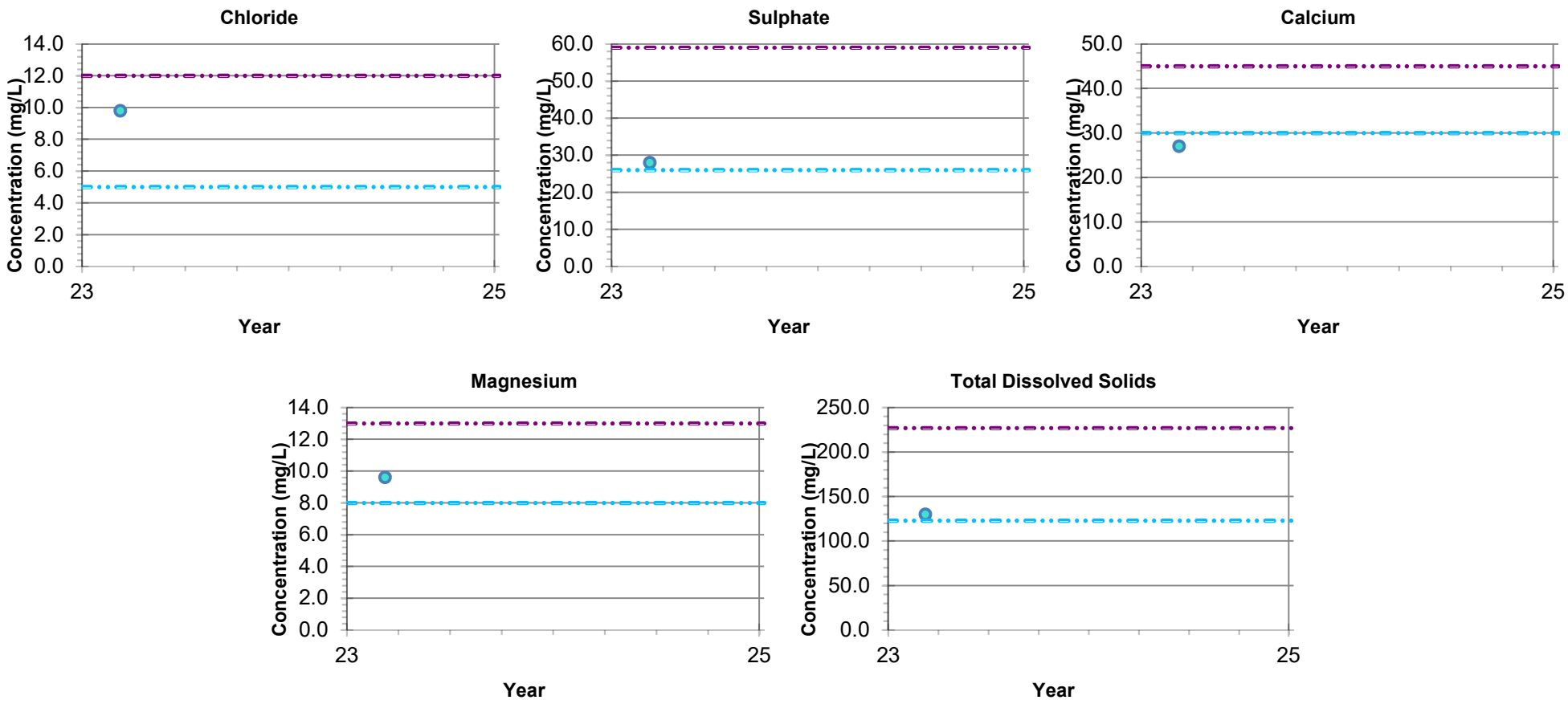
Imperial Norman Wells
2023 Groundwater Monitoring & Remediation Program

Hydrochemical Control Charts
Mackenzie River: AEMP-US-02 (10 mile)

15-Apr-2024 date	NA edited by	JC drawn by	NA app by	PROJECT NUMBER: 417085-49223-23200	Figure F-7

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS HAS NOT ENTERED INTO A CONTRACT.

File Path: https://worleyparsons-my.sharepoint.com/personal/jinrong_cui_worley_com/Documents/Desktop/Graphs-2022/417085-49223-



NOTES:
- Filled symbols denote Sample Values
- Unfilled symbols denote Values < Detection Limit(s)

Upper Control Limit

Lower Control Limit

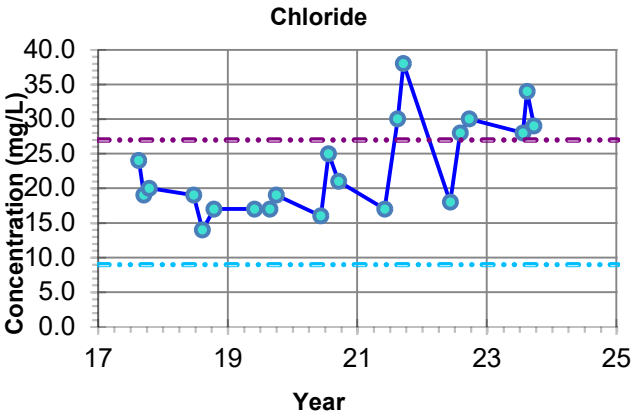
Imperial Norman Wells
2023 Groundwater Monitoring & Remediation Program

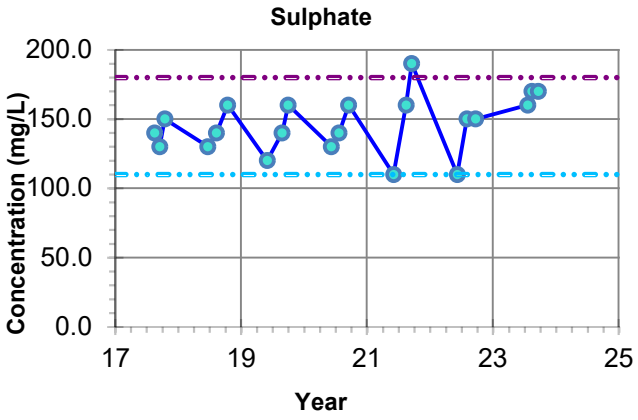
Hydrochemical Control Charts
Mackenzie River: AEMP-US-03 (Norman Wells U/S)

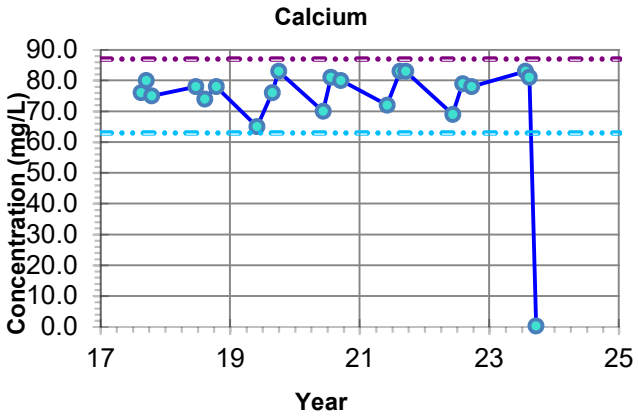
15-Apr-2024 date	NA edited by	JC drawn by	NA app by	PROJECT NUMBER: 417085-49223-23200	Figure F-8

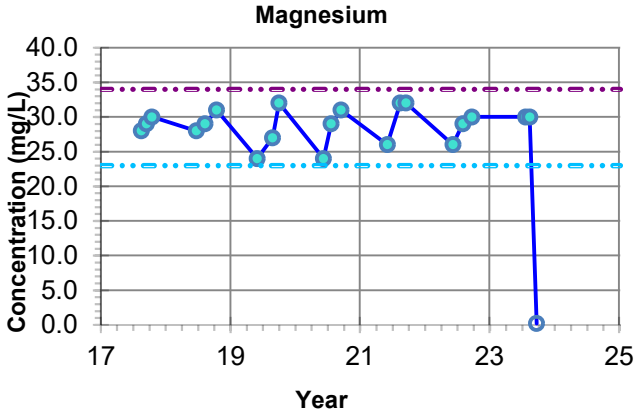
PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS HAS NOT ENTERED INTO A CONTRACT.

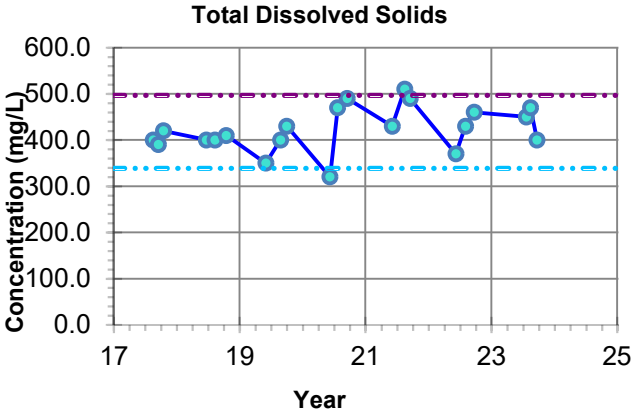
File Path: https://worleyparsons-my.sharepoint.com/personal/jinrong_cui_worley_com/Documents/Desktop/Graphs-2022/417085-49223-











NOTES:
- Filled symbols denote Sample Values
- Unfilled symbols denote Values < Detection Limit(s)

Upper Control Limit

Lower Control Limit

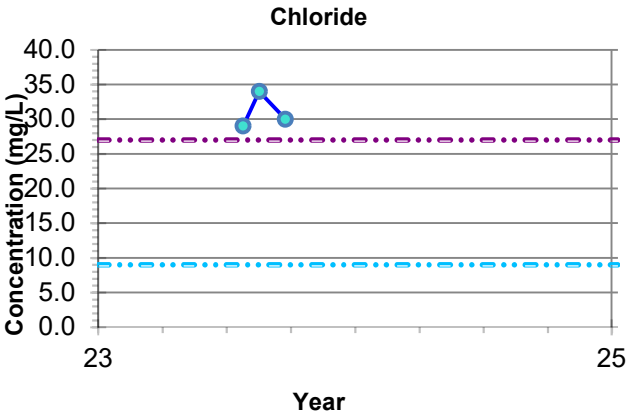
Imperial Norman Wells
2023 Groundwater Monitoring & Remediation Program

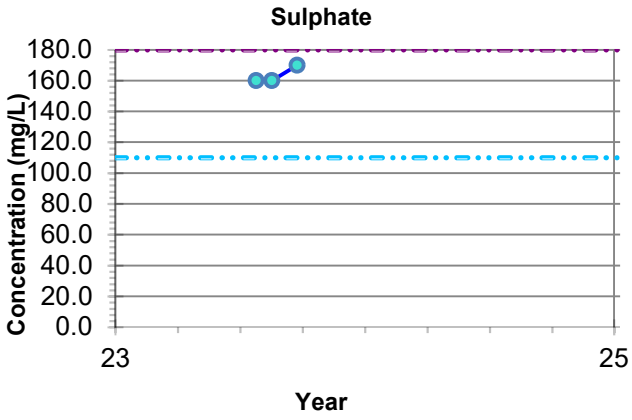
Hydrochemical Control Charts
Bosworth Creek: AEMP-DS-01 (Lwr Bosworth Crk)

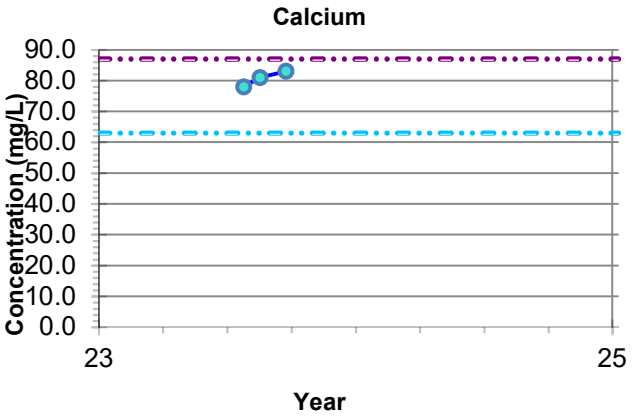
15-Apr-2024 date	NA edited by	JC drawn by	NA app by	PROJECT NUMBER:	Figure
				417085-49223-23200	F-9

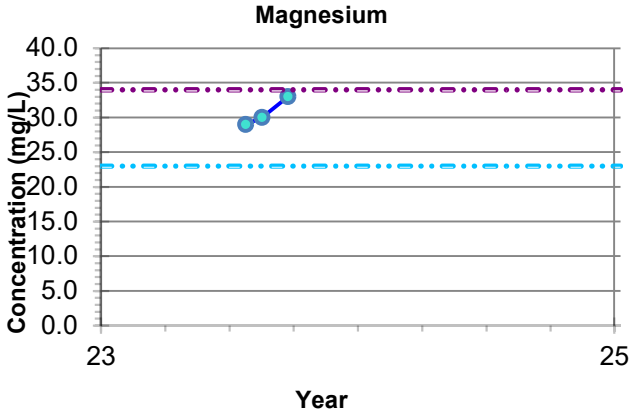
PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS HAS NOT ENTERED INTO A CONTRACT.

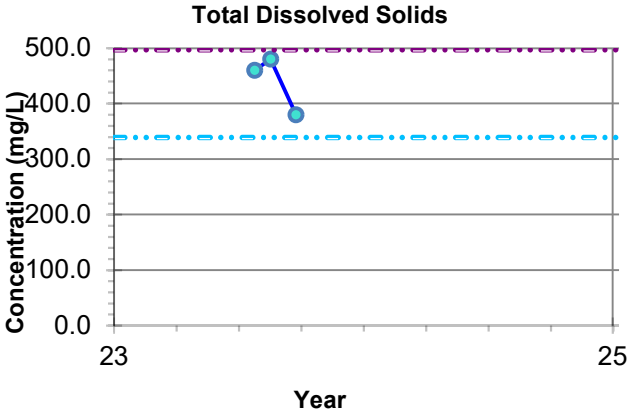
File Path: https://worleyparsons-my.sharepoint.com/personal/jinrong_cui_worley_com/Documents/Desktop/Graphs-2022/417085-49223-











NOTES:
- Filled symbols denote Sample Values
- Unfilled symbols denote Values < Detection Limit(s)

Upper Control Limit

Lower Control Limit

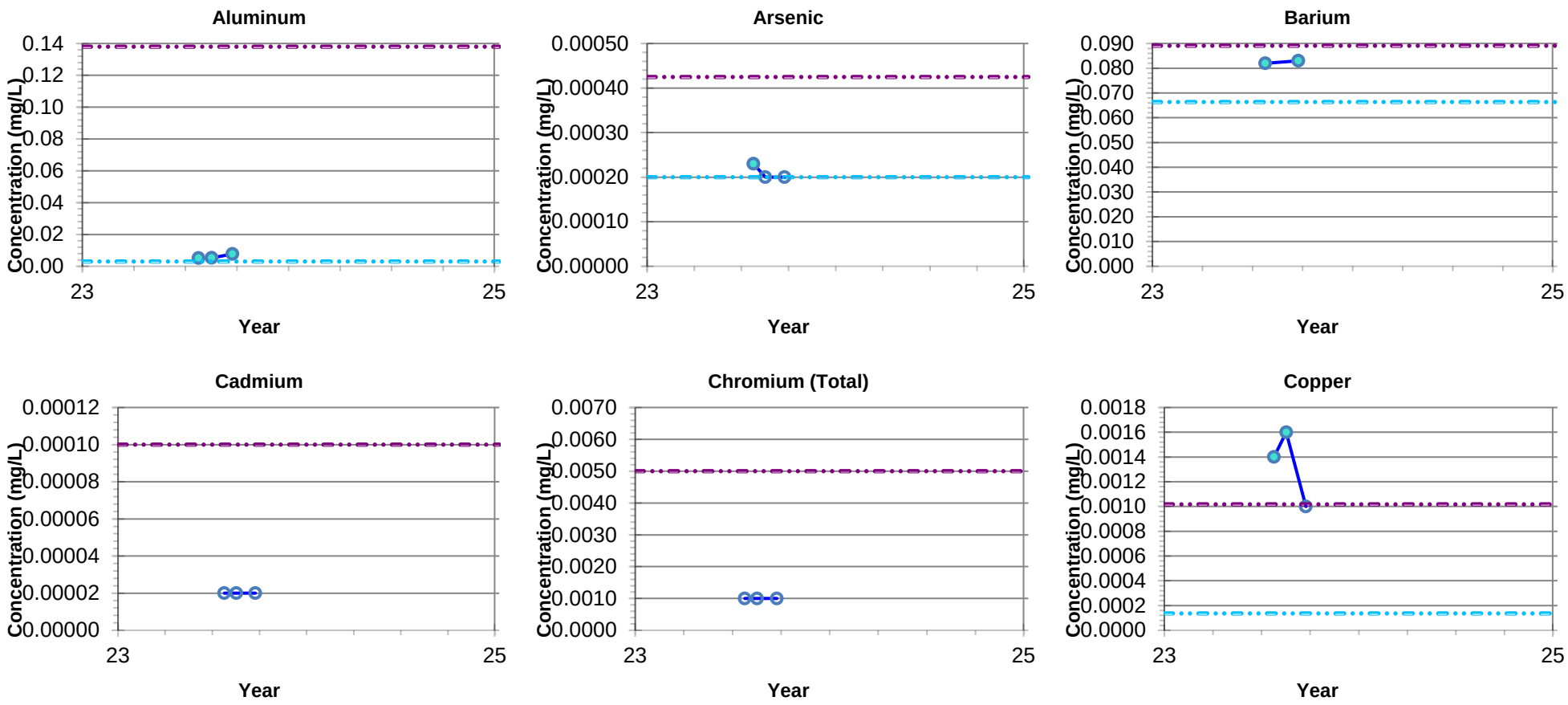
Imperial Norman Wells
2023 Groundwater Monitoring & Remediation Program

Hydrochemical Control Charts
Bosworth Creek: AEMP-US-04 (Upr Bosworth Crk)

15-Apr-2024 date	NA edited by	JC drawn by	NA app by	PROJECT NUMBER:	Figure
				417085-49223-23200	F-10

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS HAS NOT ENTERED INTO A CONTRACT.

File Path: https://worleyparsons-my.sharepoint.com/personal/jinrong_cui_worley_com/Documents/Desktop/Graphs-2022/417085-49223-



NOTES:
- Filled symbols denote Sample Values
- Unfilled symbols denote Values < Detection Limit(s)

Upper Control Limit

Lower Control Limit

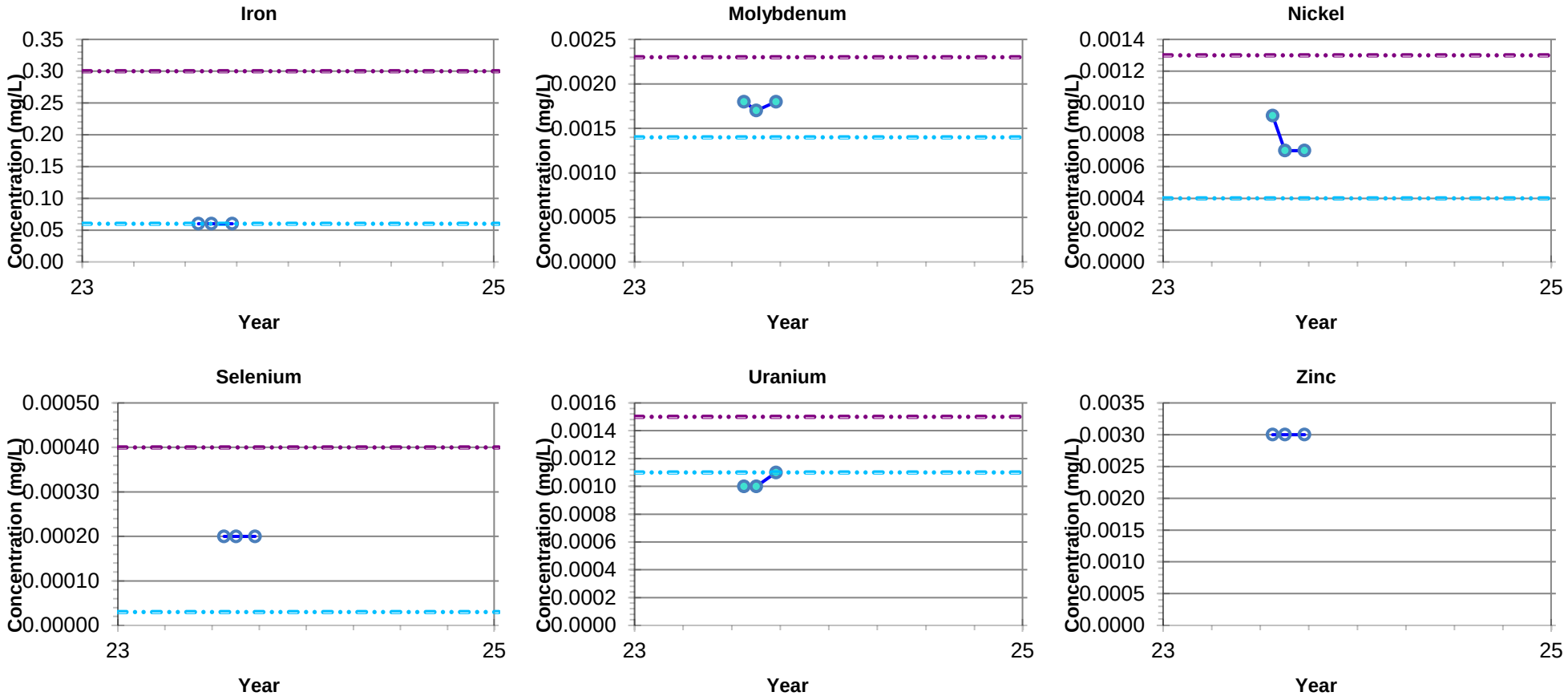
Imperial Norman Wells
2023 Groundwater Monitoring & Remediation Program

Hydrochemical Control Charts
Bosworth Creek: AEMP-US-04 (Upr Bosworth Crk)

15-Apr-2024 date	NA edited by	JC drawn by	NA app by	PROJECT NUMBER:	Figure
				417085-49223-23200	F-20

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS HAS NOT ENTERED INTO A CONTRACT.

File Path: https://worleyparsons-my.sharepoint.com/personal/jinrong_cui_worley_com/Documents/Desktop/Graphs-2022/417085-49223-



NOTES:
- Filled symbols denote Sample Values
- Unfilled symbols denote Values < Detection Limit(s)

Upper Control Limit

Lower Control Limit

Imperial Norman Wells
2023 Groundwater Monitoring & Remediation Program

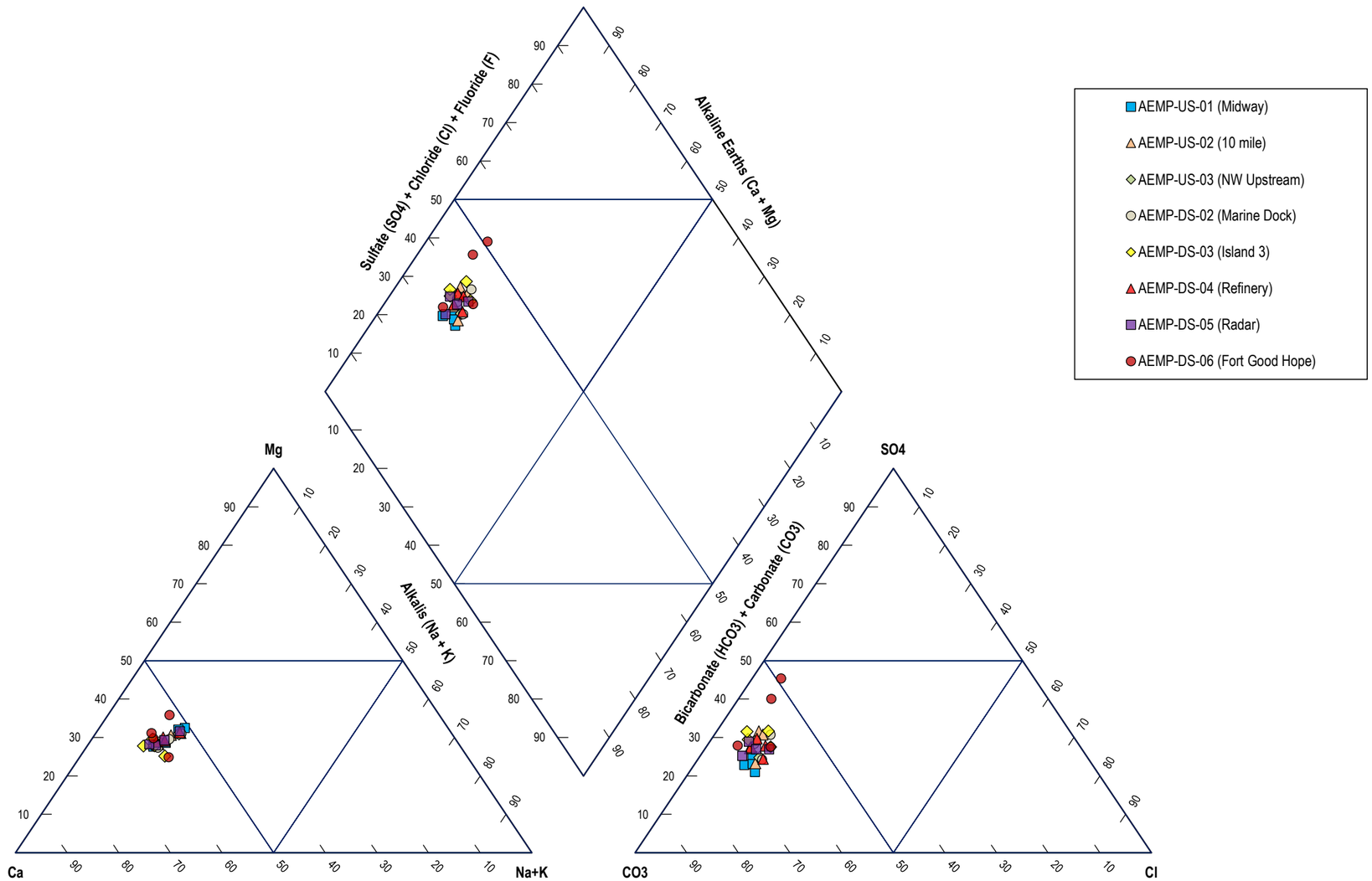
Hydrochemical Control Charts
Bosworth Creek: AEMP-US-04 (Upr Bosworth Crk)

15-Apr-2024 date	NA edited by	JC drawn by	NA app by	PROJECT NUMBER: 417085-49223-23200	Figure F-30

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS HAS NOT ENTERED INTO A CONTRACT.

File Path: https://worleyparsons-my.sharepoint.com/personal/jinrong_cui_worley_com/Documents/Desktop/Graphs-2022/417085-49223-

Appendix G. Piper Plots



IMPERIAL
AEMP
NORMAN WELLS, NT

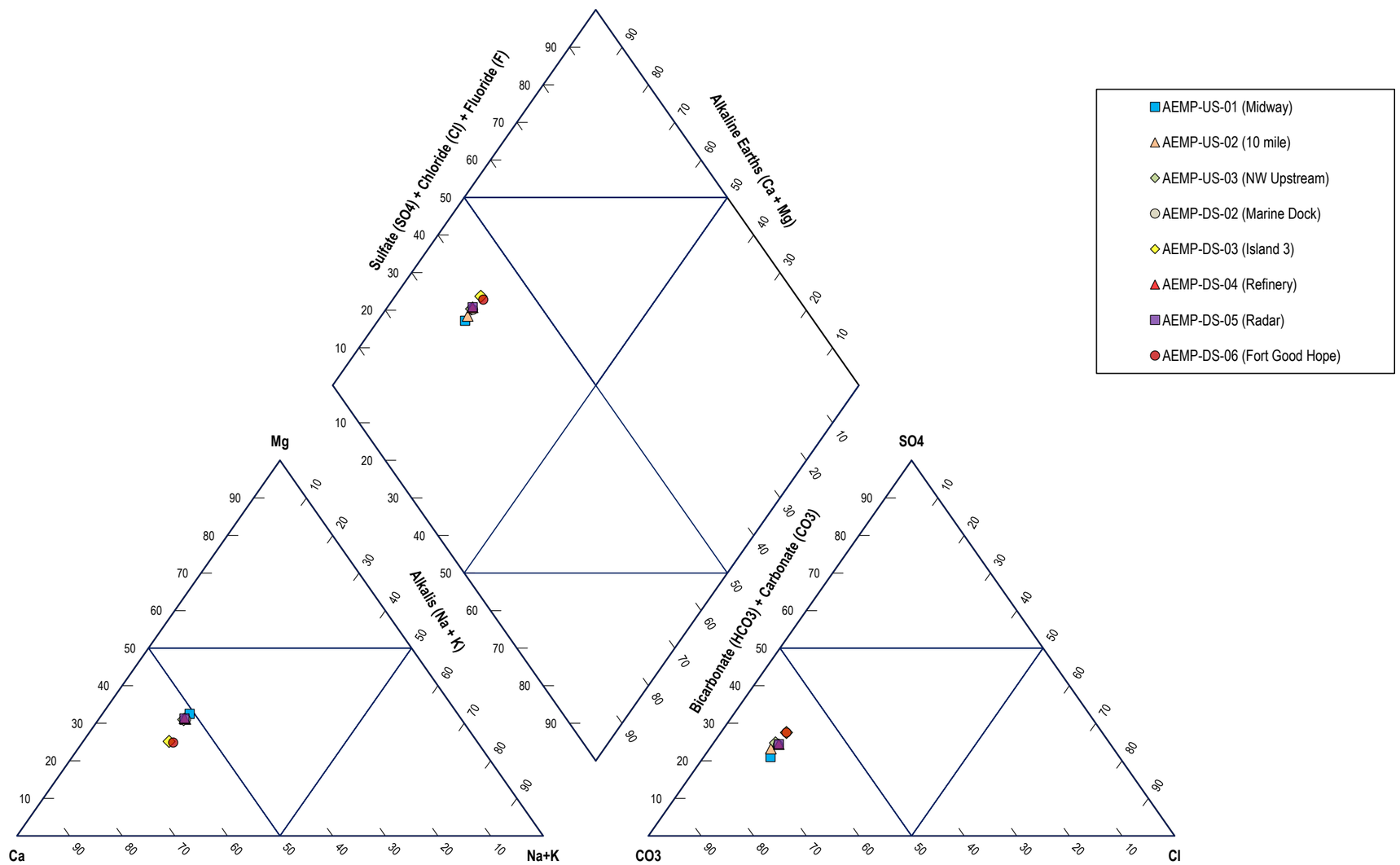
MACKENZIE RIVER - ALL 2023

Date: 11-04-2024	Drawn by: AH	Edited by:	App'd by:
		Advisian Project No. 417085-49223	
		FIG No. G-1	REV B

Imperial

TRS Advisian

* This drawing is prepared solely for the use of our customer as specified in the accompanying report.
WorleyParsons Canada Services Ltd. assumes no liability to any other party for any representations contained in this drawing.*



IMPERIAL
AEMP
NORMAN WELLS, NT

MACKENZIE RIVER - MARCH 2023

Date:	11-04-2024	Drawn by:	AH	Edited by:	App'd by:
				Advisian Project No. 417085-49223	
				FIG No. G-2	REV B

Imperial

TRS Advisian

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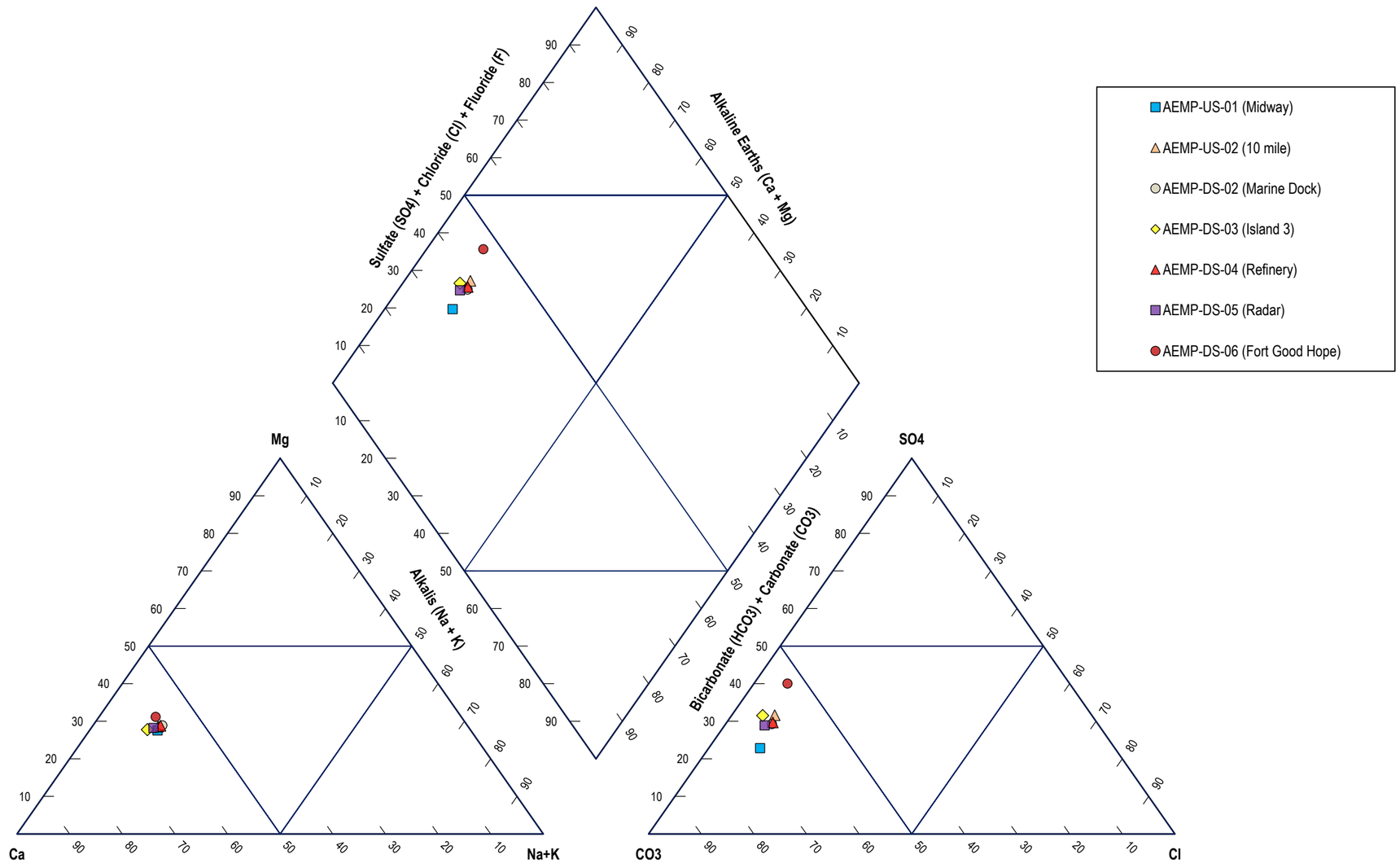

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AEMP
NORMAN WELLS, NT

MACKENZIE RIVER - JULY 2023

Date:	11-04-2024	Drawn by:	AH	Edited by:	App'd by:
				Advisian Project No. 417085-49223	
				FIG No. G-3	REV B

Imperial

TRS Advisian

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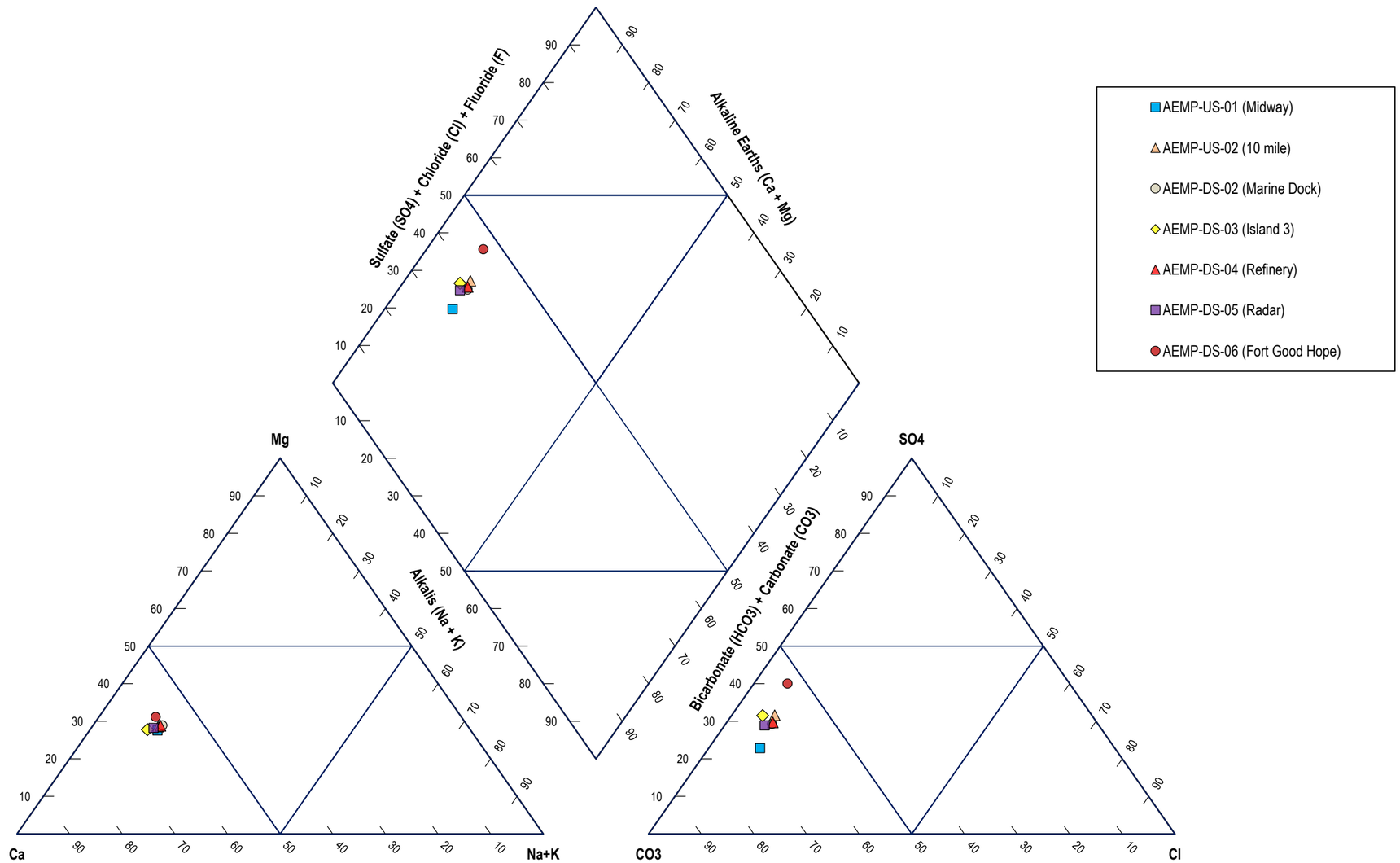

IMPERIAL
AEMP
NORMAN WELLS, NT

MACKENZIE RIVER - AUGUST 2023

Date:	11-04-2024	Drawn by:	AH	Edited by:	App'd by:
				Advisian Project No. 417085-49223	
				FIG No. G-4	REV B

Imperial

TRS Advisian

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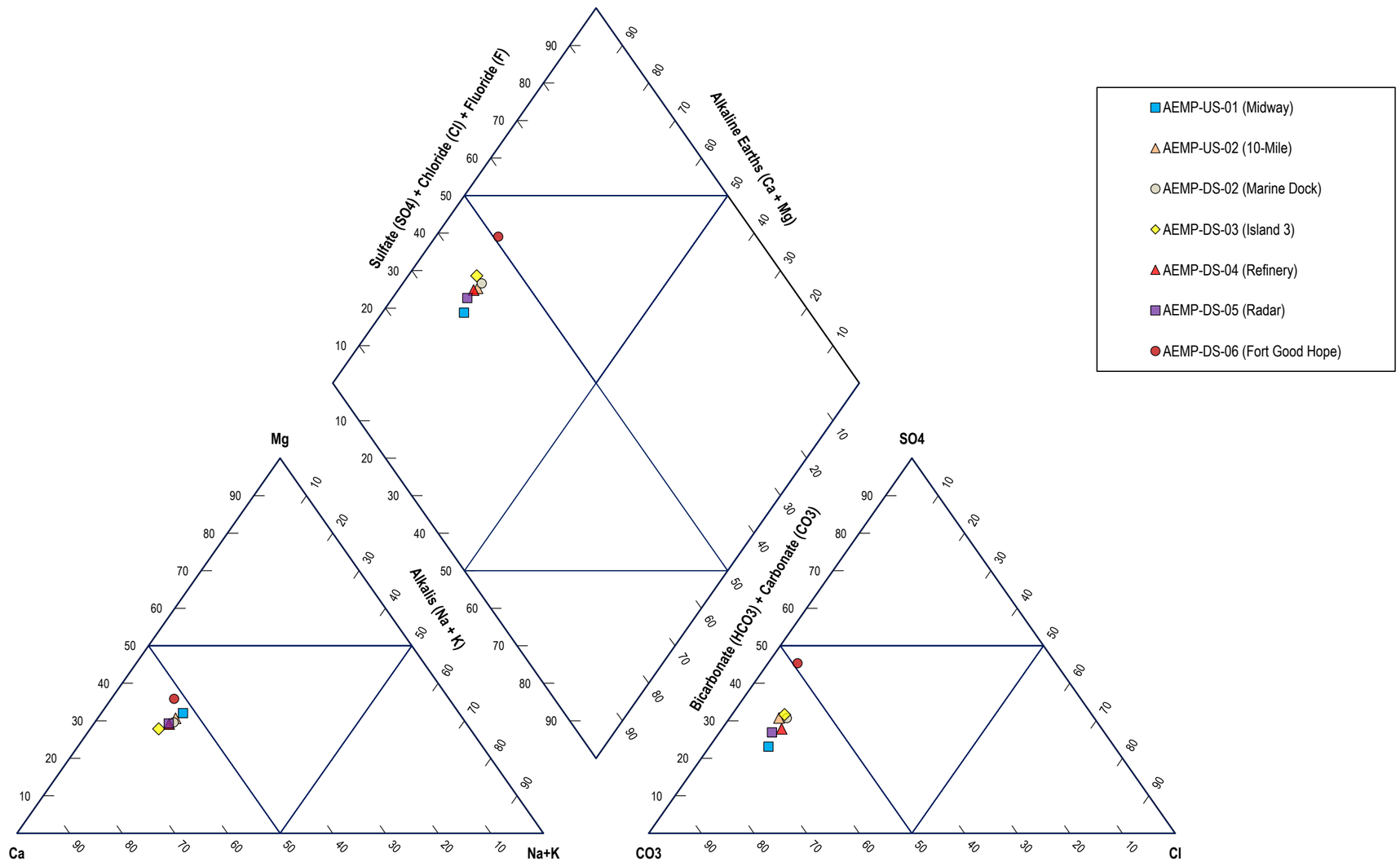

IMPERIAL
AEMP
NORMAN WELLS, NT

MACKENZIE RIVER - SEPTEMBER 2023

Date:	11-04-2024	Drawn by:	AH	Edited by:	App'd by:
				Advisian Project No.	
				417085-49223	
				FIG No. G-5	REV B

Imperial

TRS Advisian

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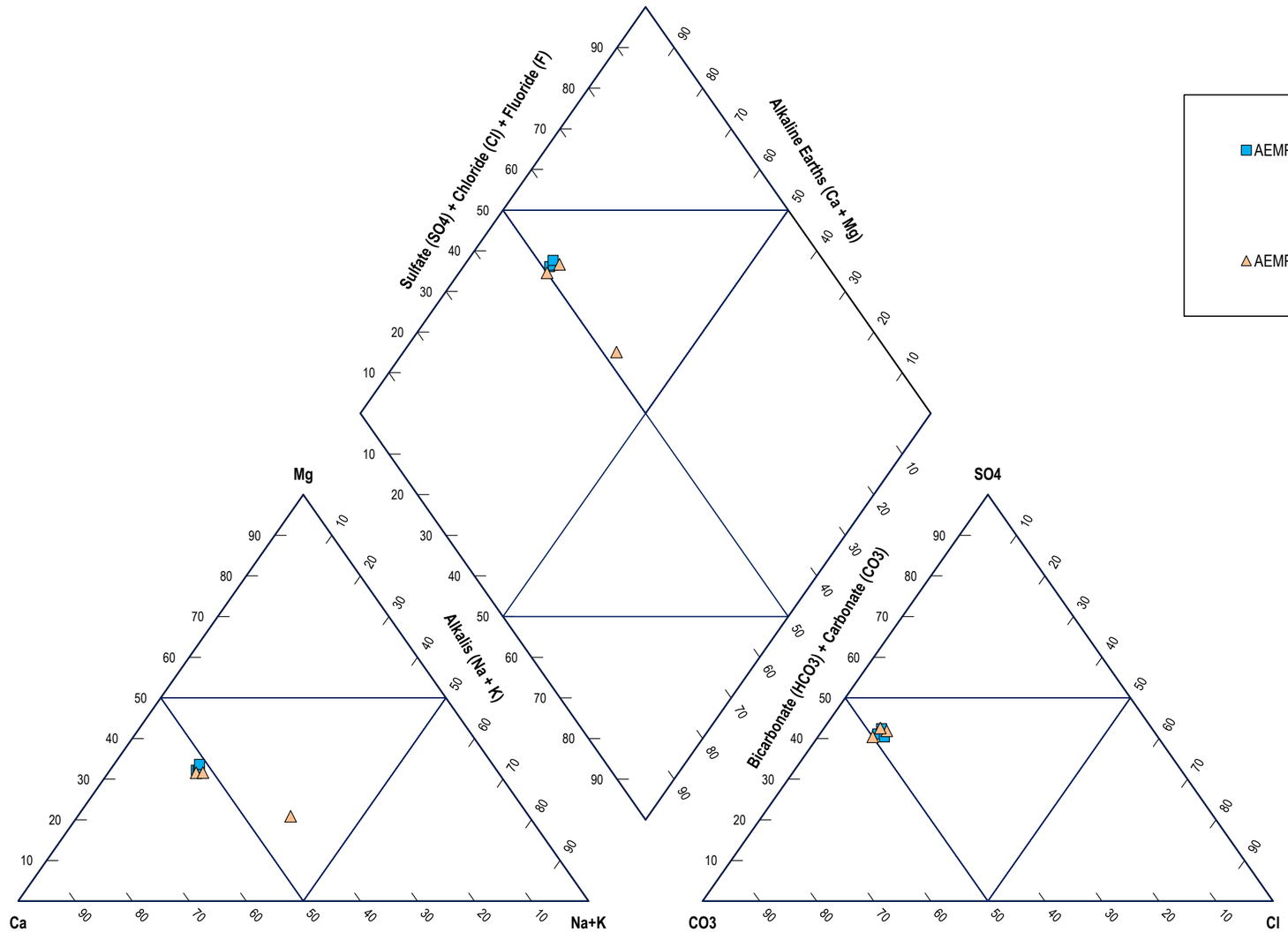

IMPERIAL
AEMP
NORMAN WELLS, NT

BOSWORTH CREEK - ALL 2023

Date:	11-04-2024	Drawn by:	AH	Edited by:	App'd by:
				Advisian Project No. 417085-49223	
				FIG No. G-6	REV B

" This drawing is prepared solely for the use of our customer as specified in the accompanying report.
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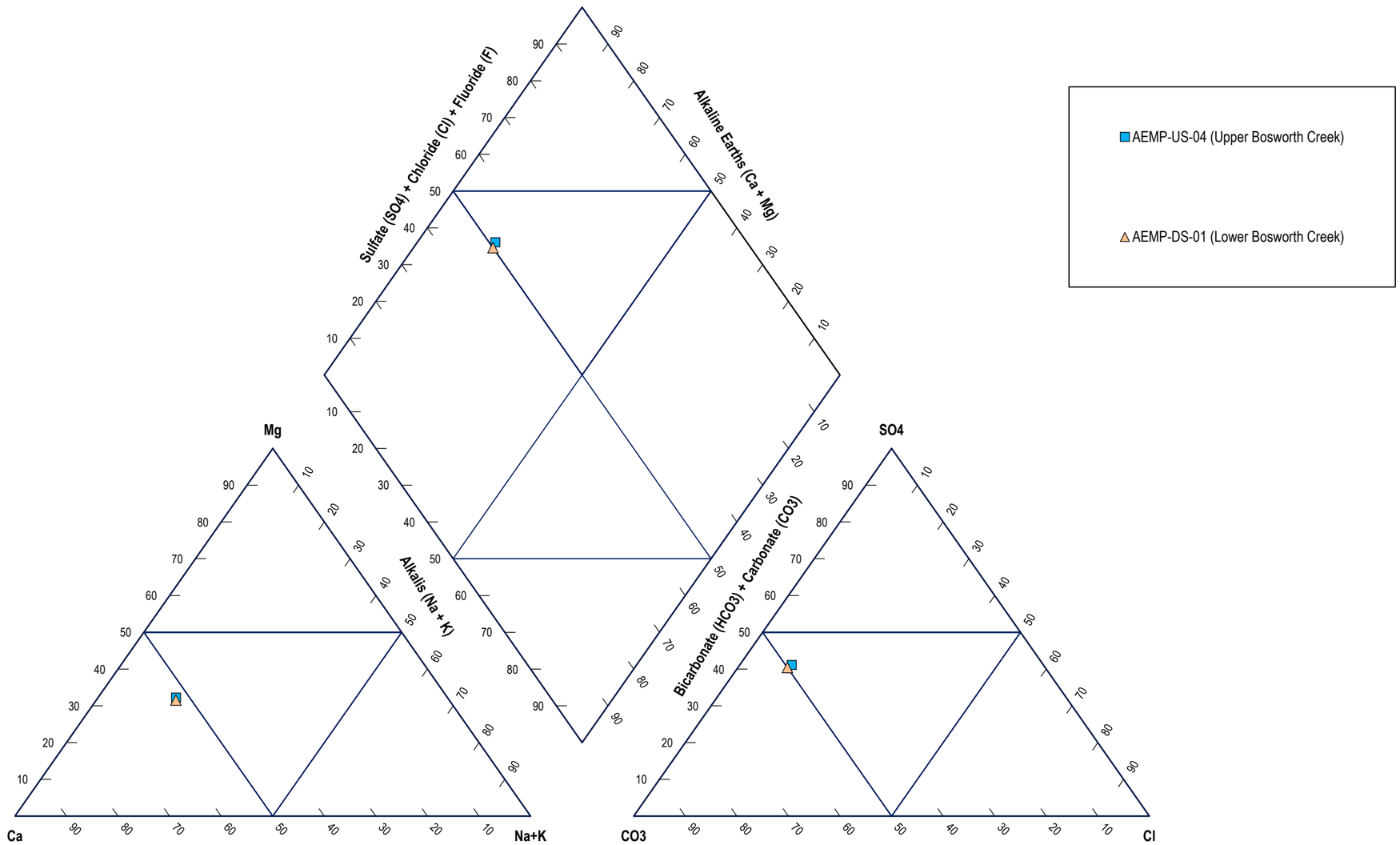

IMPERIAL
AEMP
NORMAN WELLS, NT

BOSWORTH CREEK - JULY 2023

Date:	11-04-2024	Drawn by:	AH	Edited by:	App'd by:
				Advisian Project No.	
				417085-49223	
				FIG No. G-7	REV B

" This drawing is prepared solely for the use of our customer as specified in the accompanying report.
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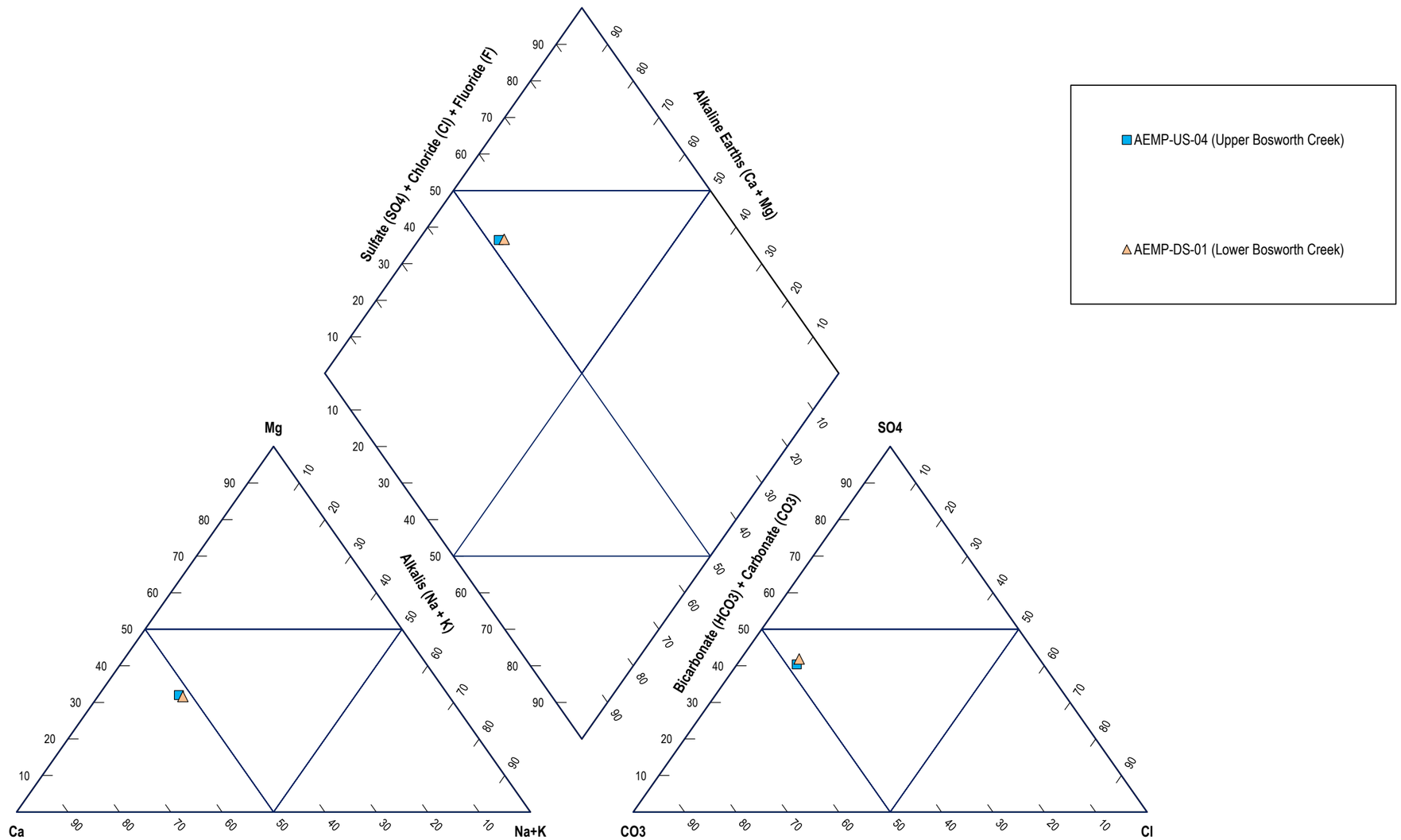

IMPERIAL
AEMP
NORMAN WELLS, NT

BOSWORTH CREEK - AUGUST 2023

Date:	11-04-2024	Drawn by:	AH	Edited by:	App'd by:
Advisian Project No.	417085-49223				
FIG No.	G-8	REV	B		

" This drawing is prepared solely for the use of our customer as specified in the accompanying report.
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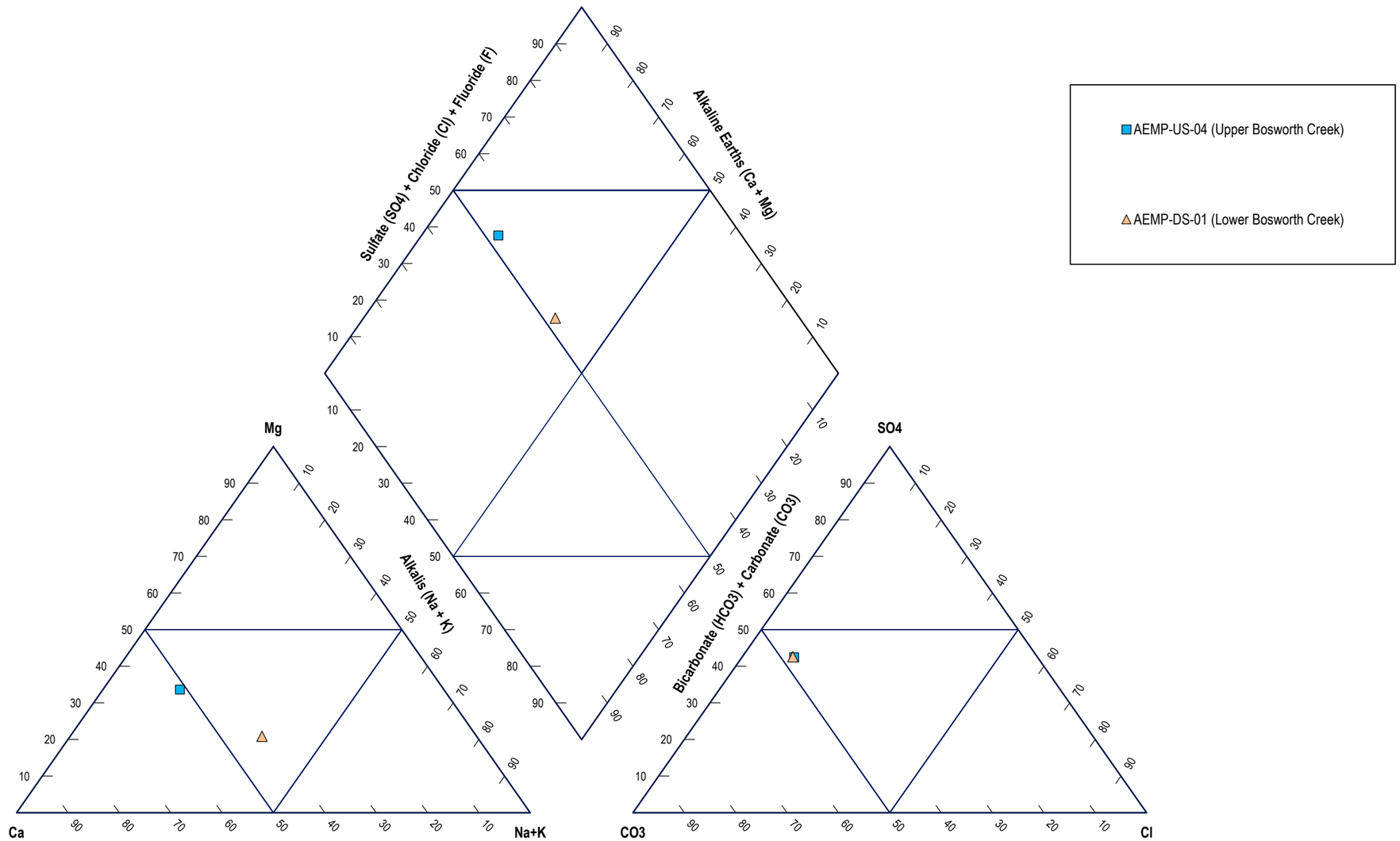

IMPERIAL
AEMP
NORMAN WELLS, NT

BOSWORTH CREEK -SEPTEMBER 2023

Date:	11-04-2024	Drawn by:	AH	Edited by:	App'd by:
Advisian Project No.	417085-49223				
FIG No.	G-9	REV	B		

Imperial

TRS Advisian

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Appendix H. Surface Water Laboratory Certificates of Analysis

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-03-11/12
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C317379	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☒ **Yes** ☐ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☒ **Yes** ☐ **No**

If yes, FLAG type and comments: Missing clerical COC information. No impact on data quality

Date samples submitted 2023-03-14

Due date for lab report on SRC 2023-03-21

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2023-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☒ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☒ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☒ **Yes** ☐ **No**	
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☒ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☐ **Yes** ☒ **No** ☐ **N/A**	Total selenium – lab warrants data is acceptable
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☒ **Yes** ☐ **No** ☐ **N/A**	

Data check completed by Alex Haigh **Date** 2023-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	

Data check completed by Alex Haigh **Date** 2023-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Trip Blank results acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Field Blank results acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Equipment Blank results acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes ☐ No ☒ N/A	**Comments**	

Data check completed by Alex Haigh **Date** 2023-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Field pH vs. Lab pH RPDs acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes ☐ No ☐ N/A	**Comments**	

Data check completed by Alex Haigh **Date** 2023-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☒ Yes ☐ No

Explain rationale for yes/no:

Request lab to recheck data? If so give details	☐ Yes ☒ No ☐ N/A	**Comments**	
If Yes, Lab request to recheck must be approved by Project Manager Name:		**Date**	

Data check completed by Alex Haigh **Date** 2023-03-26

Task Order#: PENDING
Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200
Your C.O.C. #: 292857

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/03/21
Report #: R3312792
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C317379
Received: 2023/03/14, 10:28

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	4	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID (1)	4	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	4		Auto Calc
Cadmium - low level CCME - Dissolved (1)	4		Auto Calc
Cadmium - low level CCME (Total) (1)	4		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	4	AB SOP-00020	SM23-4500-Cl/SO4-E m
Carbon (DOC) (1, 2)	4	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	4	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 3)	4	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Sulphide (as H2S) (1)	4		Auto Calc
Hardness (1)	4		Auto Calc
Mercury (Dissolved) by CV (1, 4)	4	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV (1)	4	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 4)	4	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	4	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (1, 4)	4	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total (1)	4	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance (1)	4		Auto Calc
Ammonia-N (Total) (1)	4	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate and Nitrite (1)	4		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water (1)	4	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N) (1)	4		Auto Calc
Oil and Grease (Gravimetric, n-Hexane) (1)	4	AB SOP-00092	SM 23 5520B/5520F m
Benzo[a]pyrene Equivalency (1, 5)	4		Auto Calc
PAH in Water by GC/MS (1)	4	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270E m
Orthophosphate by Konelab (1, 6)	4	AB SOP-00025	SM 23 4500-P A,F m
Total Sulphide (1)	4	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue) (1)	4	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen (Total) (1)	4	BBY WI-00033	Auto Calc
Nitrogen (Total) (1)	4	AB SOP-00093	SM 24 4500-N C m
Carbon (Total Organic) (1, 7)	4	AB SOP-00087	MMCW 119 1996 m

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Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/03/21
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CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C317379
Received: 2023/03/14, 10:28

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* 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) Silica gel clean up employed.
(4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(6) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
(7) TOC present in the sample should be considered as non-purgeable TOC.

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CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C317379
Received: 2023/03/14, 10:28

Encryption Key

Namita Sahni
Customer Solutions Representative
21 Mar 2023 12:41:17

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614

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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 Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

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Bureau Veritas Job #: C317379
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

AT1 BTEX AND F1-F2 IN WATER (WATER)

Bureau Veritas ID		BNK168			BNK168			BNK169		
Sampling Date		2023/03/12 16:30			2023/03/12 16:30			2023/03/12 13:30		
COC Number		292857			292857			292857		
	UNITS	**AEMP-US-01**	**RDL**	**QC Batch**	**AEMP-US-01 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-US-02**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.10	A910233				<0.10	0.10	A910233
Volatiles										
Benzene	mg/L	<0.00040	0.00040	A909765	<0.00040	0.00040	A909765	<0.00040	0.00040	A909765
Toluene	mg/L	<0.00040	0.00040	A909765	<0.00040	0.00040	A909765	<0.00040	0.00040	A909765
Ethylbenzene	mg/L	<0.00040	0.00040	A909765	<0.00040	0.00040	A909765	<0.00040	0.00040	A909765
m & p-Xylene	mg/L	<0.00080	0.00080	A909765	<0.00080	0.00080	A909765	<0.00080	0.00080	A909765
o-Xylene	mg/L	<0.00040	0.00040	A909765	<0.00040	0.00040	A909765	<0.00040	0.00040	A909765
Xylenes (Total)	mg/L	<0.00089	0.00089	A908200				<0.00089	0.00089	A908200
F1 (C6-C10) - BTEX	mg/L	<0.10	0.10	A908200				<0.10	0.10	A908200
F1 (C6-C10)	mg/L	<0.10	0.10	A909765	<0.10	0.10	A909765	<0.10	0.10	A909765
Extraction Surrogate Recovery (%)										
O-TERPHENYL (sur.)	%	89		A910233				89		A910233
Instrument Surrogate Recovery (%)										
1,4-Difluorobenzene (sur.)	%	103		A909765	101		A909765	102		A909765
4-Bromofluorobenzene (sur.	%	92		A909765	93		A909765	95		A909765
D4-1,2-Dichloroethane (sur.)	%	92		A909765	95		A909765	94		A909765

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C317379
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Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

AT1 BTEX AND F1-F2 IN WATER (WATER)

Bureau Veritas ID		BNK170	BNK171		
Sampling Date		2023/03/11 15:00	2023/03/11 13:30		
COC Number		292857	292857		
	UNITS	**AEMP-DS-04**	**AEMP-DS-05**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	0.10	A910233
Volatiles					
Benzene	mg/L	<0.00040	<0.00040	0.00040	A909765
Toluene	mg/L	<0.00040	<0.00040	0.00040	A909765
Ethylbenzene	mg/L	<0.00040	<0.00040	0.00040	A909765
m & p-Xylene	mg/L	<0.00080	<0.00080	0.00080	A909765
o-Xylene	mg/L	<0.00040	<0.00040	0.00040	A909765
Xylenes (Total)	mg/L	<0.00089	<0.00089	0.00089	A908200
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	0.10	A908200
F1 (C6-C10)	mg/L	<0.10	<0.10	0.10	A909765
Extraction Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	89	90		A910233
Instrument Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	103	102		A909765
4-Bromofluorobenzene (sur.	%	96	93		A909765
D4-1,2-Dichloroethane (sur.)	%	94	95		A909765
RDL = Reportable Detection Limit					

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Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		BNK168	BNK169	BNK170	BNK171		
Sampling Date		2023/03/12 16:30	2023/03/12 13:30	2023/03/11 15:00	2023/03/11 13:30		
COC Number		292857	292857	292857	292857		
	UNITS	**AEMP-US-01**	**AEMP-US-02**	**AEMP-DS-04**	**AEMP-DS-05**	**RDL**	**QC Batch**
Calculated Parameters							
Total Total Kjeldahl Nitrogen (Calc	mg/L	0.29	0.11	0.051	0.12	0.020	A908261
Nutrients							
Total Nitrogen (N)	mg/L	0.64	0.31	0.31	0.37	0.020	A911117
RDL = Reportable Detection Limit							

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Bureau Veritas Job #: C317379
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Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BNK168	BNK169	BNK170	BNK171			BNK171		
Sampling Date		2023/03/12 16:30	2023/03/12 13:30	2023/03/11 15:00	2023/03/11 13:30			2023/03/11 13:30		
COC Number		292857	292857	292857	292857			292857		
	UNITS	**AEMP-US-01**	**AEMP-US-02**	**AEMP-DS-04**	**AEMP-DS-05**	**RDL**	**QC Batch**	**AEMP-DS-05 Lab-Dup**	**RDL**	**QC Batch**
Elements										
Total Cadmium (Cd)	mg/L	0.000072	<0.000020	0.000026	0.000037	0.000020	A907930			
Total Mercury (Hg)	ug/L	0.0046	<0.0019	<0.0019	<0.0019	0.0019	A910825	<0.0019	0.0019	A910825
Total Aluminum (Al)	mg/L	1.6	0.037	0.020	0.034	0.0030	A909613			
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	<0.00060	0.00060	A909613			
Total Arsenic (As)	mg/L	0.0014	<0.00020	0.00022	0.00036	0.00020	A909613			
Total Barium (Ba)	mg/L	0.073	0.036	0.035	0.039	0.010	A909617			
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	A909613			
Total Boron (B)	mg/L	<0.020	<0.020	0.025	<0.020	0.020	A909617			
Total Calcium (Ca)	mg/L	23	24	25	29	0.30	A909617			
Total Chromium (Cr)	mg/L	0.0029	<0.0010	<0.0010	<0.0010	0.0010	A909613			
Total Cobalt (Co)	mg/L	0.0013	<0.00030	<0.00030	<0.00030	0.00030	A909613			
Total Copper (Cu)	mg/L	0.0027	<0.0010	0.0018	0.0017	0.0010	A909613			
Total Iron (Fe)	mg/L	2.6	<0.060	<0.060	<0.060	0.060	A909617			
Total Lead (Pb)	mg/L	0.0017	<0.00020	<0.00020	<0.00020	0.00020	A909613			
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	<0.020	0.020	A909617			
Total Magnesium (Mg)	mg/L	9.5	8.6	8.9	9.9	0.20	A909617			
Total Manganese (Mn)	mg/L	0.069	<0.0040	<0.0040	<0.0040	0.0040	A909617			
Total Molybdenum (Mo)	mg/L	0.00057	0.00060	0.00060	0.00092	0.00020	A909613			
Total Nickel (Ni)	mg/L	0.0039	0.00078	0.00071	0.00073	0.00050	A909613			
Total Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	<0.10	0.10	A909617			
Total Potassium (K)	mg/L	1.4	0.77	0.79	0.89	0.30	A909617			
Total Selenium (Se)	mg/L	<0.00020	<0.00020	0.00022	<0.00020	0.00020	A909613			
Total Silicon (Si)	mg/L	5.0	1.5	1.5	1.6	0.50	A909617			
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A909613			
Total Sodium (Na)	mg/L	7.8	8.2	8.3	9.6	0.50	A909617			
Total Strontium (Sr)	mg/L	0.18	0.20	0.22	0.27	0.020	A909617			
Total Sulphur (S)	mg/L	6.6	7.7	8.3	10	0.20	A909617			
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	A909613			
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	A909613			
Total Titanium (Ti)	mg/L	0.062	<0.0010	<0.0010	0.0015	0.0010	A909613			

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Bureau Veritas Job #: C317379
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BNK168	BNK169	BNK170	BNK171			BNK171		
Sampling Date		2023/03/12 16:30	2023/03/12 13:30	2023/03/11 15:00	2023/03/11 13:30			2023/03/11 13:30		
COC Number		292857	292857	292857	292857			292857		
	UNITS	**AEMP-US-01**	**AEMP-US-02**	**AEMP-DS-04**	**AEMP-DS-05**	**RDL**	**QC Batch**	**AEMP-DS-05 Lab-Dup**	**RDL**	**QC Batch**
Total Uranium (U)	mg/L	0.00059	0.00050	0.00044	0.00082	0.00010	A909613			
Total Vanadium (V)	mg/L	0.0051	<0.0010	<0.0010	<0.0010	0.0010	A909613			
Total Zinc (Zn)	mg/L	0.016	<0.0030	<0.0030	0.0044	0.0030	A909613			

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Bureau Veritas Job #: C317379
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BNK168			BNK168			BNK169		
Sampling Date		2023/03/12 16:30			2023/03/12 16:30			2023/03/12 13:30		
COC Number		292857			292857			292857		
	UNITS	**AEMP-US-01**	**RDL**	**QC Batch**	**AEMP-US-01 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-US-02**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	93	0.50	A907933				100	0.50	A907933
Ion Balance (% Difference)	%	0.96	N/A	A908484				0.44	N/A	A908484
Nitrate (N)	mg/L	0.35	0.010	A907937				0.20	0.010	A907937
Nitrate (NO3)	mg/L	1.5	0.044	A908485				0.87	0.044	A908485
Nitrite (NO2)	mg/L	<0.033	0.033	A908485				<0.033	0.033	A908485
Sulphide (as H2S)	mg/L	0.0039	0.0020	A908201				<0.0020	0.0020	A908201
Elements										
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	A907929				<0.000020	0.000020	A907929
Misc. Inorganics										
Conductivity	uS/cm	210	2.0	A910220				220	2.0	A910220
Dissolved Organic Carbon (C	mg/L	2.5	0.50	A910816				2.2	0.50	A910816
Total Organic Carbon (C)	mg/L	1.8	0.50	A911000				2.2	0.50	A911000
Total Dissolved Solids	mg/L	120	10	A909483	130	10	A909483	150	10	A909483
Anions										
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	A910215				<1.0	1.0	A910215
Alkalinity (Total as CaCO3)	mg/L	72	1.0	A910215				78	1.0	A910215
Bicarbonate (HCO3)	mg/L	87	1.0	A910215				95	1.0	A910215
Carbonate (CO3)	mg/L	<1.0	1.0	A910215				<1.0	1.0	A910215
Hydroxide (OH)	mg/L	<1.0	1.0	A910215				<1.0	1.0	A910215
Total Sulphide	mg/L	0.0036	0.0018	A910208				<0.0018	0.0018	A910208
Chloride (Cl)	mg/L	9.8	1.0	A910945	10	1.0	A910945	10	1.0	A910943
Sulphate (SO4)	mg/L	22	1.0	A910945	22	1.0	A910945	27	1.0	A910943
Nutrients										
Total Ammonia (N)	mg/L	<0.015	0.015	A910303				<0.015	0.015	A910303
Orthophosphate (P)	mg/L	0.0041	0.0030	A910448				0.0045	0.0030	A910448
Nitrite (N)	mg/L	<0.010	0.010	A910236				<0.010	0.010	A910236
Nitrate plus Nitrite (N)	mg/L	0.35	0.010	A910236				0.20	0.010	A910236
Misc. Organics										
Total Oil and grease	mg/L	<2.0	2.0	A906577				<2.0	2.0	A906577

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

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Bureau Veritas Job #: C317379
Report Date: 2023/03/21

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Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BNK170			BNK170			BNK171		
Sampling Date		2023/03/11 15:00			2023/03/11 15:00			2023/03/11 13:30		
COC Number		292857			292857			292857		
	UNITS	**AEMP-DS-04**	**RDL**	**QC Batch**	**AEMP-DS-04 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-DS-05**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	100	0.50	A907933				120	0.50	A907933
Ion Balance (% Difference)	%	0.41	N/A	A908484				2.0	N/A	A908484
Nitrate (N)	mg/L	0.26	0.010	A907937				0.26	0.010	A907937
Nitrate (NO3)	mg/L	1.2	0.044	A908485				1.1	0.044	A908485
Nitrite (NO2)	mg/L	<0.033	0.033	A908485				<0.033	0.033	A908485
Sulphide (as H2S)	mg/L	<0.0020	0.0020	A908201				<0.0020	0.0020	A908201
Elements										
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	A907929				<0.000020	0.000020	A907929
Misc. Inorganics										
Conductivity	uS/cm	230	2.0	A910220				260	2.0	A910220
Dissolved Organic Carbon (C	mg/L	3.6	0.50	A914259	3.6	0.50	A914259	3.4	0.50	A914259
Total Organic Carbon (C)	mg/L	2.0	0.50	A914095				2.1	0.50	A914095
Total Dissolved Solids	mg/L	120	10	A909483				160	10	A909483
Anions										
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	A910215				<1.0	1.0	A910215
Alkalinity (Total as CaCO3)	mg/L	77	1.0	A910215				81	1.0	A910215
Bicarbonate (HCO3)	mg/L	94	1.0	A910215				99	1.0	A910215
Carbonate (CO3)	mg/L	<1.0	1.0	A910215				<1.0	1.0	A910215
Hydroxide (OH)	mg/L	<1.0	1.0	A910215				<1.0	1.0	A910215
Total Sulphide	mg/L	<0.0018	0.0018	A910221				<0.0018	0.0018	A910221
Chloride (Cl)	mg/L	11	1.0	A910943				12	1.0	A910943
Sulphate (SO4)	mg/L	29	1.0	A910943				35	1.0	A910943
Nutrients										
Total Ammonia (N)	mg/L	<0.015	0.015	A910303				<0.015	0.015	A910303
Orthophosphate (P)	mg/L	<0.0030	0.0030	A910448				0.0054	0.0030	A910448
Nitrite (N)	mg/L	<0.010	0.010	A910236				<0.010	0.010	A910236
Nitrate plus Nitrite (N)	mg/L	0.26	0.010	A910236				0.26	0.010	A910236
Misc. Organics										
Total Oil and grease	mg/L	<2.0	2.0	A906577				3.0	2.0	A906577

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

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SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BNK168	BNK169	BNK170	BNK171		
Sampling Date		2023/03/12 16:30	2023/03/12 13:30	2023/03/11 15:00	2023/03/11 13:30		
COC Number		292857	292857	292857	292857		
	UNITS	**AEMP-US-01**	**AEMP-US-02**	**AEMP-DS-04**	**AEMP-DS-05**	**RDL**	**QC Batch**
Polycyclic Aromatics							
B[a]P TPE Total Potency Equivalent	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	A908252
Acenaphthene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A910237
Acenaphthylene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A910237
Acridine	mg/L	<0.000040	<0.000040	<0.000040	<0.000040	0.000040	A910237
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	A910237
Benzo(a)anthracene	mg/L	<0.0000085	<0.0000085	<0.0000085	<0.0000085	0.0000085	A910237
Benzo(b&j)fluoranthene	mg/L	<0.0000085	<0.0000085	<0.0000085	<0.0000085	0.0000085	A910237
Benzo(k)fluoranthene	mg/L	<0.0000085	<0.0000085	<0.0000085	<0.0000085	0.0000085	A910237
Benzo(g,h,i)perylene	mg/L	<0.0000085	<0.0000085	<0.0000085	<0.0000085	0.0000085	A910237
Benzo(c)phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	A910237
Benzo(a)pyrene	mg/L	<0.0000075	<0.0000075	<0.0000075	<0.0000075	0.0000075	A910237
Benzo(e)pyrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	A910237
Chrysene	mg/L	<0.0000085	<0.0000085	<0.0000085	<0.0000085	0.0000085	A910237
Dibenz(a,h)anthracene	mg/L	<0.0000075	<0.0000075	<0.0000075	<0.0000075	0.0000075	A910237
Fluoranthene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	A910237
Fluorene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	A910237
Indeno(1,2,3-cd)pyrene	mg/L	<0.0000085	<0.0000085	<0.0000085	<0.0000085	0.0000085	A910237
1-Methylnaphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A910237
2-Methylnaphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A910237
Naphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A910237
Phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	A910237
Perylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	A910237
Pyrene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	0.000020	A910237
Quinoline	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	A910237
Extraction Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	103	124	109	116		A910237
D8-ACENAPHTHYLENE (sur.)	%	101	120	108	114		A910237
D8-NAPHTHALENE (sur.)	%	84	100	90	97		A910237
TERPHENYL-D14 (sur.)	%	103	121	108	113		A910237
RDL = Reportable Detection Limit							

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MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		BNK168	BNK169	BNK170	BNK170	BNK171		
Sampling Date		2023/03/12 16:30	2023/03/12 13:30	2023/03/11 15:00	2023/03/11 15:00	2023/03/11 13:30		
COC Number		292857	292857	292857	292857	292857		
	UNITS	**AEMP-US-01**	**AEMP-US-02**	**AEMP-DS-04**	**AEMP-DS-04 Lab-Dup**	**AEMP-DS-05**	**RDL**	**QC Batch**
Elements								
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	0.0019	A912158

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BNK168		BNK169		BNK170		BNK171		
Sampling Date		2023/03/12 16:30		2023/03/12 13:30		2023/03/11 15:00		2023/03/11 13:30		
COC Number		292857		292857		292857		292857		
	UNITS	**AEMP-US-01**	**QC Batch**	**AEMP-US-02**	**QC Batch**	**AEMP-DS-04**	**QC Batch**	**AEMP-DS-05**	**RDL**	**QC Batch**
Elements										
Dissolved Aluminum (Al)	mg/L	0.018	A910295	<0.0030	A910295	0.0044	A910295	<0.0030	0.0030	A910295
Dissolved Antimony (Sb)	mg/L	<0.00060	A910295	<0.00060	A910295	<0.00060	A910295	<0.00060	0.00060	A910295
Dissolved Arsenic (As)	mg/L	0.00021	A910295	0.00020	A910295	0.00023	A910295	<0.00020	0.00020	A910295
Dissolved Barium (Ba)	mg/L	0.034	A910309	0.048	A910309	0.035	A910309	0.039	0.010	A910309
Dissolved Beryllium (Be)	mg/L	<0.0010	A910295	<0.0010	A910295	<0.0010	A910295	<0.0010	0.0010	A910295
Dissolved Boron (B)	mg/L	<0.020	A910309	<0.020	A910309	<0.020	A910309	<0.020	0.020	A910309
Dissolved Calcium (Ca)	mg/L	23	A910309	25	A910309	26	A910309	30	0.30	A910309
Dissolved Chromium (Cr)	mg/L	<0.0010	A910295	<0.0010	A910295	<0.0010	A910295	<0.0010	0.0010	A910295
Dissolved Cobalt (Co)	mg/L	<0.00030	A910295	<0.00030	A910295	<0.00030	A910295	<0.00030	0.00030	A910295
Dissolved Copper (Cu)	mg/L	<0.0010	A910295	0.0037	A913451	<0.0010	A910295	<0.0010	0.0010	A910295
Dissolved Iron (Fe)	mg/L	<0.060	A910309	<0.060	A910309	<0.060	A910309	<0.060	0.060	A910309
Dissolved Lead (Pb)	mg/L	<0.00020	A910295	<0.00020	A910295	<0.00020	A910295	<0.00020	0.00020	A910295
Dissolved Lithium (Li)	mg/L	<0.020	A910309	<0.020	A910309	<0.020	A910309	<0.020	0.020	A910309
Dissolved Magnesium (Mg)	mg/L	8.9	A910309	9.0	A910309	9.4	A910309	11	0.20	A910309
Dissolved Manganese (Mn)	mg/L	<0.0040	A910309	<0.0040	A910309	<0.0040	A910309	<0.0040	0.0040	A910309
Dissolved Molybdenum (Mo	mg/L	0.00057	A910295	0.00053	A910295	0.00054	A910295	0.00053	0.00020	A910295
Dissolved Nickel (Ni)	mg/L	<0.00050	A910295	<0.00050	A910295	<0.00050	A910295	<0.00050	0.00050	A910295
Dissolved Phosphorus (P)	mg/L	<0.10	A910309	<0.10	A910309	<0.10	A910309	<0.10	0.10	A910309
Dissolved Potassium (K)	mg/L	0.81	A910309	0.82	A910309	0.84	A910309	0.87	0.30	A910309
Dissolved Selenium (Se)	mg/L	<0.00020	A910295	<0.00020	A910295	<0.00020	A910295	0.00022	0.00020	A910295
Dissolved Silicon (Si)	mg/L	1.3	A910309	1.3	A910309	1.3	A910309	1.4	0.50	A910309
Dissolved Silver (Ag)	mg/L	<0.00010	A910295	<0.00010	A910295	<0.00010	A910295	<0.00010	0.00010	A910295
Dissolved Sodium (Na)	mg/L	8.1	A910309	8.5	A910309	8.7	A910309	10	0.50	A910309
Dissolved Strontium (Sr)	mg/L	0.18	A910309	0.20	A910309	0.22	A910309	0.29	0.020	A910309
Dissolved Sulphur (S)	mg/L	6.6	A910309	7.9	A910309	21	A911988	11	0.20	A910309
Dissolved Thallium (Tl)	mg/L	<0.00020	A910295	<0.00020	A910295	<0.00020	A910295	<0.00020	0.00020	A910295
Dissolved Tin (Sn)	mg/L	<0.0010	A910295	<0.0010	A910295	<0.0010	A910295	<0.0010	0.0010	A910295
Dissolved Titanium (Ti)	mg/L	<0.0010	A910295	<0.0010	A910295	<0.0010	A910295	<0.0010	0.0010	A910295
Dissolved Uranium (U)	mg/L	0.00037	A910295	0.00043	A910295	0.00040	A910295	0.00048	0.00010	A910295
Dissolved Vanadium (V)	mg/L	<0.0010	A910295	<0.0010	A910295	<0.0010	A910295	<0.0010	0.0010	A910295
Dissolved Zinc (Zn)	mg/L	<0.0030	A910295	0.0040	A910295	<0.0030	A913451	0.0086	0.0030	A910295
RDL = Reportable Detection Limit										

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Report Date: 2023/03/21

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Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

TEST SUMMARY

Bureau Veritas ID: BNK168
Sample ID: AEMP-US-01
Matrix: Water

Collected: 2023/03/12
Relinquished: 2023/03/13
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	A910215	N/A	2023/03/16	Taylor Mullings
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	A909765	N/A	2023/03/16	Darrus Ong
F1-BTEX	CALC/MS	A908200	N/A	2023/03/16	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	A907929	N/A	2023/03/17	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	A907930	N/A	2023/03/18	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	A910945	N/A	2023/03/16	Paolo Jose Geronimo
Carbon (DOC)	TECH	A910816	N/A	2023/03/16	Ming Dong
Conductivity @25C	COND	A910220	N/A	2023/03/16	Taylor Mullings
CCME Hydrocarbons in Water (F2; C10-C16)	GC/FID	A910233	2023/03/16	2023/03/16	Clujd Astudillo
Sulphide (as H2S)	CALC	A908201	N/A	2023/03/15	Automated Statchk
Hardness	CALC	A907933	N/A	2023/03/16	Automated Statchk
Mercury (Dissolved) by CV	CV	A912158	2023/03/17	2023/03/17	Kiran Kumari
Mercury (Total) by CV	CV	A910825	2023/03/16	2023/03/16	Kiran Kumari
Elements by ICP - Dissolved	ICPA	A910309	N/A	2023/03/15	Mohammad Pousti
Elements by ICP - Total	ICPA	A909617	2023/03/15	2023/03/15	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	A910295	N/A	2023/03/16	Mandeep Kaur
Elements by ICPMS - Total	ICPM	A909613	2023/03/15	2023/03/15	Jason Bao
Ion Balance	CALC	A908484	N/A	2023/03/16	Automated Statchk
Ammonia-N (Total)	KONE	A910303	N/A	2023/03/15	Adam Fishleigh
Nitrate and Nitrite	CALC	A908485	N/A	2023/03/15	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	A910236	N/A	2023/03/15	Adam Fishleigh
Nitrate (as N)	CALC	A907937	2023/03/15	2023/03/15	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	A906577	2023/03/16	2023/03/16	Junyan Ban
Benzo[a]pyrene Equivalency	GC/MSD	A908252	N/A	2023/03/17	Automated Statchk
PAH in Water by GC/MS	GC/MS	A910237	2023/03/16	2023/03/16	Nora Kazemian
Orthophosphate by Konelab	KONE	A910448	N/A	2023/03/15	Mary Anne Dela Cruz
Total Sulphide	SPEC	A910208	N/A	2023/03/15	Ly Vu
Total Dissolved Solids (Filt. Residue)	BAL	A909483	2023/03/15	2023/03/15	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	A908261	N/A	2023/03/16	Automated Statchk
Nitrogen (Total)	AC/COL	A911117	2023/03/16	2023/03/16	Carlo Truong
Carbon (Total Organic)	TECH	A911000	N/A	2023/03/16	Ming Dong

Bureau Veritas ID: BNK168 Dup
Sample ID: AEMP-US-01
Matrix: Water

Collected: 2023/03/12
Relinquished: 2023/03/13
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	A909765	N/A	2023/03/16	Darrus Ong
Chloride/Sulphate by Auto Colourimetry	KONE	A910945	N/A	2023/03/16	Paolo Jose Geronimo
Total Dissolved Solids (Filt. Residue)	BAL	A909483	2023/03/15	2023/03/15	Haydee Estilong

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Task Order#: PENDING, Line Item: 10
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TEST SUMMARY

Bureau Veritas ID: BNK169
Sample ID: AEMP-US-02
Matrix: Water

Collected: 2023/03/12
Relinquished: 2023/03/13
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	A910215	N/A	2023/03/16	Taylor Mullings
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	A909765	N/A	2023/03/16	Darrus Ong
F1-BTEX	CALC/MS	A908200	N/A	2023/03/16	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	A907929	N/A	2023/03/17	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	A907930	N/A	2023/03/18	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	A910943	N/A	2023/03/16	Paolo Jose Geronimo
Carbon (DOC)	TECH	A910816	N/A	2023/03/16	Ming Dong
Conductivity @25C	COND	A910220	N/A	2023/03/16	Taylor Mullings
CCME Hydrocarbons in Water (F2; C10-C16)	GC/FID	A910233	2023/03/16	2023/03/16	Clujd Astudillo
Sulphide (as H2S)	CALC	A908201	N/A	2023/03/15	Automated Statchk
Hardness	CALC	A907933	N/A	2023/03/16	Automated Statchk
Mercury (Dissolved) by CV	CV	A912158	2023/03/17	2023/03/17	Kiran Kumari
Mercury (Total) by CV	CV	A910825	2023/03/16	2023/03/16	Kiran Kumari
Elements by ICP - Dissolved	ICPA	A910309	N/A	2023/03/15	Mohammad Pousti
Elements by ICP - Total	ICPA	A909617	2023/03/15	2023/03/15	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	A910295	N/A	2023/03/16	Mandeep Kaur
Elements by ICPMS - Total	ICPM	A909613	2023/03/15	2023/03/15	Jason Bao
Ion Balance	CALC	A908484	N/A	2023/03/16	Automated Statchk
Ammonia-N (Total)	KONE	A910303	N/A	2023/03/15	Adam Fishleigh
Nitrate and Nitrite	CALC	A908485	N/A	2023/03/15	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	A910236	N/A	2023/03/15	Adam Fishleigh
Nitrate (as N)	CALC	A907937	2023/03/15	2023/03/15	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	A906577	2023/03/16	2023/03/16	Junyan Ban
Benzo[a]pyrene Equivalency	GC/MSD	A908252	N/A	2023/03/17	Automated Statchk
PAH in Water by GC/MS	GC/MS	A910237	2023/03/16	2023/03/16	Nora Kazemian
Orthophosphate by Konelab	KONE	A910448	N/A	2023/03/15	Mary Anne Dela Cruz
Total Sulphide	SPEC	A910208	N/A	2023/03/15	Ly Vu
Total Dissolved Solids (Filt. Residue)	BAL	A909483	2023/03/15	2023/03/15	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	A908261	N/A	2023/03/16	Automated Statchk
Nitrogen (Total)	AC/COL	A911117	2023/03/16	2023/03/16	Carlo Truong
Carbon (Total Organic)	TECH	A911000	N/A	2023/03/16	Ming Dong

Bureau Veritas ID: BNK170
Sample ID: AEMP-DS-04
Matrix: Water

Collected: 2023/03/11
Relinquished: 2023/03/13
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	A910215	N/A	2023/03/16	Taylor Mullings
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	A909765	N/A	2023/03/16	Darrus Ong
F1-BTEX	CALC/MS	A908200	N/A	2023/03/16	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	A907929	N/A	2023/03/17	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	A907930	N/A	2023/03/18	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	A910943	N/A	2023/03/16	Paolo Jose Geronimo
Carbon (DOC)	TECH	A914259	N/A	2023/03/20	Ming Dong

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Bureau Veritas Job #: C317379
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

TEST SUMMARY

Bureau Veritas ID: BNK170
Sample ID: AEMP-DS-04
Matrix: Water

Collected: 2023/03/11
Relinquished: 2023/03/13
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity @25C	COND	A910220	N/A	2023/03/16	Taylor Mullings
CCME Hydrocarbons in Water (F2; C10-C16)	GC/FID	A910233	2023/03/16	2023/03/16	Clujd Astudillo
Sulphide (as H2S)	CALC	A908201	N/A	2023/03/15	Automated Statchk
Hardness	CALC	A907933	N/A	2023/03/16	Automated Statchk
Mercury (Dissolved) by CV	CV	A912158	2023/03/17	2023/03/17	Kiran Kumari
Mercury (Total) by CV	CV	A910825	2023/03/16	2023/03/16	Kiran Kumari
Elements by ICP - Dissolved	ICPA	A910309	N/A	2023/03/15	Mohammad Pousti
Elements by ICP - Total	ICPA	A909617	2023/03/15	2023/03/15	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	A910295	N/A	2023/03/16	Mandeep Kaur
Elements by ICPMS - Total	ICPM	A909613	2023/03/15	2023/03/17	Jason Bao
Ion Balance	CALC	A908484	N/A	2023/03/16	Automated Statchk
Ammonia-N (Total)	KONE	A910303	N/A	2023/03/15	Adam Fishleigh
Nitrate and Nitrite	CALC	A908485	N/A	2023/03/15	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	A910236	N/A	2023/03/15	Adam Fishleigh
Nitrate (as N)	CALC	A907937	2023/03/15	2023/03/15	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	A906577	2023/03/16	2023/03/16	Junyan Ban
Benzo[a]pyrene Equivalency	GC/MSD	A908252	N/A	2023/03/17	Automated Statchk
PAH in Water by GC/MS	GC/MS	A910237	2023/03/16	2023/03/16	Nora Kazemian
Orthophosphate by Konelab	KONE	A910448	N/A	2023/03/15	Mary Anne Dela Cruz
Total Sulphide	SPEC	A910221	N/A	2023/03/15	Ly Vu
Total Dissolved Solids (Filt. Residue)	BAL	A909483	2023/03/15	2023/03/15	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	A908261	N/A	2023/03/16	Automated Statchk
Nitrogen (Total)	AC/COL	A911117	2023/03/16	2023/03/16	Carlo Truong
Carbon (Total Organic)	TECH	A914095	N/A	2023/03/20	Ming Dong

Bureau Veritas ID: BNK170 Dup
Sample ID: AEMP-DS-04
Matrix: Water

Collected: 2023/03/11
Relinquished: 2023/03/13
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbon (DOC)	TECH	A914259	N/A	2023/03/20	Ming Dong
Mercury (Dissolved) by CV	CV	A912158	2023/03/17	2023/03/17	Kiran Kumari

Bureau Veritas ID: BNK171
Sample ID: AEMP-DS-05
Matrix: Water

Collected: 2023/03/11
Relinquished: 2023/03/13
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	A910215	N/A	2023/03/16	Taylor Mullings
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	A909765	N/A	2023/03/16	Darrus Ong
F1-BTEX	CALC/MS	A908200	N/A	2023/03/16	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	A907929	N/A	2023/03/17	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	A907930	N/A	2023/03/18	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	A910943	N/A	2023/03/16	Paolo Jose Geronimo

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Report Date: 2023/03/21

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Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

TEST SUMMARY

Bureau Veritas ID: BNK171
Sample ID: AEMP-DS-05
Matrix: Water

Collected: 2023/03/11
Relinquished: 2023/03/13
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbon (DOC)	TECH	A914259	N/A	2023/03/20	Ming Dong
Conductivity @25C	COND	A910220	N/A	2023/03/16	Taylor Mullings
CCME Hydrocarbons in Water (F2; C10-C16)	GC/FID	A910233	2023/03/16	2023/03/16	Clujd Astudillo
Sulphide (as H2S)	CALC	A908201	N/A	2023/03/15	Automated Statchk
Hardness	CALC	A907933	N/A	2023/03/16	Automated Statchk
Mercury (Dissolved) by CV	CV	A912158	2023/03/17	2023/03/17	Kiran Kumari
Mercury (Total) by CV	CV	A910825	2023/03/16	2023/03/16	Kiran Kumari
Elements by ICP - Dissolved	ICPA	A910309	N/A	2023/03/15	Mohammad Pousti
Elements by ICP - Total	ICPA	A909617	2023/03/15	2023/03/15	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	A910295	N/A	2023/03/16	Mandeep Kaur
Elements by ICPMS - Total	ICPM	A909613	2023/03/15	2023/03/15	Jason Bao
Ion Balance	CALC	A908484	N/A	2023/03/16	Automated Statchk
Ammonia-N (Total)	KONE	A910303	N/A	2023/03/15	Adam Fishleigh
Nitrate and Nitrite	CALC	A908485	N/A	2023/03/15	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	A910236	N/A	2023/03/15	Adam Fishleigh
Nitrate (as N)	CALC	A907937	2023/03/15	2023/03/15	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	A906577	2023/03/16	2023/03/16	Junyan Ban
Benzo[a]pyrene Equivalency	GC/MSD	A908252	N/A	2023/03/17	Automated Statchk
PAH in Water by GC/MS	GC/MS	A910237	2023/03/16	2023/03/16	Nora Kazemian
Orthophosphate by Konelab	KONE	A910448	N/A	2023/03/15	Mary Anne Dela Cruz
Total Sulphide	SPEC	A910221	N/A	2023/03/15	Ly Vu
Total Dissolved Solids (Filt. Residue)	BAL	A909483	2023/03/15	2023/03/15	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	A908261	N/A	2023/03/16	Automated Statchk
Nitrogen (Total)	AC/COL	A911117	2023/03/16	2023/03/16	Carlo Truong
Carbon (Total Organic)	TECH	A914095	N/A	2023/03/20	Ming Dong

Bureau Veritas ID: BNK171 Dup
Sample ID: AEMP-DS-05
Matrix: Water

Collected: 2023/03/11
Relinquished: 2023/03/13
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury (Total) by CV	CV	A910825	2023/03/16	2023/03/16	Kiran Kumari

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GENERAL COMMENTS

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

Package 1	3.7°C

Note: C of C information incomplete; Task Order was not provided on the Chain of Custody. Alex Haigh was notified via email and the lab proceeded with the analysis.

Temperatures upon receipt at Bureau Veritas Labs Calgary
Package 1: 2 degrees C
Each temperature is the average of up to three cooler temperatures taken at receipt.

Sample BNK170 [AEMP-DS-04] : NO2 (N); NO2 (N) + NO3 (N) in Water completed within five days of sampling. Data is satisfactory for compliance purposes. Orthophosphate by Konelab completed within five days of sampling. Data is satisfactory for compliance purposes.

Sample BNK171 [AEMP-DS-05] : NO2 (N); NO2 (N) + NO3 (N) in Water completed within five days of sampling. Data is satisfactory for compliance purposes. Orthophosphate by Konelab completed within five days of sampling. Data is satisfactory for compliance purposes.

Sample BNK169, Elements by ICPMS - Dissolved: Test repeated.
Sample BNK170, Elements by ICPMS - Dissolved: Test repeated.
Sample BNK170, Elements by ICP - Dissolved: Test repeated.

Results relate only to the items tested.

Bureau Veritas Job #: C317379
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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A906577	JB9	Method Blank	Total Oil and grease	2023/03/16	<2.0		mg/L	
A909483	HE1	Method Blank	Total Dissolved Solids	2023/03/15	<10		mg/L	
A909613	JAB	Method Blank	Total Aluminum (Al)	2023/03/15	<0.0030		mg/L	
			Total Chromium (Cr)	2023/03/15	<0.0010		mg/L	
			Total Cobalt (Co)	2023/03/15	<0.00030		mg/L	
			Total Copper (Cu)	2023/03/15	<0.0010		mg/L	
			Total Lead (Pb)	2023/03/15	<0.00020		mg/L	
			Total Antimony (Sb)	2023/03/15	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/03/15	<0.00020		mg/L	
			Total Nickel (Ni)	2023/03/15	<0.00050		mg/L	
			Total Selenium (Se)	2023/03/15	<0.00020		mg/L	
			Total Silver (Ag)	2023/03/15	<0.00010		mg/L	
			Total Arsenic (As)	2023/03/15	<0.00020		mg/L	
			Total Thallium (Tl)	2023/03/15	<0.00020		mg/L	
			Total Tin (Sn)	2023/03/15	<0.0010		mg/L	
			Total Titanium (Ti)	2023/03/15	<0.0010		mg/L	
			Total Uranium (U)	2023/03/15	<0.00010		mg/L	
			Total Vanadium (V)	2023/03/15	<0.0010		mg/L	
			Total Zinc (Zn)	2023/03/15	<0.0030		mg/L	
			Total Beryllium (Be)	2023/03/15	<0.0010		mg/L	
A909617	MPU	Method Blank	Total Iron (Fe)	2023/03/15	<0.060		mg/L	
			Total Lithium (Li)	2023/03/15	<0.020		mg/L	
			Total Magnesium (Mg)	2023/03/15	<0.20		mg/L	
			Total Manganese (Mn)	2023/03/15	<0.0040		mg/L	
			Total Potassium (K)	2023/03/15	<0.30		mg/L	
			Total Sodium (Na)	2023/03/15	<0.50		mg/L	
			Total Strontium (Sr)	2023/03/15	<0.020		mg/L	
			Total Sulphur (S)	2023/03/15	<0.20		mg/L	
			Total Phosphorus (P)	2023/03/15	<0.10		mg/L	
			Total Barium (Ba)	2023/03/15	<0.010		mg/L	
			Total Silicon (Si)	2023/03/15	<0.50		mg/L	
			Total Boron (B)	2023/03/15	<0.020		mg/L	
			Total Calcium (Ca)	2023/03/15	<0.30		mg/L	
A909765	DO1	Method Blank	1,4-Difluorobenzene (sur.)	2023/03/16		101	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/03/16		94	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/03/16		94	%	50 - 140
			Benzene	2023/03/16	<0.00040		mg/L	
			Toluene	2023/03/16	<0.00040		mg/L	
			Ethylbenzene	2023/03/16	<0.00040		mg/L	
			m & p-Xylene	2023/03/16	<0.00080		mg/L	
			o-Xylene	2023/03/16	<0.00040		mg/L	
			F1 (C6-C10)	2023/03/16	<0.10		mg/L	
A910208	LYV	Method Blank	Total Sulphide	2023/03/15	<0.0018		mg/L	
A910215	TMU	Method Blank	Alkalinity (Total as CaCO3)	2023/03/16	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/03/16	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/03/16	<1.0		mg/L	
			Carbonate (CO3)	2023/03/16	<1.0		mg/L	
			Hydroxide (OH)	2023/03/16	<1.0		mg/L	
A910220	TMU	Method Blank	Conductivity	2023/03/16	<2.0		uS/cm	
A910221	LYV	Method Blank	Total Sulphide	2023/03/15	<0.0018		mg/L	
A910233	CAU	Method Blank	O-TERPHENYL (sur.)	2023/03/16		90	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/03/16	<0.10		mg/L	

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Site Location: NORMAN WELLS, NT
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A910236	AFI	Method Blank	Nitrite (N)	2023/03/15	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/03/15	<0.010		mg/L	
A910237	NK3	Method Blank	D10-ANTHRACENE (sur.)	2023/03/16		118	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/03/16		129	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/03/16		122	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/03/16		87	%	50 - 130
			Acenaphthene	2023/03/16	<0.00010		mg/L	
			Acenaphthylene	2023/03/16	<0.00010		mg/L	
			Acridine	2023/03/16	<0.000040		mg/L	
			Anthracene	2023/03/16	<0.000010		mg/L	
			Benzo(a)anthracene	2023/03/16	<0.0000085		mg/L	
			Benzo(b&j)fluoranthene	2023/03/16	<0.0000085		mg/L	
			Benzo(k)fluoranthene	2023/03/16	<0.0000085		mg/L	
			Benzo(g,h,i)perylene	2023/03/16	<0.0000085		mg/L	
			Benzo(c)phenanthrene	2023/03/16	<0.000050		mg/L	
			Benzo(a)pyrene	2023/03/16	<0.0000075		mg/L	
			Benzo(e)pyrene	2023/03/16	<0.000050		mg/L	
			Chrysene	2023/03/16	<0.0000085		mg/L	
			Dibenz(a,h)anthracene	2023/03/16	<0.0000075		mg/L	
			Fluoranthene	2023/03/16	<0.000010		mg/L	
			Fluorene	2023/03/16	<0.000050		mg/L	
			Indeno(1,2,3-cd)pyrene	2023/03/16	<0.0000085		mg/L	
			1-Methylnaphthalene	2023/03/16	<0.00010		mg/L	
			2-Methylnaphthalene	2023/03/16	<0.00010		mg/L	
			Naphthalene	2023/03/16	<0.00010		mg/L	
			Phenanthrene	2023/03/16	<0.000050		mg/L	
			Perylene	2023/03/16	<0.000050		mg/L	
			Pyrene	2023/03/16	<0.000020		mg/L	
			Quinoline	2023/03/16	<0.00020		mg/L	
A910295	MKJ	Method Blank	Dissolved Aluminum (Al)	2023/03/16	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/03/16	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/03/16	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/03/16	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/03/16	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/03/16	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/03/16	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/03/16	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/03/16	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/03/16	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/03/16	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/03/16	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/03/16	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/03/16	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/03/16	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/03/16	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/03/16	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/03/16	<0.0010		mg/L	
A910303	AFI	Method Blank	Total Ammonia (N)	2023/03/15	<0.015		mg/L	
A910309	MPU	Method Blank	Dissolved Iron (Fe)	2023/03/15	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/03/15	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/03/15	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/03/15	<0.0040		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Potassium (K)	2023/03/15	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/03/15	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/03/15	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/03/15	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/03/15	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/03/15	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/03/15	<0.50		mg/L	
			Dissolved Boron (B)	2023/03/15	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/03/15	<0.30		mg/L	
A910448	MAP	Method Blank	Orthophosphate (P)	2023/03/15	<0.0030		mg/L	
A910816	MDO	Method Blank	Dissolved Organic Carbon (C)	2023/03/16	<0.50		mg/L	
A910825	KKM	Method Blank	Total Mercury (Hg)	2023/03/16	<0.0019		ug/L	
A910943	GPJ	Method Blank	Chloride (Cl)	2023/03/16	<1.0		mg/L	
			Sulphate (SO4)	2023/03/16	<1.0		mg/L	
A910945	GPJ	Method Blank	Chloride (Cl)	2023/03/16	<1.0		mg/L	
			Sulphate (SO4)	2023/03/16	<1.0		mg/L	
A911000	MDO	Method Blank	Total Organic Carbon (C)	2023/03/16	<0.50		mg/L	
A911117	CTU	Method Blank	Total Nitrogen (N)	2023/03/16	<0.020		mg/L	
A911988	PC5	Method Blank	Dissolved Sulphur (S)	2023/03/17	<0.20		mg/L	
A912158	KKM	Method Blank	Dissolved Mercury (Hg)	2023/03/17	<0.0019		ug/L	
A913451	JAB	Method Blank	Dissolved Copper (Cu)	2023/03/19	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/03/19	<0.0030		mg/L	
A914095	MDO	Method Blank	Total Organic Carbon (C)	2023/03/20	<0.50		mg/L	
A914259	MDO	Method Blank	Dissolved Organic Carbon (C)	2023/03/20	<0.50		mg/L	
A909483	HE1	RPD [BNK168-02]	Total Dissolved Solids	2023/03/15	6.5		%	20
A909765	DO1	RPD [BNK168-09]	Benzene	2023/03/16	NC		%	30
			Toluene	2023/03/16	NC		%	30
			Ethylbenzene	2023/03/16	NC		%	30
			m & p-Xylene	2023/03/16	NC		%	30
			o-Xylene	2023/03/16	NC		%	30
			F1 (C6-C10)	2023/03/16	NC		%	30
A910945	GPJ	RPD [BNK168-01]	Chloride (Cl)	2023/03/16	1.9		%	20
			Sulphate (SO4)	2023/03/16	0.82		%	20
A912158	KKM	RPD [BNK170-13]	Dissolved Mercury (Hg)	2023/03/17	NC		%	20
A914259	MDO	RPD [BNK170-04]	Dissolved Organic Carbon (C)	2023/03/20	1.3		%	20
A910825	KKM	RPD [BNK171-12]	Total Mercury (Hg)	2023/03/16	NC		%	20
A909483	HE1	Matrix Spike [BNK169-02]	Total Dissolved Solids	2023/03/15		94	%	80 - 120
A909613	JAB	Matrix Spike [BNK170-05]	Total Aluminum (Al)	2023/03/17		107	%	80 - 120
			Total Chromium (Cr)	2023/03/17		108	%	80 - 120
			Total Cobalt (Co)	2023/03/17		110	%	80 - 120
			Total Copper (Cu)	2023/03/17		107	%	80 - 120
			Total Lead (Pb)	2023/03/17		109	%	80 - 120
			Total Antimony (Sb)	2023/03/17		120	%	80 - 120
			Total Molybdenum (Mo)	2023/03/17		115	%	80 - 120
			Total Nickel (Ni)	2023/03/17		106	%	80 - 120
			Total Selenium (Se)	2023/03/17		121 (1)	%	80 - 120
			Total Silver (Ag)	2023/03/17		110	%	80 - 120
			Total Arsenic (As)	2023/03/17		107	%	80 - 120
			Total Thallium (Tl)	2023/03/17		110	%	80 - 120
			Total Tin (Sn)	2023/03/17		113	%	80 - 120
			Total Titanium (Ti)	2023/03/17		109	%	80 - 120
			Total Uranium (U)	2023/03/17		109	%	80 - 120

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Bureau Veritas Job #: C317379
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Vanadium (V)	2023/03/17		110	%	80 - 120
			Total Zinc (Zn)	2023/03/17		108	%	80 - 120
			Total Beryllium (Be)	2023/03/17		95	%	80 - 120
A909765	DO1	Matrix Spike [BNK169-09]	1,4-Difluorobenzene (sur.)	2023/03/16		101	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/03/16		98	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/03/16		94	%	50 - 140
			Benzene	2023/03/16		86	%	50 - 140
			Toluene	2023/03/16		93	%	50 - 140
			Ethylbenzene	2023/03/16		93	%	50 - 140
			m & p-Xylene	2023/03/16		96	%	50 - 140
			o-Xylene	2023/03/16		98	%	50 - 140
			F1 (C6-C10)	2023/03/16		115	%	60 - 140
A910825	KKM	Matrix Spike [BNK169-12]	Total Mercury (Hg)	2023/03/16		113	%	80 - 120
A910945	GPJ	Matrix Spike [BNK168-01]	Chloride (Cl)	2023/03/16		103	%	80 - 120
			Sulphate (SO4)	2023/03/16		96	%	80 - 120
A914259	MDO	Matrix Spike [BNK170-04]	Dissolved Organic Carbon (C)	2023/03/20		86	%	80 - 120
A906577	JB9	LCS	Total Oil and grease	2023/03/16		110	%	70 - 130
A909483	HE1	LCS	Total Dissolved Solids	2023/03/15		101	%	80 - 120
A909613	JAB	LCS	Total Aluminum (Al)	2023/03/15		100	%	80 - 120
			Total Chromium (Cr)	2023/03/15		109	%	80 - 120
			Total Cobalt (Co)	2023/03/15		109	%	80 - 120
			Total Copper (Cu)	2023/03/15		111	%	80 - 120
			Total Lead (Pb)	2023/03/15		113	%	80 - 120
			Total Antimony (Sb)	2023/03/15		117	%	80 - 120
			Total Molybdenum (Mo)	2023/03/15		112	%	80 - 120
			Total Nickel (Ni)	2023/03/15		110	%	80 - 120
			Total Selenium (Se)	2023/03/15		117	%	80 - 120
			Total Silver (Ag)	2023/03/15		111	%	80 - 120
			Total Arsenic (As)	2023/03/15		105	%	80 - 120
			Total Thallium (Tl)	2023/03/15		115	%	80 - 120
			Total Tin (Sn)	2023/03/15		108	%	80 - 120
			Total Titanium (Ti)	2023/03/15		107	%	80 - 120
			Total Uranium (U)	2023/03/15		112	%	80 - 120
			Total Vanadium (V)	2023/03/15		107	%	80 - 120
			Total Zinc (Zn)	2023/03/15		106	%	80 - 120
			Total Beryllium (Be)	2023/03/15		96	%	80 - 120
A909617	MPU	LCS	Total Iron (Fe)	2023/03/15		97	%	80 - 120
			Total Lithium (Li)	2023/03/15		112	%	80 - 120
			Total Magnesium (Mg)	2023/03/15		100	%	80 - 120
			Total Manganese (Mn)	2023/03/15		102	%	80 - 120
			Total Potassium (K)	2023/03/15		103	%	80 - 120
			Total Sodium (Na)	2023/03/15		107	%	80 - 120
			Total Strontium (Sr)	2023/03/15		103	%	80 - 120
			Total Sulphur (S)	2023/03/15		97	%	80 - 120
			Total Phosphorus (P)	2023/03/15		93	%	80 - 120
			Total Barium (Ba)	2023/03/15		108	%	80 - 120
			Total Silicon (Si)	2023/03/15		101	%	80 - 120
			Total Boron (B)	2023/03/15		100	%	80 - 120
			Total Calcium (Ca)	2023/03/15		103	%	80 - 120
A909765	DO1	LCS	1,4-Difluorobenzene (sur.)	2023/03/16		101	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/03/16		97	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/03/16		92	%	50 - 140

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Task Order#: PENDING, Line Item: 10
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Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzene	2023/03/16		87	%	60 - 130
			Toluene	2023/03/16		94	%	60 - 130
			Ethylbenzene	2023/03/16		94	%	60 - 130
			m & p-Xylene	2023/03/16		97	%	60 - 130
			o-Xylene	2023/03/16		98	%	60 - 130
			F1 (C6-C10)	2023/03/16		107	%	60 - 140
A910208	LYV	LCS	Total Sulphide	2023/03/15		96	%	80 - 120
A910215	TMU	LCS	Alkalinity (Total as CaCO3)	2023/03/15		100	%	80 - 120
A910220	TMU	LCS	Conductivity	2023/03/15		100	%	90 - 110
A910221	LYV	LCS	Total Sulphide	2023/03/15		95	%	80 - 120
A910233	CAU	LCS	O-TERPHENYL (sur.)	2023/03/16		89	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/03/16		93	%	60 - 140
A910236	AFI	LCS	Nitrite (N)	2023/03/15		100	%	80 - 120
			Nitrate plus Nitrite (N)	2023/03/15		104	%	80 - 120
A910237	NK3	LCS	D10-ANTHRACENE (sur.)	2023/03/16		117	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/03/16		122	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/03/16		120	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/03/16		99	%	50 - 130
			Acenaphthene	2023/03/16		82	%	50 - 130
			Acenaphthylene	2023/03/16		89	%	50 - 130
			Acridine	2023/03/16		88	%	50 - 130
			Anthracene	2023/03/16		93	%	50 - 130
			Benzo(a)anthracene	2023/03/16		111	%	50 - 130
			Benzo(b&j)fluoranthene	2023/03/16		102	%	50 - 130
			Benzo(k)fluoranthene	2023/03/16		94	%	50 - 130
			Benzo(g,h,i)perylene	2023/03/16		100	%	50 - 130
			Benzo(c)phenanthrene	2023/03/16		111	%	50 - 130
			Benzo(a)pyrene	2023/03/16		102	%	50 - 130
			Benzo(e)pyrene	2023/03/16		93	%	50 - 130
			Chrysene	2023/03/16		102	%	50 - 130
			Dibenz(a,h)anthracene	2023/03/16		103	%	50 - 130
			Fluoranthene	2023/03/16		101	%	50 - 130
			Fluorene	2023/03/16		93	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/03/16		106	%	50 - 130
			1-Methylnaphthalene	2023/03/16		66	%	50 - 130
			2-Methylnaphthalene	2023/03/16		81	%	50 - 130
			Naphthalene	2023/03/16		78	%	50 - 130
			Phenanthrene	2023/03/16		92	%	50 - 130
			Perylene	2023/03/16		92	%	50 - 130
			Pyrene	2023/03/16		100	%	50 - 130
			Quinoline	2023/03/16		74	%	50 - 130
A910295	MKJ	LCS	Dissolved Aluminum (Al)	2023/03/16		117	%	80 - 120
			Dissolved Chromium (Cr)	2023/03/16		106	%	80 - 120
			Dissolved Cobalt (Co)	2023/03/16		104	%	80 - 120
			Dissolved Copper (Cu)	2023/03/16		102	%	80 - 120
			Dissolved Lead (Pb)	2023/03/16		100	%	80 - 120
			Dissolved Antimony (Sb)	2023/03/16		110	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/03/16		105	%	80 - 120
			Dissolved Nickel (Ni)	2023/03/16		102	%	80 - 120
			Dissolved Selenium (Se)	2023/03/16		112	%	80 - 120
			Dissolved Silver (Ag)	2023/03/16		100	%	80 - 120
			Dissolved Arsenic (As)	2023/03/16		99	%	80 - 120

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Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Thallium (Tl)	2023/03/16		103	%	80 - 120
			Dissolved Tin (Sn)	2023/03/16		102	%	80 - 120
			Dissolved Titanium (Ti)	2023/03/16		110	%	80 - 120
			Dissolved Uranium (U)	2023/03/16		98	%	80 - 120
			Dissolved Vanadium (V)	2023/03/16		107	%	80 - 120
			Dissolved Zinc (Zn)	2023/03/16		106	%	80 - 120
			Dissolved Beryllium (Be)	2023/03/16		89	%	80 - 120
A910303	AFI	LCS	Total Ammonia (N)	2023/03/15		98	%	80 - 120
A910309	MPU	LCS	Dissolved Iron (Fe)	2023/03/15		95	%	80 - 120
			Dissolved Lithium (Li)	2023/03/15		111	%	80 - 120
			Dissolved Magnesium (Mg)	2023/03/15		100	%	80 - 120
			Dissolved Manganese (Mn)	2023/03/15		101	%	80 - 120
			Dissolved Potassium (K)	2023/03/15		102	%	80 - 120
			Dissolved Sodium (Na)	2023/03/15		106	%	80 - 120
			Dissolved Strontium (Sr)	2023/03/15		102	%	80 - 120
			Dissolved Sulphur (S)	2023/03/15		94	%	80 - 120
			Dissolved Phosphorus (P)	2023/03/15		93	%	80 - 120
			Dissolved Barium (Ba)	2023/03/15		107	%	80 - 120
			Dissolved Silicon (Si)	2023/03/15		97	%	80 - 120
			Dissolved Boron (B)	2023/03/15		98	%	80 - 120
			Dissolved Calcium (Ca)	2023/03/15		103	%	80 - 120
A910448	MAP	LCS	Orthophosphate (P)	2023/03/15		99	%	80 - 120
A910816	MDO	LCS	Dissolved Organic Carbon (C)	2023/03/16		106	%	80 - 120
A910825	KKM	LCS	Total Mercury (Hg)	2023/03/16		99	%	80 - 120
A910943	GPJ	LCS	Chloride (Cl)	2023/03/16		103	%	80 - 120
			Sulphate (SO4)	2023/03/16		100	%	80 - 120
A910945	GPJ	LCS	Chloride (Cl)	2023/03/16		103	%	80 - 120
			Sulphate (SO4)	2023/03/16		100	%	80 - 120
A911000	MDO	LCS	Total Organic Carbon (C)	2023/03/16		101	%	80 - 120
A911117	CTU	LCS	Total Nitrogen (N)	2023/03/16		100	%	80 - 120
A911988	PC5	LCS	Dissolved Sulphur (S)	2023/03/17		98	%	80 - 120
A912158	KKM	LCS	Dissolved Mercury (Hg)	2023/03/17		108	%	80 - 120
A913451	JAB	LCS	Dissolved Copper (Cu)	2023/03/19		96	%	80 - 120
			Dissolved Zinc (Zn)	2023/03/19		92	%	80 - 120
A914095	MDO	LCS	Total Organic Carbon (C)	2023/03/20		111	%	80 - 120
A914259	MDO	LCS	Dissolved Organic Carbon (C)	2023/03/20		112	%	80 - 120
A911117	CTU	SRM	Total Nitrogen (N)	2023/03/16		101	%	80 - 120

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.

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

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

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

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

NC (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.

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Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

VALIDATION SIGNATURE PAGE

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

Janet Gao, B.Sc., QP, Supervisor, Organics

Luba Shymushovska, B.Sc., QP, Senior Analyst, Organics

Sandy Yuan, M.Sc., QP, Scientific Specialist

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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Maxxam
A Bureau Veritas Group Company

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AMY 269

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 292857

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: Alex Haigh
Address: 150, 205 Quarry Park Blvd SE Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Sampler Name (Print): Alex Haigh | Stacy Gibb

REPORT INFORMATION

Company Name: Advisian
Contact Name: Alex Haigh
Address: 150, 205 Quarry Park Blvd SE Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Consultant Project #: ~~42051~~ 417085-42051-22200

ANALYSIS REQUESTED

	FIELD SAMPLE ID	MATRIX: GROUND WATER	SURFACE WATER	SOIL	OTHER	# CONTAINERS	SAMPLING: DATE (YYYY/MM/DD)	TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-2 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☒ DIS ☐	MERCURY TOTAL ☐ DISSOLVED ☒	SALINITY SOIL	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	NITRATE NITRITE, NO_2+NO_3, TKN	Total Sulphide	Oil + Grease	Carbon - TOC, DOC	Ammonia, Orthophosphate	Total + Dissolved Sulphur	Limited Sample	Samples may contain air
1	AEMP-US-01		X			15	2023/03/12	16:30	X			X	X							X	X					X		X	X	X	X	X	X	X
2	AEMP-US-02		X			15	"	13:30	X			X	X							X	X					X		X	X	X	X	X	X	X
3	AEMP-DS-04		X			15	2023/03/11	1500	X			X	X							X	X					X		X	X	X	X	X	X	X
4	AEMP-DS-05		X			15	"	1330	X			X	X							X	X					X		X	X	X	X	X	X	X
5																																		
6																																		
7																																		
8																																		
9																																		
10																																		

IOL SITE LOCATION: Norman Wells, NT
IOL PROJECT # (if applicable): NA
MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-42051-22200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) FAL ☐ Other

SPECIAL INSTRUCTIONS: email canada.chemistry@wooley.com cacal.ior data track @wooley.com
~~#~~ IES A2601436

JARS USED & NOT SUBMITTED (Enter N/A for Water): NA

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID #			
SEAL PRESENT	✓		TEMP °C	5	4 (2)	2 (3)
SEAL INTACT	✓					
COOLING MEDIA PRESENT	✓					

	YES	NO	COOLER ID # FMCAL			
SEAL PRESENT	✓		TEMP °C	2 (1)	2 (2)	2 (3)
SEAL INTACT	✓					
COOLING MEDIA PRESENT	✓					

	YES	NO	COOLER ID #			
SEAL PRESENT			TEMP °C	(1)	(2)	(3)
SEAL INTACT						
COOLING MEDIA PRESENT						

LAB USE ONLY
MAXXAM JOB # C317379

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1.	Alex Haigh	2023/03/13	0900	1. Deji Wu		2023/03/14	10:28
2. Alana M	Alana Morrison	2023/03/14	11:20	2.	Spencley D'Thomas	2023/03/15	08:40
3.				3.			

SAMPLES
LABELED BY: AMY
VERIFIED BY: DW2

COC-1010 (06/2016) IOL-AB
White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-03-09/10
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C317382	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☒ **Yes** ☐ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☐ **Yes** ☒ **No**

If yes, FLAG type and comments*:*

Date samples submitted 2023-03-14

Due date for lab report on SRC 2023-03-21

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2023-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☒ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☒ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☒ **No**	Nitrite and orthophosphate
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☒ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☒ **No** ☐ **N/A**	Surrogate recovery – data meets acceptable criteria

Data check completed by Alex Haigh **Date** 2023-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	
Data check completed by	Alex Haigh	**Date** 2023-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☒ Yes	☐ No	☐ N/A	**Comments**
Trip Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Equipment Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes	☐ No	☒ N/A	**Comments**
Data check completed by	Alex Haigh			**Date** 2023-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field pH vs. Lab pH RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes	☐ No	☐ N/A	**Comments**
Data check completed by	Alex Haigh			**Date** 2023-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose?	☒ Yes	☐ No		
Explain rationale for yes/no:				
Request lab to recheck data? If so give details	☐ Yes	☒ No	☐ N/A	**Comments**
If Yes, Lab request to recheck must be approved by Project Manager Name:				**Date**
Data check completed by	Alex Haigh			**Date** 2023-03-26

Task Order#: PENDING
Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200
Your C.O.C. #: 292856

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/03/21
Report #: R3312793
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C317382
Received: 2023/03/14, 10:28

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	5	AB SOP-00005	SM 23 2320 B m
Send Part to Archive (1)	3		
BTEX/F1 in Water by HS GC/MS/FID (1)	5	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	5		Auto Calc
Cadmium - low level CCME - Dissolved (1)	5		Auto Calc
Cadmium - low level CCME (Total) (1)	5		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	5	AB SOP-00020	SM23-4500-Cl/SO4-E m
Carbon (DOC) (1, 2)	5	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	5	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 3)	5	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Sulphide (as H2S) (1)	5		Auto Calc
Hardness (1)	5		Auto Calc
Mercury (Dissolved) by CV (1, 4)	5	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV (1)	5	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 4)	5	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	5	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (1, 4)	5	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total (1)	5	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance (1)	5		Auto Calc
Ammonia-N (Total) (1)	5	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate and Nitrite (1)	5		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water (1)	5	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N) (1)	5		Auto Calc
Oil and Grease (Gravimetric, n-Hexane) (1)	5	AB SOP-00092	SM 23 5520B/5520F m
Benzo[a]pyrene Equivalency (1, 5)	5		Auto Calc
PAH in Water by GC/MS (1)	5	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270E m
Orthophosphate by Konelab (1, 6)	5	AB SOP-00025	SM 23 4500-P A,F m
Total Sulphide (1)	5	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue) (1)	5	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen (Total) (1)	5	BBY WI-00033	Auto Calc
Nitrogen (Total) (1)	5	AB SOP-00093	SM 24 4500-N C m

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Task Order#: PENDING
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Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200
Your C.O.C. #: 292856

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/03/21
Report #: R3312793
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C317382
Received: 2023/03/14, 10:28

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Laboratory Method	Analytical Method
Carbon (Total Organic) (1, 7)	5	AB SOP-00087	MMCW 119 1996 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* 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) Silica gel clean up employed.
(4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(6) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
(7) TOC present in the sample should be considered as non-purgeable TOC.

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Task Order#: PENDING
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Project #: 417085-42051-22200
Your C.O.C. #: 292856

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/03/21
Report #: R3312793
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CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C317382
Received: 2023/03/14, 10:28

Encryption Key

Namita Sahni
Customer Solutions Representative
21 Mar 2023 12:42:14

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614

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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 Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

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Bureau Veritas Job #: C317382
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

AT1 BTEX AND F1-F2 IN WATER (WATER)

Bureau Veritas ID		BNK177	BNK178	BNK179	BNK180	BNK181		
Sampling Date		2023/03/10 11:20	2023/03/10 11:28	2023/03/09 11:25	2023/03/09 12:30	2023/03/09 15:20		
COC Number		292856	292856	292856	292856	292856		
	UNITS	**AEMP-DS-06**	**AEMP-DUP 1**	**AEMP-DS-02**	**AEMP-DS-03**	**AEMP-US-03**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A908709
Volatiles								
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	A909765
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	A909765
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	A909765
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	A909765
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	A909765
Xylenes (Total)	mg/L	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	0.00089	A908200
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A908200
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A909765
Extraction Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	93	91	91	90	91		A908709
Instrument Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	103	103	103	104	104		A909765
4-Bromofluorobenzene (sur.	%	95	96	96	94	93		A909765
D4-1,2-Dichloroethane (sur.)	%	95	91	93	93	95		A909765
RDL = Reportable Detection Limit								

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Bureau Veritas Job #: C317382
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		BNK177	BNK178	BNK179	BNK180	BNK181		
Sampling Date		2023/03/10 11:20	2023/03/10 11:28	2023/03/09 11:25	2023/03/09 12:30	2023/03/09 15:20		
COC Number		292856	292856	292856	292856	292856		
	UNITS	**AEMP-DS-06**	**AEMP-DUP 1**	**AEMP-DS-02**	**AEMP-DS-03**	**AEMP-US-03**	**RDL**	**QC Batch**
Calculated Parameters								
Total Total Kjeldahl Nitrogen (Calc	mg/L	0.16	0.12	0.16	0.17	0.093	0.020	A908261
Nutrients								
Total Nitrogen (N)	mg/L	0.32	0.28	0.34	0.35	0.30	0.020	A911117
RDL = Reportable Detection Limit								

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Bureau Veritas Job #: C317382
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BNK177	BNK178	BNK179		BNK180		BNK181		
Sampling Date		2023/03/10 11:20	2023/03/10 11:28	2023/03/09 11:25		2023/03/09 12:30		2023/03/09 15:20		
COC Number		292856	292856	292856		292856		292856		
	UNITS	**AEMP-DS-06**	**AEMP-DUP 1**	**AEMP-DS-02**	**QC Batch**	**AEMP-DS-03**	**QC Batch**	**AEMP-US-03**	**RDL**	**QC Batch**
Elements										
Total Cadmium (Cd)	mg/L	0.000046	0.000025	0.000033	A907930	0.000097	A907930	0.000023	0.000020	A907930
Total Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	A910825	<0.0019	A910825	<0.0019	0.0019	A910825
Total Aluminum (Al)	mg/L	0.13	0.13	0.038	A909526	0.17	A909613	0.027	0.0030	A909526
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	A909526	<0.00060	A909613	<0.00060	0.00060	A909526
Total Arsenic (As)	mg/L	0.00043	0.00034	0.00023	A909526	0.00091	A909613	0.00024	0.00020	A909526
Total Barium (Ba)	mg/L	0.060	0.060	0.036	A909571	0.069	A909617	0.035	0.010	A909571
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	A909526	<0.0010	A909613	<0.0010	0.0010	A909526
Total Boron (B)	mg/L	<0.020	<0.020	<0.020	A909571	<0.020	A909617	<0.020	0.020	A909571
Total Calcium (Ca)	mg/L	43	44	26	A909571	45	A909617	26	0.30	A909571
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	0.0011	A909526	0.040	A909613	<0.0010	0.0010	A909526
Total Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	A909526	0.00055	A909613	<0.00030	0.00030	A909526
Total Copper (Cu)	mg/L	0.0033	0.0027	0.0013	A909526	0.0036	A909613	<0.0010	0.0010	A909526
Total Iron (Fe)	mg/L	0.12	0.12	<0.060	A909571	0.47	A909617	<0.060	0.060	A909571
Total Lead (Pb)	mg/L	0.00023	0.00022	0.00029	A909526	0.00063	A909613	<0.00020	0.00020	A909526
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	A909571	<0.020	A909617	<0.020	0.020	A909571
Total Magnesium (Mg)	mg/L	11	12	9.1	A909571	12	A909617	9.1	0.20	A909571
Total Manganese (Mn)	mg/L	<0.0040	<0.0040	<0.0040	A909571	0.011	A909617	<0.0040	0.0040	A909571
Total Molybdenum (Mo)	mg/L	0.0013	0.0010	0.00057	A909526	0.0027	A909613	0.00057	0.00020	A909526
Total Nickel (Ni)	mg/L	0.0023	0.0016	0.0012	A909526	0.022	A909613	0.00071	0.00050	A909526
Total Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	A909571	<0.10	A909617	<0.10	0.10	A909571
Total Potassium (K)	mg/L	1.2	1.2	0.85	A909571	1.2	A909617	0.80	0.30	A909571
Total Selenium (Se)	mg/L	0.00055	0.00050	<0.00020	A909526	0.00067	A909613	<0.00020	0.00020	A909526
Total Silicon (Si)	mg/L	2.3	2.3	1.6	A909571	2.5	A909617	1.5	0.50	A909571
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	A909526	<0.00010	A909613	<0.00010	0.00010	A909526
Total Sodium (Na)	mg/L	14	14	8.8	A909571	14	A909617	8.6	0.50	A909571
Total Strontium (Sr)	mg/L	0.30	0.29	0.21	A909571	0.32	A909617	0.21	0.020	A909571
Total Sulphur (S)	mg/L	15	15	8.4	A909571	15	A909617	8.5	0.20	A909571
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	A909526	<0.00020	A909613	<0.00020	0.00020	A909526
Total Tin (Sn)	mg/L	<0.0010	<0.0010	0.0013	A909526	<0.0010	A909613	<0.0010	0.0010	A909526
Total Titanium (Ti)	mg/L	0.0025	0.0034	<0.0010	A909526	0.0026	A909613	<0.0010	0.0010	A909526
Total Uranium (U)	mg/L	0.0010	0.00099	0.00047	A909526	0.0013	A909613	0.00046	0.00010	A909526
RDL = Reportable Detection Limit										

Bureau Veritas Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Bureau Veritas Job #: C317382
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BNK177	BNK178	BNK179		BNK180		BNK181		
Sampling Date		2023/03/10 11:20	2023/03/10 11:28	2023/03/09 11:25		2023/03/09 12:30		2023/03/09 15:20		
COC Number		292856	292856	292856		292856		292856		
	UNITS	**AEMP-DS-06**	**AEMP-DUP 1**	**AEMP-DS-02**	**QC Batch**	**AEMP-DS-03**	**QC Batch**	**AEMP-US-03**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	0.0018	0.0017	0.0017	A909526	<0.0010	A909613	0.0010	0.0010	A909526
Total Zinc (Zn)	mg/L	<0.0030	0.0032	0.0042	A909526	0.0090	A909613	<0.0030	0.0030	A909526
RDL = Reportable Detection Limit										

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Bureau Veritas Job #: C317382
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Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BNK181		
Sampling Date		2023/03/09 15:20		
COC Number		292856		
	UNITS	**AEMP-US-03 Lab-Dup**	**RDL**	**QC Batch**
Elements				
Total Aluminum (Al)	mg/L	0.028	0.0030	A909526
Total Antimony (Sb)	mg/L	<0.00060	0.00060	A909526
Total Arsenic (As)	mg/L	0.00028	0.00020	A909526
Total Barium (Ba)	mg/L	0.034	0.010	A909571
Total Beryllium (Be)	mg/L	<0.0010	0.0010	A909526
Total Boron (B)	mg/L	<0.020	0.020	A909571
Total Calcium (Ca)	mg/L	25	0.30	A909571
Total Chromium (Cr)	mg/L	0.0014	0.0010	A909526
Total Cobalt (Co)	mg/L	<0.00030	0.00030	A909526
Total Copper (Cu)	mg/L	<0.0010	0.0010	A909526
Total Iron (Fe)	mg/L	<0.060	0.060	A909571
Total Lead (Pb)	mg/L	<0.00020	0.00020	A909526
Total Lithium (Li)	mg/L	<0.020	0.020	A909571
Total Magnesium (Mg)	mg/L	8.9	0.20	A909571
Total Manganese (Mn)	mg/L	<0.0040	0.0040	A909571
Total Molybdenum (Mo)	mg/L	0.00065	0.00020	A909526
Total Nickel (Ni)	mg/L	0.00093	0.00050	A909526
Total Phosphorus (P)	mg/L	<0.10	0.10	A909571
Total Potassium (K)	mg/L	0.83	0.30	A909571
Total Selenium (Se)	mg/L	<0.00020	0.00020	A909526
Total Silicon (Si)	mg/L	1.5	0.50	A909571
Total Silver (Ag)	mg/L	<0.00010	0.00010	A909526
Total Sodium (Na)	mg/L	8.4	0.50	A909571
Total Strontium (Sr)	mg/L	0.21	0.020	A909571
Total Sulphur (S)	mg/L	8.4	0.20	A909571
Total Thallium (Tl)	mg/L	<0.00020	0.00020	A909526
Total Tin (Sn)	mg/L	<0.0010	0.0010	A909526
Total Titanium (Ti)	mg/L	<0.0010	0.0010	A909526
Total Uranium (U)	mg/L	0.00053	0.00010	A909526
Total Vanadium (V)	mg/L	0.0010	0.0010	A909526

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C317382
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BNK181		
Sampling Date		2023/03/09 15:20		
COC Number		292856		
	UNITS	**AEMP-US-03 Lab-Dup**	**RDL**	**QC Batch**
Total Zinc (Zn)	mg/L	<0.0030	0.0030	A909526

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BNK177			BNK177			BNK178		
Sampling Date		2023/03/10 11:20			2023/03/10 11:20			2023/03/10 11:28		
COC Number		292856			292856			292856		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**	**AEMP-DS-06 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-DUP 1**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	170	0.50	A907933				170	0.50	A907933
Ion Balance (% Difference)	%	3.2	N/A	A908484				3.4	N/A	A908484
Nitrate (N)	mg/L	0.16	0.010	A908521				0.16	0.010	A908521
Nitrate (NO3)	mg/L	0.71	0.044	A908485				0.72	0.044	A908485
Nitrite (NO2)	mg/L	<0.033	0.033	A908485				<0.033	0.033	A908485
Sulphide (as H2S)	mg/L	<0.0020	0.0020	A908201				<0.0020	0.0020	A908201
Elements										
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	A907929				<0.000020	0.000020	A907929
Misc. Inorganics										
Conductivity	uS/cm	350	2.0	A910220				350	2.0	A910220
Dissolved Organic Carbon (C	mg/L	3.7	0.50	A910816				3.7	0.50	A910816
Total Organic Carbon (C)	mg/L	3.6	0.50	A911000				3.5	0.50	A911000
Total Dissolved Solids	mg/L	200	10	A909483				220	10	A909483
Anions										
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	A910215				<1.0	1.0	A910215
Alkalinity (Total as CaCO3)	mg/L	110	1.0	A910215				110	1.0	A910215
Bicarbonate (HCO3)	mg/L	140	1.0	A910215				130	1.0	A910215
Carbonate (CO3)	mg/L	<1.0	1.0	A910215				<1.0	1.0	A910215
Hydroxide (OH)	mg/L	<1.0	1.0	A910215				<1.0	1.0	A910215
Total Sulphide	mg/L	<0.0018	0.0018	A910221				<0.0018	0.0018	A910221
Chloride (Cl)	mg/L	17	1.0	A910943				18	1.0	A910943
Sulphate (SO4)	mg/L	51	1.0	A910943				51	1.0	A910943
Nutrients										
Total Ammonia (N)	mg/L	<0.015	0.015	A910303				<0.015	0.015	A910303
Orthophosphate (P)	mg/L	0.0034	0.0030	A910448				0.0031	0.0030	A910448
Nitrite (N)	mg/L	<0.010	0.010	A910236	<0.010	0.010	A910236	<0.010	0.010	A910236
Nitrate plus Nitrite (N)	mg/L	0.16	0.010	A910236	0.16	0.010	A910236	0.16	0.010	A910236
Misc. Organics										
Total Oil and grease	mg/L	<2.0	2.0	A906577				4.0	2.0	A906577

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

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Bureau Veritas Job #: C317382
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BNK179			BNK179			BNK180		
Sampling Date		2023/03/09 11:25			2023/03/09 11:25			2023/03/09 12:30		
COC Number		292856			292856			292856		
	UNITS	**AEMP-DS-02**	**RDL**	**QC Batch**	**AEMP-DS-02 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-DS-03**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	110	0.50	A907933				160	0.50	A908518
Ion Balance (% Difference)	%	2.1	N/A	A908484				0.0060	N/A	A908484
Nitrate (N)	mg/L	0.19	0.010	A908521				0.18	0.010	A908521
Nitrate (NO3)	mg/L	0.82	0.044	A908485				0.78	0.044	A908485
Nitrite (NO2)	mg/L	<0.033	0.033	A908485				<0.033	0.033	A908485
Sulphide (as H2S)	mg/L	<0.0020	0.0020	A908201				<0.0020	0.0020	A908201
Elements										
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	A907929				0.000024	0.000020	A907929
Misc. Inorganics										
Conductivity	uS/cm	230	2.0	A910220				360	2.0	A910220
Dissolved Organic Carbon (C	mg/L	2.1	0.50	A914259				4.2	0.50	A910816
Total Organic Carbon (C)	mg/L	2.1	0.50	A914095	2.1	0.50	A914095	4.0	0.50	A911000
Total Dissolved Solids	mg/L	120	10	A909483				210	10	A909483
Anions										
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	A910215				<1.0	1.0	A910215
Alkalinity (Total as CaCO3)	mg/L	78	1.0	A910215				120	1.0	A910215
Bicarbonate (HCO3)	mg/L	95	1.0	A910215				140	1.0	A910215
Carbonate (CO3)	mg/L	<1.0	1.0	A910215				<1.0	1.0	A910215
Hydroxide (OH)	mg/L	<1.0	1.0	A910215				<1.0	1.0	A910215
Total Sulphide	mg/L	<0.0018	0.0018	A910221				<0.0018	0.0018	A910221
Chloride (Cl)	mg/L	11	1.0	A910943				17	1.0	A910943
Sulphate (SO4)	mg/L	29	1.0	A910943				51	1.0	A910943
Nutrients										
Total Ammonia (N)	mg/L	<0.015	0.015	A910303				<0.015	0.015	A910303
Orthophosphate (P)	mg/L	<0.0030	0.0030	A910448				<0.0030	0.0030	A910448
Nitrite (N)	mg/L	<0.010	0.010	A910236				<0.010	0.010	A910236
Nitrate plus Nitrite (N)	mg/L	0.19	0.010	A910236				0.18	0.010	A910236
Misc. Organics										
Total Oil and grease	mg/L	5.0	2.0	A906577				4.0	2.0	A906577

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

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Bureau Veritas Job #: C317382
Report Date: 2023/03/21

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Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BNK181		
Sampling Date		2023/03/09 15:20		
COC Number		292856		
	UNITS	**AEMP-US-03**	**RDL**	**QC Batch**
Calculated Parameters				
Hardness (CaCO3)	mg/L	110	0.50	A908518
Ion Balance (% Difference)	%	3.7	N/A	A908484
Nitrate (N)	mg/L	0.20	0.010	A908521
Nitrate (NO3)	mg/L	0.90	0.044	A908485
Nitrite (NO2)	mg/L	<0.033	0.033	A908485
Sulphide (as H2S)	mg/L	<0.0020	0.0020	A908201
Elements				
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	A907929
Misc. Inorganics				
Conductivity	uS/cm	220	2.0	A910220
Dissolved Organic Carbon (C	mg/L	2.0	0.50	A910816
Total Organic Carbon (C)	mg/L	2.0	0.50	A911000
Total Dissolved Solids	mg/L	130	10	A909483
Anions				
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	A910215
Alkalinity (Total as CaCO3)	mg/L	74	1.0	A910215
Bicarbonate (HCO3)	mg/L	90	1.0	A910215
Carbonate (CO3)	mg/L	<1.0	1.0	A910215
Hydroxide (OH)	mg/L	<1.0	1.0	A910215
Total Sulphide	mg/L	<0.0018	0.0018	A910221
Chloride (Cl)	mg/L	9.8	1.0	A910943
Sulphate (SO4)	mg/L	28	1.0	A910943
Nutrients				
Total Ammonia (N)	mg/L	<0.015	0.015	A910303
Orthophosphate (P)	mg/L	<0.0030	0.0030	A910448
Nitrite (N)	mg/L	<0.010	0.010	A910236
Nitrate plus Nitrite (N)	mg/L	0.20	0.010	A910236
Misc. Organics				
Total Oil and grease	mg/L	4.0	2.0	A906577

RDL = Reportable Detection Limit
N/A = Not Applicable

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Bureau Veritas Job #: C317382
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Task Order#: PENDING, Line Item: 10
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Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BNK177	BNK178	BNK179	BNK180	BNK181		
Sampling Date		2023/03/10 11:20	2023/03/10 11:28	2023/03/09 11:25	2023/03/09 12:30	2023/03/09 15:20		
COC Number		292856	292856	292856	292856	292856		
	UNITS	**AEMP-DS-06**	**AEMP-DUP 1**	**AEMP-DS-02**	**AEMP-DS-03**	**AEMP-US-03**	**RDL**	**QC Batch**
Polycyclic Aromatics								
B[a]P TPE Total Potency Equivalent	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	A908252
Acenaphthene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A908623
Acenaphthylene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A908623
Acridine	mg/L	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	0.000040	A908623
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	A908623
Benzo(a)anthracene	mg/L	<0.0000085	<0.0000085	<0.0000085	<0.0000085	<0.0000085	0.0000085	A908623
Benzo(b&j)fluoranthene	mg/L	<0.0000085	<0.0000085	<0.0000085	<0.0000085	<0.0000085	0.0000085	A908623
Benzo(k)fluoranthene	mg/L	<0.0000085	<0.0000085	<0.0000085	<0.0000085	<0.0000085	0.0000085	A908623
Benzo(g,h,i)perylene	mg/L	<0.0000085	<0.0000085	<0.0000085	<0.0000085	<0.0000085	0.0000085	A908623
Benzo(c)phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	A908623
Benzo(a)pyrene	mg/L	<0.0000075	<0.0000075	<0.0000075	<0.0000075	<0.0000075	0.0000075	A908623
Benzo(e)pyrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	A908623
Chrysene	mg/L	<0.0000085	<0.0000085	<0.0000085	<0.0000085	<0.0000085	0.0000085	A908623
Dibenz(a,h)anthracene	mg/L	<0.0000075	<0.0000075	<0.0000075	<0.0000075	<0.0000075	0.0000075	A908623
Fluoranthene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	A908623
Fluorene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	A908623
Indeno(1,2,3-cd)pyrene	mg/L	<0.0000085	<0.0000085	<0.0000085	<0.0000085	<0.0000085	0.0000085	A908623
1-Methylnaphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A908623
2-Methylnaphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A908623
Naphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A908623
Phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	A908623
Perylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	A908623
Pyrene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000020	A908623
Quinoline	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	A908623
Extraction Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	117	120	118	110	118		A908623
D8-ACENAPHTHYLENE (sur.)	%	117	115	115	105	113		A908623
D8-NAPHTHALENE (sur.)	%	95	93	96	85	95		A908623
TERPHENYL-D14 (sur.)	%	118	125	119	123	124		A908623
RDL = Reportable Detection Limit								

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Bureau Veritas Job #: C317382
Report Date: 2023/03/21

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Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		BNK177		BNK178		BNK179	BNK180	BNK181		
Sampling Date		2023/03/10 11:20		2023/03/10 11:28		2023/03/09 11:25	2023/03/09 12:30	2023/03/09 15:20		
COC Number		292856		292856		292856	292856	292856		
	UNITS	**AEMP-DS-06**	**QC Batch**	**AEMP-DUP 1**	**QC Batch**	**AEMP-DS-02**	**AEMP-DS-03**	**AEMP-US-03**	**RDL**	**QC Batch**
Elements										
Dissolved Mercury (Hg)	ug/L	<0.0019	A912158	<0.0019	A911401	<0.0019	<0.0019	<0.0019	0.0019	A912158
RDL = Reportable Detection Limit										

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Advisian
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Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BNK177	BNK178	BNK179	BNK180	BNK181		
Sampling Date		2023/03/10 11:20	2023/03/10 11:28	2023/03/09 11:25	2023/03/09 12:30	2023/03/09 15:20		
COC Number		292856	292856	292856	292856	292856		
	UNITS	**AEMP-DS-06**	**AEMP-DUP 1**	**AEMP-DS-02**	**AEMP-DS-03**	**AEMP-US-03**	**RDL**	**QC Batch**
Elements								
Dissolved Aluminum (Al)	mg/L	0.0036	0.0044	0.0033	0.0075	0.012	0.0030	A910295
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	0.00060	A910295
Dissolved Arsenic (As)	mg/L	0.00024	0.00023	0.00030	0.00046	<0.00020	0.00020	A910295
Dissolved Barium (Ba)	mg/L	0.063	0.063	0.038	0.066	0.036	0.010	A910309
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	A910295
Dissolved Boron (B)	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	A910309
Dissolved Calcium (Ca)	mg/L	46	46	27	46	27	0.30	A910309
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0010	A910295
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	0.00052	<0.00030	<0.00030	0.00030	A910295
Dissolved Copper (Cu)	mg/L	<0.0010	0.0022	<0.0010	0.0018	<0.0010	0.0010	A910295
Dissolved Iron (Fe)	mg/L	<0.060	<0.060	<0.060	<0.060	<0.060	0.060	A910309
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	A910295
Dissolved Lithium (Li)	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	A910309
Dissolved Magnesium (Mg)	mg/L	12	12	9.7	12	9.6	0.20	A910309
Dissolved Manganese (Mn)	mg/L	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	A910309
Dissolved Molybdenum (Mo	mg/L	0.00095	0.0011	0.00053	0.0011	0.00051	0.00020	A910295
Dissolved Nickel (Ni)	mg/L	0.0011	0.0017	0.0011	0.0058	0.00074	0.00050	A910295
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A910309
Dissolved Potassium (K)	mg/L	1.2	1.1	0.89	1.2	0.86	0.30	A910309
Dissolved Selenium (Se)	mg/L	<0.00020	0.00037	<0.00020	0.00048	<0.00020	0.00020	A910295
Dissolved Silicon (Si)	mg/L	2.0	2.1	1.4	2.1	1.4	0.50	A910309
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	A910295
Dissolved Sodium (Na)	mg/L	15	15	9.3	14	9.0	0.50	A910309
Dissolved Strontium (Sr)	mg/L	0.32	0.32	0.23	0.32	0.23	0.020	A910309
Dissolved Sulphur (S)	mg/L	16	16	8.7	15	8.8	0.20	A910309
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	A910295
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	A910295
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	A910295
Dissolved Uranium (U)	mg/L	0.00079	0.00080	0.00013	0.00079	0.00041	0.00010	A910295
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	A910295
Dissolved Zinc (Zn)	mg/L	0.0058	<0.0030	0.0064	0.0036	<0.0030	0.0030	A910295
RDL = Reportable Detection Limit								

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Bureau Veritas Job #: C317382
Report Date: 2023/03/21

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Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

TEST SUMMARY

Bureau Veritas ID: BNK177
Sample ID: AEMP-DS-06
Matrix: Water

Collected: 2023/03/10
Relinquished: 2023/03/11
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	A910215	N/A	2023/03/16	Taylor Mullings
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	A909765	N/A	2023/03/16	Darrus Ong
F1-BTEX	CALC/MS	A908200	N/A	2023/03/16	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	A907929	N/A	2023/03/17	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	A907930	N/A	2023/03/16	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	A910943	N/A	2023/03/16	Paolo Jose Geronimo
Carbon (DOC)	TECH	A910816	N/A	2023/03/16	Ming Dong
Conductivity @25C	COND	A910220	N/A	2023/03/16	Taylor Mullings
CCME Hydrocarbons in Water (F2; C10-C16)	GC/FID	A908709	2023/03/15	2023/03/15	Vian Pereira
Sulphide (as H2S)	CALC	A908201	N/A	2023/03/15	Automated Statchk
Hardness	CALC	A907933	N/A	2023/03/16	Automated Statchk
Mercury (Dissolved) by CV	CV	A912158	2023/03/17	2023/03/17	Kiran Kumari
Mercury (Total) by CV	CV	A910825	2023/03/16	2023/03/16	Kiran Kumari
Elements by ICP - Dissolved	ICPA	A910309	N/A	2023/03/15	Mohammad Pousti
Elements by ICP - Total	ICPA	A909571	2023/03/15	2023/03/15	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	A910295	N/A	2023/03/16	Mandeep Kaur
Elements by ICPMS - Total	ICPM	A909526	2023/03/15	2023/03/15	Mandeep Kaur
Ion Balance	CALC	A908484	N/A	2023/03/16	Automated Statchk
Ammonia-N (Total)	KONE	A910303	N/A	2023/03/15	Adam Fishleigh
Nitrate and Nitrite	CALC	A908485	N/A	2023/03/15	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	A910236	N/A	2023/03/15	Adam Fishleigh
Nitrate (as N)	CALC	A908521	2023/03/15	2023/03/15	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	A906577	2023/03/16	2023/03/16	Junyan Ban
Benzo[a]pyrene Equivalency	GC/MSD	A908252	N/A	2023/03/16	Automated Statchk
PAH in Water by GC/MS	GC/MS	A908623	2023/03/15	2023/03/15	Nora Kazemian
Orthophosphate by Konelab	KONE	A910448	N/A	2023/03/15	Mary Anne Dela Cruz
Total Sulphide	SPEC	A910221	N/A	2023/03/15	Ly Vu
Total Dissolved Solids (Filt. Residue)	BAL	A909483	2023/03/15	2023/03/15	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	A908261	N/A	2023/03/16	Automated Statchk
Nitrogen (Total)	AC/COL	A911117	2023/03/16	2023/03/16	Carlo Truong
Carbon (Total Organic)	TECH	A911000	N/A	2023/03/16	Ming Dong

Bureau Veritas ID: BNK177 Dup
Sample ID: AEMP-DS-06
Matrix: Water

Collected: 2023/03/10
Relinquished: 2023/03/11
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	A910236	N/A	2023/03/15	Adam Fishleigh

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Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

TEST SUMMARY

Bureau Veritas ID: BNK178
Sample ID: AEMP-DUP 1
Matrix: Water

Collected: 2023/03/10
Relinquished: 2023/03/11
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	A910215	N/A	2023/03/16	Taylor Mullings
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	A909765	N/A	2023/03/16	Darrus Ong
F1-BTEX	CALC/MS	A908200	N/A	2023/03/16	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	A907929	N/A	2023/03/17	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	A907930	N/A	2023/03/16	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	A910943	N/A	2023/03/16	Paolo Jose Geronimo
Carbon (DOC)	TECH	A910816	N/A	2023/03/16	Ming Dong
Conductivity @25C	COND	A910220	N/A	2023/03/16	Taylor Mullings
CCME Hydrocarbons in Water (F2; C10-C16)	GC/FID	A908709	2023/03/15	2023/03/15	Vian Pereira
Sulphide (as H2S)	CALC	A908201	N/A	2023/03/15	Automated Statchk
Hardness	CALC	A907933	N/A	2023/03/16	Automated Statchk
Mercury (Dissolved) by CV	CV	A911401	2023/03/16	2023/03/16	Kiran Kumari
Mercury (Total) by CV	CV	A910825	2023/03/16	2023/03/16	Kiran Kumari
Elements by ICP - Dissolved	ICPA	A910309	N/A	2023/03/15	Mohammad Pousti
Elements by ICP - Total	ICPA	A909571	2023/03/15	2023/03/15	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	A910295	N/A	2023/03/16	Mandeep Kaur
Elements by ICPMS - Total	ICPM	A909526	2023/03/15	2023/03/15	Mandeep Kaur
Ion Balance	CALC	A908484	N/A	2023/03/16	Automated Statchk
Ammonia-N (Total)	KONE	A910303	N/A	2023/03/15	Adam Fishleigh
Nitrate and Nitrite	CALC	A908485	N/A	2023/03/15	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	A910236	N/A	2023/03/15	Adam Fishleigh
Nitrate (as N)	CALC	A908521	2023/03/15	2023/03/15	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	A906577	2023/03/16	2023/03/16	Junyan Ban
Benzo[a]pyrene Equivalency	GC/MSD	A908252	N/A	2023/03/16	Automated Statchk
PAH in Water by GC/MS	GC/MS	A908623	2023/03/15	2023/03/15	Nora Kazemian
Orthophosphate by Konelab	KONE	A910448	N/A	2023/03/15	Mary Anne Dela Cruz
Total Sulphide	SPEC	A910221	N/A	2023/03/15	Ly Vu
Total Dissolved Solids (Filt. Residue)	BAL	A909483	2023/03/15	2023/03/15	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	A908261	N/A	2023/03/16	Automated Statchk
Nitrogen (Total)	AC/COL	A911117	2023/03/16	2023/03/16	Carlo Truong
Carbon (Total Organic)	TECH	A911000	N/A	2023/03/16	Ming Dong

Bureau Veritas ID: BNK179
Sample ID: AEMP-DS-02
Matrix: Water

Collected: 2023/03/09
Relinquished: 2023/03/11
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	A910215	N/A	2023/03/16	Taylor Mullings
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	A909765	N/A	2023/03/16	Darrus Ong
F1-BTEX	CALC/MS	A908200	N/A	2023/03/16	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	A907929	N/A	2023/03/17	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	A907930	N/A	2023/03/16	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	A910943	N/A	2023/03/16	Paolo Jose Geronimo
Carbon (DOC)	TECH	A914259	N/A	2023/03/20	Ming Dong

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Task Order#: PENDING, Line Item: 10
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Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

TEST SUMMARY

Bureau Veritas ID: BNK179
Sample ID: AEMP-DS-02
Matrix: Water

Collected: 2023/03/09
Relinquished: 2023/03/11
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity @25C	COND	A910220	N/A	2023/03/16	Taylor Mullings
CCME Hydrocarbons in Water (F2; C10-C16)	GC/FID	A908709	2023/03/15	2023/03/15	Vian Pereira
Sulphide (as H2S)	CALC	A908201	N/A	2023/03/15	Automated Statchk
Hardness	CALC	A907933	N/A	2023/03/16	Automated Statchk
Mercury (Dissolved) by CV	CV	A912158	2023/03/17	2023/03/17	Kiran Kumari
Mercury (Total) by CV	CV	A910825	2023/03/16	2023/03/16	Kiran Kumari
Elements by ICP - Dissolved	ICPA	A910309	N/A	2023/03/15	Mohammad Pousti
Elements by ICP - Total	ICPA	A909571	2023/03/15	2023/03/15	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	A910295	N/A	2023/03/16	Mandeep Kaur
Elements by ICPMS - Total	ICPM	A909526	2023/03/15	2023/03/15	Mandeep Kaur
Ion Balance	CALC	A908484	N/A	2023/03/16	Automated Statchk
Ammonia-N (Total)	KONE	A910303	N/A	2023/03/15	Adam Fishleigh
Nitrate and Nitrite	CALC	A908485	N/A	2023/03/15	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	A910236	N/A	2023/03/15	Adam Fishleigh
Nitrate (as N)	CALC	A908521	2023/03/15	2023/03/15	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	A906577	2023/03/16	2023/03/16	Junyan Ban
Benzo[a]pyrene Equivalency	GC/MSD	A908252	N/A	2023/03/16	Automated Statchk
PAH in Water by GC/MS	GC/MS	A908623	2023/03/15	2023/03/15	Nora Kazemian
Orthophosphate by Konelab	KONE	A910448	N/A	2023/03/15	Mary Anne Dela Cruz
Total Sulphide	SPEC	A910221	N/A	2023/03/15	Ly Vu
Total Dissolved Solids (Filt. Residue)	BAL	A909483	2023/03/15	2023/03/15	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	A908261	N/A	2023/03/16	Automated Statchk
Nitrogen (Total)	AC/COL	A911117	2023/03/16	2023/03/16	Carlo Truong
Carbon (Total Organic)	TECH	A914095	N/A	2023/03/20	Ming Dong

Bureau Veritas ID: BNK179 Dup
Sample ID: AEMP-DS-02
Matrix: Water

Collected: 2023/03/09
Relinquished: 2023/03/11
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbon (Total Organic)	TECH	A914095	N/A	2023/03/20	Ming Dong

Bureau Veritas ID: BNK180
Sample ID: AEMP-DS-03
Matrix: Water

Collected: 2023/03/09
Relinquished: 2023/03/11
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	A910215	N/A	2023/03/16	Taylor Mullings
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	A909765	N/A	2023/03/16	Darrus Ong
F1-BTEX	CALC/MS	A908200	N/A	2023/03/16	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	A907929	N/A	2023/03/17	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	A907930	N/A	2023/03/18	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	A910943	N/A	2023/03/16	Paolo Jose Geronimo
Carbon (DOC)	TECH	A910816	N/A	2023/03/16	Ming Dong

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Task Order#: PENDING, Line Item: 10
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Project #: 417085-42051-22200

TEST SUMMARY

Bureau Veritas ID: BNK180
Sample ID: AEMP-DS-03
Matrix: Water

Collected: 2023/03/09
Relinquished: 2023/03/11
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity @25C	COND	A910220	N/A	2023/03/16	Taylor Mullings
CCME Hydrocarbons in Water (F2; C10-C16)	GC/FID	A908709	2023/03/15	2023/03/15	Vian Pereira
Sulphide (as H2S)	CALC	A908201	N/A	2023/03/15	Automated Statchk
Hardness	CALC	A908518	N/A	2023/03/16	Automated Statchk
Mercury (Dissolved) by CV	CV	A912158	2023/03/17	2023/03/17	Kiran Kumari
Mercury (Total) by CV	CV	A910825	2023/03/16	2023/03/16	Kiran Kumari
Elements by ICP - Dissolved	ICPA	A910309	N/A	2023/03/15	Mohammad Pousti
Elements by ICP - Total	ICPA	A909617	2023/03/15	2023/03/15	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	A910295	N/A	2023/03/16	Mandeep Kaur
Elements by ICPMS - Total	ICPM	A909613	2023/03/15	2023/03/15	Jason Bao
Ion Balance	CALC	A908484	N/A	2023/03/16	Automated Statchk
Ammonia-N (Total)	KONE	A910303	N/A	2023/03/15	Adam Fishleigh
Nitrate and Nitrite	CALC	A908485	N/A	2023/03/15	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	A910236	N/A	2023/03/15	Adam Fishleigh
Nitrate (as N)	CALC	A908521	2023/03/15	2023/03/15	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	A906577	2023/03/16	2023/03/16	Junyan Ban
Benzo[a]pyrene Equivalency	GC/MSD	A908252	N/A	2023/03/16	Automated Statchk
PAH in Water by GC/MS	GC/MS	A908623	2023/03/15	2023/03/15	Nora Kazemian
Orthophosphate by Konelab	KONE	A910448	N/A	2023/03/15	Mary Anne Dela Cruz
Total Sulphide	SPEC	A910221	N/A	2023/03/15	Ly Vu
Total Dissolved Solids (Filt. Residue)	BAL	A909483	2023/03/15	2023/03/15	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	A908261	N/A	2023/03/16	Automated Statchk
Nitrogen (Total)	AC/COL	A911117	2023/03/16	2023/03/16	Carlo Truong
Carbon (Total Organic)	TECH	A911000	N/A	2023/03/16	Ming Dong

Bureau Veritas ID: BNK181
Sample ID: AEMP-US-03
Matrix: Water

Collected: 2023/03/09
Relinquished: 2023/03/11
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	A910215	N/A	2023/03/16	Taylor Mullings
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	A909765	N/A	2023/03/16	Darrus Ong
F1-BTEX	CALC/MS	A908200	N/A	2023/03/16	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	A907929	N/A	2023/03/17	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	A907930	N/A	2023/03/15	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	A910943	N/A	2023/03/16	Paolo Jose Geronimo
Carbon (DOC)	TECH	A910816	N/A	2023/03/16	Ming Dong
Conductivity @25C	COND	A910220	N/A	2023/03/16	Taylor Mullings
CCME Hydrocarbons in Water (F2; C10-C16)	GC/FID	A908709	2023/03/15	2023/03/15	Vian Pereira
Sulphide (as H2S)	CALC	A908201	N/A	2023/03/15	Automated Statchk
Hardness	CALC	A908518	N/A	2023/03/16	Automated Statchk
Mercury (Dissolved) by CV	CV	A912158	2023/03/17	2023/03/17	Kiran Kumari
Mercury (Total) by CV	CV	A910825	2023/03/16	2023/03/16	Kiran Kumari
Elements by ICP - Dissolved	ICPA	A910309	N/A	2023/03/15	Mohammad Pousti

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Task Order#: PENDING, Line Item: 10
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Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

TEST SUMMARY

Bureau Veritas ID: BNK181
Sample ID: AEMP-US-03
Matrix: Water

Collected: 2023/03/09
Relinquished: 2023/03/11
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Elements by ICP - Total	ICPA	A909571	2023/03/15	2023/03/15	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	A910295	N/A	2023/03/16	Mandeep Kaur
Elements by ICPMS - Total	ICPM	A909526	2023/03/15	2023/03/15	Mandeep Kaur
Ion Balance	CALC	A908484	N/A	2023/03/16	Automated Statchk
Ammonia-N (Total)	KONE	A910303	N/A	2023/03/15	Adam Fishleigh
Nitrate and Nitrite	CALC	A908485	N/A	2023/03/15	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	A910236	N/A	2023/03/15	Adam Fishleigh
Nitrate (as N)	CALC	A908521	2023/03/15	2023/03/15	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	A906577	2023/03/16	2023/03/16	Junyan Ban
Benzo[a]pyrene Equivalency	GC/MSD	A908252	N/A	2023/03/16	Automated Statchk
PAH in Water by GC/MS	GC/MS	A908623	2023/03/15	2023/03/15	Nora Kazemian
Orthophosphate by Konelab	KONE	A910448	N/A	2023/03/15	Mary Anne Dela Cruz
Total Sulphide	SPEC	A910221	N/A	2023/03/15	Ly Vu
Total Dissolved Solids (Filt. Residue)	BAL	A909483	2023/03/15	2023/03/15	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	A908261	N/A	2023/03/16	Automated Statchk
Nitrogen (Total)	AC/COL	A911117	2023/03/16	2023/03/16	Carlo Truong
Carbon (Total Organic)	TECH	A911000	N/A	2023/03/16	Ming Dong

Bureau Veritas ID: BNK181 Dup
Sample ID: AEMP-US-03
Matrix: Water

Collected: 2023/03/09
Relinquished: 2023/03/11
Received: 2023/03/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Elements by ICP - Total	ICPA	A909571	2023/03/15	2023/03/15	Mohammad Pousti
Elements by ICPMS - Total	ICPM	A909526	2023/03/15	2023/03/15	Mandeep Kaur

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GENERAL COMMENTS

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

Package 1	2.7°C

Note: C of C information incomplete; Task Order was not provided on the Chain of Custody; Alex Haigh was notified via email and the lab proceeded with the analysis.

Note: Samples received after hold time; Samples received past hold time for orthophosphate analysis; Alex Haigh was notified via email and the lab proceeded with the analysis.

Temperatures upon receipt at Bureau Veritas Labs Calgary
Package 1: 1 degrees C
Each temperature is the average of up to three cooler temperatures taken at receipt.

Sample BNK177 [AEMP-DS-06] : NO2 (N); NO2 (N) + NO3 (N) in Water completed within five days of sampling. Data is satisfactory for compliance purposes. Orthophosphate by Konelab completed within five days of sampling. Data is satisfactory for compliance purposes.

Sample BNK178 [AEMP-DUP 1] : NO2 (N); NO2 (N) + NO3 (N) in Water completed within five days of sampling. Data is satisfactory for compliance purposes. Orthophosphate by Konelab completed within five days of sampling. Data is satisfactory for compliance purposes.

Sample BNK179 [AEMP-DS-02] : Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. 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 Orthophosphate by Konelab.

Sample BNK180 [AEMP-DS-03] : Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. 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 Orthophosphate by Konelab.

Sample BNK181 [AEMP-US-03] : Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. 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 Orthophosphate by Konelab.

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
A906577	JB9	Method Blank	Total Oil and grease	2023/03/16	<2.0		mg/L	
A908623	NK3	Method Blank	D10-ANTHRACENE (sur.)	2023/03/15		119	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/03/15		129	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/03/15		114	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/03/15		84	%	50 - 130
			Acenaphthene	2023/03/15	<0.00010		mg/L	
			Acenaphthylene	2023/03/15	<0.00010		mg/L	
			Acridine	2023/03/15	<0.000040		mg/L	
			Anthracene	2023/03/15	<0.000010		mg/L	
			Benzo(a)anthracene	2023/03/15	<0.0000085		mg/L	
			Benzo(b&j)fluoranthene	2023/03/15	<0.0000085		mg/L	
			Benzo(k)fluoranthene	2023/03/15	<0.0000085		mg/L	
			Benzo(g,h,i)perylene	2023/03/15	<0.0000085		mg/L	
			Benzo(c)phenanthrene	2023/03/15	<0.000050		mg/L	
			Benzo(a)pyrene	2023/03/15	<0.0000075		mg/L	
			Benzo(e)pyrene	2023/03/15	<0.000050		mg/L	
			Chrysene	2023/03/15	<0.0000085		mg/L	
			Dibenz(a,h)anthracene	2023/03/15	<0.0000075		mg/L	
			Fluoranthene	2023/03/15	<0.000010		mg/L	
			Fluorene	2023/03/15	<0.000050		mg/L	
			Indeno(1,2,3-cd)pyrene	2023/03/15	<0.0000085		mg/L	
			1-Methylnaphthalene	2023/03/15	<0.00010		mg/L	
			2-Methylnaphthalene	2023/03/15	<0.00010		mg/L	
			Naphthalene	2023/03/15	<0.00010		mg/L	
			Phenanthrene	2023/03/15	<0.000050		mg/L	
			Perylene	2023/03/15	<0.000050		mg/L	
			Pyrene	2023/03/15	<0.000020		mg/L	
			Quinoline	2023/03/15	<0.00020		mg/L	
A908709	VP4	Method Blank	O-TERPHENYL (sur.)	2023/03/15		94	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/03/15	<0.10		mg/L	
A909483	HE1	Method Blank	Total Dissolved Solids	2023/03/15	<10		mg/L	
A909526	MKJ	Method Blank	Total Aluminum (Al)	2023/03/15	<0.0030		mg/L	
			Total Chromium (Cr)	2023/03/15	<0.0010		mg/L	
			Total Cobalt (Co)	2023/03/15	<0.00030		mg/L	
			Total Copper (Cu)	2023/03/15	<0.0010		mg/L	
			Total Lead (Pb)	2023/03/15	<0.00020		mg/L	
			Total Antimony (Sb)	2023/03/15	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/03/15	<0.00020		mg/L	
			Total Nickel (Ni)	2023/03/15	<0.00050		mg/L	
			Total Selenium (Se)	2023/03/15	<0.00020		mg/L	
			Total Silver (Ag)	2023/03/15	<0.00010		mg/L	
			Total Arsenic (As)	2023/03/15	<0.00020		mg/L	
			Total Thallium (Tl)	2023/03/15	<0.00020		mg/L	
			Total Tin (Sn)	2023/03/15	<0.0010		mg/L	
			Total Titanium (Ti)	2023/03/15	<0.0010		mg/L	
			Total Uranium (U)	2023/03/15	<0.00010		mg/L	
			Total Vanadium (V)	2023/03/15	<0.0010		mg/L	
			Total Zinc (Zn)	2023/03/15	<0.0030		mg/L	
			Total Beryllium (Be)	2023/03/15	<0.0010		mg/L	
A909571	MPU	Method Blank	Total Iron (Fe)	2023/03/15	<0.060		mg/L	
			Total Lithium (Li)	2023/03/15	<0.020		mg/L	
			Total Magnesium (Mg)	2023/03/15	<0.20		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Manganese (Mn)	2023/03/15	<0.0040		mg/L	
			Total Potassium (K)	2023/03/15	<0.30		mg/L	
			Total Sodium (Na)	2023/03/15	<0.50		mg/L	
			Total Strontium (Sr)	2023/03/15	<0.020		mg/L	
			Total Sulphur (S)	2023/03/15	<0.20		mg/L	
			Total Phosphorus (P)	2023/03/15	<0.10		mg/L	
			Total Barium (Ba)	2023/03/15	<0.010		mg/L	
			Total Silicon (Si)	2023/03/15	<0.50		mg/L	
			Total Boron (B)	2023/03/15	<0.020		mg/L	
			Total Calcium (Ca)	2023/03/15	<0.30		mg/L	
A909613	JAB	Method Blank	Total Aluminum (Al)	2023/03/15	<0.0030		mg/L	
			Total Chromium (Cr)	2023/03/15	<0.0010		mg/L	
			Total Cobalt (Co)	2023/03/15	<0.00030		mg/L	
			Total Copper (Cu)	2023/03/15	<0.0010		mg/L	
			Total Lead (Pb)	2023/03/15	<0.00020		mg/L	
			Total Antimony (Sb)	2023/03/15	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/03/15	<0.00020		mg/L	
			Total Nickel (Ni)	2023/03/15	<0.00050		mg/L	
			Total Selenium (Se)	2023/03/15	<0.00020		mg/L	
			Total Silver (Ag)	2023/03/15	<0.00010		mg/L	
			Total Arsenic (As)	2023/03/15	<0.00020		mg/L	
			Total Thallium (Tl)	2023/03/15	<0.00020		mg/L	
			Total Tin (Sn)	2023/03/15	<0.0010		mg/L	
			Total Titanium (Ti)	2023/03/15	<0.0010		mg/L	
			Total Uranium (U)	2023/03/15	<0.00010		mg/L	
			Total Vanadium (V)	2023/03/15	<0.0010		mg/L	
			Total Zinc (Zn)	2023/03/15	<0.0030		mg/L	
			Total Beryllium (Be)	2023/03/15	<0.0010		mg/L	
A909617	MPU	Method Blank	Total Iron (Fe)	2023/03/15	<0.060		mg/L	
			Total Lithium (Li)	2023/03/15	<0.020		mg/L	
			Total Magnesium (Mg)	2023/03/15	<0.20		mg/L	
			Total Manganese (Mn)	2023/03/15	<0.0040		mg/L	
			Total Potassium (K)	2023/03/15	<0.30		mg/L	
			Total Sodium (Na)	2023/03/15	<0.50		mg/L	
			Total Strontium (Sr)	2023/03/15	<0.020		mg/L	
			Total Sulphur (S)	2023/03/15	<0.20		mg/L	
			Total Phosphorus (P)	2023/03/15	<0.10		mg/L	
			Total Barium (Ba)	2023/03/15	<0.010		mg/L	
			Total Silicon (Si)	2023/03/15	<0.50		mg/L	
			Total Boron (B)	2023/03/15	<0.020		mg/L	
			Total Calcium (Ca)	2023/03/15	<0.30		mg/L	
A909765	DO1	Method Blank	1,4-Difluorobenzene (sur.)	2023/03/16		101	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/03/16		94	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/03/16		94	%	50 - 140
			Benzene	2023/03/16	<0.00040		mg/L	
			Toluene	2023/03/16	<0.00040		mg/L	
			Ethylbenzene	2023/03/16	<0.00040		mg/L	
			m & p-Xylene	2023/03/16	<0.00080		mg/L	
			o-Xylene	2023/03/16	<0.00040		mg/L	
			F1 (C6-C10)	2023/03/16	<0.10		mg/L	
A910215	TMU	Method Blank	Alkalinity (Total as CaCO3)	2023/03/16	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/03/16	<1.0		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Bicarbonate (HCO3)	2023/03/16	<1.0		mg/L	
			Carbonate (CO3)	2023/03/16	<1.0		mg/L	
			Hydroxide (OH)	2023/03/16	<1.0		mg/L	
A910220	TMU	Method Blank	Conductivity	2023/03/16	<2.0		uS/cm	
A910221	LYV	Method Blank	Total Sulphide	2023/03/15	<0.0018		mg/L	
A910236	AFI	Method Blank	Nitrite (N)	2023/03/15	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/03/15	<0.010		mg/L	
A910295	MKJ	Method Blank	Dissolved Aluminum (Al)	2023/03/16	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/03/16	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/03/16	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/03/16	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/03/16	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/03/16	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/03/16	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/03/16	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/03/16	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/03/16	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/03/16	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/03/16	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/03/16	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/03/16	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/03/16	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/03/16	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/03/16	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/03/16	<0.0010		mg/L	
A910303	AFI	Method Blank	Total Ammonia (N)	2023/03/15	<0.015		mg/L	
A910309	MPU	Method Blank	Dissolved Iron (Fe)	2023/03/15	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/03/15	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/03/15	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/03/15	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/03/15	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/03/15	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/03/15	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/03/15	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/03/15	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/03/15	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/03/15	<0.50		mg/L	
			Dissolved Boron (B)	2023/03/15	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/03/15	<0.30		mg/L	
A910448	MAP	Method Blank	Orthophosphate (P)	2023/03/15	<0.0030		mg/L	
A910816	MDO	Method Blank	Dissolved Organic Carbon (C)	2023/03/16	<0.50		mg/L	
A910825	KKM	Method Blank	Total Mercury (Hg)	2023/03/16	<0.0019		ug/L	
A910943	GPJ	Method Blank	Chloride (Cl)	2023/03/16	<1.0		mg/L	
			Sulphate (SO4)	2023/03/16	<1.0		mg/L	
A911000	MDO	Method Blank	Total Organic Carbon (C)	2023/03/16	<0.50		mg/L	
A911117	CTU	Method Blank	Total Nitrogen (N)	2023/03/16	<0.020		mg/L	
A911401	KKM	Method Blank	Dissolved Mercury (Hg)	2023/03/16	<0.0019		ug/L	
A912158	KKM	Method Blank	Dissolved Mercury (Hg)	2023/03/17	<0.0019		ug/L	
A914095	MDO	Method Blank	Total Organic Carbon (C)	2023/03/20	<0.50		mg/L	
A914259	MDO	Method Blank	Dissolved Organic Carbon (C)	2023/03/20	<0.50		mg/L	
A910236	AFI	RPD [BNK177-01]	Nitrite (N)	2023/03/15	NC		%	20
			Nitrate plus Nitrite (N)	2023/03/15	1.4		%	20

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A914095	MDO	RPD [BNK179-05]	Total Organic Carbon (C)	2023/03/20	0.068		%	20
A909526	MKJ	RPD [BNK181-03]	Total Aluminum (Al)	2023/03/15	1.9		%	20
			Total Chromium (Cr)	2023/03/15	NC		%	20
			Total Cobalt (Co)	2023/03/15	NC		%	20
			Total Copper (Cu)	2023/03/15	NC		%	20
			Total Lead (Pb)	2023/03/15	NC		%	20
			Total Antimony (Sb)	2023/03/15	NC		%	20
			Total Molybdenum (Mo)	2023/03/15	12		%	20
			Total Nickel (Ni)	2023/03/15	NC		%	20
			Total Selenium (Se)	2023/03/15	NC		%	20
			Total Silver (Ag)	2023/03/15	NC		%	20
			Total Arsenic (As)	2023/03/15	15		%	20
			Total Thallium (Tl)	2023/03/15	NC		%	20
			Total Tin (Sn)	2023/03/15	NC		%	20
			Total Titanium (Ti)	2023/03/15	NC		%	20
			Total Uranium (U)	2023/03/15	13		%	20
			Total Vanadium (V)	2023/03/15	3.5		%	20
			Total Zinc (Zn)	2023/03/15	NC		%	20
			Total Beryllium (Be)	2023/03/15	NC		%	20
A909571	MPU	RPD [BNK181-03]	Total Iron (Fe)	2023/03/15	NC		%	20
			Total Lithium (Li)	2023/03/15	NC		%	20
			Total Magnesium (Mg)	2023/03/15	1.7		%	20
			Total Manganese (Mn)	2023/03/15	NC		%	20
			Total Potassium (K)	2023/03/15	4.2		%	20
			Total Sodium (Na)	2023/03/15	2.5		%	20
			Total Strontium (Sr)	2023/03/15	1.1		%	20
			Total Sulphur (S)	2023/03/15	1.4		%	20
			Total Phosphorus (P)	2023/03/15	NC		%	20
			Total Barium (Ba)	2023/03/15	2.3		%	20
			Total Silicon (Si)	2023/03/15	1.9		%	20
			Total Boron (B)	2023/03/15	NC		%	20
			Total Calcium (Ca)	2023/03/15	1.7		%	20
A910236	AFI	Matrix Spike [BNK177-01]	Nitrite (N)	2023/03/15		96	%	80 - 120
			Nitrate plus Nitrite (N)	2023/03/15		110	%	80 - 120
A912158	KKM	Matrix Spike [BNK177-12]	Dissolved Mercury (Hg)	2023/03/17		91	%	80 - 120
A914095	MDO	Matrix Spike [BNK179-05]	Total Organic Carbon (C)	2023/03/20		94	%	80 - 120
A906577	JB9	LCS	Total Oil and grease	2023/03/16		110	%	70 - 130
A908623	NK3	LCS	D10-ANTHRACENE (sur.)	2023/03/15		127	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/03/15		137 (1)	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/03/15		129	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/03/15		104	%	50 - 130
			Acenaphthene	2023/03/15		93	%	50 - 130
			Acenaphthylene	2023/03/15		101	%	50 - 130
			Acridine	2023/03/15		102	%	50 - 130
			Anthracene	2023/03/15		106	%	50 - 130
			Benzo(a)anthracene	2023/03/15		122	%	50 - 130
			Benzo(b&j)fluoranthene	2023/03/15		119	%	50 - 130
			Benzo(k)fluoranthene	2023/03/15		112	%	50 - 130
			Benzo(g,h,i)perylene	2023/03/15		113	%	50 - 130
			Benzo(c)phenanthrene	2023/03/15		129	%	50 - 130
			Benzo(a)pyrene	2023/03/15		114	%	50 - 130
			Benzo(e)pyrene	2023/03/15		111	%	50 - 130

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chrysene	2023/03/15		118	%	50 - 130
			Dibenz(a,h)anthracene	2023/03/15		117	%	50 - 130
			Fluoranthene	2023/03/15		130	%	50 - 130
			Fluorene	2023/03/15		106	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/03/15		122	%	50 - 130
			1-Methylnaphthalene	2023/03/15		71	%	50 - 130
			2-Methylnaphthalene	2023/03/15		87	%	50 - 130
			Naphthalene	2023/03/15		92	%	50 - 130
			Phenanthrene	2023/03/15		103	%	50 - 130
			Perylene	2023/03/15		108	%	50 - 130
			Pyrene	2023/03/15		117	%	50 - 130
			Quinoline	2023/03/15		73	%	50 - 130
A908709	VP4	LCS	O-TERPHENYL (sur.)	2023/03/15		96	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/03/15		97	%	60 - 140
A909483	HE1	LCS	Total Dissolved Solids	2023/03/15		101	%	80 - 120
A909526	MKJ	LCS	Total Aluminum (Al)	2023/03/15		111	%	80 - 120
			Total Chromium (Cr)	2023/03/15		110	%	80 - 120
			Total Cobalt (Co)	2023/03/15		109	%	80 - 120
			Total Copper (Cu)	2023/03/15		111	%	80 - 120
			Total Lead (Pb)	2023/03/15		111	%	80 - 120
			Total Antimony (Sb)	2023/03/15		118	%	80 - 120
			Total Molybdenum (Mo)	2023/03/15		111	%	80 - 120
			Total Nickel (Ni)	2023/03/15		109	%	80 - 120
			Total Selenium (Se)	2023/03/15		117	%	80 - 120
			Total Silver (Ag)	2023/03/15		112	%	80 - 120
			Total Arsenic (As)	2023/03/15		105	%	80 - 120
			Total Thallium (Tl)	2023/03/15		112	%	80 - 120
			Total Tin (Sn)	2023/03/15		110	%	80 - 120
			Total Titanium (Ti)	2023/03/15		109	%	80 - 120
			Total Uranium (U)	2023/03/15		110	%	80 - 120
			Total Vanadium (V)	2023/03/15		110	%	80 - 120
			Total Zinc (Zn)	2023/03/15		106	%	80 - 120
			Total Beryllium (Be)	2023/03/15		110	%	80 - 120
A909571	MPU	LCS	Total Iron (Fe)	2023/03/15		98	%	80 - 120
			Total Lithium (Li)	2023/03/15		113	%	80 - 120
			Total Magnesium (Mg)	2023/03/15		101	%	80 - 120
			Total Manganese (Mn)	2023/03/15		104	%	80 - 120
			Total Potassium (K)	2023/03/15		104	%	80 - 120
			Total Sodium (Na)	2023/03/15		108	%	80 - 120
			Total Strontium (Sr)	2023/03/15		99	%	80 - 120
			Total Sulphur (S)	2023/03/15		98	%	80 - 120
			Total Phosphorus (P)	2023/03/15		95	%	80 - 120
			Total Barium (Ba)	2023/03/15		105	%	80 - 120
			Total Silicon (Si)	2023/03/15		102	%	80 - 120
			Total Boron (B)	2023/03/15		99	%	80 - 120
			Total Calcium (Ca)	2023/03/15		104	%	80 - 120
A909613	JAB	LCS	Total Aluminum (Al)	2023/03/15		100	%	80 - 120
			Total Chromium (Cr)	2023/03/15		109	%	80 - 120
			Total Cobalt (Co)	2023/03/15		109	%	80 - 120
			Total Copper (Cu)	2023/03/15		111	%	80 - 120
			Total Lead (Pb)	2023/03/15		113	%	80 - 120
			Total Antimony (Sb)	2023/03/15		117	%	80 - 120

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Molybdenum (Mo)	2023/03/15		112	%	80 - 120
			Total Nickel (Ni)	2023/03/15		110	%	80 - 120
			Total Selenium (Se)	2023/03/15		117	%	80 - 120
			Total Silver (Ag)	2023/03/15		111	%	80 - 120
			Total Arsenic (As)	2023/03/15		105	%	80 - 120
			Total Thallium (Tl)	2023/03/15		115	%	80 - 120
			Total Tin (Sn)	2023/03/15		108	%	80 - 120
			Total Titanium (Ti)	2023/03/15		107	%	80 - 120
			Total Uranium (U)	2023/03/15		112	%	80 - 120
			Total Vanadium (V)	2023/03/15		107	%	80 - 120
			Total Zinc (Zn)	2023/03/15		106	%	80 - 120
			Total Beryllium (Be)	2023/03/15		96	%	80 - 120
A909617	MPU	LCS	Total Iron (Fe)	2023/03/15		97	%	80 - 120
			Total Lithium (Li)	2023/03/15		112	%	80 - 120
			Total Magnesium (Mg)	2023/03/15		100	%	80 - 120
			Total Manganese (Mn)	2023/03/15		102	%	80 - 120
			Total Potassium (K)	2023/03/15		103	%	80 - 120
			Total Sodium (Na)	2023/03/15		107	%	80 - 120
			Total Strontium (Sr)	2023/03/15		103	%	80 - 120
			Total Sulphur (S)	2023/03/15		97	%	80 - 120
			Total Phosphorus (P)	2023/03/15		93	%	80 - 120
			Total Barium (Ba)	2023/03/15		108	%	80 - 120
			Total Silicon (Si)	2023/03/15		101	%	80 - 120
			Total Boron (B)	2023/03/15		100	%	80 - 120
			Total Calcium (Ca)	2023/03/15		103	%	80 - 120
A909765	DO1	LCS	1,4-Difluorobenzene (sur.)	2023/03/16		101	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/03/16		97	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/03/16		92	%	50 - 140
			Benzene	2023/03/16		87	%	60 - 130
			Toluene	2023/03/16		94	%	60 - 130
			Ethylbenzene	2023/03/16		94	%	60 - 130
			m & p-Xylene	2023/03/16		97	%	60 - 130
			o-Xylene	2023/03/16		98	%	60 - 130
			F1 (C6-C10)	2023/03/16		107	%	60 - 140
A910215	TMU	LCS	Alkalinity (Total as CaCO3)	2023/03/15		100	%	80 - 120
A910220	TMU	LCS	Conductivity	2023/03/15		100	%	90 - 110
A910221	LYV	LCS	Total Sulphide	2023/03/15		95	%	80 - 120
A910236	AFI	LCS	Nitrite (N)	2023/03/15		100	%	80 - 120
			Nitrate plus Nitrite (N)	2023/03/15		104	%	80 - 120
A910295	MKJ	LCS	Dissolved Aluminum (Al)	2023/03/16		117	%	80 - 120
			Dissolved Chromium (Cr)	2023/03/16		106	%	80 - 120
			Dissolved Cobalt (Co)	2023/03/16		104	%	80 - 120
			Dissolved Copper (Cu)	2023/03/16		102	%	80 - 120
			Dissolved Lead (Pb)	2023/03/16		100	%	80 - 120
			Dissolved Antimony (Sb)	2023/03/16		110	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/03/16		105	%	80 - 120
			Dissolved Nickel (Ni)	2023/03/16		102	%	80 - 120
			Dissolved Selenium (Se)	2023/03/16		112	%	80 - 120
			Dissolved Silver (Ag)	2023/03/16		100	%	80 - 120
			Dissolved Arsenic (As)	2023/03/16		99	%	80 - 120
			Dissolved Thallium (Tl)	2023/03/16		103	%	80 - 120
			Dissolved Tin (Sn)	2023/03/16		102	%	80 - 120

Bureau Veritas Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Bureau Veritas Job #: C317382
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Titanium (Ti)	2023/03/16		110	%	80 - 120
			Dissolved Uranium (U)	2023/03/16		98	%	80 - 120
			Dissolved Vanadium (V)	2023/03/16		107	%	80 - 120
			Dissolved Zinc (Zn)	2023/03/16		106	%	80 - 120
			Dissolved Beryllium (Be)	2023/03/16		89	%	80 - 120
A910303	AFI	LCS	Total Ammonia (N)	2023/03/15		98	%	80 - 120
A910309	MPU	LCS	Dissolved Iron (Fe)	2023/03/15		95	%	80 - 120
			Dissolved Lithium (Li)	2023/03/15		111	%	80 - 120
			Dissolved Magnesium (Mg)	2023/03/15		100	%	80 - 120
			Dissolved Manganese (Mn)	2023/03/15		101	%	80 - 120
			Dissolved Potassium (K)	2023/03/15		102	%	80 - 120
			Dissolved Sodium (Na)	2023/03/15		106	%	80 - 120
			Dissolved Strontium (Sr)	2023/03/15		102	%	80 - 120
			Dissolved Sulphur (S)	2023/03/15		94	%	80 - 120
			Dissolved Phosphorus (P)	2023/03/15		93	%	80 - 120
			Dissolved Barium (Ba)	2023/03/15		107	%	80 - 120
			Dissolved Silicon (Si)	2023/03/15		97	%	80 - 120
			Dissolved Boron (B)	2023/03/15		98	%	80 - 120
			Dissolved Calcium (Ca)	2023/03/15		103	%	80 - 120
A910448	MAP	LCS	Orthophosphate (P)	2023/03/15		99	%	80 - 120
A910816	MDO	LCS	Dissolved Organic Carbon (C)	2023/03/16		106	%	80 - 120
A910825	KKM	LCS	Total Mercury (Hg)	2023/03/16		99	%	80 - 120
A910943	GPJ	LCS	Chloride (Cl)	2023/03/16		103	%	80 - 120
			Sulphate (SO4)	2023/03/16		100	%	80 - 120
A911000	MDO	LCS	Total Organic Carbon (C)	2023/03/16		101	%	80 - 120
A911117	CTU	LCS	Total Nitrogen (N)	2023/03/16		100	%	80 - 120
A911401	KKM	LCS	Dissolved Mercury (Hg)	2023/03/16		99	%	80 - 120
A912158	KKM	LCS	Dissolved Mercury (Hg)	2023/03/17		108	%	80 - 120
A914095	MDO	LCS	Total Organic Carbon (C)	2023/03/20		111	%	80 - 120
A914259	MDO	LCS	Dissolved Organic Carbon (C)	2023/03/20		112	%	80 - 120
A911117	CTU	SRM	Total Nitrogen (N)	2023/03/16		101	%	80 - 120

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.

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

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

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

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

NC (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.

Bureau Veritas Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Bureau Veritas Job #: C317382
Report Date: 2023/03/21

Advisian
Task Order#: PENDING, Line Item: 10
Site#:
Site Location: NORMAN WELLS, NT
Project #: 417085-42051-22200

VALIDATION SIGNATURE PAGE

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

Gita Pokhrel, Laboratory Supervisor

Janet Gao, B.Sc., QP, Supervisor, Organics

Sandy Yuan, M.Sc., QP, Scientific Specialist

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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Bureau Veritas Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam
A Bureau Veritas Group Company

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AMY
268

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 292856

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: Alex Haigh
Address: 150, 205 Quarry Park Blvd SE Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Sampler Name (Print): Alex Haigh / Stacy Gibb

REPORT INFORMATION

Company Name: Advisian
Contact Name: Alex Haigh
Address: 150, 205 Quarry Park Blvd SE Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Consultant Project #: 417085-42051-22200

ANALYSIS REQUESTED

	FIELD SAMPLE ID	MATRIX: GROUND WATER	MATRIX: SURFACE WATER	MATRIX: SOIL	MATRIX: OTHER	# CONTAINERS	SAMPLING: DATE (YYYY/MM/DD)	SAMPLING: TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-2 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☒ DIS ☒	MERCURY TOTAL ☒ DISSOLVED ☒	SALINITY SOIL	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY	pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	Total Sulphide	Total and dissolved Sulphur	Oil + Grease	Carbon - TOC, DOC	Nitrate as N, Nitrite as N, NO2+NO3	Ammonia - TKN or orthophosphate	Limited Sample	Head space pass. bye in vials
1	AEMP-DS-06		X			15	2023/03/10	11:20	✓			X	X							X	X					X			X	X	X	X	X	X	X	X
2	AEMP-Dup1		X			15	2023/03/10	11:28	✓			X	X							X	X					X			X	X	X	X	X	X	X	X
3	AEMP-DS-02		X			16	2023/03/09	11:25	✓			X	X							X	X					X			X	X	X	X	X	X	X	X
4	AEMP-DS-03		X			16	2023/03/09	12:30	✓			X	X							X	X					X			X	X	X	X	X	X	X	X
5	~~AEMP-DU~~																																			
6	AEMP-US-03		X			16	2023/03/09	15:20	✓			X	X							X	X					X			X	X	X	X	X	X	X	X
7																																				
8																																				
9																																				
10																																				

IOL SITE LOCATION: Norman Wells / NT
IOL PROJECT # (if applicable): NA
MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-42051-22200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) FAL ☐ Other _____

SPECIAL INSTRUCTIONS: email canada.chemistry@worley.com cacal.lor.data.track@worley.com
IES A2601436

JARS USED & NOT SUBMITTED Enter N/A for Water: NA

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID #	1	2	3
SEAL PRESENT	✓		TEMP °C	3	3	2
SEAL INTACT	✓					
COOLING MEDIA PRESENT	✓					

	YES	NO	COOLER ID # MCAL	1	2	3
SEAL PRESENT	✓		TEMP °C	1	1	1
SEAL INTACT	✓					
COOLING MEDIA PRESENT	✓					

	YES	NO	COOLER ID #	1	2	3
SEAL PRESENT			TEMP °C			
SEAL INTACT						
COOLING MEDIA PRESENT						

LAB USE ONLY
MAXXAM JOB # C317382

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1. SL	STACY GIBB	2023/03/11	10:10	1. Dejiwu	D	2023/03/14	10:28
2. D	DEJIWU	2023/03/14	12:10	2. [signature]	Stanley P Thomas	2023/03/15	06:40
3.				3.			

SAMPLES
LABELED BY: DW2
VERIFIED BY: AMY

COC-1010 (06/2016) IOL-AB White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-07-26
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C357840	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☒ **Yes** ☐ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☒ **Yes** ☐ **No**

If yes, FLAG type and comments: Extra bottles received. No impact on data quality

Date samples submitted 2023-07-28

Due date for lab report on SRC 2023-08-08

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☒ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☒ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☒ **Yes** ☐ **No**	
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☒ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☒ **No** ☐ **N/A**	RPD outside limits – data is acceptable

Data check completed by Alex Haigh **Date** 2024-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	

Data check completed by Alex Haigh **Date** 2024-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Trip Blank results acceptable?	☒ Yes	☐ No	☐ N/A	**Comments**
Field Blank results acceptable?	☒ Yes	☐ No	☐ N/A	**Comments**
Equipment Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes	☐ No	☒ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field pH vs. Lab pH RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes	☐ No	☐ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☒ Yes ☐ No

Explain rationale for yes/no:

Request lab to recheck data? If so give details	☐ Yes	☒ No	☐ N/A	**Comments**

If Yes, Lab request to recheck must be approved by Project Manager Name: **Date**

Data check completed by Alex Haigh **Date** 2024-03-26

Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 298656

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/08
Report #: R3377639
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C357840
Received: 2023/07/28, 15:20

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	AB SOP-00005	SM 23 2320 B m
Send Part to Archive	3		
BTEX/F1 in Water by HS GC/MS/FID	3	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	3		Auto Calc
Cadmium - low level CCME - Dissolved	1		Auto Calc
Cadmium - low level CCME (Total)	1		Auto Calc
Chloride/Sulphate by Auto Colourimetry	1	AB SOP-00020	SM24-4500-Cl/SO4-E m
COD by Colorimeter	1	AB SOP-00016	SM 23 5220D m
True Colour	1	CAL SOP-00049	SM 24 2120 C m
Carbon (DOC) (1)	1	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	1	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	3	AB SOP-00037	CCME PHC-CWS m
Sulphide (as H2S)	1		Auto Calc
Hardness	1		Auto Calc
Mercury (Dissolved) by CV (3)	1	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	1	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	1	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	1	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (3)	1	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	1	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	1		Auto Calc
Ammonia-N (Total)	1	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate and Nitrite	1		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	1	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N)	1		Auto Calc
Oil and Grease (Gravimetric, n-Hexane)	1	AB SOP-00092	SM 23 5520B/5520F m
Target & Alkylated PAH in Water by GC/MS (4)	3	AB SOP-00037 CAL SOP-00250	EPA 8270e m
Benzo[a]pyrene Equivalency (5)	3		Auto Calc
PAH in Water by GC/MS	3	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270E m
Orthophosphate by Konelab (6)	1	AB SOP-00025	SM 24 4500-P A,F m
Total Sulphide	1	AB SOP-00080	SM 23 4500 S2-A D Fm

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Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 298656

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/08
Report #: R3377639
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C357840
Received: 2023/07/28, 15:20

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Total Dissolved Solids (Filt. Residue)	1	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen (Total)	1	BBY WI-00033	Auto Calc
Nitrogen (Total)	1	AB SOP-00093	SM 24 4500-N C m
Carbon (Total Organic) (7)	1	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR)	1	AB SOP-00061	SM 24 2540 D m
Turbidity	1	CAL SOP-00081	SM 23 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) 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.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Alkylated PAH results are semiquantitative
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 298656

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/08
Report #: R3377639
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C357840

Received: 2023/07/28, 15:20

(6) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
(7) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Danielle Boisvert
Customer Solutions Representative
08 Aug 2023 18:59:06

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614

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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 Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C357840
Report Date: 2023/08/08

Advisian
Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		BVQ373	BVQ374	BVQ375		
Sampling Date		2023/07/26 09:15	2023/07/26 15:00	2023/07/26 15:30		
COC Number		298656	298656	298656		
	UNITS	**AEMP-US-04**	**AEMP-DUP4 (TRIP BLANK)**	**AEMP-DUP3 (FIELD BLANK)**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	B053613
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	B053613
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.20	B053613
Volatiles						
Benzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B053334
Toluene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B053334
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B053334
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	0.00080	B053334
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B053334
Xylenes (Total)	mg/L	<0.00089	<0.00089	<0.00089	0.00089	B052476
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	0.10	B052476
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	0.10	B053334
Extraction Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	98	98	98		B053613
Instrument Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	96	98	96		B053334
4-Bromofluorobenzene (sur.)	%	102	102	101		B053334
D4-1,2-Dichloroethane (sur.)	%	100	100	102		B053334
RDL = Reportable Detection Limit						

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Project #: 417085-49223-23200

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		BVQ373		
Sampling Date		2023/07/26 09:15		
COC Number		298656		
	UNITS	**AEMP-US-04**	**RDL**	**QC Batch**
Calculated Parameters				
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.088	0.020	B052490
Nutrients				
Total Nitrogen (N)	mg/L	0.14	0.020	B058456
RDL = Reportable Detection Limit				

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Advisian
Task Order#: 417085-49223
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Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BVQ373		
Sampling Date		2023/07/26 09:15		
COC Number		298656		
	UNITS	**AEMP-US-04**	**RDL**	**QC Batch**
Elements				
Total Cadmium (Cd)	mg/L	<0.000020	0.000020	B052478
Total Mercury (Hg)	ug/L	<0.0019	0.0019	B058636
Total Aluminum (Al)	mg/L	0.024	0.0030	B056840
Total Antimony (Sb)	mg/L	<0.00060	0.00060	B056840
Total Arsenic (As)	mg/L	0.00025	0.00020	B056840
Total Barium (Ba)	mg/L	0.080	0.010	B056845
Total Beryllium (Be)	mg/L	<0.0010	0.0010	B056840
Total Boron (B)	mg/L	0.040	0.020	B056845
Total Calcium (Ca)	mg/L	83	0.30	B056845
Total Chromium (Cr)	mg/L	<0.0010	0.0010	B056840
Total Cobalt (Co)	mg/L	<0.00030	0.00030	B056840
Total Copper (Cu)	mg/L	<0.0010	0.0010	B056840
Total Iron (Fe)	mg/L	<0.060	0.060	B056845
Total Lead (Pb)	mg/L	<0.00020	0.00020	B056840
Total Lithium (Li)	mg/L	<0.020	0.020	B056845
Total Magnesium (Mg)	mg/L	31	0.20	B056845
Total Manganese (Mn)	mg/L	0.0066	0.0040	B056845
Total Molybdenum (Mo)	mg/L	0.0019	0.00020	B056840
Total Nickel (Ni)	mg/L	0.00071	0.00050	B056840
Total Phosphorus (P)	mg/L	<0.10	0.10	B056845
Total Potassium (K)	mg/L	1.2	0.30	B056845
Total Selenium (Se)	mg/L	0.00022	0.00020	B056840
Total Silicon (Si)	mg/L	2.4	0.50	B056845
Total Silver (Ag)	mg/L	<0.00010	0.00010	B056840
Total Sodium (Na)	mg/L	25	0.50	B056845
Total Strontium (Sr)	mg/L	1.5	0.020	B056845
Total Sulphur (S)	mg/L	52	0.20	B056845
Total Thallium (Tl)	mg/L	<0.00020	0.00020	B056840
Total Tin (Sn)	mg/L	<0.0010	0.0010	B056840
Total Titanium (Ti)	mg/L	<0.0010	0.0010	B056840
Total Uranium (U)	mg/L	0.0011	0.00010	B056840
RDL = Reportable Detection Limit				

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Advisian
Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BVQ373		
Sampling Date		2023/07/26 09:15		
COC Number		298656		
	UNITS	**AEMP-US-04**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	<0.0010	0.0010	B056840
Total Zinc (Zn)	mg/L	<0.0030	0.0030	B056840
RDL = Reportable Detection Limit				

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Report Date: 2023/08/08

Advisian
Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ373			BVQ373		
Sampling Date		2023/07/26 09:15			2023/07/26 09:15		
COC Number		298656			298656		
	UNITS	**AEMP-US-04**	**RDL**	**QC Batch**	**AEMP-US-04 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters							
Hardness (CaCO3)	mg/L	320	0.50	B052502			
Ion Balance (% Difference)	%	3.4	N/A	B052480			
Nitrate (N)	mg/L	0.049	0.010	B052449			
Nitrate (NO3)	mg/L	0.22	0.044	B052475			
Nitrite (NO2)	mg/L	<0.033	0.033	B052475			
Sulphide (as H2S)	mg/L	<0.0020	0.0020	B052383			
Demand Parameters							
Chemical Oxygen Demand	mg/L	17	10	B054523			
Elements							
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	B052473			
Misc. Inorganics							
Conductivity	uS/cm	720	2.0	B057421			
Dissolved Organic Carbon (C)	mg/L	2.9	0.50	B054922			
Total Organic Carbon (C)	mg/L	2.4	0.50	B054860	2.5	0.50	B054860
Total Dissolved Solids	mg/L	460	10	B057076			
Total Suspended Solids	mg/L	1.4	1.0	B057058			
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	B057417			
Alkalinity (Total as CaCO3)	mg/L	190	1.0	B057417			
Bicarbonate (HCO3)	mg/L	240	1.0	B057417			
Carbonate (CO3)	mg/L	<1.0	1.0	B057417			
Hydroxide (OH)	mg/L	<1.0	1.0	B057417			
Total Sulphide	mg/L	<0.0018	0.0018	B056916			
Chloride (Cl)	mg/L	29	1.0	B053410			
Sulphate (SO4)	mg/L	160	5.0	B053410			
Nutrients							
Total Ammonia (N)	mg/L	<0.015	0.015	B058694			
Orthophosphate (P)	mg/L	<0.0030	0.0030	B053023			
Nitrite (N)	mg/L	<0.010	0.010	B052926			

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

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Bureau Veritas Job #: C357840
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Advisian
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Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ373			BVQ373		
Sampling Date		2023/07/26 09:15			2023/07/26 09:15		
COC Number		298656			298656		
	UNITS	**AEMP-US-04**	**RDL**	**QC Batch**	**AEMP-US-04 Lab-Dup**	**RDL**	**QC Batch**
Nitrate plus Nitrite (N)	mg/L	0.049	0.010	B052926			
Misc. Organics							
Total Oil and grease	mg/L	<2.0	2.0	B052369			
Physical Properties							
True Colour	PtCo units	7.7	2.0	B053037			
Physical Properties							
Turbidity	NTU	0.78	0.10	B052637			

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C357840
Report Date: 2023/08/08

Advisian
Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ373	BVQ374	BVQ375		
Sampling Date		2023/07/26 09:15	2023/07/26 15:00	2023/07/26 15:30		
COC Number		298656	298656	298656		
	UNITS	**AEMP-US-04**	**AEMP-DUP4 (TRIP BLANK)**	**AEMP-DUP3 (FIELD BLANK)**	**RDL**	**QC Batch**
Polycyclic Aromatics						
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B052484
Acenaphthene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
Acenaphthylene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
Acridine	mg/L	<0.000040	<0.000040	<0.000040	0.000040	B053612
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B053612
Benzo(a)anthracene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Benzo(b&j)fluoranthene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Benzo(k)fluoranthene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Benzo(g,h,i)perylene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Benzo(c)phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Benzo(a)pyrene	mg/L	<0.0000075	<0.0000075	<0.0000075	0.0000075	B053612
Benzo(e)pyrene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Chrysene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Dibenz(a,h)anthracene	mg/L	<0.0000075	<0.0000075	<0.0000075	0.0000075	B053612
Fluoranthene	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B053612
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B059055
Fluorene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Indeno(1,2,3-cd)pyrene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
1-Methylnaphthalene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
2-Methylnaphthalene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
Naphthalene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
Phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Perylene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Retene	ug/L	<0.050	<0.050	<0.050	0.050	B059055
C1-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B059055
Pyrene	mg/L	<0.000020	<0.000020	<0.000020	0.000020	B053612
C3-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B059055
Quinoline	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B053612
C4-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B059055
C2-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B059055
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C357840
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Advisian
Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ373	BVQ374	BVQ375		
Sampling Date		2023/07/26 09:15	2023/07/26 15:00	2023/07/26 15:30		
COC Number		298656	298656	298656		
	UNITS	**AEMP-US-04**	**AEMP-DUP4 (TRIP BLANK)**	**AEMP-DUP3 (FIELD BLANK)**	**RDL**	**QC Batch**
Biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B059055
C1-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B059055
C2-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B059055
C1-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B059055
C2-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B059055
C3-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B059055
Dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B059055
C1-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B059055
C2-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B059055
C3-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B059055
C4-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B059055
C1 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B059055
C2 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B059055
C3 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B059055
C4 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B059055
C1 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B059055
C2 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B059055
C3 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B059055
C4 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B059055
C1 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B059055
C2 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B059055
C3 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B059055
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B059055
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B059055
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B059055
C1-Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B059055
Extraction Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	105	108	113		B059055
D8-ACENAPHTHYLENE (sur.)	%	87	86	95		B059055
D8-NAPHTHALENE (sur.)	%	70	68	80		B059055
RDL = Reportable Detection Limit						

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SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ373	BVQ374	BVQ375		
Sampling Date		2023/07/26 09:15	2023/07/26 15:00	2023/07/26 15:30		
COC Number		298656	298656	298656		
	UNITS	**AEMP-US-04**	**AEMP-DUP4 (TRIP BLANK)**	**AEMP-DUP3 (FIELD BLANK)**	**RDL**	**QC Batch**
TERPHENYL-D14 (sur.)	%	106	110	115		B059055
D10-ANTHRACENE (sur.)	%	100	87	106		B053612
D8-ACENAPHTHYLENE (sur.)	%	89	77	85		B053612
D8-NAPHTHALENE (sur.)	%	65	75	80		B053612
TERPHENYL-D14 (sur.)	%	110	90	107		B053612
RDL = Reportable Detection Limit						

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MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		BVQ373		
Sampling Date		2023/07/26 09:15		
COC Number		298656		
	UNITS	**AEMP-US-04**	**RDL**	**QC Batch**
Elements				
Dissolved Mercury (Hg)	ug/L	0.0032	0.0019	B057560
RDL = Reportable Detection Limit				

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BVQ373		
Sampling Date		2023/07/26 09:15		
COC Number		298656		
	UNITS	**AEMP-US-04**	**RDL**	**QC Batch**
Elements				
Dissolved Aluminum (Al)	mg/L	0.0051	0.0030	B055619
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	B055619
Dissolved Arsenic (As)	mg/L	0.00023	0.00020	B055619
Dissolved Barium (Ba)	mg/L	0.082	0.010	B055240
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	B055619
Dissolved Boron (B)	mg/L	0.038	0.020	B055240
Dissolved Calcium (Ca)	mg/L	78	0.30	B055240
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	B055619
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	B055619
Dissolved Copper (Cu)	mg/L	0.0014	0.0010	B055619
Dissolved Iron (Fe)	mg/L	<0.060	0.060	B055240
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	B055619
Dissolved Lithium (Li)	mg/L	<0.020	0.020	B055240
Dissolved Magnesium (Mg)	mg/L	29	0.20	B055240
Dissolved Manganese (Mn)	mg/L	<0.0040	0.0040	B055240
Dissolved Molybdenum (Mo)	mg/L	0.0018	0.00020	B055619
Dissolved Nickel (Ni)	mg/L	0.00092	0.00050	B055619
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	B055240
Dissolved Potassium (K)	mg/L	1.2	0.30	B055240
Dissolved Selenium (Se)	mg/L	<0.00020	0.00020	B055619
Dissolved Silicon (Si)	mg/L	2.4	0.50	B055240
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	B055619
Dissolved Sodium (Na)	mg/L	25	0.50	B055240
Dissolved Strontium (Sr)	mg/L	1.5	0.020	B055240
Dissolved Sulphur (S)	mg/L	53	0.20	B055240
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	B055619
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	B055619
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	B055619
Dissolved Uranium (U)	mg/L	0.0010	0.00010	B055619
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	B055619
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	B055619
RDL = Reportable Detection Limit				

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Bureau Veritas Job #: C357840
Report Date: 2023/08/08

Advisian
Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ373
Sample ID: AEMP-US-04
Matrix: Water

Collected: 2023/07/26
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B057417	N/A	2023/08/02	Jeanette Chavol Melo
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B053334	N/A	2023/08/01	Ancheol Jeong
F1-BTEX	CALC/MS	B052476	N/A	2023/08/02	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B052473	N/A	2023/08/01	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B052478	N/A	2023/08/03	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B053410	N/A	2023/07/30	Adam Fishleigh
COD by Colorimeter	M/PROB	B054523	N/A	2023/08/01	Princess Nicole Hernaez
True Colour	SPEC/COL	B053037	N/A	2023/07/29	Carlo Truong
Carbon (DOC)	TECH	B054922	N/A	2023/08/04	Ming Dong
Conductivity @25C	COND	B057421	N/A	2023/08/02	Jeanette Chavol Melo
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Sulphide (as H2S)	CALC	B052383	N/A	2023/08/02	Automated Statchk
Hardness	CALC	B052502	N/A	2023/08/01	Automated Statchk
Mercury (Dissolved) by CV	CV	B057560	2023/08/02	2023/08/02	Kiran Kumari
Mercury (Total) by CV	CV	B058636	2023/08/03	2023/08/03	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B055240	N/A	2023/08/01	Kristijan Kovac
Elements by ICP - Total	ICPA	B056845	2023/08/02	2023/08/03	Vincy Scaria
Elements by ICPMS - Dissolved	ICPM	B055619	N/A	2023/08/01	Kevin Huang
Elements by ICPMS - Total	ICPM	B056840	2023/08/02	2023/08/02	Mandeep Kaur
Ion Balance	CALC	B052480	N/A	2023/08/03	Automated Statchk
Ammonia-N (Total)	KONE	B058694	N/A	2023/08/03	Isabelle White
Nitrate and Nitrite	CALC	B052475	N/A	2023/07/30	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B052926	N/A	2023/07/29	Isabelle White
Nitrate (as N)	CALC	B052449	2023/07/30	2023/07/30	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B052369	2023/08/02	2023/08/02	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B059055	2023/08/05	2023/08/06	Shuang (Jessica) Chen
Benzo[a]pyrene Equivalency	GC/MSD	B052484	N/A	2023/08/08	Automated Statchk
PAH in Water by GC/MS	GC/MS	B053612	2023/08/04	2023/08/05	Jiby Uthup
Orthophosphate by Konelab	KONE	B053023	N/A	2023/07/29	Carlo Truong
Total Sulphide	SPEC	B056916	N/A	2023/08/02	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B057076	2023/08/02	2023/08/03	Coralynn Topping
Total Kjeldahl Nitrogen (Total)	CALC	B052490	N/A	2023/08/03	Automated Statchk
Nitrogen (Total)	AC/COL	B058456	2023/08/03	2023/08/03	Carlo Truong
Carbon (Total Organic)	TECH	B054860	N/A	2023/08/04	Ming Dong
Total Suspended Solids (NFR)	BAL	B057058	2023/08/02	2023/08/03	Amy Phan
Turbidity	TURB	B052637	N/A	2023/07/29	Ashhel Zia

Bureau Veritas ID: BVQ373 Dup
Sample ID: AEMP-US-04
Matrix: Water

Collected: 2023/07/26
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbon (Total Organic)	TECH	B054860	N/A	2023/08/04	Ming Dong

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Bureau Veritas Job #: C357840
Report Date: 2023/08/08

Advisian
Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ374
Sample ID: AEMP-DUP4 (TRIP BLANK)
Matrix: Water

Collected: 2023/07/26
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B053334	N/A	2023/08/01	Ancheol Jeong
F1-BTEX	CALC/MS	B052476	N/A	2023/08/02	Automated Statchk
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Target & Alkylated PAH in Water by GC/MS	GC/MS	B059055	2023/08/05	2023/08/06	Shuang (Jessica) Chen
Benzo[a]pyrene Equivalency	GC/MSD	B052484	N/A	2023/08/08	Automated Statchk
PAH in Water by GC/MS	GC/MS	B053612	2023/08/04	2023/08/05	Jiby Uthup

Bureau Veritas ID: BVQ375
Sample ID: AEMP-DUP3 (FIELD BLANK)
Matrix: Water

Collected: 2023/07/26
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B053334	N/A	2023/08/01	Ancheol Jeong
F1-BTEX	CALC/MS	B052476	N/A	2023/08/02	Automated Statchk
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Target & Alkylated PAH in Water by GC/MS	GC/MS	B059055	2023/08/05	2023/08/06	Shuang (Jessica) Chen
Benzo[a]pyrene Equivalency	GC/MSD	B052484	N/A	2023/08/08	Automated Statchk
PAH in Water by GC/MS	GC/MS	B053612	2023/08/04	2023/08/05	Jiby Uthup

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Project #: 417085-49223-23200

GENERAL COMMENTS

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

Package 1	2.7°C

Note: Analysis required not listed or clearly specified on C of C; All samples were received with 2 250-mL amber with Sodium Bisulfate but no request that requires these containers was selected. Alex Haigh was notified via email and the lab proceeded with the analysis.

Results relate only to the items tested.

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Bureau Veritas Job #: C357840
Report Date: 2023/08/08

Advisian
Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B052369	JB9	Method Blank	Total Oil and grease	2023/08/02	<2.0		mg/L	
B052637	AZI	Method Blank	Turbidity	2023/07/29	<0.10		NTU	
B052926	ISW	Method Blank	Nitrite (N)	2023/07/29	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/07/29	<0.010		mg/L	
B053023	CTU	Method Blank	Orthophosphate (P)	2023/07/29	<0.0030		mg/L	
B053037	CTU	Method Blank	True Colour	2023/07/29	<2.0		PtCo units	
B053334	AJG	Method Blank	1,4-Difluorobenzene (sur.)	2023/08/01		98	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/01		104	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/01		102	%	50 - 140
			Benzene	2023/08/01	<0.00040		mg/L	
			Toluene	2023/08/01	<0.00040		mg/L	
			Ethylbenzene	2023/08/01	<0.00040		mg/L	
			m & p-Xylene	2023/08/01	<0.00080		mg/L	
			o-Xylene	2023/08/01	<0.00040		mg/L	
			F1 (C6-C10)	2023/08/01	<0.10		mg/L	
B053410	AFI	Method Blank	Chloride (Cl)	2023/07/30	<1.0		mg/L	
			Sulphate (SO4)	2023/07/30	<1.0		mg/L	
B053612	JU2	Method Blank	D10-ANTHRACENE (sur.)	2023/08/05		101	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/05		109	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/05		77	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/05		58	%	50 - 130
			Acenaphthene	2023/08/05	<0.00010		mg/L	
			Acenaphthylene	2023/08/05	<0.00010		mg/L	
			Acridine	2023/08/05	<0.000040		mg/L	
			Anthracene	2023/08/05	<0.000010		mg/L	
			Benzo(a)anthracene	2023/08/05	<0.0000085		mg/L	
			Benzo(b&j)fluoranthene	2023/08/05	<0.0000085		mg/L	
			Benzo(k)fluoranthene	2023/08/05	<0.0000085		mg/L	
			Benzo(g,h,i)perylene	2023/08/05	<0.0000085		mg/L	
			Benzo(c)phenanthrene	2023/08/05	<0.000050		mg/L	
			Benzo(a)pyrene	2023/08/05	<0.0000075		mg/L	
			Benzo(e)pyrene	2023/08/05	<0.000050		mg/L	
			Chrysene	2023/08/05	<0.0000085		mg/L	
			Dibenz(a,h)anthracene	2023/08/05	<0.0000075		mg/L	
			Fluoranthene	2023/08/05	<0.000010		mg/L	
			Fluorene	2023/08/05	<0.000050		mg/L	
			Indeno(1,2,3-cd)pyrene	2023/08/05	<0.0000085		mg/L	
			1-Methylnaphthalene	2023/08/05	<0.00010		mg/L	
			2-Methylnaphthalene	2023/08/05	<0.00010		mg/L	
			Naphthalene	2023/08/05	<0.00010		mg/L	
			Phenanthrene	2023/08/05	<0.000050		mg/L	
			Perylene	2023/08/05	<0.000050		mg/L	
			Pyrene	2023/08/05	<0.000020		mg/L	
			Quinoline	2023/08/05	<0.00020		mg/L	
B053613	AAX	Method Blank	O-TERPHENYL (sur.)	2023/08/04		100	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/04	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2023/08/04	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2023/08/04	<0.20		mg/L	
B054523	NHE	Method Blank	Chemical Oxygen Demand	2023/08/01	<10		mg/L	
B054860	MDO	Method Blank	Total Organic Carbon (C)	2023/08/04	<0.50		mg/L	
B054922	MDO	Method Blank	Dissolved Organic Carbon (C)	2023/08/04	<0.50		mg/L	
B055240	KKC	Method Blank	Dissolved Iron (Fe)	2023/08/01	<0.060		mg/L	

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Bureau Veritas Job #: C357840
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Advisian
Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Lithium (Li)	2023/08/01	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/08/01	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/08/01	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/08/01	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/08/01	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/08/01	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/08/01	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/08/01	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/08/01	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/08/01	<0.50		mg/L	
			Dissolved Boron (B)	2023/08/01	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/08/01	<0.30		mg/L	
B055619	KH2	Method Blank	Dissolved Aluminum (Al)	2023/08/01	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/08/01	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/08/01	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/08/01	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/08/01	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/08/01	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/08/01	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/08/01	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/08/01	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/08/01	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/08/01	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/08/01	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/08/01	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/08/01	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/08/01	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/08/01	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/08/01	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/08/01	<0.0010		mg/L	
B056840	MKJ	Method Blank	Total Aluminum (Al)	2023/08/02	<0.0030		mg/L	
			Total Chromium (Cr)	2023/08/02	<0.0010		mg/L	
			Total Cobalt (Co)	2023/08/02	<0.00030		mg/L	
			Total Copper (Cu)	2023/08/02	<0.0010		mg/L	
			Total Lead (Pb)	2023/08/02	<0.00020		mg/L	
			Total Antimony (Sb)	2023/08/02	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/08/02	<0.00020		mg/L	
			Total Nickel (Ni)	2023/08/02	<0.00050		mg/L	
			Total Selenium (Se)	2023/08/02	<0.00020		mg/L	
			Total Silver (Ag)	2023/08/02	<0.00010		mg/L	
			Total Arsenic (As)	2023/08/02	<0.00020		mg/L	
			Total Thallium (Tl)	2023/08/02	<0.00020		mg/L	
			Total Tin (Sn)	2023/08/02	<0.0010		mg/L	
			Total Titanium (Ti)	2023/08/02	<0.0010		mg/L	
			Total Uranium (U)	2023/08/02	<0.00010		mg/L	
			Total Vanadium (V)	2023/08/02	<0.0010		mg/L	
			Total Zinc (Zn)	2023/08/02	<0.0030		mg/L	
			Total Beryllium (Be)	2023/08/02	<0.0010		mg/L	
B056845	VSC	Method Blank	Total Iron (Fe)	2023/08/03	<0.060		mg/L	
			Total Lithium (Li)	2023/08/03	<0.020		mg/L	
			Total Magnesium (Mg)	2023/08/03	<0.20		mg/L	
			Total Manganese (Mn)	2023/08/03	<0.0040		mg/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 Potassium (K)	2023/08/03	<0.30		mg/L	
			Total Sodium (Na)	2023/08/03	<0.50		mg/L	
			Total Strontium (Sr)	2023/08/03	<0.020		mg/L	
			Total Sulphur (S)	2023/08/03	<0.20		mg/L	
			Total Phosphorus (P)	2023/08/03	<0.10		mg/L	
			Total Barium (Ba)	2023/08/03	<0.010		mg/L	
			Total Silicon (Si)	2023/08/03	<0.50		mg/L	
			Total Boron (B)	2023/08/03	<0.020		mg/L	
			Total Calcium (Ca)	2023/08/03	<0.30		mg/L	
B056916	DSX	Method Blank	Total Sulphide	2023/08/02	<0.0018		mg/L	
B057058	AP1	Method Blank	Total Suspended Solids	2023/08/03	<1.0		mg/L	
B057076	CT6	Method Blank	Total Dissolved Solids	2023/08/03	<10		mg/L	
B057417	JVM	Method Blank	Alkalinity (Total as CaCO3)	2023/08/02	1.1, RDL=1.0 (1)		mg/L	
			Alkalinity (PP as CaCO3)	2023/08/02	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/08/02	1.4, RDL=1.0		mg/L	
			Carbonate (CO3)	2023/08/02	<1.0		mg/L	
			Hydroxide (OH)	2023/08/02	<1.0		mg/L	
B057421	JVM	Method Blank	Conductivity	2023/08/02	<2.0		uS/cm	
B057560	KKM	Method Blank	Dissolved Mercury (Hg)	2023/08/02	<0.0019		ug/L	
B058456	CTU	Method Blank	Total Nitrogen (N)	2023/08/03	<0.020		mg/L	
B058636	KKM	Method Blank	Total Mercury (Hg)	2023/08/03	<0.0019		ug/L	
B058694	ISW	Method Blank	Total Ammonia (N)	2023/08/03	<0.015		mg/L	
B059055	JC7	Method Blank	D10-ANTHRACENE (sur.)	2023/08/06		109	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/06		120	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/06		92	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/06		67	%	50 - 130
			Indeno(1,2,3-cd)fluoranthene	2023/08/06	<0.0085		ug/L	
			Retene	2023/08/06	<0.050		ug/L	
			C1-Naphthalene	2023/08/06	<0.10		ug/L	
			C3-Naphthalene	2023/08/06	<0.10		ug/L	
			C4-Naphthalene	2023/08/06	<0.10		ug/L	
			C2-Naphthalene	2023/08/06	<0.10		ug/L	
			Biphenyl	2023/08/06	<0.020		ug/L	
			C1-biphenyl	2023/08/06	<0.020		ug/L	
			C2-biphenyl	2023/08/06	<0.020		ug/L	
			C1-fluorene	2023/08/06	<0.050		ug/L	
			C2-fluorene	2023/08/06	<0.050		ug/L	
			C3-fluorene	2023/08/06	<0.050		ug/L	
			Dibenzothiophene	2023/08/06	<0.020		ug/L	
			C1-dibenzothiophene	2023/08/06	<0.020		ug/L	
			C2-dibenzothiophene	2023/08/06	<0.020		ug/L	
			C3-dibenzothiophene	2023/08/06	<0.020		ug/L	
			C4-dibenzothiophene	2023/08/06	<0.020		ug/L	
			C1 phenanthrene/anthracene	2023/08/06	<0.050		ug/L	
			C2 phenanthrene/anthracene	2023/08/06	<0.050		ug/L	
			C3 phenanthrene/anthracene	2023/08/06	<0.050		ug/L	
			C4 phenanthrene/anthracene	2023/08/06	<0.050		ug/L	
			C1 fluoranthene/pyrene	2023/08/06	<0.020		ug/L	
			C2 fluoranthene/pyrene	2023/08/06	<0.020		ug/L	
			C3 fluoranthene/pyrene	2023/08/06	<0.020		ug/L	

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Bureau Veritas Job #: C357840
Report Date: 2023/08/08

Advisian
Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			C4 fluoranthene/pyrene	2023/08/06	<0.020		ug/L	
			C1 benzo(a)anthracene/chrysene	2023/08/06	<0.0085		ug/L	
			C2 benzo(a)anthracene/chrysene	2023/08/06	<0.0085		ug/L	
			C3 benzo(a)anthracene/chrysene	2023/08/06	<0.0085		ug/L	
			C4 benzo(a)anthracene/chrysene	2023/08/06	<0.0085		ug/L	
			C1benzobjkfluoranthene/benzoapyrene	2023/08/06	<0.0075		ug/L	
			C2benzobjkfluoranthene/benzoapyrene	2023/08/06	<0.0075		ug/L	
			C1-Acenaphthene	2023/08/06	<0.10		ug/L	
B054860	MDO	RPD [BVQ373-03]	Total Organic Carbon (C)	2023/08/04	3.9		%	20
B053612	JU2	Matrix Spike [BVQ374-02]	D10-ANTHRACENE (sur.)	2023/08/05		100	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/05		109	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/05		88	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/05		79	%	50 - 130
			Acenaphthene	2023/08/05		78	%	50 - 130
			Acenaphthylene	2023/08/05		83	%	50 - 130
			Acridine	2023/08/05		86	%	50 - 130
			Anthracene	2023/08/05		74	%	50 - 130
			Benzo(a)anthracene	2023/08/05		91	%	50 - 130
			Benzo(b&j)fluoranthene	2023/08/05		100	%	50 - 130
			Benzo(k)fluoranthene	2023/08/05		101	%	50 - 130
			Benzo(g,h,i)perylene	2023/08/05		99	%	50 - 130
			Benzo(c)phenanthrene	2023/08/05		96	%	50 - 130
			Benzo(a)pyrene	2023/08/05		110	%	50 - 130
			Benzo(e)pyrene	2023/08/05		90	%	50 - 130
			Chrysene	2023/08/05		87	%	50 - 130
			Dibenz(a,h)anthracene	2023/08/05		110	%	50 - 130
			Fluoranthene	2023/08/05		91	%	50 - 130
			Fluorene	2023/08/05		92	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/08/05		97	%	50 - 130
			1-Methylnaphthalene	2023/08/05		65	%	50 - 130
			2-Methylnaphthalene	2023/08/05		77	%	50 - 130
			Naphthalene	2023/08/05		78	%	50 - 130
			Phenanthrene	2023/08/05		99	%	50 - 130
			Perylene	2023/08/05		86	%	50 - 130
			Pyrene	2023/08/05		86	%	50 - 130
			Quinoline	2023/08/05		86	%	50 - 130
B053613	AAX	Matrix Spike [BVQ375-02]	O-TERPHENYL (sur.)	2023/08/04		102	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/04		99	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/08/04		109	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/08/04		103	%	60 - 140
B054860	MDO	Matrix Spike [BVQ373-03]	Total Organic Carbon (C)	2023/08/04		104	%	80 - 120
B052369	JB9	LCS	Total Oil and grease	2023/08/02		100	%	70 - 130
B052637	AZI	LCS	Turbidity	2023/07/29		102	%	80 - 120
B052926	ISW	LCS	Nitrite (N)	2023/07/29		99	%	80 - 120
			Nitrate plus Nitrite (N)	2023/07/29		96	%	80 - 120
B053023	CTU	LCS	Orthophosphate (P)	2023/07/29		99	%	80 - 120
B053037	CTU	LCS	True Colour	2023/07/29		99	%	80 - 120
B053334	AJG	LCS	1,4-Difluorobenzene (sur.)	2023/08/01		94	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/01		106	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/01		97	%	50 - 140
			Benzene	2023/08/01		95	%	60 - 130
			Toluene	2023/08/01		95	%	60 - 130

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Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Ethylbenzene	2023/08/01		103	%	60 - 130
			m & p-Xylene	2023/08/01		104	%	60 - 130
			o-Xylene	2023/08/01		107	%	60 - 130
			F1 (C6-C10)	2023/08/01		102	%	60 - 140
B053410	AFI	LCS	Chloride (Cl)	2023/07/30		100	%	80 - 120
			Sulphate (SO4)	2023/07/30		100	%	80 - 120
B053612	JU2	LCS	D10-ANTHRACENE (sur.)	2023/08/05		99	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/05		112	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/05		89	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/05		74	%	50 - 130
			Acenaphthene	2023/08/05		80	%	50 - 130
			Acenaphthylene	2023/08/05		85	%	50 - 130
			Acridine	2023/08/05		85	%	50 - 130
			Anthracene	2023/08/05		72	%	50 - 130
			Benzo(a)anthracene	2023/08/05		103	%	50 - 130
			Benzo(b&j)fluoranthene	2023/08/05		100	%	50 - 130
			Benzo(k)fluoranthene	2023/08/05		95	%	50 - 130
			Benzo(g,h,i)perylene	2023/08/05		91	%	50 - 130
			Benzo(c)phenanthrene	2023/08/05		106	%	50 - 130
			Benzo(a)pyrene	2023/08/05		105	%	50 - 130
			Benzo(e)pyrene	2023/08/05		87	%	50 - 130
			Chrysene	2023/08/05		102	%	50 - 130
			Dibenz(a,h)anthracene	2023/08/05		102	%	50 - 130
			Fluoranthene	2023/08/05		90	%	50 - 130
			Fluorene	2023/08/05		91	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/08/05		91	%	50 - 130
			1-Methylnaphthalene	2023/08/05		66	%	50 - 130
			2-Methylnaphthalene	2023/08/05		76	%	50 - 130
			Naphthalene	2023/08/05		81	%	50 - 130
			Phenanthrene	2023/08/05		97	%	50 - 130
			Perylene	2023/08/05		84	%	50 - 130
			Pyrene	2023/08/05		91	%	50 - 130
			Quinoline	2023/08/05		81	%	50 - 130
B053613	AAX	LCS	O-TERPHENYL (sur.)	2023/08/04		101	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/04		100	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/08/04		110	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/08/04		103	%	60 - 140
B054523	NHE	LCS	Chemical Oxygen Demand	2023/08/01		102	%	80 - 120
B054860	MDO	LCS	Total Organic Carbon (C)	2023/08/04		107	%	80 - 120
B054922	MDO	LCS	Dissolved Organic Carbon (C)	2023/08/04		106	%	80 - 120
B055240	KKC	LCS	Dissolved Iron (Fe)	2023/08/01		104	%	80 - 120
			Dissolved Lithium (Li)	2023/08/01		103	%	80 - 120
			Dissolved Magnesium (Mg)	2023/08/01		102	%	80 - 120
			Dissolved Manganese (Mn)	2023/08/01		102	%	80 - 120
			Dissolved Potassium (K)	2023/08/01		107	%	80 - 120
			Dissolved Sodium (Na)	2023/08/01		103	%	80 - 120
			Dissolved Strontium (Sr)	2023/08/01		97	%	80 - 120
			Dissolved Sulphur (S)	2023/08/01		101	%	80 - 120
			Dissolved Phosphorus (P)	2023/08/01		102	%	80 - 120
			Dissolved Barium (Ba)	2023/08/01		100	%	80 - 120
			Dissolved Silicon (Si)	2023/08/01		97	%	80 - 120
			Dissolved Boron (B)	2023/08/01		98	%	80 - 120

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Advisian
Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Calcium (Ca)	2023/08/01		101	%	80 - 120
B055619	KH2	LCS	Dissolved Aluminum (Al)	2023/08/01		113	%	80 - 120
			Dissolved Chromium (Cr)	2023/08/01		106	%	80 - 120
			Dissolved Cobalt (Co)	2023/08/01		106	%	80 - 120
			Dissolved Copper (Cu)	2023/08/01		110	%	80 - 120
			Dissolved Lead (Pb)	2023/08/01		107	%	80 - 120
			Dissolved Antimony (Sb)	2023/08/01		108	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/08/01		103	%	80 - 120
			Dissolved Nickel (Ni)	2023/08/01		107	%	80 - 120
			Dissolved Selenium (Se)	2023/08/01		108	%	80 - 120
			Dissolved Silver (Ag)	2023/08/01		98	%	80 - 120
			Dissolved Arsenic (As)	2023/08/01		103	%	80 - 120
			Dissolved Thallium (Tl)	2023/08/01		107	%	80 - 120
			Dissolved Tin (Sn)	2023/08/01		98	%	80 - 120
			Dissolved Titanium (Ti)	2023/08/01		105	%	80 - 120
			Dissolved Uranium (U)	2023/08/01		102	%	80 - 120
			Dissolved Vanadium (V)	2023/08/01		105	%	80 - 120
			Dissolved Zinc (Zn)	2023/08/01		106	%	80 - 120
			Dissolved Beryllium (Be)	2023/08/01		106	%	80 - 120
B056840	MKJ	LCS	Total Aluminum (Al)	2023/08/02		105	%	80 - 120
			Total Chromium (Cr)	2023/08/02		94	%	80 - 120
			Total Cobalt (Co)	2023/08/02		94	%	80 - 120
			Total Copper (Cu)	2023/08/02		95	%	80 - 120
			Total Lead (Pb)	2023/08/02		98	%	80 - 120
			Total Antimony (Sb)	2023/08/02		101	%	80 - 120
			Total Molybdenum (Mo)	2023/08/02		99	%	80 - 120
			Total Nickel (Ni)	2023/08/02		94	%	80 - 120
			Total Selenium (Se)	2023/08/02		100	%	80 - 120
			Total Silver (Ag)	2023/08/02		100	%	80 - 120
			Total Arsenic (As)	2023/08/02		93	%	80 - 120
			Total Thallium (Tl)	2023/08/02		100	%	80 - 120
			Total Tin (Sn)	2023/08/02		98	%	80 - 120
			Total Titanium (Ti)	2023/08/02		92	%	80 - 120
			Total Uranium (U)	2023/08/02		97	%	80 - 120
			Total Vanadium (V)	2023/08/02		94	%	80 - 120
			Total Zinc (Zn)	2023/08/02		94	%	80 - 120
			Total Beryllium (Be)	2023/08/02		97	%	80 - 120
B056845	VSC	LCS	Total Iron (Fe)	2023/08/02		108	%	80 - 120
			Total Lithium (Li)	2023/08/02		112	%	80 - 120
			Total Magnesium (Mg)	2023/08/02		108	%	80 - 120
			Total Manganese (Mn)	2023/08/02		110	%	80 - 120
			Total Potassium (K)	2023/08/02		110	%	80 - 120
			Total Sodium (Na)	2023/08/02		103	%	80 - 120
			Total Strontium (Sr)	2023/08/02		97	%	80 - 120
			Total Sulphur (S)	2023/08/02		99	%	80 - 120
			Total Phosphorus (P)	2023/08/02		101	%	80 - 120
			Total Barium (Ba)	2023/08/02		101	%	80 - 120
			Total Silicon (Si)	2023/08/02		100	%	80 - 120
			Total Boron (B)	2023/08/02		99	%	80 - 120
			Total Calcium (Ca)	2023/08/02		109	%	80 - 120
B056916	DSX	LCS	Total Sulphide	2023/08/02		90	%	80 - 120
B057058	AP1	LCS	Total Suspended Solids	2023/08/03		88	%	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
B057076	CT6	LCS	Total Dissolved Solids	2023/08/03		97	%	80 - 120
B057417	JVM	LCS	Alkalinity (Total as CaCO3)	2023/08/02		103	%	80 - 120
B057421	JVM	LCS	Conductivity	2023/08/02		102	%	90 - 110
B057560	KKM	LCS	Dissolved Mercury (Hg)	2023/08/02		101	%	80 - 120
B058456	CTU	LCS	Total Nitrogen (N)	2023/08/03		103	%	80 - 120
B058636	KKM	LCS	Total Mercury (Hg)	2023/08/03		103	%	80 - 120
B058694	ISW	LCS	Total Ammonia (N)	2023/08/03		103	%	80 - 120
B059055	JC7	LCS	D10-ANTHRACENE (sur.)	2023/08/06		127	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/06		132 (2)	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/06		115	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/06		104	%	50 - 130
			C1-Naphthalene	2023/08/06		77	%	50 - 130
			C3-Naphthalene	2023/08/06		102	%	50 - 130
			C2-Naphthalene	2023/08/06		96	%	50 - 130
			C1-biphenyl	2023/08/06		92	%	50 - 130
			C1 phenanthrene/anthracene	2023/08/06		114	%	50 - 130
			C2 phenanthrene/anthracene	2023/08/06		112	%	50 - 130
			C1 fluoranthene/pyrene	2023/08/06		110	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/08/06		77	%	30 - 130
B058456	CTU	SRM	Total Nitrogen (N)	2023/08/03		105	%	80 - 120

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.

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

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

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

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

(1) Method blank above criteria. Data inspected. All data < RDL or greater than 10x Method Blank.

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

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Advisian
Task Order#: 417085-49223
Site#:
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

VALIDATION SIGNATURE PAGE

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

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Janet Gao, B.Sc., QP, Supervisor, Organics

Rahul Suryawanshi, Senior Analyst

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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Maxxam
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Toll Free: (800) 386-7247

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

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C of C # 298656

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C-3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Sampler Name (Print): Alex Haigh / Stacy Gibb

REPORT INFORMATION

Company Name: Advisian
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C-3E7
Email: alex.haigh@advisian.com
Ph: 587 897 6249
Consultant Project #: 417085-49223-23200

ANALYSIS REQUESTED

FIELD SAMPLE ID	MATRIX: GROUND WATER	MATRIX: SURFACE WATER	MATRIX: SOIL	MATRIX: OTHER	# CONTAINERS	SAMPLING DATE (YYYY/MM/DD)	SAMPLING TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-2 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☒ DIS ☒	MERCURY TOTAL ☒ DISSOLVED ☒	SALINITY SOIL	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	True color, TSS, TDS, Turbidity	Oil & Grease	TOC, DOC, Sulphide	Orthophosphate	Sulphur - total + dissolved	COD	Nitrate, Nitrite, Ammonia (total) TKN	Limited Sample
1 AEMP-US-04		X			17	2023/07/26	9:15	X			X		X						X	X							X	X	X	X	X	X	X	X
2 AEMP-DUP 4 (TRIP BLANK)		X			7	2023/07/26	15:00				X		X																					
3 AEMP-DUP 3 (FIELD BLANK)		X			7	2023/07/26	15:30				X		X																					
4																																		
5																																		
6																																		
7																																		
8																																		
9																																		
10																																		

IOL SITE LOCATION: Norman Well, NT
IOL PROJECT # (if applicable): NA
MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-49223-23200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) FWAL ☐ Other

SPECIAL INSTRUCTIONS: email canada.chemistry@worley.com, canada.lab.data.track@worley.com, stacy.gibb@worley.com, IES A2601436

JARS USED & NOT SUBMITTED (Enter N/A for Water): NA

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID #			
SEAL PRESENT	✓		TEMP °C	2	3	3
SEAL INTACT	✓			1	2	3
COOLING MEDIA PRESENT	✓					

	YES	NO	COOLER ID #			
SEAL PRESENT			TEMP °C			
SEAL INTACT				1	2	3
COOLING MEDIA PRESENT						

	YES	NO	COOLER ID #			
SEAL PRESENT			TEMP °C			
SEAL INTACT				1	2	3
COOLING MEDIA PRESENT						

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1.	STACY GIBB	2023/07/27	10:10	1.	Josh Kinaschuk	2023/07/28	15:00
2.				2.			
3.				3.			

LAB USE ONLY
MAXXAM JOB # C357840
SAMPLES
LABELED BY: NKS
VERIFIED BY: SKY

COC-1010 (06/2016) IOL-AB
White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-07-25
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C357842	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☒ **Yes** ☐ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☒ **Yes** ☐ **No**

If yes, FLAG type and comments: Extra bottles received. No impact on data quality

Date samples submitted 2023-07-28

Due date for lab report on SRC 2023-08-08

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☒ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☒ **Yes** ☐ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:** 2023-08-09
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☒ **No**	Turbidity, orthophosphate, true colour, nitrite
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☒ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☒ **N/A**	
Matrix Spike Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☒ **No** ☐ **N/A**	RPD outside limits – data is acceptable

Data check completed by Alex Haigh **Date** 2024-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	

Data check completed by Alex Haigh **Date** 2024-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Trip Blank results acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Field Blank results acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Equipment Blank results acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes ☐ No ☒ N/A	**Comments**	

Data check completed by Alex Haigh **Date** 2024-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Field pH vs. Lab pH RPDs acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes ☐ No ☐ N/A	**Comments**	

Data check completed by Alex Haigh **Date** 2024-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☒ Yes ☐ No

Explain rationale for yes/no:

Request lab to recheck data? If so give details	☐ Yes ☒ No ☐ N/A	**Comments**	
If Yes, Lab request to recheck must be approved by Project Manager Name:		**Date**	

Data check completed by Alex Haigh **Date** 2024-03-26

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 298654

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/14
Report #: R3380220
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C357842
Received: 2023/07/28, 15:20

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	3	AB SOP-00005	SM 23 2320 B m
Send Part to Archive	3		
BTEX/F1 in Water by HS GC/MS/FID	3	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	3		Auto Calc
Cadmium - low level CCME - Dissolved	3		Auto Calc
Cadmium - low level CCME (Total)	3		Auto Calc
Chloride/Sulphate by Auto Colourimetry	3	AB SOP-00020	SM24-4500-Cl/SO4-E m
COD by Colorimeter	3	AB SOP-00016	SM 23 5220D m
True Colour	3	CAL SOP-00049	SM 24 2120 C m
Carbon (DOC) (1)	3	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	3	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	3	AB SOP-00037	CCME PHC-CWS m
Sulphide (as H2S)	3		Auto Calc
Hardness	3		Auto Calc
Mercury (Dissolved) by CV (3)	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	3	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	3	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (3)	3	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	3	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	3		Auto Calc
Ammonia-N (Total)	3	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate and Nitrite	3		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	3	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N)	3		Auto Calc
Oil and Grease (Gravimetric, n-Hexane)	3	AB SOP-00092	SM 23 5520B/5520F m
Target & Alkylated PAH in Water by GC/MS (4)	3	AB SOP-00037 CAL SOP-00250	EPA 8270e m
Benzo[a]pyrene Equivalency (5)	3		Auto Calc
Orthophosphate by Konelab (6)	3	AB SOP-00025	SM 24 4500-P A,F m
Total Sulphide	3	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	3	AB SOP-00065	SM 23 2540 C m

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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 298654

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/14
Report #: R3380220
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C357842
Received: 2023/07/28, 15:20

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Total Kjeldahl Nitrogen (Total)	3	BBY WI-00033	Auto Calc
Nitrogen (Total)	3	AB SOP-00093	SM 24 4500-N C m
Carbon (Total Organic) (7)	3	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR)	3	AB SOP-00061	SM 24 2540 D m
Turbidity	3	CAL SOP-00081	SM 23 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) 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.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Alkylated PAH results are semiquantitative
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(6) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets

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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 298654

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/14
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CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C357842
Received: 2023/07/28, 15:20

acceptable levels unless otherwise noted.
(7) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Namita Sahni
Customer Solutions Representative
14 Aug 2023 15:14:55

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614

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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 Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C357842
Report Date: 2023/08/14

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		BVQ377	BVQ378	BVQ379		
Sampling Date		2023/07/25 13:54	2023/07/25 11:25	2023/07/25 10:40		
COC Number		298654	298654	298654		
	UNITS	**AEMP-DS-05**	**AEMP-US-02**	**AEMP-US-01**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	B053613
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	B053613
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.20	B053613
Volatiles						
Benzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B052814
Toluene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B052814
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B052814
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	0.00080	B052814
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B052814
Xylenes (Total)	mg/L	<0.00089	<0.00089	<0.00089	0.00089	B052460
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	0.10	B052460
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	0.10	B052814
Extraction Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	102	101	100		B053613
Instrument Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	98	98	98		B052814
4-Bromofluorobenzene (sur.)	%	98	99	100		B052814
D4-1,2-Dichloroethane (sur.)	%	105	103	105		B052814
RDL = Reportable Detection Limit						

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		BVQ377			BVQ377			BVQ378		
Sampling Date		2023/07/25 13:54			2023/07/25 13:54			2023/07/25 11:25		
COC Number		298654			298654			298654		
	UNITS	**AEMP-DS-05**	**RDL**	**QC Batch**	**AEMP-DS-05 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-US-02**	**RDL**	**QC Batch**
Calculated Parameters										
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.13	0.020	B051212				0.11	0.020	B051212
Nutrients										
Total Nitrogen (N)	mg/L	0.17	0.020	B058456	0.16	0.020	B058456	0.14	0.020	B058456

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas ID		BVQ379		
Sampling Date		2023/07/25 10:40		
COC Number		298654		
	UNITS	**AEMP-US-01**	**RDL**	**QC Batch**
Calculated Parameters				
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.12	0.020	B051212
Nutrients				
Total Nitrogen (N)	mg/L	0.17	0.020	B058456

RDL = Reportable Detection Limit

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Bureau Veritas Job #: C357842
Report Date: 2023/08/14

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BVQ377	BVQ378	BVQ379		
Sampling Date		2023/07/25 13:54	2023/07/25 11:25	2023/07/25 10:40		
COC Number		298654	298654	298654		
	UNITS	**AEMP-DS-05**	**AEMP-US-02**	**AEMP-US-01**	**RDL**	**QC Batch**
Elements						
Total Cadmium (Cd)	mg/L	0.000041	0.000029	0.000033	0.000020	B052240
Total Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	B058636
Total Aluminum (Al)	mg/L	0.51	0.23	0.39	0.0030	B056840
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	0.00060	B056840
Total Arsenic (As)	mg/L	0.00069	0.00048	0.00048	0.00020	B056840
Total Barium (Ba)	mg/L	0.057	0.052	0.051	0.010	B056845
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B056840
Total Boron (B)	mg/L	<0.020	<0.020	<0.020	0.020	B056845
Total Calcium (Ca)	mg/L	37	38	34	0.30	B056845
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B056840
Total Cobalt (Co)	mg/L	0.00043	<0.00030	<0.00030	0.00030	B056840
Total Copper (Cu)	mg/L	0.0016	0.0012	0.0013	0.0010	B056840
Total Iron (Fe)	mg/L	0.78	0.30	0.48	0.060	B056845
Total Lead (Pb)	mg/L	0.00044	0.00022	0.00028	0.00020	B056840
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	0.020	B056845
Total Magnesium (Mg)	mg/L	11	11	10	0.20	B056845
Total Manganese (Mn)	mg/L	0.023	0.014	0.014	0.0040	B056845
Total Molybdenum (Mo)	mg/L	0.0010	0.0012	0.00095	0.00020	B056840
Total Nickel (Ni)	mg/L	0.0036	0.0015	0.0015	0.00050	B056840
Total Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	0.10	B056845
Total Potassium (K)	mg/L	1.1	1.0	1.1	0.30	B056845
Total Selenium (Se)	mg/L	0.00041	0.00037	0.00031	0.00020	B056840
Total Silicon (Si)	mg/L	2.6	2.0	2.4	0.50	B056845
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B056840
Total Sodium (Na)	mg/L	8.1	8.8	8.7	0.50	B056845
Total Strontium (Sr)	mg/L	0.22	0.24	0.22	0.020	B056845
Total Sulphur (S)	mg/L	13	15	12	0.20	B056845
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B056840
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B056840
Total Titanium (Ti)	mg/L	0.010	0.0050	0.0093	0.0010	B056840
Total Uranium (U)	mg/L	0.00079	0.00083	0.00068	0.00010	B056840
RDL = Reportable Detection Limit						

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C357842
Report Date: 2023/08/14

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BVQ377	BVQ378	BVQ379		
Sampling Date		2023/07/25 13:54	2023/07/25 11:25	2023/07/25 10:40		
COC Number		298654	298654	298654		
	UNITS	**AEMP-DS-05**	**AEMP-US-02**	**AEMP-US-01**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	0.0013	<0.0010	<0.0010	0.0010	B056840
Total Zinc (Zn)	mg/L	0.0051	<0.0030	0.0031	0.0030	B056840
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C357842
Report Date: 2023/08/14

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ377		BVQ378			BVQ378		
Sampling Date		2023/07/25 13:54		2023/07/25 11:25			2023/07/25 11:25		
COC Number		298654		298654			298654		
	UNITS	**AEMP-DS-05**	**QC Batch**	**AEMP-US-02**	**RDL**	**QC Batch**	**AEMP-US-02 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters									
Hardness (CaCO3)	mg/L	120	B052278	130	0.50	B052278			
Ion Balance (% Difference)	%	8.7	B052335	9.9	N/A	B052335			
Nitrate (N)	mg/L	0.036	B052449	0.027	0.010	B052449			
Nitrate (NO3)	mg/L	0.16	B052412	0.12	0.044	B052412			
Nitrite (NO2)	mg/L	<0.033	B052412	<0.033	0.033	B052412			
Sulphide (as H2S)	mg/L	<0.0020	B052383	<0.0020	0.0020	B052383			
Demand Parameters									
Chemical Oxygen Demand	mg/L	12	B055473	10	10	B055796			
Elements									
Dissolved Cadmium (Cd)	mg/L	<0.000020	B052105	<0.000020	0.000020	B052105			
Misc. Inorganics									
Conductivity	uS/cm	290	B055530	310	2.0	B055530			
Dissolved Organic Carbon (C)	mg/L	3.6	B056536	3.3	0.50	B063109	3.7	0.50	B063109
Total Organic Carbon (C)	mg/L	3.2	B054860	3.8	0.50	B063089			
Total Dissolved Solids	mg/L	110	B055063	150	10	B055063			
Total Suspended Solids	mg/L	19	B055106	5.7	1.0	B055096			
Anions									
Alkalinity (PP as CaCO3)	mg/L	<1.0	B055528	<1.0	1.0	B055528			
Alkalinity (Total as CaCO3)	mg/L	110	B055528	110	1.0	B055528			
Bicarbonate (HCO3)	mg/L	140	B055528	140	1.0	B055528			
Carbonate (CO3)	mg/L	<1.0	B055528	<1.0	1.0	B055528			
Hydroxide (OH)	mg/L	<1.0	B055528	<1.0	1.0	B055528			
Total Sulphide	mg/L	<0.0018	B054934	<0.0018	0.0018	B054934			
Chloride (Cl)	mg/L	10	B057053	11	1.0	B057051			
Sulphate (SO4)	mg/L	42	B057053	47	1.0	B057051			
Nutrients									
Total Ammonia (N)	mg/L	<0.015	B058699	<0.015	0.015	B058699			
Orthophosphate (P)	mg/L	<0.0030	B054915	<0.0030	0.0030	B054915			
Nitrite (N)	mg/L	<0.010	B054700	<0.010	0.010	B054700			

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

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Bureau Veritas Job #: C357842
Report Date: 2023/08/14

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ377		BVQ378			BVQ378		
Sampling Date		2023/07/25 13:54		2023/07/25 11:25			2023/07/25 11:25		
COC Number		298654		298654			298654		
	UNITS	**AEMP-DS-05**	**QC Batch**	**AEMP-US-02**	**RDL**	**QC Batch**	**AEMP-US-02 Lab-Dup**	**RDL**	**QC Batch**
Nitrate plus Nitrite (N)	mg/L	0.036	B054700	0.027	0.010	B054700			
Misc. Organics									
Total Oil and grease	mg/L	<2.0	B052369	<2.0	2.0	B052369			
Physical Properties									
True Colour	PtCo units	5.0	B054943	5.1	2.0	B054943			
Physical Properties									
Turbidity	NTU	16	B052641	6.8	0.10	B052641			

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C357842
Report Date: 2023/08/14

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ379			BVQ379		
Sampling Date		2023/07/25 10:40			2023/07/25 10:40		
COC Number		298654			298654		
	UNITS	**AEMP-US-01**	**RDL**	**QC Batch**	**AEMP-US-01 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters							
Hardness (CaCO3)	mg/L	110	0.50	B052278			
Ion Balance (% Difference)	%	6.5	N/A	B052335			
Nitrate (N)	mg/L	0.052	0.010	B052449			
Nitrate (NO3)	mg/L	0.23	0.044	B052412			
Nitrite (NO2)	mg/L	<0.033	0.033	B052412			
Sulphide (as H2S)	mg/L	<0.0020	0.0020	B052383			
Demand Parameters							
Chemical Oxygen Demand	mg/L	12	10	B055796			
Elements							
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	B052105			
Misc. Inorganics							
Conductivity	uS/cm	270	2.0	B055530			
Dissolved Organic Carbon (C)	mg/L	3.5	0.50	B056536			
Total Organic Carbon (C)	mg/L	2.9	0.50	B054860			
Total Dissolved Solids	mg/L	96	10	B055063			
Total Suspended Solids	mg/L	14	1.0	B055096			
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	B055528			
Alkalinity (Total as CaCO3)	mg/L	95	1.0	B055528			
Bicarbonate (HCO3)	mg/L	120	1.0	B055528			
Carbonate (CO3)	mg/L	<1.0	1.0	B055528			
Hydroxide (OH)	mg/L	<1.0	1.0	B055528			
Total Sulphide	mg/L	<0.0018	0.0018	B054934			
Chloride (Cl)	mg/L	11	1.0	B057053			
Sulphate (SO4)	mg/L	37	1.0	B057053			
Nutrients							
Total Ammonia (N)	mg/L	<0.015	0.015	B058699			
Orthophosphate (P)	mg/L	0.0036	0.0030	B054915	0.0031	0.0030	B054915
Nitrite (N)	mg/L	<0.010	0.010	B054700	<0.010	0.010	B054700

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

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Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ379			BVQ379		
Sampling Date		2023/07/25 10:40			2023/07/25 10:40		
COC Number		298654			298654		
	UNITS	**AEMP-US-01**	**RDL**	**QC Batch**	**AEMP-US-01 Lab-Dup**	**RDL**	**QC Batch**
Nitrate plus Nitrite (N)	mg/L	0.052	0.010	B054700	0.051	0.010	B054700
Misc. Organics							
Total Oil and grease	mg/L	<2.0	2.0	B052369			
Physical Properties							
True Colour	PtCo units	5.4	2.0	B054943	6.7	2.0	B054943
Physical Properties							
Turbidity	NTU	15	0.10	B052641			

RDL = Reportable Detection Limit
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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ377	BVQ378	BVQ379		
Sampling Date		2023/07/25 13:54	2023/07/25 11:25	2023/07/25 10:40		
COC Number		298654	298654	298654		
	UNITS	**AEMP-DS-05**	**AEMP-US-02**	**AEMP-US-01**	**RDL**	**QC Batch**
Polycyclic Aromatics						
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B060289
Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Acenaphthylene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Acridine	ug/L	<0.040	<0.040	<0.040	0.040	B061414
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	B061414
Benzo(a)anthracene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
Benzo(b&j)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
Benzo(k)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
Benzo(g,h,i)perylene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
Benzo(c)phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
Benzo(a)pyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B061414
Benzo(e)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
Chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
Dibenz(a,h)anthracene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B061414
Fluoranthene	ug/L	<0.010	<0.010	<0.010	0.010	B061414
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
Perylene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
Quinoline	ug/L	<0.20	<0.20	<0.20	0.20	B061414
Retene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C1-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
C3-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
C4-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
C2-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B061414
RDL = Reportable Detection Limit						

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ377	BVQ378	BVQ379		
Sampling Date		2023/07/25 13:54	2023/07/25 11:25	2023/07/25 10:40		
COC Number		298654	298654	298654		
	UNITS	**AEMP-DS-05**	**AEMP-US-02**	**AEMP-US-01**	**RDL**	**QC Batch**
C2-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C2-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C3-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
Dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C2-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C3-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C4-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C2 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C3 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C4 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C1 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C2 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C3 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C4 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
C2 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
C3 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B061414
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B061414
C1-Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
1-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Extraction Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	88	83	87		B061414
D8-ACENAPHTHYLENE (sur.)	%	79	82	80		B061414
D8-NAPHTHALENE (sur.)	%	67	68	68		B061414
TERPHENYL-D14 (sur.)	%	76	78	76		B061414
RDL = Reportable Detection Limit						

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Task Order#: 417085-49223
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Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		BVQ377	BVQ378	BVQ379		
Sampling Date		2023/07/25 13:54	2023/07/25 11:25	2023/07/25 10:40		
COC Number		298654	298654	298654		
	UNITS	**AEMP-DS-05**	**AEMP-US-02**	**AEMP-US-01**	**RDL**	**QC Batch**
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	B057560
RDL = Reportable Detection Limit						

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Advisian
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Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BVQ377	BVQ378		BVQ379			BVQ379		
Sampling Date		2023/07/25 13:54	2023/07/25 11:25		2023/07/25 10:40			2023/07/25 10:40		
COC Number		298654	298654		298654			298654		
	UNITS	**AEMP-DS-05**	**AEMP-US-02**	**QC Batch**	**AEMP-US-01**	**RDL**	**QC Batch**	**AEMP-US-01 Lab-Dup**	**RDL**	**QC Batch**
Elements										
Dissolved Aluminum (Al)	mg/L	0.028	0.035	B055630	0.024	0.0030	B055630	0.022	0.0030	B055630
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	B055630	<0.00060	0.00060	B055630	<0.00060	0.00060	B055630
Dissolved Arsenic (As)	mg/L	0.00038	0.00032	B055630	0.00032	0.00020	B055630	0.00032	0.00020	B055630
Dissolved Barium (Ba)	mg/L	0.047	0.046	B055245	0.056	0.010	B055240			
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	B055630	<0.0010	0.0010	B055630	<0.0010	0.0010	B055630
Dissolved Boron (B)	mg/L	<0.020	<0.020	B055245	<0.020	0.020	B055240			
Dissolved Calcium (Ca)	mg/L	34	34	B055245	30	0.30	B055240			
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	B055630	<0.0010	0.0010	B055630	<0.0010	0.0010	B055630
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	B055630	<0.00030	0.00030	B055630	<0.00030	0.00030	B055630
Dissolved Copper (Cu)	mg/L	0.0028	0.0023	B055630	0.0015	0.0010	B055630	0.0015	0.0010	B055630
Dissolved Iron (Fe)	mg/L	<0.060	<0.060	B055245	<0.060	0.060	B055240			
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	B055630	<0.00020	0.00020	B055630	<0.00020	0.00020	B055630
Dissolved Lithium (Li)	mg/L	<0.020	<0.020	B055245	<0.020	0.020	B055240			
Dissolved Magnesium (Mg)	mg/L	9.8	10	B055245	9.2	0.20	B055240			
Dissolved Manganese (Mn)	mg/L	<0.0040	<0.0040	B055245	<0.0040	0.0040	B055240			
Dissolved Molybdenum (Mo)	mg/L	0.00094	0.0011	B055630	0.00082	0.00020	B055630	0.00083	0.00020	B055630
Dissolved Nickel (Ni)	mg/L	0.0012	0.0011	B055630	0.0013	0.00050	B055630	0.0012	0.00050	B055630
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	B055245	<0.10	0.10	B055240			
Dissolved Potassium (K)	mg/L	0.93	0.90	B055245	0.87	0.30	B055240			
Dissolved Selenium (Se)	mg/L	0.00033	0.00034	B055630	0.00024	0.00020	B055630	0.00024	0.00020	B055630
Dissolved Silicon (Si)	mg/L	1.7	1.6	B055245	1.7	0.50	B055240			
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	B055630	<0.00010	0.00010	B055630	<0.00010	0.00010	B055630
Dissolved Sodium (Na)	mg/L	8.2	8.6	B055245	8.5	0.50	B055240			
Dissolved Strontium (Sr)	mg/L	0.22	0.24	B055245	0.22	0.020	B055240			
Dissolved Sulphur (S)	mg/L	14	15	B055245	12	0.20	B055240			
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	B055630	<0.00020	0.00020	B055630	<0.00020	0.00020	B055630
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	B055630	<0.0010	0.0010	B055630	<0.0010	0.0010	B055630
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	B055630	<0.0010	0.0010	B055630	<0.0010	0.0010	B055630
Dissolved Uranium (U)	mg/L	0.00067	0.00078	B055630	0.00063	0.00010	B055630	0.00058	0.00010	B055630
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	B055630	<0.0010	0.0010	B055630	<0.0010	0.0010	B055630

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BVQ377	BVQ378		BVQ379			BVQ379		
Sampling Date		2023/07/25 13:54	2023/07/25 11:25		2023/07/25 10:40			2023/07/25 10:40		
COC Number		298654	298654		298654			298654		
	UNITS	**AEMP-DS-05**	**AEMP-US-02**	**QC Batch**	**AEMP-US-01**	**RDL**	**QC Batch**	**AEMP-US-01 Lab-Dup**	**RDL**	**QC Batch**
Dissolved Zinc (Zn)	mg/L	<0.0030	<0.0030	B055630	<0.0030	0.0030	B055630	<0.0030	0.0030	B055630

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Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ377
Sample ID: AEMP-DS-05
Matrix: Water

Collected: 2023/07/25
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B055528	N/A	2023/08/01	Jeanette Chavol Melo
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B052814	N/A	2023/08/02	Ancheol Jeong
F1-BTEX	CALC/MS	B052460	N/A	2023/08/02	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B052105	N/A	2023/08/01	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B052240	N/A	2023/08/03	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B057053	N/A	2023/08/02	Carlo Truong
COD by Colorimeter	M/PROB	B055473	N/A	2023/08/01	Princess Nicole Hernaez
True Colour	SPEC/COL	B054943	N/A	2023/07/31	Tyler Orr
Carbon (DOC)	TECH	B056536	N/A	2023/08/02	Ming Dong
Conductivity @25C	COND	B055530	N/A	2023/08/01	Jeanette Chavol Melo
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Sulphide (as H2S)	CALC	B052383	N/A	2023/08/01	Automated Statchk
Hardness	CALC	B052278	N/A	2023/08/01	Automated Statchk
Mercury (Dissolved) by CV	CV	B057560	2023/08/02	2023/08/02	Kiran Kumari
Mercury (Total) by CV	CV	B058636	2023/08/03	2023/08/03	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B055245	N/A	2023/08/01	Kristijan Kovac
Elements by ICP - Total	ICPA	B056845	2023/08/02	2023/08/03	Vincy Scaria
Elements by ICPMS - Dissolved	ICPM	B055630	N/A	2023/08/01	Mandeep Kaur
Elements by ICPMS - Total	ICPM	B056840	2023/08/02	2023/08/02	Mandeep Kaur
Ion Balance	CALC	B052335	N/A	2023/08/02	Automated Statchk
Ammonia-N (Total)	KONE	B058699	N/A	2023/08/03	Isabelle White
Nitrate and Nitrite	CALC	B052412	N/A	2023/08/02	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B054700	N/A	2023/07/31	Adam Fishleigh
Nitrate (as N)	CALC	B052449	2023/08/02	2023/08/02	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B052369	2023/08/02	2023/08/02	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B061414	2023/08/08	2023/08/11	Jingyuan Song
Benzo[a]pyrene Equivalency	GC/MSD	B060289	N/A	2023/08/11	Automated Statchk
Orthophosphate by Konelab	KONE	B054915	N/A	2023/07/31	Mary Anne Dela Cruz
Total Sulphide	SPEC	B054934	N/A	2023/08/01	Princess Nicole Hernaez
Total Dissolved Solids (Filt. Residue)	BAL	B055063	2023/08/01	2023/08/02	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	B051212	N/A	2023/08/03	Automated Statchk
Nitrogen (Total)	AC/COL	B058456	2023/08/03	2023/08/03	Carlo Truong
Carbon (Total Organic)	TECH	B054860	N/A	2023/08/04	Ming Dong
Total Suspended Solids (NFR)	BAL	B055106	2023/08/01	2023/08/02	Ly Vu
Turbidity	TURB	B052641	N/A	2023/07/29	Ashhel Zia

Bureau Veritas ID: BVQ377 Dup
Sample ID: AEMP-DS-05
Matrix: Water

Collected: 2023/07/25
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrogen (Total)	AC/COL	B058456	2023/08/03	2023/08/03	Carlo Truong

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Bureau Veritas Job #: C357842
Report Date: 2023/08/14

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ378
Sample ID: AEMP-US-02
Matrix: Water

Collected: 2023/07/25
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B055528	N/A	2023/08/01	Jeanette Chavol Melo
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B052814	N/A	2023/08/02	Ancheol Jeong
F1-BTEX	CALC/MS	B052460	N/A	2023/08/02	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B052105	N/A	2023/08/01	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B052240	N/A	2023/08/03	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B057051	N/A	2023/08/02	Carlo Truong
COD by Colorimeter	M/PROB	B055796	N/A	2023/08/01	Princess Nicole Hernaez
True Colour	SPEC/COL	B054943	N/A	2023/07/31	Tyler Orr
Carbon (DOC)	TECH	B063109	N/A	2023/08/08	Ye Hyun KIM
Conductivity @25C	COND	B055530	N/A	2023/08/01	Jeanette Chavol Melo
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Sulphide (as H2S)	CALC	B052383	N/A	2023/08/01	Automated Statchk
Hardness	CALC	B052278	N/A	2023/08/01	Automated Statchk
Mercury (Dissolved) by CV	CV	B057560	2023/08/02	2023/08/02	Kiran Kumari
Mercury (Total) by CV	CV	B058636	2023/08/03	2023/08/03	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B055245	N/A	2023/08/01	Kristijan Kovac
Elements by ICP - Total	ICPA	B056845	2023/08/02	2023/08/03	Vincy Scaria
Elements by ICPMS - Dissolved	ICPM	B055630	N/A	2023/08/01	Mandeep Kaur
Elements by ICPMS - Total	ICPM	B056840	2023/08/02	2023/08/02	Mandeep Kaur
Ion Balance	CALC	B052335	N/A	2023/08/02	Automated Statchk
Ammonia-N (Total)	KONE	B058699	N/A	2023/08/03	Isabelle White
Nitrate and Nitrite	CALC	B052412	N/A	2023/08/02	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B054700	N/A	2023/07/31	Adam Fishleigh
Nitrate (as N)	CALC	B052449	2023/08/02	2023/08/02	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B052369	2023/08/02	2023/08/02	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B061414	2023/08/08	2023/08/11	Jingyuan Song
Benzo[a]pyrene Equivalency	GC/MSD	B060289	N/A	2023/08/11	Automated Statchk
Orthophosphate by Konelab	KONE	B054915	N/A	2023/07/31	Mary Anne Dela Cruz
Total Sulphide	SPEC	B054934	N/A	2023/08/01	Princess Nicole Hernaez
Total Dissolved Solids (Filt. Residue)	BAL	B055063	2023/08/01	2023/08/02	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	B051212	N/A	2023/08/03	Automated Statchk
Nitrogen (Total)	AC/COL	B058456	2023/08/03	2023/08/03	Carlo Truong
Carbon (Total Organic)	TECH	B063089	N/A	2023/08/08	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B055096	2023/08/01	2023/08/01	Haydee Estilong
Turbidity	TURB	B052641	N/A	2023/07/29	Ashhel Zia

Bureau Veritas ID: BVQ378 Dup
Sample ID: AEMP-US-02
Matrix: Water

Collected: 2023/07/25
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbon (DOC)	TECH	B063109	N/A	2023/08/08	Ye Hyun KIM

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Bureau Veritas Job #: C357842
Report Date: 2023/08/14

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ379
Sample ID: AEMP-US-01
Matrix: Water

Collected: 2023/07/25
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B055528	N/A	2023/08/01	Jeanette Chavol Melo
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B052814	N/A	2023/08/02	Ancheol Jeong
F1-BTEX	CALC/MS	B052460	N/A	2023/08/02	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B052105	N/A	2023/08/01	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B052240	N/A	2023/08/03	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B057053	N/A	2023/08/02	Carlo Truong
COD by Colorimeter	M/PROB	B055796	N/A	2023/08/01	Princess Nicole Hernaez
True Colour	SPEC/COL	B054943	N/A	2023/07/31	Tyler Orr
Carbon (DOC)	TECH	B056536	N/A	2023/08/02	Ming Dong
Conductivity @25C	COND	B055530	N/A	2023/08/01	Jeanette Chavol Melo
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Sulphide (as H2S)	CALC	B052383	N/A	2023/08/01	Automated Statchk
Hardness	CALC	B052278	N/A	2023/08/01	Automated Statchk
Mercury (Dissolved) by CV	CV	B057560	2023/08/02	2023/08/02	Kiran Kumari
Mercury (Total) by CV	CV	B058636	2023/08/03	2023/08/03	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B055240	N/A	2023/08/01	Kristijan Kovac
Elements by ICP - Total	ICPA	B056845	2023/08/02	2023/08/03	Vincy Scaria
Elements by ICPMS - Dissolved	ICPM	B055630	N/A	2023/08/01	Mandeep Kaur
Elements by ICPMS - Total	ICPM	B056840	2023/08/02	2023/08/02	Mandeep Kaur
Ion Balance	CALC	B052335	N/A	2023/08/02	Automated Statchk
Ammonia-N (Total)	KONE	B058699	N/A	2023/08/03	Isabelle White
Nitrate and Nitrite	CALC	B052412	N/A	2023/08/02	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B054700	N/A	2023/07/31	Adam Fishleigh
Nitrate (as N)	CALC	B052449	2023/08/02	2023/08/02	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B052369	2023/08/02	2023/08/02	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B061414	2023/08/08	2023/08/11	Jingyuan Song
Benzo[a]pyrene Equivalency	GC/MSD	B060289	N/A	2023/08/11	Automated Statchk
Orthophosphate by Konelab	KONE	B054915	N/A	2023/07/31	Mary Anne Dela Cruz
Total Sulphide	SPEC	B054934	N/A	2023/08/01	Princess Nicole Hernaez
Total Dissolved Solids (Filt. Residue)	BAL	B055063	2023/08/01	2023/08/02	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	B051212	N/A	2023/08/03	Automated Statchk
Nitrogen (Total)	AC/COL	B058456	2023/08/03	2023/08/03	Carlo Truong
Carbon (Total Organic)	TECH	B054860	N/A	2023/08/04	Ming Dong
Total Suspended Solids (NFR)	BAL	B055096	2023/08/01	2023/08/01	Haydee Estilong
Turbidity	TURB	B052641	N/A	2023/07/29	Ashhel Zia

Bureau Veritas ID: BVQ379 Dup
Sample ID: AEMP-US-01
Matrix: Water

Collected: 2023/07/25
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
True Colour	SPEC/COL	B054943	N/A	2023/07/31	Tyler Orr
Elements by ICPMS - Dissolved	ICPM	B055630	N/A	2023/08/01	Mandeep Kaur
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B054700	N/A	2023/07/31	Adam Fishleigh

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Bureau Veritas Job #: C357842
Report Date: 2023/08/14

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ379 Dup
Sample ID: AEMP-US-01
Matrix: Water

Collected: 2023/07/25
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Orthophosphate by Konelab	KONE	B054915	N/A	2023/07/31	Mary Anne Dela Cruz

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Site#: N/A
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GENERAL COMMENTS

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

Package 1	2.7°C

Note: Analysis required not listed or clearly specified on C of C; All samples were received with 2 250-mL amber with Sodium Bisulfate but no request that requires these containers was selected.. Alex Haigh was notified via email and the lab proceeded with the analysis.

Version 4: Report reissued to include change in ID from AEMP-DS-O5 to AEMP-DS-05 as per client request.

Sample BVQ377 [AEMP-DS-05] : Sample was analyzed past method specified hold time for Turbidity. 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 True Colour. Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

Sample BVQ378 [AEMP-US-02] : Sample was analyzed past method specified hold time for Turbidity. 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 True Colour. Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

Sample BVQ379 [AEMP-US-01] : Sample was analyzed past method specified hold time for Turbidity. 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 True Colour. Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

Results relate only to the items tested.

DATA QUALITY OVERVIEW

Lab ID	Client Sample ID	Matrix	Test Code	Analysis Type	Parameters	Deviation	Root Cause	Potential Impact
BVQ377	AEMP-DS-05	Water	COLOURT-W	PHYS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ377	AEMP-DS-05	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ377	AEMP-DS-05	Water	PO4AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ377	AEMP-DS-05	Water	TURB	SPP	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ378	AEMP-US-02	Water	COLOURT-W	PHYS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ378	AEMP-US-02	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
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DATA QUALITY OVERVIEW

Lab ID	Client Sample ID	Matrix	Test Code	Analysis Type	Parameters	Deviation	Root Cause	Potential Impact
BVQ378	AEMP-US-02	Water	PO4AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ378	AEMP-US-02	Water	TURB	SPP	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ379	AEMP-US-01	Water	COLOURT-W	PHYS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ379	AEMP-US-01	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ379	AEMP-US-01	Water	PO4AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ379	AEMP-US-01	Water	TURB	SPP	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.

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Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B052369	JB9	Method Blank	Total Oil and grease	2023/08/02	<2.0		mg/L	
B052641	AZI	Method Blank	Turbidity	2023/07/29	<0.10		NTU	
B052814	AJG	Method Blank	1,4-Difluorobenzene (sur.)	2023/08/02		98	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/02		101	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/02		105	%	50 - 140
			Benzene	2023/08/02	<0.00040		mg/L	
			Toluene	2023/08/02	<0.00040		mg/L	
			Ethylbenzene	2023/08/02	<0.00040		mg/L	
			m & p-Xylene	2023/08/02	<0.00080		mg/L	
			o-Xylene	2023/08/02	<0.00040		mg/L	
			F1 (C6-C10)	2023/08/02	<0.10		mg/L	
B053613	AAX	Method Blank	O-TERPHENYL (sur.)	2023/08/04		100	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/04	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2023/08/04	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2023/08/04	<0.20		mg/L	
B054700	AFI	Method Blank	Nitrite (N)	2023/07/31	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/07/31	<0.010		mg/L	
B054860	MDO	Method Blank	Total Organic Carbon (C)	2023/08/04	<0.50		mg/L	
B054915	MAP	Method Blank	Orthophosphate (P)	2023/08/01	<0.0030		mg/L	
B054934	NHE	Method Blank	Total Sulphide	2023/08/01	<0.0018		mg/L	
B054943	TOR	Method Blank	True Colour	2023/07/31	<2.0		PtCo units	
B055063	HE1	Method Blank	Total Dissolved Solids	2023/08/02	<10		mg/L	
B055096	HE1	Method Blank	Total Suspended Solids	2023/08/01	<1.0		mg/L	
B055106	LYV	Method Blank	Total Suspended Solids	2023/08/02	<1.0		mg/L	
B055240	KKC	Method Blank	Dissolved Iron (Fe)	2023/08/01	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/08/01	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/08/01	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/08/01	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/08/01	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/08/01	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/08/01	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/08/01	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/08/01	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/08/01	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/08/01	<0.50		mg/L	
			Dissolved Boron (B)	2023/08/01	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/08/01	<0.30		mg/L	
B055245	KKC	Method Blank	Dissolved Iron (Fe)	2023/08/01	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/08/01	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/08/01	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/08/01	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/08/01	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/08/01	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/08/01	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/08/01	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/08/01	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/08/01	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/08/01	<0.50		mg/L	
			Dissolved Boron (B)	2023/08/01	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/08/01	<0.30		mg/L	
B055473	NHE	Method Blank	Chemical Oxygen Demand	2023/08/01	<10		mg/L	
B055528	JVM	Method Blank	Alkalinity (Total as CaCO3)	2023/08/01	<1.0		mg/L	

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Bureau Veritas Job #: C357842
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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Alkalinity (PP as CaCO3)	2023/08/01	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/08/01	<1.0		mg/L	
			Carbonate (CO3)	2023/08/01	<1.0		mg/L	
			Hydroxide (OH)	2023/08/01	<1.0		mg/L	
B055530	JVM	Method Blank	Conductivity	2023/08/01	<2.0		uS/cm	
B055630	MKJ	Method Blank	Dissolved Aluminum (Al)	2023/08/01	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/08/01	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/08/01	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/08/01	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/08/01	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/08/01	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/08/01	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/08/01	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/08/01	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/08/01	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/08/01	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/08/01	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/08/01	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/08/01	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/08/01	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/08/01	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/08/01	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/08/01	<0.0010		mg/L	
B055796	NHE	Method Blank	Chemical Oxygen Demand	2023/08/01	<10		mg/L	
B056536	MDO	Method Blank	Dissolved Organic Carbon (C)	2023/08/02	<0.50		mg/L	
B056840	MKJ	Method Blank	Total Aluminum (Al)	2023/08/02	<0.0030		mg/L	
			Total Chromium (Cr)	2023/08/02	<0.0010		mg/L	
			Total Cobalt (Co)	2023/08/02	<0.00030		mg/L	
			Total Copper (Cu)	2023/08/02	<0.0010		mg/L	
			Total Lead (Pb)	2023/08/02	<0.00020		mg/L	
			Total Antimony (Sb)	2023/08/02	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/08/02	<0.00020		mg/L	
			Total Nickel (Ni)	2023/08/02	<0.00050		mg/L	
			Total Selenium (Se)	2023/08/02	<0.00020		mg/L	
			Total Silver (Ag)	2023/08/02	<0.00010		mg/L	
			Total Arsenic (As)	2023/08/02	<0.00020		mg/L	
			Total Thallium (Tl)	2023/08/02	<0.00020		mg/L	
			Total Tin (Sn)	2023/08/02	<0.0010		mg/L	
			Total Titanium (Ti)	2023/08/02	<0.0010		mg/L	
			Total Uranium (U)	2023/08/02	<0.00010		mg/L	
			Total Vanadium (V)	2023/08/02	<0.0010		mg/L	
			Total Zinc (Zn)	2023/08/02	<0.0030		mg/L	
			Total Beryllium (Be)	2023/08/02	<0.0010		mg/L	
B056845	VSC	Method Blank	Total Iron (Fe)	2023/08/03	<0.060		mg/L	
			Total Lithium (Li)	2023/08/03	<0.020		mg/L	
			Total Magnesium (Mg)	2023/08/03	<0.20		mg/L	
			Total Manganese (Mn)	2023/08/03	<0.0040		mg/L	
			Total Potassium (K)	2023/08/03	<0.30		mg/L	
			Total Sodium (Na)	2023/08/03	<0.50		mg/L	
			Total Strontium (Sr)	2023/08/03	<0.020		mg/L	
			Total Sulphur (S)	2023/08/03	<0.20		mg/L	
			Total Phosphorus (P)	2023/08/03	<0.10		mg/L	

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Bureau Veritas Job #: C357842
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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Barium (Ba)	2023/08/03	<0.010		mg/L	
			Total Silicon (Si)	2023/08/03	<0.50		mg/L	
			Total Boron (B)	2023/08/03	<0.020		mg/L	
			Total Calcium (Ca)	2023/08/03	<0.30		mg/L	
B057051	CTU	Method Blank	Chloride (Cl)	2023/08/02	<1.0		mg/L	
			Sulphate (SO4)	2023/08/02	<1.0		mg/L	
B057053	CTU	Method Blank	Chloride (Cl)	2023/08/02	<1.0		mg/L	
			Sulphate (SO4)	2023/08/02	<1.0		mg/L	
B057560	KKM	Method Blank	Dissolved Mercury (Hg)	2023/08/02	<0.0019		ug/L	
B058456	CTU	Method Blank	Total Nitrogen (N)	2023/08/03	<0.020		mg/L	
B058636	KKM	Method Blank	Total Mercury (Hg)	2023/08/03	<0.0019		ug/L	
B058699	ISW	Method Blank	Total Ammonia (N)	2023/08/03	<0.015		mg/L	
B061414	SJ1	Method Blank	D10-ANTHRACENE (sur.)	2023/08/10		86	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/10		75	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/10		79	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/10		66	%	50 - 130
			Acenaphthene	2023/08/10	<0.10		ug/L	
			Acenaphthylene	2023/08/10	<0.10		ug/L	
			Acridine	2023/08/10	<0.040		ug/L	
			Anthracene	2023/08/10	<0.010		ug/L	
			Benzo(a)anthracene	2023/08/10	<0.0085		ug/L	
			Benzo(b&j)fluoranthene	2023/08/10	<0.0085		ug/L	
			Benzo(k)fluoranthene	2023/08/10	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2023/08/10	<0.0085		ug/L	
			Benzo(c)phenanthrene	2023/08/10	<0.050		ug/L	
			Benzo(a)pyrene	2023/08/10	<0.0075		ug/L	
			Benzo(e)pyrene	2023/08/10	<0.050		ug/L	
			Chrysene	2023/08/10	<0.0085		ug/L	
			Dibenz(a,h)anthracene	2023/08/10	<0.0075		ug/L	
			Fluoranthene	2023/08/10	<0.010		ug/L	
			Fluorene	2023/08/10	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2023/08/10	<0.0085		ug/L	
			Indeno(1,2,3-cd)fluoranthene	2023/08/10	<0.0085		ug/L	
			2-Methylnaphthalene	2023/08/10	<0.10		ug/L	
			Naphthalene	2023/08/10	<0.10		ug/L	
			Phenanthrene	2023/08/10	<0.050		ug/L	
			Perylene	2023/08/10	<0.050		ug/L	
			Pyrene	2023/08/10	<0.020		ug/L	
			Quinoline	2023/08/10	<0.20		ug/L	
			Retene	2023/08/10	<0.050		ug/L	
			C1-Naphthalene	2023/08/10	<0.10		ug/L	
			C3-Naphthalene	2023/08/10	<0.10		ug/L	
			C4-Naphthalene	2023/08/10	<0.10		ug/L	
			C2-Naphthalene	2023/08/10	<0.10		ug/L	
			Biphenyl	2023/08/10	<0.020		ug/L	
			C1-biphenyl	2023/08/10	<0.020		ug/L	
			C2-biphenyl	2023/08/10	<0.020		ug/L	
			C1-fluorene	2023/08/10	<0.050		ug/L	
			C2-fluorene	2023/08/10	<0.050		ug/L	
			C3-fluorene	2023/08/10	<0.050		ug/L	
			Dibenzothiophene	2023/08/10	<0.020		ug/L	
			C1-dibenzothiophene	2023/08/10	<0.020		ug/L	

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Site Location: Norman Wells, NWT
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			C2-dibenzothiophene	2023/08/10	<0.020		ug/L	
			C3-dibenzothiophene	2023/08/10	<0.020		ug/L	
			C4-dibenzothiophene	2023/08/10	<0.020		ug/L	
			C1 phenanthrene/anthracene	2023/08/10	<0.050		ug/L	
			C2 phenanthrene/anthracene	2023/08/10	<0.050		ug/L	
			C3 phenanthrene/anthracene	2023/08/10	<0.050		ug/L	
			C4 phenanthrene/anthracene	2023/08/10	<0.050		ug/L	
			C1 fluoranthene/pyrene	2023/08/10	<0.020		ug/L	
			C2 fluoranthene/pyrene	2023/08/10	<0.020		ug/L	
			C3 fluoranthene/pyrene	2023/08/10	<0.020		ug/L	
			C4 fluoranthene/pyrene	2023/08/10	<0.020		ug/L	
			C1 benzo(a)anthracene/chrysene	2023/08/10	<0.0085		ug/L	
			C2 benzo(a)anthracene/chrysene	2023/08/10	<0.0085		ug/L	
			C3 benzo(a)anthracene/chrysene	2023/08/10	<0.0085		ug/L	
			C4 benzo(a)anthracene/chrysene	2023/08/10	<0.0085		ug/L	
			C1benzobjkfluoranthene/benzoapyrene	2023/08/10	<0.0075		ug/L	
			C2benzobjkfluoranthene/benzoapyrene	2023/08/10	<0.0075		ug/L	
			C1-Acenaphthene	2023/08/10	<0.10		ug/L	
			1-Methylnaphthalene	2023/08/10	<0.10		ug/L	
B063089	YHK	Method Blank	Total Organic Carbon (C)	2023/08/08	<0.50		mg/L	
B063109	YHK	Method Blank	Dissolved Organic Carbon (C)	2023/08/08	<0.50		mg/L	
B058456	CTU	RPD [BVQ377-03]	Total Nitrogen (N)	2023/08/03	2.8		%	20
B063109	YHK	RPD [BVQ378-04]	Dissolved Organic Carbon (C)	2023/08/08	11		%	20
B054700	AFI	RPD [BVQ379-02]	Nitrite (N)	2023/07/31	NC		%	20
			Nitrate plus Nitrite (N)	2023/07/31	1.6		%	20
B054915	MAP	RPD [BVQ379-02]	Orthophosphate (P)	2023/07/31	16		%	20
B054943	TOR	RPD [BVQ379-02]	True Colour	2023/07/31	NC		%	20
B055630	MKJ	RPD [BVQ379-06]	Dissolved Aluminum (Al)	2023/08/01	6.2		%	20
			Dissolved Chromium (Cr)	2023/08/01	NC		%	20
			Dissolved Cobalt (Co)	2023/08/01	NC		%	20
			Dissolved Copper (Cu)	2023/08/01	0.86		%	20
			Dissolved Lead (Pb)	2023/08/01	NC		%	20
			Dissolved Antimony (Sb)	2023/08/01	NC		%	20
			Dissolved Molybdenum (Mo)	2023/08/01	0.98		%	20
			Dissolved Nickel (Ni)	2023/08/01	8.1		%	20
			Dissolved Selenium (Se)	2023/08/01	1.5		%	20
			Dissolved Silver (Ag)	2023/08/01	NC		%	20
			Dissolved Arsenic (As)	2023/08/01	0.35		%	20
			Dissolved Thallium (Tl)	2023/08/01	NC		%	20
			Dissolved Tin (Sn)	2023/08/01	NC		%	20
			Dissolved Titanium (Ti)	2023/08/01	NC		%	20
			Dissolved Uranium (U)	2023/08/01	6.8		%	20
			Dissolved Vanadium (V)	2023/08/01	NC		%	20
			Dissolved Zinc (Zn)	2023/08/01	NC		%	20
			Dissolved Beryllium (Be)	2023/08/01	NC		%	20
B054700	AFI	Matrix Spike [BVQ379-02]	Nitrite (N)	2023/07/31		102	%	80 - 120
			Nitrate plus Nitrite (N)	2023/07/31		107	%	80 - 120
B054915	MAP	Matrix Spike [BVQ379-02]	Orthophosphate (P)	2023/07/31		99	%	80 - 120
B054943	TOR	Matrix Spike [BVQ379-02]	True Colour	2023/07/31		106	%	80 - 120
B063109	YHK	Matrix Spike [BVQ378-04]	Dissolved Organic Carbon (C)	2023/08/08		115	%	80 - 120
B052369	JB9	LCS	Total Oil and grease	2023/08/02		100	%	70 - 130
B052641	AZI	LCS	Turbidity	2023/07/29		102	%	80 - 120

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B052814	AJG	LCS	1,4-Difluorobenzene (sur.)	2023/08/02		94	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/02		104	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/02		101	%	50 - 140
			Benzene	2023/08/02		93	%	60 - 130
			Toluene	2023/08/02		90	%	60 - 130
			Ethylbenzene	2023/08/02		96	%	60 - 130
			m & p-Xylene	2023/08/02		95	%	60 - 130
			o-Xylene	2023/08/02		101	%	60 - 130
			F1 (C6-C10)	2023/08/02		103	%	60 - 140
B053613	AAX	LCS	O-TERPHENYL (sur.)	2023/08/04		101	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/04		100	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/08/04		110	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/08/04		103	%	60 - 140
B054700	AFI	LCS	Nitrite (N)	2023/07/31		100	%	80 - 120
			Nitrate plus Nitrite (N)	2023/07/31		100	%	80 - 120
B054860	MDO	LCS	Total Organic Carbon (C)	2023/08/04		107	%	80 - 120
B054915	MAP	LCS	Orthophosphate (P)	2023/07/31		100	%	80 - 120
B054934	NHE	LCS	Total Sulphide	2023/08/01		93	%	80 - 120
B054943	TOR	LCS	True Colour	2023/07/31		100	%	80 - 120
B055063	HE1	LCS	Total Dissolved Solids	2023/08/02		96	%	80 - 120
B055096	HE1	LCS	Total Suspended Solids	2023/08/01		97	%	80 - 120
B055106	LYV	LCS	Total Suspended Solids	2023/08/02		92	%	80 - 120
B055240	KKC	LCS	Dissolved Iron (Fe)	2023/08/01		104	%	80 - 120
			Dissolved Lithium (Li)	2023/08/01		103	%	80 - 120
			Dissolved Magnesium (Mg)	2023/08/01		102	%	80 - 120
			Dissolved Manganese (Mn)	2023/08/01		102	%	80 - 120
			Dissolved Potassium (K)	2023/08/01		107	%	80 - 120
			Dissolved Sodium (Na)	2023/08/01		103	%	80 - 120
			Dissolved Strontium (Sr)	2023/08/01		97	%	80 - 120
			Dissolved Sulphur (S)	2023/08/01		101	%	80 - 120
			Dissolved Phosphorus (P)	2023/08/01		102	%	80 - 120
			Dissolved Barium (Ba)	2023/08/01		100	%	80 - 120
			Dissolved Silicon (Si)	2023/08/01		97	%	80 - 120
			Dissolved Boron (B)	2023/08/01		98	%	80 - 120
			Dissolved Calcium (Ca)	2023/08/01		101	%	80 - 120
B055245	KKC	LCS	Dissolved Iron (Fe)	2023/08/01		102	%	80 - 120
			Dissolved Lithium (Li)	2023/08/01		102	%	80 - 120
			Dissolved Magnesium (Mg)	2023/08/01		103	%	80 - 120
			Dissolved Manganese (Mn)	2023/08/01		101	%	80 - 120
			Dissolved Potassium (K)	2023/08/01		106	%	80 - 120
			Dissolved Sodium (Na)	2023/08/01		103	%	80 - 120
			Dissolved Strontium (Sr)	2023/08/01		97	%	80 - 120
			Dissolved Sulphur (S)	2023/08/01		99	%	80 - 120
			Dissolved Phosphorus (P)	2023/08/01		100	%	80 - 120
			Dissolved Barium (Ba)	2023/08/01		99	%	80 - 120
			Dissolved Silicon (Si)	2023/08/01		96	%	80 - 120
			Dissolved Boron (B)	2023/08/01		98	%	80 - 120
			Dissolved Calcium (Ca)	2023/08/01		102	%	80 - 120
B055473	NHE	LCS	Chemical Oxygen Demand	2023/08/01		102	%	80 - 120
B055528	JVM	LCS	Alkalinity (Total as CaCO3)	2023/08/01		100	%	80 - 120
B055530	JVM	LCS	Conductivity	2023/08/01		102	%	90 - 110
B055630	MKJ	LCS	Dissolved Aluminum (Al)	2023/08/01		118	%	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
			Dissolved Chromium (Cr)	2023/08/01		110	%	80 - 120
			Dissolved Cobalt (Co)	2023/08/01		108	%	80 - 120
			Dissolved Copper (Cu)	2023/08/01		112	%	80 - 120
			Dissolved Lead (Pb)	2023/08/01		108	%	80 - 120
			Dissolved Antimony (Sb)	2023/08/01		108	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/08/01		110	%	80 - 120
			Dissolved Nickel (Ni)	2023/08/01		111	%	80 - 120
			Dissolved Selenium (Se)	2023/08/01		113	%	80 - 120
			Dissolved Silver (Ag)	2023/08/01		104	%	80 - 120
			Dissolved Arsenic (As)	2023/08/01		107	%	80 - 120
			Dissolved Thallium (Tl)	2023/08/01		109	%	80 - 120
			Dissolved Tin (Sn)	2023/08/01		107	%	80 - 120
			Dissolved Titanium (Ti)	2023/08/01		113	%	80 - 120
			Dissolved Uranium (U)	2023/08/01		105	%	80 - 120
			Dissolved Vanadium (V)	2023/08/01		108	%	80 - 120
			Dissolved Zinc (Zn)	2023/08/01		108	%	80 - 120
			Dissolved Beryllium (Be)	2023/08/01		106	%	80 - 120
B055796	NHE	LCS	Chemical Oxygen Demand	2023/08/01		102	%	80 - 120
B056536	MDO	LCS	Dissolved Organic Carbon (C)	2023/08/02		107	%	80 - 120
B056840	MKJ	LCS	Total Aluminum (Al)	2023/08/02		105	%	80 - 120
			Total Chromium (Cr)	2023/08/02		94	%	80 - 120
			Total Cobalt (Co)	2023/08/02		94	%	80 - 120
			Total Copper (Cu)	2023/08/02		95	%	80 - 120
			Total Lead (Pb)	2023/08/02		98	%	80 - 120
			Total Antimony (Sb)	2023/08/02		101	%	80 - 120
			Total Molybdenum (Mo)	2023/08/02		99	%	80 - 120
			Total Nickel (Ni)	2023/08/02		94	%	80 - 120
			Total Selenium (Se)	2023/08/02		100	%	80 - 120
			Total Silver (Ag)	2023/08/02		100	%	80 - 120
			Total Arsenic (As)	2023/08/02		93	%	80 - 120
			Total Thallium (Tl)	2023/08/02		100	%	80 - 120
			Total Tin (Sn)	2023/08/02		98	%	80 - 120
			Total Titanium (Ti)	2023/08/02		92	%	80 - 120
			Total Uranium (U)	2023/08/02		97	%	80 - 120
			Total Vanadium (V)	2023/08/02		94	%	80 - 120
			Total Zinc (Zn)	2023/08/02		94	%	80 - 120
			Total Beryllium (Be)	2023/08/02		97	%	80 - 120
B056845	VSC	LCS	Total Iron (Fe)	2023/08/02		108	%	80 - 120
			Total Lithium (Li)	2023/08/02		112	%	80 - 120
			Total Magnesium (Mg)	2023/08/02		108	%	80 - 120
			Total Manganese (Mn)	2023/08/02		110	%	80 - 120
			Total Potassium (K)	2023/08/02		110	%	80 - 120
			Total Sodium (Na)	2023/08/02		103	%	80 - 120
			Total Strontium (Sr)	2023/08/02		97	%	80 - 120
			Total Sulphur (S)	2023/08/02		99	%	80 - 120
			Total Phosphorus (P)	2023/08/02		101	%	80 - 120
			Total Barium (Ba)	2023/08/02		101	%	80 - 120
			Total Silicon (Si)	2023/08/02		100	%	80 - 120
			Total Boron (B)	2023/08/02		99	%	80 - 120
			Total Calcium (Ca)	2023/08/02		109	%	80 - 120
B057051	CTU	LCS	Chloride (Cl)	2023/08/02		101	%	80 - 120
			Sulphate (SO4)	2023/08/02		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
B057053	CTU	LCS	Chloride (Cl)	2023/08/02		99	%	80 - 120
			Sulphate (SO4)	2023/08/02		103	%	80 - 120
B057560	KKM	LCS	Dissolved Mercury (Hg)	2023/08/02		101	%	80 - 120
B058456	CTU	LCS	Total Nitrogen (N)	2023/08/03		103	%	80 - 120
B058636	KKM	LCS	Total Mercury (Hg)	2023/08/03		103	%	80 - 120
B058699	ISW	LCS	Total Ammonia (N)	2023/08/03		101	%	80 - 120
B061414	SJ1	LCS	D10-ANTHRACENE (sur.)	2023/08/10		89	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/10		80	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/10		86	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/10		77	%	50 - 130
			Acenaphthene	2023/08/10		88	%	50 - 130
			Acenaphthylene	2023/08/10		88	%	50 - 130
			Acridine	2023/08/10		71	%	50 - 130
			Anthracene	2023/08/10		87	%	50 - 130
			Benzo(a)anthracene	2023/08/10		95	%	50 - 130
			Benzo(b&j)fluoranthene	2023/08/10		91	%	50 - 130
			Benzo(k)fluoranthene	2023/08/10		102	%	50 - 130
			Benzo(g,h,i)perylene	2023/08/10		99	%	50 - 130
			Benzo(c)phenanthrene	2023/08/10		105	%	50 - 130
			Benzo(a)pyrene	2023/08/10		100	%	50 - 130
			Benzo(e)pyrene	2023/08/10		92	%	50 - 130
			Chrysene	2023/08/10		96	%	50 - 130
			Dibenz(a,h)anthracene	2023/08/10		98	%	50 - 130
			Fluoranthene	2023/08/10		104	%	50 - 130
			Fluorene	2023/08/10		89	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/08/10		90	%	50 - 130
			2-Methylnaphthalene	2023/08/10		88	%	50 - 130
			Naphthalene	2023/08/10		81	%	50 - 130
			Phenanthrene	2023/08/10		93	%	50 - 130
			Perylene	2023/08/10		96	%	50 - 130
			Pyrene	2023/08/10		105	%	50 - 130
			Quinoline	2023/08/10		95	%	50 - 130
			C1-Naphthalene	2023/08/10		71	%	50 - 130
			C3-Naphthalene	2023/08/10		94	%	50 - 130
			C2-Naphthalene	2023/08/10		88	%	50 - 130
			C1-biphenyl	2023/08/10		85	%	50 - 130
			C1 phenanthrene/anthracene	2023/08/10		102	%	50 - 130
			C2 phenanthrene/anthracene	2023/08/10		104	%	50 - 130
			C1 fluoranthene/pyrene	2023/08/10		103	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/08/10		48	%	30 - 130
			1-Methylnaphthalene	2023/08/10		71	%	50 - 130
B063089	YHK	LCS	Total Organic Carbon (C)	2023/08/08		111	%	80 - 120
B063109	YHK	LCS	Dissolved Organic Carbon (C)	2023/08/08		108	%	80 - 120

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Bureau Veritas Job #: C357842
Report Date: 2023/08/14

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B058456	CTU	SRM	Total Nitrogen (N)	2023/08/03		105	%	80 - 120

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.

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

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

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

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

NC (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).

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Bureau Veritas Job #: C357842
Report Date: 2023/08/14

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

VALIDATION SIGNATURE PAGE

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

Sandy Yuan, M.Sc., QP, Scientific Specialist

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

Bureau Veritas Proprietary Software
Logiciel Propriétaire de Bureau Veritas

Automated Statchk

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 {0}, {1} responsible for {2} {3} laboratory operations.

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maxxam
A Bureau Veritas Group Company

☒ Calgary
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Toll Free: (800) 386-7247

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 298654

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C-3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Sampler Name (Print): Alex Haigh / Stacy Gibb

REPORT INFORMATION

Company Name: Advisian
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C-3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Consultant Project #: 417085-49223-23200

ANALYSIS REQUESTED

FIELD SAMPLE ID	MATRIX: GROUND WATER	MATRIX: SURFACE WATER	MATRIX: SOIL	MATRIX: OTHER	# CONTAINERS	SAMPLING: DATE (YYYY/MM/DD)	SAMPLING: TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-2 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☒ DIS ☒	MERCURY TOTAL ☒ DISSOLVED ☒	SALINITY SOIL	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	True color, TSS, TDS, Turbidity	O.I & grease	TOC, DOC, Sulphide	Orthophosphate	Sulphur - Total + dissolved	COD	Nitrate, Nitrite, Ammonia (total), TKN
1 AEMP — DS-05		X			18	2023/07/25	13:58	X			X		X						X	X					X		X	X	X	X	X	X	X
2 AEMP - US-02		X			18	2023/07/25	11:25	X			X		X						X	X					X		X	X	X	X	X	X	X
3 AEMP - US-01		X			18	2023/07/25	10:40	X			X		X						X	X					X		X	X	X	X	X	X	X
4																																	
5																																	
6																																	
7																																	
8																																	
9																																	
10																																	

mcal-07-1979

IOL SITE LOCATION: Norman Wells, NT
IOL PROJECT # (if applicable): NA
MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-49223, 23200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) FWAL ☐ Other

SPECIAL INSTRUCTIONS: email Canada.chemistry@worley.com cc'd, for data track @ worley.com Stacy.gibb@worley.com
IES A2601436

JARS USED & NOT SUBMITTED (Enter N/A for Water): NA

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID #				YES	NO	COOLER ID #				YES	NO	COOLER ID #			
SEAL PRESENT	✓		TEMP °C	2	3	3	SEAL PRESENT		TEMP °C	1	2	3	SEAL PRESENT		TEMP °C	1	2	3
SEAL INTACT	✓			1	2	3	SEAL INTACT						SEAL INTACT					
COOLING MEDIA PRESENT	✓						COOLING MEDIA PRESENT						COOLING MEDIA PRESENT					

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1.	STACY GIBB	2023/07/27	10:10	1.	Josh Kowalsky	2023/07/27	1520
2.				2.			
3.				3.			

LAB USE ONLY
MAXXAM JOB # C357842
SAMPLES
LABELED BY: NKS
VERIFIED BY: JKY

COC-1010 (06/2016) IOL-AB
White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-07-25/26
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C357847	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☒ **Yes** ☐ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☒ **Yes** ☐ **No**

If yes, FLAG type and comments: Extra bottles received. No impact on data quality

Date samples submitted 2023-07-28

Due date for lab report on SRC 2023-08-11

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☒ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☒ **Yes** ☐ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:** 2023-08-09
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☒ **No**	Turbidity, orthophosphate, true colour, nitrite
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☒ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☒ **N/A**	
Matrix Spike Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☒ **Yes** ☐ **No** ☐ **N/A**	

Data check completed by Alex Haigh **Date** 2024-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	

Data check completed by Alex Haigh **Date** 2024-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☒ Yes	☐ No	☐ N/A	**Comments**
Trip Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Equipment Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes	☐ No	☒ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field pH vs. Lab pH RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes	☐ No	☐ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☒ Yes ☐ No

Explain rationale for yes/no:

Request lab to recheck data? If so give details	☐ Yes	☒ No	☐ N/A	**Comments**

If Yes, Lab request to recheck must be approved by Project Manager Name: **Date**

Data check completed by Alex Haigh **Date** 2024-03-26

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 298653

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/11
Report #: R3379185
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C357847
Received: 2023/07/28, 15:20

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	3	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	3	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	3		Auto Calc
Cadmium - low level CCME - Dissolved	3		Auto Calc
Cadmium - low level CCME (Total)	3		Auto Calc
Chloride/Sulphate by Auto Colourimetry	3	AB SOP-00020	SM24-4500-Cl/SO4-E m
COD by Colorimeter	3	AB SOP-00016	SM 23 5220D m
True Colour	3	CAL SOP-00049	SM 24 2120 C m
Carbon (DOC) (1)	3	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	3	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	3	AB SOP-00037	CCME PHC-CWS m
Sulphide (as H2S)	3		Auto Calc
Hardness	3		Auto Calc
Mercury (Dissolved) by CV (3)	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	3	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	3	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (3)	3	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	3	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	3		Auto Calc
Ammonia-N (Total)	3	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate and Nitrite	3		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	3	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N)	3		Auto Calc
Oil and Grease (Gravimetric, n-Hexane)	3	AB SOP-00092	SM 23 5520B/5520F m
Target & Alkylated PAH in Water by GC/MS (4)	3	AB SOP-00037 CAL SOP-00250	EPA 8270e m
Benzo[a]pyrene Equivalency (5)	3		Auto Calc
PAH in Water by GC/MS	3	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270E m
pH @25°C (6)	3	AB SOP-00005	SM 23 4500-H+B m
Orthophosphate by Konelab (7)	3	AB SOP-00025	SM 24 4500-P A,F m
Total Sulphide	3	AB SOP-00080	SM 23 4500 S2-A D Fm

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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 298653

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/11
Report #: R3379185
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C357847
Received: 2023/07/28, 15:20

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Total Dissolved Solids (Filt. Residue)	3	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen (Total)	3	BBY WI-00033	Auto Calc
Nitrogen (Total)	3	AB SOP-00093	SM 24 4500-N C m
Carbon (Total Organic) (8)	3	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR)	3	AB SOP-00061	SM 24 2540 D m
Turbidity	3	CAL SOP-00081	SM 23 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) 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.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Alkylated PAH results are semiquantitative
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 298653

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/11
Report #: R3379185
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C357847
Received: 2023/07/28, 15:20

(6) 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.
(7) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
(8) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Namita Sahni
Customer Solutions Representative
11 Aug 2023 11:23:19

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614
==========
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Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		BVQ394	BVQ395	BVQ396		
Sampling Date		2023/07/26 15:00	2023/07/26 15:05	2023/07/25 15:40		
COC Number		298653	298653	298653		
	UNITS	**AEMP-DS-04**	**AEMP-DUP1**	**AEMP-DS-03**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	B053613
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	B053613
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.20	B053613
Volatiles						
Benzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B053334
Toluene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B053334
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B053334
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	0.00080	B053334
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B053334
Xylenes (Total)	mg/L	<0.00089	<0.00089	<0.00089	0.00089	B052555
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	0.10	B052555
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	0.10	B053334
Extraction Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	99	99	99		B053613
Instrument Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	100	96	98		B053334
4-Bromofluorobenzene (sur.)	%	101	103	99		B053334
D4-1,2-Dichloroethane (sur.)	%	101	99	101		B053334
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		BVQ394	BVQ395	BVQ396		
Sampling Date		2023/07/26 15:00	2023/07/26 15:05	2023/07/25 15:40		
COC Number		298653	298653	298653		
	UNITS	**AEMP-DS-04**	**AEMP-DUP1**	**AEMP-DS-03**	**RDL**	**QC Batch**
Calculated Parameters						
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.10	0.12	0.12	0.020	B052569
Nutrients						
Total Nitrogen (N)	mg/L	0.17	0.17	0.16	0.020	B058456
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BVQ394	BVQ395	BVQ396		
Sampling Date		2023/07/26 15:00	2023/07/26 15:05	2023/07/25 15:40		
COC Number		298653	298653	298653		
	UNITS	**AEMP-DS-04**	**AEMP-DUP1**	**AEMP-DS-03**	**RDL**	**QC Batch**
Elements						
Total Cadmium (Cd)	mg/L	0.000031	0.000037	0.000054	0.000020	B052581
Total Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	B058636
Total Aluminum (Al)	mg/L	0.40	0.45	0.88	0.0030	B056840
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	0.00060	B056840
Total Arsenic (As)	mg/L	0.00063	0.00054	0.00080	0.00020	B056840
Total Barium (Ba)	mg/L	0.054	0.055	0.064	0.010	B056845
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B056840
Total Boron (B)	mg/L	<0.020	<0.020	<0.020	0.020	B056845
Total Calcium (Ca)	mg/L	36	36	41	0.30	B056845
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	0.0013	0.0010	B056840
Total Cobalt (Co)	mg/L	0.00030	0.00036	0.00051	0.00030	B056840
Total Copper (Cu)	mg/L	0.0018	0.0014	0.0020	0.0010	B056840
Total Iron (Fe)	mg/L	0.55	0.63	1.0	0.060	B056845
Total Lead (Pb)	mg/L	0.00031	0.00045	0.00054	0.00020	B056840
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	0.020	B056845
Total Magnesium (Mg)	mg/L	10	11	12	0.20	B056845
Total Manganese (Mn)	mg/L	0.017	0.018	0.026	0.0040	B056845
Total Molybdenum (Mo)	mg/L	0.0011	0.00099	0.0011	0.00020	B056840
Total Nickel (Ni)	mg/L	0.0016	0.0018	0.0026	0.00050	B056840
Total Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	0.10	B056845
Total Potassium (K)	mg/L	1.0	1.1	1.2	0.30	B056845
Total Selenium (Se)	mg/L	0.00033	0.00032	0.00046	0.00020	B056840
Total Silicon (Si)	mg/L	2.4	2.5	3.5	0.50	B056845
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B056840
Total Sodium (Na)	mg/L	8.4	8.5	8.0	0.50	B056845
Total Strontium (Sr)	mg/L	0.22	0.23	0.24	0.020	B056845
Total Sulphur (S)	mg/L	13	13	16	0.20	B056845
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B056840
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B056840
Total Titanium (Ti)	mg/L	0.0078	0.0063	0.024	0.0010	B056840
Total Uranium (U)	mg/L	0.00076	0.00075	0.00092	0.00010	B056840
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BVQ394	BVQ395	BVQ396		
Sampling Date		2023/07/26 15:00	2023/07/26 15:05	2023/07/25 15:40		
COC Number		298653	298653	298653		
	UNITS	**AEMP-DS-04**	**AEMP-DUP1**	**AEMP-DS-03**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	0.0010	0.0011	0.0020	0.0010	B056840
Total Zinc (Zn)	mg/L	0.0047	0.0042	0.0072	0.0030	B056840
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ394		BVQ395			BVQ395		
Sampling Date		2023/07/26 15:00		2023/07/26 15:05			2023/07/26 15:05		
COC Number		298653		298653			298653		
	UNITS	**AEMP-DS-04**	**QC Batch**	**AEMP-DUP1**	**RDL**	**QC Batch**	**AEMP-DUP1 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters									
Hardness (CaCO3)	mg/L	130	B052563	120	0.50	B052563			
Ion Balance (% Difference)	%	1.1	B052564	5.5	N/A	B052564			
Nitrate (N)	mg/L	0.061	B052567	0.050	0.010	B052567			
Nitrate (NO3)	mg/L	0.27	B052566	0.22	0.044	B052566			
Nitrite (NO2)	mg/L	<0.033	B052566	<0.033	0.033	B052566			
Sulphide (as H2S)	mg/L	<0.0020	B052584	<0.0020	0.0020	B052584			
Demand Parameters									
Chemical Oxygen Demand	mg/L	21	B053851	16	10	B053851			
Elements									
Dissolved Cadmium (Cd)	mg/L	<0.000020	B052562	<0.000020	0.000020	B052562			
Misc. Inorganics									
Conductivity	uS/cm	290	B056385	280	2.0	B056385			
Dissolved Organic Carbon (C)	mg/L	3.7	B054922	3.5	0.50	B054922			
pH	pH	7.36	B056384	7.11	N/A	B056384			
Total Organic Carbon (C)	mg/L	3.0	B054860	3.1	0.50	B054860			
Total Dissolved Solids	mg/L	170	B057076	160	10	B057076			
Total Suspended Solids	mg/L	34	B057058	24	1.0	B057058			
Anions									
Alkalinity (PP as CaCO3)	mg/L	<1.0	B056378	<1.0	1.0	B056378			
Alkalinity (Total as CaCO3)	mg/L	96	B056378	99	1.0	B056378			
Bicarbonate (HCO3)	mg/L	120	B056378	120	1.0	B056378			
Carbonate (CO3)	mg/L	<1.0	B056378	<1.0	1.0	B056378			
Hydroxide (OH)	mg/L	<1.0	B056378	<1.0	1.0	B056378			
Total Sulphide	mg/L	<0.0018	B054934	<0.0018	0.0018	B054934			
Chloride (Cl)	mg/L	9.6	B053410	9.6	1.0	B053410			
Sulphate (SO4)	mg/L	41	B053410	40	1.0	B053410			
Nutrients									
Total Ammonia (N)	mg/L	<0.015	B058697	<0.015	0.015	B058697			
Orthophosphate (P)	mg/L	<0.0030	B053023	<0.0030	0.0030	B053023			

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

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ394		BVQ395			BVQ395		
Sampling Date		2023/07/26 15:00		2023/07/26 15:05			2023/07/26 15:05		
COC Number		298653		298653			298653		
	UNITS	**AEMP-DS-04**	**QC Batch**	**AEMP-DUP1**	**RDL**	**QC Batch**	**AEMP-DUP1 Lab-Dup**	**RDL**	**QC Batch**
Nitrite (N)	mg/L	<0.010	B053265	<0.010	0.010	B053265			
Nitrate plus Nitrite (N)	mg/L	0.061	B053265	0.050	0.010	B053265			
Misc. Organics									
Total Oil and grease	mg/L	<2.0	B052369	<2.0	2.0	B052369			
Physical Properties									
True Colour	PtCo units	6.2	B053037	5.9	2.0	B053037			
Physical Properties									
Turbidity	NTU	21	B054056	19	0.10	B054065	21	0.10	B054065

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
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Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ396		
Sampling Date		2023/07/25 15:40		
COC Number		298653		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**
Calculated Parameters				
Hardness (CaCO3)	mg/L	130	0.50	B052563
Ion Balance (% Difference)	%	5.0	N/A	B052564
Nitrate (N)	mg/L	0.038	0.010	B052567
Nitrate (NO3)	mg/L	0.17	0.044	B052566
Nitrite (NO2)	mg/L	<0.033	0.033	B052566
Sulphide (as H2S)	mg/L	<0.0020	0.0020	B052584
Demand Parameters				
Chemical Oxygen Demand	mg/L	10	10	B053851
Elements				
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	B052562
Misc. Inorganics				
Conductivity	uS/cm	310	2.0	B056385
Dissolved Organic Carbon (C)	mg/L	5.4	0.50	B063109
pH	pH	7.55	N/A	B056384
Total Organic Carbon (C)	mg/L	3.8	0.50	B063089
Total Dissolved Solids	mg/L	110	10	B055063
Total Suspended Solids	mg/L	45	1.0	B055096
Anions				
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	B056378
Alkalinity (Total as CaCO3)	mg/L	100	1.0	B056378
Bicarbonate (HCO3)	mg/L	130	1.0	B056378
Carbonate (CO3)	mg/L	<1.0	1.0	B056378
Hydroxide (OH)	mg/L	<1.0	1.0	B056378
Total Sulphide	mg/L	<0.0018	0.0018	B054934
Chloride (Cl)	mg/L	8.6	1.0	B053410
Sulphate (SO4)	mg/L	48	1.0	B053410
Nutrients				
Total Ammonia (N)	mg/L	<0.015	0.015	B058697
Orthophosphate (P)	mg/L	<0.0030	0.0030	B053023
Nitrite (N)	mg/L	<0.010	0.010	B053265

RDL = Reportable Detection Limit
N/A = Not Applicable

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Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ396		
Sampling Date		2023/07/25 15:40		
COC Number		298653		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**
Nitrate plus Nitrite (N)	mg/L	0.038	0.010	B053265
Misc. Organics				
Total Oil and grease	mg/L	3.0	2.0	B052369
Physical Properties				
True Colour	PtCo units	6.9	2.0	B053037
Physical Properties				
Turbidity	NTU	27	0.10	B052641
RDL = Reportable Detection Limit				

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ394	BVQ395	BVQ396		
Sampling Date		2023/07/26 15:00	2023/07/26 15:05	2023/07/25 15:40		
COC Number		298653	298653	298653		
	UNITS	**AEMP-DS-04**	**AEMP-DUP1**	**AEMP-DS-03**	**RDL**	**QC Batch**
Polycyclic Aromatics						
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B052557
Acenaphthene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
Acenaphthylene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
Acridine	mg/L	<0.000040	<0.000040	<0.000040	0.000040	B053612
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B053612
Benzo(a)anthracene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Benzo(b&j)fluoranthene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Benzo(k)fluoranthene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Benzo(g,h,i)perylene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Benzo(c)phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Benzo(a)pyrene	mg/L	<0.0000075	<0.0000075	<0.0000075	0.0000075	B053612
Benzo(e)pyrene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Chrysene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Dibenz(a,h)anthracene	mg/L	<0.0000075	<0.0000075	<0.0000075	0.0000075	B053612
Fluoranthene	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B053612
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
Fluorene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Indeno(1,2,3-cd)pyrene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
1-Methylnaphthalene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
2-Methylnaphthalene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
Naphthalene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
Phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Perylene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Retene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C1-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Pyrene	mg/L	<0.000020	<0.000020	<0.000020	0.000020	B053612
C3-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Quinoline	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B053612
C4-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
C2-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B061414
RDL = Reportable Detection Limit						

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ394	BVQ395	BVQ396		
Sampling Date		2023/07/26 15:00	2023/07/26 15:05	2023/07/25 15:40		
COC Number		298653	298653	298653		
	UNITS	**AEMP-DS-04**	**AEMP-DUP1**	**AEMP-DS-03**	**RDL**	**QC Batch**
C1-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C2-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C2-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C3-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
Dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C2-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C3-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C4-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C2 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C3 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C4 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C1 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C2 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C3 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C4 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
C2 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
C3 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B061414
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B061414
C1-Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Extraction Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	82	68	81		B061414
D8-ACENAPHTHYLENE (sur.)	%	74	64	73		B061414
D8-NAPHTHALENE (sur.)	%	64	53	64		B061414
TERPHENYL-D14 (sur.)	%	71	57	70		B061414
D10-ANTHRACENE (sur.)	%	107	101	104		B053612
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ394	BVQ395	BVQ396		
Sampling Date		2023/07/26 15:00	2023/07/26 15:05	2023/07/25 15:40		
COC Number		298653	298653	298653		
	UNITS	**AEMP-DS-04**	**AEMP-DUP1**	**AEMP-DS-03**	**RDL**	**QC Batch**
D8-ACENAPHTHYLENE (sur.)	%	91	80	83		B053612
D8-NAPHTHALENE (sur.)	%	81	70	73		B053612
TERPHENYL-D14 (sur.)	%	106	99	116		B053612
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		BVQ394	BVQ395	BVQ396		
Sampling Date		2023/07/26 15:00	2023/07/26 15:05	2023/07/25 15:40		
COC Number		298653	298653	298653		
	UNITS	**AEMP-DS-04**	**AEMP-DUP1**	**AEMP-DS-03**	**RDL**	**QC Batch**
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	B058602
RDL = Reportable Detection Limit						

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BVQ394	BVQ395	BVQ396		
Sampling Date		2023/07/26 15:00	2023/07/26 15:05	2023/07/25 15:40		
COC Number		298653	298653	298653		
	UNITS	**AEMP-DS-04**	**AEMP-DUP1**	**AEMP-DS-03**	**RDL**	**QC Batch**
Elements						
Dissolved Aluminum (Al)	mg/L	0.026	0.029	0.039	0.0030	B053329
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	0.00060	B053329
Dissolved Arsenic (As)	mg/L	0.00027	0.00033	0.00031	0.00020	B053329
Dissolved Barium (Ba)	mg/L	0.047	0.046	0.050	0.010	B054121
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B053329
Dissolved Boron (B)	mg/L	<0.020	<0.020	<0.020	0.020	B054121
Dissolved Calcium (Ca)	mg/L	34	32	36	0.30	B054121
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B053329
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	0.00030	B053329
Dissolved Copper (Cu)	mg/L	0.0010	0.0018	0.0010	0.0010	B053329
Dissolved Iron (Fe)	mg/L	<0.060	<0.060	<0.060	0.060	B054121
Dissolved Lead (Pb)	mg/L	<0.00020	0.00034	<0.00020	0.00020	B053329
Dissolved Lithium (Li)	mg/L	<0.020	<0.020	<0.020	0.020	B054121
Dissolved Magnesium (Mg)	mg/L	11	9.8	11	0.20	B054121
Dissolved Manganese (Mn)	mg/L	<0.0040	<0.0040	<0.0040	0.0040	B054121
Dissolved Molybdenum (Mo)	mg/L	0.00097	0.0010	0.0011	0.00020	B053329
Dissolved Nickel (Ni)	mg/L	0.00095	0.0016	0.0011	0.00050	B053329
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	0.10	B054121
Dissolved Potassium (K)	mg/L	1.0	0.95	0.98	0.30	B054121
Dissolved Selenium (Se)	mg/L	0.00027	0.00031	0.00037	0.00020	B053329
Dissolved Silicon (Si)	mg/L	1.5	1.4	1.6	0.50	B054121
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053329
Dissolved Sodium (Na)	mg/L	8.8	8.2	7.7	0.50	B054121
Dissolved Strontium (Sr)	mg/L	0.23	0.22	0.23	0.020	B054121
Dissolved Sulphur (S)	mg/L	12	12	15	0.20	B054121
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B053329
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B053329
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B053329
Dissolved Uranium (U)	mg/L	0.00069	0.00073	0.00083	0.00010	B053329
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B053329
Dissolved Zinc (Zn)	mg/L	0.0044	0.0077	<0.0030	0.0030	B053329
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ394
Sample ID: AEMP-DS-04
Matrix: Water

Collected: 2023/07/26
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B056378	N/A	2023/08/02	Jeanette Chavol Melo
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B053334	N/A	2023/08/01	Ancheol Jeong
F1-BTEX	CALC/MS	B052555	N/A	2023/08/02	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B052562	N/A	2023/07/30	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B052581	N/A	2023/08/03	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B053410	N/A	2023/07/30	Adam Fishleigh
COD by Colorimeter	M/PROB	B053851	N/A	2023/07/31	Ly Vu
True Colour	SPEC/COL	B053037	N/A	2023/07/29	Carlo Truong
Carbon (DOC)	TECH	B054922	N/A	2023/08/04	Ming Dong
Conductivity @25C	COND	B056385	N/A	2023/08/02	Jeanette Chavol Melo
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Sulphide (as H2S)	CALC	B052584	N/A	2023/08/01	Automated Statchk
Hardness	CALC	B052563	N/A	2023/07/31	Automated Statchk
Mercury (Dissolved) by CV	CV	B058602	2023/08/03	2023/08/03	Kiran Kumari
Mercury (Total) by CV	CV	B058636	2023/08/03	2023/08/03	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B054121	N/A	2023/07/31	Vincy Scaria
Elements by ICP - Total	ICPA	B056845	2023/08/02	2023/08/03	Vincy Scaria
Elements by ICPMS - Dissolved	ICPM	B053329	N/A	2023/07/30	Jason Bao
Elements by ICPMS - Total	ICPM	B056840	2023/08/02	2023/08/02	Mandeep Kaur
Ion Balance	CALC	B052564	N/A	2023/08/02	Automated Statchk
Ammonia-N (Total)	KONE	B058697	N/A	2023/08/03	Isabelle White
Nitrate and Nitrite	CALC	B052566	N/A	2023/07/31	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B053265	N/A	2023/07/30	Isabelle White
Nitrate (as N)	CALC	B052567	2023/07/31	2023/07/31	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B052369	2023/08/02	2023/08/02	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B061414	2023/08/08	2023/08/10	Jingyuan Song
Benzo[a]pyrene Equivalency	GC/MSD	B052557	N/A	2023/08/09	Automated Statchk
PAH in Water by GC/MS	GC/MS	B053612	2023/08/04	2023/08/05	Jiby Uthup
pH @25°C	AT/ALK	B056384	N/A	2023/08/02	Jeanette Chavol Melo
Orthophosphate by Konelab	KONE	B053023	N/A	2023/07/29	Carlo Truong
Total Sulphide	SPEC	B054934	N/A	2023/08/01	Princess Nicole Hernaez
Total Dissolved Solids (Filt. Residue)	BAL	B057076	2023/08/02	2023/08/03	Coralynn Topping
Total Kjeldahl Nitrogen (Total)	CALC	B052569	N/A	2023/08/03	Automated Statchk
Nitrogen (Total)	AC/COL	B058456	2023/08/03	2023/08/03	Carlo Truong
Carbon (Total Organic)	TECH	B054860	N/A	2023/08/04	Ming Dong
Total Suspended Solids (NFR)	BAL	B057058	2023/08/02	2023/08/03	Amy Phan
Turbidity	TURB	B054056	N/A	2023/07/31	Coralynn Topping

Bureau Veritas ID: BVQ395
Sample ID: AEMP-DUP1
Matrix: Water

Collected: 2023/07/26
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B056378	N/A	2023/08/02	Jeanette Chavol Melo

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ395
Sample ID: AEMP-DUP1
Matrix: Water

Collected: 2023/07/26
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B053334	N/A	2023/08/01	Ancheol Jeong
F1-BTEX	CALC/MS	B052555	N/A	2023/08/02	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B052562	N/A	2023/07/30	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B052581	N/A	2023/08/03	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B053410	N/A	2023/07/30	Adam Fishleigh
COD by Colorimeter	M/PROB	B053851	N/A	2023/07/31	Ly Vu
True Colour	SPEC/COL	B053037	N/A	2023/07/29	Carlo Truong
Carbon (DOC)	TECH	B054922	N/A	2023/08/04	Ming Dong
Conductivity @25C	COND	B056385	N/A	2023/08/02	Jeanette Chavol Melo
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Sulphide (as H2S)	CALC	B052584	N/A	2023/08/01	Automated Statchk
Hardness	CALC	B052563	N/A	2023/07/31	Automated Statchk
Mercury (Dissolved) by CV	CV	B058602	2023/08/03	2023/08/03	Kiran Kumari
Mercury (Total) by CV	CV	B058636	2023/08/03	2023/08/03	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B054121	N/A	2023/07/31	Vincy Scaria
Elements by ICP - Total	ICPA	B056845	2023/08/02	2023/08/03	Vincy Scaria
Elements by ICPMS - Dissolved	ICPM	B053329	N/A	2023/07/30	Jason Bao
Elements by ICPMS - Total	ICPM	B056840	2023/08/02	2023/08/02	Mandeep Kaur
Ion Balance	CALC	B052564	N/A	2023/08/02	Automated Statchk
Ammonia-N (Total)	KONE	B058697	N/A	2023/08/03	Isabelle White
Nitrate and Nitrite	CALC	B052566	N/A	2023/07/31	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B053265	N/A	2023/07/30	Isabelle White
Nitrate (as N)	CALC	B052567	2023/07/31	2023/07/31	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B052369	2023/08/02	2023/08/02	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B061414	2023/08/08	2023/08/11	Jingyuan Song
Benzo[a]pyrene Equivalency	GC/MSD	B052557	N/A	2023/08/09	Automated Statchk
PAH in Water by GC/MS	GC/MS	B053612	2023/08/04	2023/08/05	Jiby Uthup
pH @25°C	AT/ALK	B056384	N/A	2023/08/02	Jeanette Chavol Melo
Orthophosphate by Konelab	KONE	B053023	N/A	2023/07/29	Carlo Truong
Total Sulphide	SPEC	B054934	N/A	2023/08/01	Princess Nicole Hernaez
Total Dissolved Solids (Filt. Residue)	BAL	B057076	2023/08/02	2023/08/03	Coralynn Topping
Total Kjeldahl Nitrogen (Total)	CALC	B052569	N/A	2023/08/03	Automated Statchk
Nitrogen (Total)	AC/COL	B058456	2023/08/03	2023/08/03	Carlo Truong
Carbon (Total Organic)	TECH	B054860	N/A	2023/08/04	Ming Dong
Total Suspended Solids (NFR)	BAL	B057058	2023/08/02	2023/08/03	Amy Phan
Turbidity	TURB	B054065	N/A	2023/07/31	Coralynn Topping

Bureau Veritas ID: BVQ395 Dup
Sample ID: AEMP-DUP1
Matrix: Water

Collected: 2023/07/26
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Turbidity	TURB	B054065	N/A	2023/07/31	Coralynn Topping

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ396
Sample ID: AEMP-DS-03
Matrix: Water

Collected: 2023/07/25
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B056378	N/A	2023/08/02	Jeanette Chavol Melo
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B053334	N/A	2023/08/01	Ancheol Jeong
F1-BTEX	CALC/MS	B052555	N/A	2023/08/02	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B052562	N/A	2023/07/30	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B052581	N/A	2023/08/03	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B053410	N/A	2023/07/30	Adam Fishleigh
COD by Colorimeter	M/PROB	B053851	N/A	2023/07/31	Ly Vu
True Colour	SPEC/COL	B053037	N/A	2023/07/29	Carlo Truong
Carbon (DOC)	TECH	B063109	N/A	2023/08/08	Ye Hyun KIM
Conductivity @25C	COND	B056385	N/A	2023/08/02	Jeanette Chavol Melo
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Sulphide (as H2S)	CALC	B052584	N/A	2023/08/01	Automated Statchk
Hardness	CALC	B052563	N/A	2023/07/31	Automated Statchk
Mercury (Dissolved) by CV	CV	B058602	2023/08/03	2023/08/03	Kiran Kumari
Mercury (Total) by CV	CV	B058636	2023/08/03	2023/08/03	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B054121	N/A	2023/07/31	Vincy Scaria
Elements by ICP - Total	ICPA	B056845	2023/08/02	2023/08/03	Vincy Scaria
Elements by ICPMS - Dissolved	ICPM	B053329	N/A	2023/07/30	Jason Bao
Elements by ICPMS - Total	ICPM	B056840	2023/08/02	2023/08/02	Mandeep Kaur
Ion Balance	CALC	B052564	N/A	2023/08/02	Automated Statchk
Ammonia-N (Total)	KONE	B058697	N/A	2023/08/03	Isabelle White
Nitrate and Nitrite	CALC	B052566	N/A	2023/07/31	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B053265	N/A	2023/07/30	Isabelle White
Nitrate (as N)	CALC	B052567	2023/07/31	2023/07/31	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B052369	2023/08/02	2023/08/02	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B061414	2023/08/08	2023/08/11	Jingyuan Song
Benzo[a]pyrene Equivalency	GC/MSD	B052557	N/A	2023/08/08	Automated Statchk
PAH in Water by GC/MS	GC/MS	B053612	2023/08/04	2023/08/05	Jiby Uthup
pH @25°C	AT/ALK	B056384	N/A	2023/08/02	Jeanette Chavol Melo
Orthophosphate by Konelab	KONE	B053023	N/A	2023/07/29	Carlo Truong
Total Sulphide	SPEC	B054934	N/A	2023/08/01	Princess Nicole Hernaez
Total Dissolved Solids (Filt. Residue)	BAL	B055063	2023/08/01	2023/08/02	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	B052569	N/A	2023/08/03	Automated Statchk
Nitrogen (Total)	AC/COL	B058456	2023/08/03	2023/08/03	Carlo Truong
Carbon (Total Organic)	TECH	B063089	N/A	2023/08/08	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B055096	2023/08/01	2023/08/01	Haydee Estilong
Turbidity	TURB	B052641	N/A	2023/07/29	Ashhel Zia

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GENERAL COMMENTS

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

Package 1	2.0°C

Note: Bottles in shipment, but bottles not listed on C of C;Received 250mL amber glass bottles preserved in sodium bisulfate, however there is no analysis request needing such bottles.; Archived bottles and notified Alex Haigh via email.

Sample BVQ394 [AEMP-DS-04] : Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. 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 Turbidity.

Sample BVQ395 [AEMP-DUP1] : Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. 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 Turbidity.

Sample BVQ396 [AEMP-DS-03] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. 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 True Colour. Sample was analyzed past method specified hold time for Turbidity. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

Results relate only to the items tested.

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Bureau Veritas Job #: C357847
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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B052369	JB9	Method Blank	Total Oil and grease	2023/08/02	<2.0		mg/L	
B052641	AZI	Method Blank	Turbidity	2023/07/29	<0.10		NTU	
B053023	CTU	Method Blank	Orthophosphate (P)	2023/07/29	<0.0030		mg/L	
B053037	CTU	Method Blank	True Colour	2023/07/29	<2.0		PtCo units	
B053265	ISW	Method Blank	Nitrite (N)	2023/07/30	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/07/30	<0.010		mg/L	
B053329	JAB	Method Blank	Dissolved Aluminum (Al)	2023/07/30	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/07/30	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/07/30	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/07/30	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/07/30	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/07/30	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/07/30	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/07/30	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/07/30	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/07/30	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/07/30	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/07/30	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/07/30	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/07/30	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/07/30	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/07/30	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/07/30	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/07/30	<0.0010		mg/L	
B053334	AJG	Method Blank	1,4-Difluorobenzene (sur.)	2023/08/01		98	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/01		104	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/01		102	%	50 - 140
			Benzene	2023/08/01	<0.00040		mg/L	
			Toluene	2023/08/01	<0.00040		mg/L	
			Ethylbenzene	2023/08/01	<0.00040		mg/L	
			m & p-Xylene	2023/08/01	<0.00080		mg/L	
			o-Xylene	2023/08/01	<0.00040		mg/L	
			F1 (C6-C10)	2023/08/01	<0.10		mg/L	
B053410	AFI	Method Blank	Chloride (Cl)	2023/07/30	<1.0		mg/L	
			Sulphate (SO4)	2023/07/30	<1.0		mg/L	
B053612	JU2	Method Blank	D10-ANTHRACENE (sur.)	2023/08/05		101	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/05		109	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/05		77	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/05		58	%	50 - 130
			Acenaphthene	2023/08/05	<0.00010		mg/L	
			Acenaphthylene	2023/08/05	<0.00010		mg/L	
			Acridine	2023/08/05	<0.000040		mg/L	
			Anthracene	2023/08/05	<0.000010		mg/L	
			Benzo(a)anthracene	2023/08/05	<0.0000085		mg/L	
			Benzo(b&j)fluoranthene	2023/08/05	<0.0000085		mg/L	
			Benzo(k)fluoranthene	2023/08/05	<0.0000085		mg/L	
			Benzo(g,h,i)perylene	2023/08/05	<0.0000085		mg/L	
			Benzo(c)phenanthrene	2023/08/05	<0.000050		mg/L	
			Benzo(a)pyrene	2023/08/05	<0.0000075		mg/L	
			Benzo(e)pyrene	2023/08/05	<0.000050		mg/L	
			Chrysene	2023/08/05	<0.0000085		mg/L	
			Dibenz(a,h)anthracene	2023/08/05	<0.0000075		mg/L	

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Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Fluoranthene	2023/08/05	<0.000010		mg/L	
			Fluorene	2023/08/05	<0.000050		mg/L	
			Indeno(1,2,3-cd)pyrene	2023/08/05	<0.0000085		mg/L	
			1-Methylnaphthalene	2023/08/05	<0.00010		mg/L	
			2-Methylnaphthalene	2023/08/05	<0.00010		mg/L	
			Naphthalene	2023/08/05	<0.00010		mg/L	
			Phenanthrene	2023/08/05	<0.000050		mg/L	
			Perylene	2023/08/05	<0.000050		mg/L	
			Pyrene	2023/08/05	<0.000020		mg/L	
			Quinoline	2023/08/05	<0.00020		mg/L	
B053613	AAX	Method Blank	O-TERPHENYL (sur.)	2023/08/04		100	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/04	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2023/08/04	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2023/08/04	<0.20		mg/L	
B053851	LYV	Method Blank	Chemical Oxygen Demand	2023/07/31	<10		mg/L	
B054056	CT6	Method Blank	Turbidity	2023/07/31	<0.10		NTU	
B054065	CT6	Method Blank	Turbidity	2023/07/31	<0.10		NTU	
B054121	VSC	Method Blank	Dissolved Iron (Fe)	2023/07/31	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/07/31	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/07/31	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/07/31	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/07/31	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/07/31	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/07/31	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/07/31	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/07/31	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/07/31	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/07/31	<0.50		mg/L	
			Dissolved Boron (B)	2023/07/31	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/07/31	<0.30		mg/L	
B054860	MDO	Method Blank	Total Organic Carbon (C)	2023/08/04	<0.50		mg/L	
B054922	MDO	Method Blank	Dissolved Organic Carbon (C)	2023/08/04	<0.50		mg/L	
B054934	NHE	Method Blank	Total Sulphide	2023/08/01	<0.0018		mg/L	
B055063	HE1	Method Blank	Total Dissolved Solids	2023/08/02	<10		mg/L	
B055096	HE1	Method Blank	Total Suspended Solids	2023/08/01	<1.0		mg/L	
B056378	JVM	Method Blank	Alkalinity (Total as CaCO3)	2023/08/02	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/08/02	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/08/02	<1.0		mg/L	
			Carbonate (CO3)	2023/08/02	<1.0		mg/L	
			Hydroxide (OH)	2023/08/02	<1.0		mg/L	
B056385	JVM	Method Blank	Conductivity	2023/08/02	<2.0		uS/cm	
B056840	MKJ	Method Blank	Total Aluminum (Al)	2023/08/02	<0.0030		mg/L	
			Total Chromium (Cr)	2023/08/02	<0.0010		mg/L	
			Total Cobalt (Co)	2023/08/02	<0.00030		mg/L	
			Total Copper (Cu)	2023/08/02	<0.0010		mg/L	
			Total Lead (Pb)	2023/08/02	<0.00020		mg/L	
			Total Antimony (Sb)	2023/08/02	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/08/02	<0.00020		mg/L	
			Total Nickel (Ni)	2023/08/02	<0.00050		mg/L	
			Total Selenium (Se)	2023/08/02	<0.00020		mg/L	
			Total Silver (Ag)	2023/08/02	<0.00010		mg/L	
			Total Arsenic (As)	2023/08/02	<0.00020		mg/L	

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Thallium (Tl)	2023/08/02	<0.00020		mg/L	
			Total Tin (Sn)	2023/08/02	<0.0010		mg/L	
			Total Titanium (Ti)	2023/08/02	<0.0010		mg/L	
			Total Uranium (U)	2023/08/02	<0.00010		mg/L	
			Total Vanadium (V)	2023/08/02	<0.0010		mg/L	
			Total Zinc (Zn)	2023/08/02	<0.0030		mg/L	
			Total Beryllium (Be)	2023/08/02	<0.0010		mg/L	
B056845	VSC	Method Blank	Total Iron (Fe)	2023/08/03	<0.060		mg/L	
			Total Lithium (Li)	2023/08/03	<0.020		mg/L	
			Total Magnesium (Mg)	2023/08/03	<0.20		mg/L	
			Total Manganese (Mn)	2023/08/03	<0.0040		mg/L	
			Total Potassium (K)	2023/08/03	<0.30		mg/L	
			Total Sodium (Na)	2023/08/03	<0.50		mg/L	
			Total Strontium (Sr)	2023/08/03	<0.020		mg/L	
			Total Sulphur (S)	2023/08/03	<0.20		mg/L	
			Total Phosphorus (P)	2023/08/03	<0.10		mg/L	
			Total Barium (Ba)	2023/08/03	<0.010		mg/L	
			Total Silicon (Si)	2023/08/03	<0.50		mg/L	
			Total Boron (B)	2023/08/03	<0.020		mg/L	
			Total Calcium (Ca)	2023/08/03	<0.30		mg/L	
B057058	AP1	Method Blank	Total Suspended Solids	2023/08/03	<1.0		mg/L	
B057076	CT6	Method Blank	Total Dissolved Solids	2023/08/03	<10		mg/L	
B058456	CTU	Method Blank	Total Nitrogen (N)	2023/08/03	<0.020		mg/L	
B058602	KKM	Method Blank	Dissolved Mercury (Hg)	2023/08/03	<0.0019		ug/L	
B058636	KKM	Method Blank	Total Mercury (Hg)	2023/08/03	<0.0019		ug/L	
B058697	ISW	Method Blank	Total Ammonia (N)	2023/08/03	<0.015		mg/L	
B061414	SJ1	Method Blank	D10-ANTHRACENE (sur.)	2023/08/10		86	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/10		75	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/10		79	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/10		66	%	50 - 130
			Indeno(1,2,3-cd)fluoranthene	2023/08/10	<0.0085		ug/L	
			Retene	2023/08/10	<0.050		ug/L	
			C1-Naphthalene	2023/08/10	<0.10		ug/L	
			C3-Naphthalene	2023/08/10	<0.10		ug/L	
			C4-Naphthalene	2023/08/10	<0.10		ug/L	
			C2-Naphthalene	2023/08/10	<0.10		ug/L	
			Biphenyl	2023/08/10	<0.020		ug/L	
			C1-biphenyl	2023/08/10	<0.020		ug/L	
			C2-biphenyl	2023/08/10	<0.020		ug/L	
			C1-fluorene	2023/08/10	<0.050		ug/L	
			C2-fluorene	2023/08/10	<0.050		ug/L	
			C3-fluorene	2023/08/10	<0.050		ug/L	
			Dibenzothiophene	2023/08/10	<0.020		ug/L	
			C1-dibenzothiophene	2023/08/10	<0.020		ug/L	
			C2-dibenzothiophene	2023/08/10	<0.020		ug/L	
			C3-dibenzothiophene	2023/08/10	<0.020		ug/L	
			C4-dibenzothiophene	2023/08/10	<0.020		ug/L	
			C1 phenanthrene/anthracene	2023/08/10	<0.050		ug/L	
			C2 phenanthrene/anthracene	2023/08/10	<0.050		ug/L	
			C3 phenanthrene/anthracene	2023/08/10	<0.050		ug/L	
			C4 phenanthrene/anthracene	2023/08/10	<0.050		ug/L	
			C1 fluoranthene/pyrene	2023/08/10	<0.020		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
			C2 fluoranthene/pyrene	2023/08/10	<0.020		ug/L	
			C3 fluoranthene/pyrene	2023/08/10	<0.020		ug/L	
			C4 fluoranthene/pyrene	2023/08/10	<0.020		ug/L	
			C1 benzo(a)anthracene/chrysene	2023/08/10	<0.0085		ug/L	
			C2 benzo(a)anthracene/chrysene	2023/08/10	<0.0085		ug/L	
			C3 benzo(a)anthracene/chrysene	2023/08/10	<0.0085		ug/L	
			C4 benzo(a)anthracene/chrysene	2023/08/10	<0.0085		ug/L	
			C1benzobjkfluoranthene/benzoapyrene	2023/08/10	<0.0075		ug/L	
			C2benzobjkfluoranthene/benzoapyrene	2023/08/10	<0.0075		ug/L	
			C1-Acenaphthene	2023/08/10	<0.10		ug/L	
B063089	YHK	Method Blank	Total Organic Carbon (C)	2023/08/08	<0.50		mg/L	
B063109	YHK	Method Blank	Dissolved Organic Carbon (C)	2023/08/08	<0.50		mg/L	
B054065	CT6	RPD [BVQ395-01]	Turbidity	2023/07/31	7.5		%	20
B061414	SJ1	Matrix Spike [BVQ394-09]	D10-ANTHRACENE (sur.)	2023/08/10		96	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/10		84	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/10		93	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/10		86	%	50 - 130
			C1-Naphthalene	2023/08/10		78	%	50 - 130
			C3-Naphthalene	2023/08/10		101	%	50 - 130
			C2-Naphthalene	2023/08/10		95	%	50 - 130
			C1-biphenyl	2023/08/10		94	%	50 - 130
			C1 phenanthrene/anthracene	2023/08/10		109	%	50 - 130
			C2 phenanthrene/anthracene	2023/08/10		107	%	50 - 130
			C1 fluoranthene/pyrene	2023/08/10		103	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/08/10		47	%	30 - 130
B052369	JB9	LCS	Total Oil and grease	2023/08/02		100	%	70 - 130
B052641	AZI	LCS	Turbidity	2023/07/29		102	%	80 - 120
B053023	CTU	LCS	Orthophosphate (P)	2023/07/29		99	%	80 - 120
B053037	CTU	LCS	True Colour	2023/07/29		99	%	80 - 120
B053265	ISW	LCS	Nitrite (N)	2023/07/30		101	%	80 - 120
			Nitrate plus Nitrite (N)	2023/07/30		104	%	80 - 120
B053329	JAB	LCS	Dissolved Aluminum (Al)	2023/07/30		104	%	80 - 120
			Dissolved Chromium (Cr)	2023/07/30		97	%	80 - 120
			Dissolved Cobalt (Co)	2023/07/30		99	%	80 - 120
			Dissolved Copper (Cu)	2023/07/30		98	%	80 - 120
			Dissolved Lead (Pb)	2023/07/30		98	%	80 - 120
			Dissolved Antimony (Sb)	2023/07/30		103	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/07/30		99	%	80 - 120
			Dissolved Nickel (Ni)	2023/07/30		97	%	80 - 120
			Dissolved Selenium (Se)	2023/07/30		97	%	80 - 120
			Dissolved Silver (Ag)	2023/07/30		96	%	80 - 120
			Dissolved Arsenic (As)	2023/07/30		95	%	80 - 120
			Dissolved Thallium (Tl)	2023/07/30		98	%	80 - 120
			Dissolved Tin (Sn)	2023/07/30		97	%	80 - 120
			Dissolved Titanium (Ti)	2023/07/30		101	%	80 - 120
			Dissolved Uranium (U)	2023/07/30		95	%	80 - 120
			Dissolved Vanadium (V)	2023/07/30		98	%	80 - 120
			Dissolved Zinc (Zn)	2023/07/30		97	%	80 - 120
			Dissolved Beryllium (Be)	2023/07/30		96	%	80 - 120
B053334	AJG	LCS	1,4-Difluorobenzene (sur.)	2023/08/01		94	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/01		106	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/01		97	%	50 - 140

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzene	2023/08/01		95	%	60 - 130
			Toluene	2023/08/01		95	%	60 - 130
			Ethylbenzene	2023/08/01		103	%	60 - 130
			m & p-Xylene	2023/08/01		104	%	60 - 130
			o-Xylene	2023/08/01		107	%	60 - 130
			F1 (C6-C10)	2023/08/01		102	%	60 - 140
B053410	AFI	LCS	Chloride (Cl)	2023/07/30		100	%	80 - 120
			Sulphate (SO4)	2023/07/30		100	%	80 - 120
B053612	JU2	LCS	D10-ANTHRACENE (sur.)	2023/08/05		99	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/05		112	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/05		89	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/05		74	%	50 - 130
			Acenaphthene	2023/08/05		80	%	50 - 130
			Acenaphthylene	2023/08/05		85	%	50 - 130
			Acridine	2023/08/05		85	%	50 - 130
			Anthracene	2023/08/05		72	%	50 - 130
			Benzo(a)anthracene	2023/08/05		103	%	50 - 130
			Benzo(b&j)fluoranthene	2023/08/05		100	%	50 - 130
			Benzo(k)fluoranthene	2023/08/05		95	%	50 - 130
			Benzo(g,h,i)perylene	2023/08/05		91	%	50 - 130
			Benzo(c)phenanthrene	2023/08/05		106	%	50 - 130
			Benzo(a)pyrene	2023/08/05		105	%	50 - 130
			Benzo(e)pyrene	2023/08/05		87	%	50 - 130
			Chrysene	2023/08/05		102	%	50 - 130
			Dibenz(a,h)anthracene	2023/08/05		102	%	50 - 130
			Fluoranthene	2023/08/05		90	%	50 - 130
			Fluorene	2023/08/05		91	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/08/05		91	%	50 - 130
			1-Methylnaphthalene	2023/08/05		66	%	50 - 130
			2-Methylnaphthalene	2023/08/05		76	%	50 - 130
			Naphthalene	2023/08/05		81	%	50 - 130
			Phenanthrene	2023/08/05		97	%	50 - 130
			Perylene	2023/08/05		84	%	50 - 130
			Pyrene	2023/08/05		91	%	50 - 130
			Quinoline	2023/08/05		81	%	50 - 130
B053613	AAX	LCS	O-TERPHENYL (sur.)	2023/08/04		101	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/04		100	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/08/04		110	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/08/04		103	%	60 - 140
B053851	LYV	LCS	Chemical Oxygen Demand	2023/07/31		102	%	80 - 120
B054056	CT6	LCS	Turbidity	2023/07/31		101	%	80 - 120
B054065	CT6	LCS	Turbidity	2023/07/31		102	%	80 - 120
B054121	VSC	LCS	Dissolved Iron (Fe)	2023/07/31		105	%	80 - 120
			Dissolved Lithium (Li)	2023/07/31		101	%	80 - 120
			Dissolved Magnesium (Mg)	2023/07/31		114	%	80 - 120
			Dissolved Manganese (Mn)	2023/07/31		108	%	80 - 120
			Dissolved Potassium (K)	2023/07/31		102	%	80 - 120
			Dissolved Sodium (Na)	2023/07/31		101	%	80 - 120
			Dissolved Strontium (Sr)	2023/07/31		98	%	80 - 120
			Dissolved Sulphur (S)	2023/07/31		102	%	80 - 120
			Dissolved Phosphorus (P)	2023/07/31		103	%	80 - 120
			Dissolved Barium (Ba)	2023/07/31		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
			Dissolved Silicon (Si)	2023/07/31		96	%	80 - 120
			Dissolved Boron (B)	2023/07/31		103	%	80 - 120
			Dissolved Calcium (Ca)	2023/07/31		102	%	80 - 120
B054860	MDO	LCS	Total Organic Carbon (C)	2023/08/04		107	%	80 - 120
B054922	MDO	LCS	Dissolved Organic Carbon (C)	2023/08/04		106	%	80 - 120
B054934	NHE	LCS	Total Sulphide	2023/08/01		93	%	80 - 120
B055063	HE1	LCS	Total Dissolved Solids	2023/08/02		96	%	80 - 120
B055096	HE1	LCS	Total Suspended Solids	2023/08/01		97	%	80 - 120
B056378	JVM	LCS	Alkalinity (Total as CaCO3)	2023/08/02		99	%	80 - 120
B056384	JVM	LCS	pH	2023/08/02		100	%	97 - 103
B056385	JVM	LCS	Conductivity	2023/08/02		104	%	90 - 110
B056840	MKJ	LCS	Total Aluminum (Al)	2023/08/02		105	%	80 - 120
			Total Chromium (Cr)	2023/08/02		94	%	80 - 120
			Total Cobalt (Co)	2023/08/02		94	%	80 - 120
			Total Copper (Cu)	2023/08/02		95	%	80 - 120
			Total Lead (Pb)	2023/08/02		98	%	80 - 120
			Total Antimony (Sb)	2023/08/02		101	%	80 - 120
			Total Molybdenum (Mo)	2023/08/02		99	%	80 - 120
			Total Nickel (Ni)	2023/08/02		94	%	80 - 120
			Total Selenium (Se)	2023/08/02		100	%	80 - 120
			Total Silver (Ag)	2023/08/02		100	%	80 - 120
			Total Arsenic (As)	2023/08/02		93	%	80 - 120
			Total Thallium (Tl)	2023/08/02		100	%	80 - 120
			Total Tin (Sn)	2023/08/02		98	%	80 - 120
			Total Titanium (Ti)	2023/08/02		92	%	80 - 120
			Total Uranium (U)	2023/08/02		97	%	80 - 120
			Total Vanadium (V)	2023/08/02		94	%	80 - 120
			Total Zinc (Zn)	2023/08/02		94	%	80 - 120
			Total Beryllium (Be)	2023/08/02		97	%	80 - 120
B056845	VSC	LCS	Total Iron (Fe)	2023/08/02		108	%	80 - 120
			Total Lithium (Li)	2023/08/02		112	%	80 - 120
			Total Magnesium (Mg)	2023/08/02		108	%	80 - 120
			Total Manganese (Mn)	2023/08/02		110	%	80 - 120
			Total Potassium (K)	2023/08/02		110	%	80 - 120
			Total Sodium (Na)	2023/08/02		103	%	80 - 120
			Total Strontium (Sr)	2023/08/02		97	%	80 - 120
			Total Sulphur (S)	2023/08/02		99	%	80 - 120
			Total Phosphorus (P)	2023/08/02		101	%	80 - 120
			Total Barium (Ba)	2023/08/02		101	%	80 - 120
			Total Silicon (Si)	2023/08/02		100	%	80 - 120
			Total Boron (B)	2023/08/02		99	%	80 - 120
			Total Calcium (Ca)	2023/08/02		109	%	80 - 120
B057058	AP1	LCS	Total Suspended Solids	2023/08/03		88	%	80 - 120
B057076	CT6	LCS	Total Dissolved Solids	2023/08/03		97	%	80 - 120
B058456	CTU	LCS	Total Nitrogen (N)	2023/08/03		103	%	80 - 120
B058602	KKM	LCS	Dissolved Mercury (Hg)	2023/08/03		101	%	80 - 120
B058636	KKM	LCS	Total Mercury (Hg)	2023/08/03		103	%	80 - 120
B058697	ISW	LCS	Total Ammonia (N)	2023/08/03		100	%	80 - 120
B061414	SJ1	LCS	D10-ANTHRACENE (sur.)	2023/08/10		89	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/10		80	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/10		86	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/10		77	%	50 - 130

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			C1-Naphthalene	2023/08/10		71	%	50 - 130
			C3-Naphthalene	2023/08/10		94	%	50 - 130
			C2-Naphthalene	2023/08/10		88	%	50 - 130
			C1-biphenyl	2023/08/10		85	%	50 - 130
			C1 phenanthrene/anthracene	2023/08/10		102	%	50 - 130
			C2 phenanthrene/anthracene	2023/08/10		104	%	50 - 130
			C1 fluoranthene/pyrene	2023/08/10		103	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/08/10		48	%	30 - 130
B063089	YHK	LCS	Total Organic Carbon (C)	2023/08/08		111	%	80 - 120
B063109	YHK	LCS	Dissolved Organic Carbon (C)	2023/08/08		108	%	80 - 120
B058456	CTU	SRM	Total Nitrogen (N)	2023/08/03		105	%	80 - 120

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.

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

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

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

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

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Bureau Veritas Job #: C357847
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

VALIDATION SIGNATURE PAGE

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

Rahul Suryawanshi, Senior Analyst

Sandy Yuan, M.Sc., QP, Scientific Specialist

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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Automated Statchk

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Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

axxam
Bureau Veritas Group Company

☒ Calgary
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Toll Free: (800) 386-7247

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 298653

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C-3E7
Email: Alex.haigh@advisian.com
Ph: 587-897-6249
Sampler Name (Print): Stacy Gibb / Alex Haigh

REPORT INFORMATION

Company Name: Advisian
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C-3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Consultant Project #: 417085-49223-23200

ANALYSIS REQUESTED

FIELD SAMPLE ID	MATRIX: GROUND WATER	MATRIX: SURFACE WATER	MATRIX: SOIL	MATRIX: OTHER	# CONTAINERS	SAMPLING: DATE (YYYY/MM/DD)	SAMPLING: TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-2 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☒ DIS ☒	MERCURY TOTAL ☒ DISSOLVED ☒	SALINITY SOIL	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	True Color, TSS, TDS, Turbidity	Oil & grease	TOC, DOC, Sulphide	Orthophosphate	Sulphur - Total & dissolved	COD	Nitrate, Nitrite, Ammonia total, TKN
1 AEMP-DS-04		X			18	2023/07/26	15:00	X			X		X						X	X					X		X	X	X	X	X	X	X
2 AEMP-DUP 1		X			18	2023/07/26	15:05	X			X		X						X	X					X		X	X	X	X	X	X	X
3 AEMP-DS-03		X			18	2023/07/25	15:40	X			X		X						X	X					X		X	X	X	X	X	X	X
4																																	
5																																	
6																																	
7																																	
8																																	
9																																	
10																																	

IOL SITE LOCATION: Norman Wells, NT
IOL PROJECT # (if applicable): NA
MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-49223, 23200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) FWAL ☐ Other

SPECIAL INSTRUCTIONS: email Canada.chemistry@worley.com Cacal.for data track@worley.com stacy.gibb@worley.com
IES A2601436

JARS USED & NOT SUBMITTED Enter N/A for Water: NA

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID #				YES	NO	COOLER ID #				YES	NO	COOLER ID #			
SEAL PRESENT	✓		TEMP °C	2	2	2			TEMP °C	1	2	3			TEMP °C	1	2	3
SEAL INTACT	✓																	
COOLING MEDIA PRESENT	✓																	

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1.	STACY GIBB	2023/07/27	10:10	1.	JOSHKUCSOVSKY	2023/07/28	15:20
2.				2.			
3.				3.			

LAB USE ONLY
MAXXAM JOB # C357847
SAMPLES
LABELED BY: NKS
VERIFIED BY: SGG

COC-1010 (06/2016) IOL-AB
White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-07-24/25/26
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C357842	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☒ **Yes** ☐ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☒ **Yes** ☐ **No**

If yes, FLAG type and comments: Extra bottles received. No impact on data quality

Date samples submitted 2023-07-28

Due date for lab report on SRC 2023-08-08

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature? ☒ **Yes** ☐ **No** **Comments**

(Imperial Oil only) Data Quality Waver (DQW) issued? ☒ **Yes** ☐ **No** **If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.**

Date returned to lab: 2023-08-09

Extractions and analysis conducted within acceptable hold times? ☐ **Yes** ☒ **No** Turbidity, orthophosphate, true colour, nitrite, PAH

Lab has warranted all tests were in statistical control? (look for trend rule failure notes) ☒ **Yes** ☐ **No**

Lab QA/QC samples are within Acceptance Criteria?

Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☒ **Yes** ☒ **No** ☐ **N/A**	

Data check completed by Alex Haigh **Date** 2024-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	

Data check completed by Alex Haigh **Date** 2024-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Trip Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Equipment Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes	☐ No	☒ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field pH vs. Lab pH RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes	☐ No	☐ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☒ Yes ☐ No

Explain rationale for yes/no:

Request lab to recheck data? If so give details	☐ Yes	☒ No	☐ N/A	**Comments**

If Yes, Lab request to recheck must be approved by Project Manager Name: **Date**

Data check completed by Alex Haigh **Date** 2024-03-26

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 298655

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/11
Report #: R3379186
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C357848
Received: 2023/07/28, 15:20

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	3	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	3	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	3		Auto Calc
Cadmium - low level CCME - Dissolved	3		Auto Calc
Cadmium - low level CCME (Total)	3		Auto Calc
Chloride/Sulphate by Auto Colourimetry	3	AB SOP-00020	SM24-4500-Cl/SO4-E m
COD by Colorimeter	3	AB SOP-00016	SM 23 5220D m
True Colour	3	CAL SOP-00049	SM 24 2120 C m
Carbon (DOC) (1)	3	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	3	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	3	AB SOP-00037	CCME PHC-CWS m
Sulphide (as H2S)	3		Auto Calc
Hardness	3		Auto Calc
Mercury (Dissolved) by CV (3)	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	3	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	3	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (3)	3	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	3	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	3		Auto Calc
Ammonia-N (Total)	3	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate and Nitrite	3		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	3	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N)	3		Auto Calc
Oil and Grease (Gravimetric, n-Hexane)	3	AB SOP-00092	SM 23 5520B/5520F m
Target & Alkylated PAH in Water by GC/MS (4)	3	AB SOP-00037 CAL SOP-00250	EPA 8270e m
Benzo[a]pyrene Equivalency (5)	3		Auto Calc
PAH in Water by GC/MS	3	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270E m
pH @25°C (6)	3	AB SOP-00005	SM 23 4500-H+B m
Orthophosphate by Konelab (7)	3	AB SOP-00025	SM 24 4500-P A,F m
Total Sulphide	3	AB SOP-00080	SM 23 4500 S2-A D Fm

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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 298655

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/11
Report #: R3379186
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C357848
Received: 2023/07/28, 15:20

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Total Dissolved Solids (Filt. Residue)	3	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen (Total)	3	BBY WI-00033	Auto Calc
Nitrogen (Total)	3	AB SOP-00093	SM 24 4500-N C m
Carbon (Total Organic) (8)	3	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR)	3	AB SOP-00061	SM 24 2540 D m
Turbidity	3	CAL SOP-00081	SM 23 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) 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.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Alkylated PAH results are semiquantitative
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 298655

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/11
Report #: R3379186
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C357848

Received: 2023/07/28, 15:20

(6) 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.
(7) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
(8) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Namita Sahni
Customer Solutions Representative
11 Aug 2023 11:24:15

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614

==========

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Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		BVQ397	BVQ398	BVQ399			BVQ399		
Sampling Date		2023/07/24 12:15	2023/07/26 11:45	2023/07/25 11:15			2023/07/25 11:15		
COC Number		298655	298655	298655			298655		
	UNITS	**AEMP-DS-06**	**AEMP-DS-01**	**AEMP-DS-02**	**RDL**	**QC Batch**	**AEMP-DS-02 Lab-Dup**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	B053613	<0.10	0.10	B053613
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	B053613	<0.10	0.10	B053613
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.20	B053613	<0.20	0.20	B053613
Volatiles									
Benzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B053334			
Toluene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B053334			
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B053334			
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	0.00080	B053334			
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B053334			
Xylenes (Total)	mg/L	<0.00089	<0.00089	<0.00089	0.00089	B052555			
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	0.10	B052555			
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	0.10	B053334			
Extraction Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	99	100	98		B053613	97		B053613
Instrument Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	98	97	96		B053334			
4-Bromofluorobenzene (sur.)	%	100	101	102		B053334			
D4-1,2-Dichloroethane (sur.)	%	103	101	101		B053334			

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		BVQ397	BVQ398	BVQ399		
Sampling Date		2023/07/24 12:15	2023/07/26 11:45	2023/07/25 11:15		
COC Number		298655	298655	298655		
	UNITS	**AEMP-DS-06**	**AEMP-DS-01**	**AEMP-DS-02**	**RDL**	**QC Batch**
Calculated Parameters						
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.095	0.093	0.11	0.020	B052569
Nutrients						
Total Nitrogen (N)	mg/L	0.16	0.15	0.15	0.020	B058456
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BVQ397		BVQ398		BVQ399		
Sampling Date		2023/07/24 12:15		2023/07/26 11:45		2023/07/25 11:15		
COC Number		298655		298655		298655		
	UNITS	**AEMP-DS-06**	**QC Batch**	**AEMP-DS-01**	**QC Batch**	**AEMP-DS-02**	**RDL**	**QC Batch**
Elements								
Total Cadmium (Cd)	mg/L	0.000098	B052581	<0.000020	B052581	0.000050	0.000020	B052581
Total Mercury (Hg)	ug/L	<0.0019	B058636	<0.0019	B058636	<0.0019	0.0019	B058636
Total Aluminum (Al)	mg/L	1.3	B057423	0.029	B056840	0.61	0.0030	B057423
Total Antimony (Sb)	mg/L	<0.00060	B057423	<0.00060	B056840	<0.00060	0.00060	B057423
Total Arsenic (As)	mg/L	0.00093	B057423	0.00022	B056840	0.00076	0.00020	B057423
Total Barium (Ba)	mg/L	0.075	B057446	0.086	B056845	0.057	0.010	B057446
Total Beryllium (Be)	mg/L	<0.0010	B057423	<0.0010	B056840	<0.0010	0.0010	B057423
Total Boron (B)	mg/L	<0.020	B057446	0.044	B056845	<0.020	0.020	B057446
Total Calcium (Ca)	mg/L	44	B057446	88	B056845	35	0.30	B057446
Total Chromium (Cr)	mg/L	0.0022	B057423	<0.0010	B056840	0.0011	0.0010	B057423
Total Cobalt (Co)	mg/L	0.00086	B057423	<0.00030	B056840	0.00045	0.00030	B057423
Total Copper (Cu)	mg/L	0.0027	B057423	<0.0010	B056840	0.0020	0.0010	B057423
Total Iron (Fe)	mg/L	1.4	B057446	<0.060	B056845	0.59	0.060	B057446
Total Lead (Pb)	mg/L	0.00088	B057423	<0.00020	B056840	0.00045	0.00020	B057423
Total Lithium (Li)	mg/L	<0.020	B057446	<0.020	B056845	<0.020	0.020	B057446
Total Magnesium (Mg)	mg/L	14	B057446	33	B056845	10	0.20	B057446
Total Manganese (Mn)	mg/L	0.035	B057446	0.0077	B056845	0.017	0.0040	B057446
Total Molybdenum (Mo)	mg/L	0.0012	B057423	0.0020	B056840	0.0014	0.00020	B057423
Total Nickel (Ni)	mg/L	0.0035	B057423	0.00082	B056840	0.0023	0.00050	B057423
Total Phosphorus (P)	mg/L	<0.10	B057446	<0.10	B056845	<0.10	0.10	B057446
Total Potassium (K)	mg/L	1.2	B057446	1.3	B056845	1.0	0.30	B057446
Total Selenium (Se)	mg/L	0.00053	B057423	<0.00020	B056840	0.00045	0.00020	B057423
Total Silicon (Si)	mg/L	3.5	B057446	2.5	B056845	2.6	0.50	B057446
Total Silver (Ag)	mg/L	<0.00010	B057423	<0.00010	B056840	<0.00010	0.00010	B057423
Total Sodium (Na)	mg/L	9.2	B057446	28	B056845	8.9	0.50	B057446
Total Strontium (Sr)	mg/L	0.27	B057446	1.5	B056845	0.25	0.020	B057446
Total Sulphur (S)	mg/L	22	B057446	53	B056845	14	0.20	B057446
Total Thallium (Tl)	mg/L	<0.00020	B057423	<0.00020	B056840	<0.00020	0.00020	B057423
Total Tin (Sn)	mg/L	<0.0010	B057423	<0.0010	B056840	<0.0010	0.0010	B057423
Total Titanium (Ti)	mg/L	0.021	B057423	<0.0010	B056840	0.014	0.0010	B057423
Total Uranium (U)	mg/L	0.0011	B057423	0.0011	B056840	0.0011	0.00010	B057423
RDL = Reportable Detection Limit								

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BVQ397		BVQ398		BVQ399		
Sampling Date		2023/07/24 12:15		2023/07/26 11:45		2023/07/25 11:15		
COC Number		298655		298655		298655		
	UNITS	**AEMP-DS-06**	**QC Batch**	**AEMP-DS-01**	**QC Batch**	**AEMP-DS-02**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	0.0035	B057423	<0.0010	B056840	0.0020	0.0010	B057423
Total Zinc (Zn)	mg/L	0.010	B057423	<0.0030	B056840	0.0054	0.0030	B057423
RDL = Reportable Detection Limit								

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Advisian
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Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ397			BVQ398		
Sampling Date		2023/07/24 12:15			2023/07/26 11:45		
COC Number		298655			298655		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**	**AEMP-DS-01**	**RDL**	**QC Batch**
Calculated Parameters							
Hardness (CaCO3)	mg/L	160	0.50	B052563	330	0.50	B052563
Ion Balance (% Difference)	%	18	N/A	B052564	1.8	N/A	B052564
Nitrate (N)	mg/L	0.056	0.010	B052567	0.054	0.010	B052567
Nitrate (NO3)	mg/L	0.25	0.044	B052566	0.24	0.044	B052566
Nitrite (NO2)	mg/L	0.039	0.033	B052566	<0.033	0.033	B052566
Sulphide (as H2S)	mg/L	0.022	0.0020	B052584	0.0058	0.0020	B052584
Demand Parameters							
Chemical Oxygen Demand	mg/L	11	10	B053851	<10 (1)	10	B053851
Elements							
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	B052562	<0.000020	0.000020	B052562
Misc. Inorganics							
Conductivity	uS/cm	370	2.0	B056385	720	2.0	B056385
Dissolved Organic Carbon (C)	mg/L	3.0	0.50	B054922	3.2	0.50	B064719
pH	pH	7.66	N/A	B056384	8.32	N/A	B056384
Total Organic Carbon (C)	mg/L	2.8	0.50	B054860	2.4	0.50	B054860
Total Dissolved Solids	mg/L	210	10	B053973	450	10	B057076
Total Suspended Solids	mg/L	17	1.0	B053990	2.9	1.0	B057058
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	B056378	<1.0	1.0	B056378
Alkalinity (Total as CaCO3)	mg/L	170	1.0	B056378	200	1.0	B056378
Bicarbonate (HCO3)	mg/L	210	1.0	B056378	250	1.0	B056378
Carbonate (CO3)	mg/L	<1.0	1.0	B056378	<1.0	1.0	B056378
Hydroxide (OH)	mg/L	<1.0	1.0	B056378	<1.0	1.0	B056378
Total Sulphide	mg/L	0.021	0.0018	B054305	0.0055	0.0018	B054305
Chloride (Cl)	mg/L	11	1.0	B057034	28	1.0	B057051
Sulphate (SO4)	mg/L	70	1.0	B057034	160	5.0	B057051
Nutrients							
Total Ammonia (N)	mg/L	<0.015	0.015	B058694	<0.015	0.015	B058699

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) COD < DOC: Both values fall within the method uncertainty for duplicates and are likely equivalent. COD < TOC: Both values fall within the method uncertainty for duplicates and are likely equivalent.

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ397			BVQ398		
Sampling Date		2023/07/24 12:15			2023/07/26 11:45		
COC Number		298655			298655		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**	**AEMP-DS-01**	**RDL**	**QC Batch**
Orthophosphate (P)	mg/L	<0.0030	0.0030	B054915	<0.0030	0.0030	B053044
Nitrite (N)	mg/L	0.012	0.010	B053384	<0.010	0.010	B053387
Nitrate plus Nitrite (N)	mg/L	0.068	0.010	B053384	0.054	0.010	B053387
Misc. Organics							
Total Oil and grease	mg/L	<2.0	2.0	B054755	<2.0	2.0	B054755
Physical Properties							
True Colour	PtCo units	7.8	2.0	B053536	7.3	2.0	B053043
Physical Properties							
Turbidity	NTU	24	0.10	B054065	<0.10	0.10	B054065
RDL = Reportable Detection Limit							

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ399			BVQ399		
Sampling Date		2023/07/25 11:15			2023/07/25 11:15		
COC Number		298655			298655		
	UNITS	**AEMP-DS-02**	**RDL**	**QC Batch**	**AEMP-DS-02 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters							
Hardness (CaCO3)	mg/L	130	0.50	B052563			
Ion Balance (% Difference)	%	3.6	N/A	B052564			
Nitrate (N)	mg/L	0.040	0.010	B052567			
Nitrate (NO3)	mg/L	0.18	0.044	B052566			
Nitrite (NO2)	mg/L	<0.033	0.033	B052566			
Sulphide (as H2S)	mg/L	<0.0020	0.0020	B052584			
Demand Parameters							
Chemical Oxygen Demand	mg/L	<10 (1)	10	B053851			
Elements							
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	B052562			
Misc. Inorganics							
Conductivity	uS/cm	290	2.0	B056385			
Dissolved Organic Carbon (C)	mg/L	3.6	0.50	B054922	3.6	0.50	B054922
pH	pH	7.35	N/A	B056384			
Total Organic Carbon (C)	mg/L	3.1	0.50	B054860			
Total Dissolved Solids	mg/L	96	10	B055063			
Total Suspended Solids	mg/L	13	1.0	B055096			
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	B056378			
Alkalinity (Total as CaCO3)	mg/L	100	1.0	B056378			
Bicarbonate (HCO3)	mg/L	120	1.0	B056378			
Carbonate (CO3)	mg/L	<1.0	1.0	B056378			
Hydroxide (OH)	mg/L	<1.0	1.0	B056378			
Total Sulphide	mg/L	<0.0018	0.0018	B054305			
Chloride (Cl)	mg/L	10	1.0	B057051			
Sulphate (SO4)	mg/L	43	1.0	B057051			

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) COD < DOC: Both values fall within the method uncertainty for duplicates and are likely equivalent. COD < TOC: Both values fall within the method uncertainty for duplicates and are likely equivalent.

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Bureau Veritas Job #: C357848
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Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BVQ399			BVQ399		
Sampling Date		2023/07/25 11:15			2023/07/25 11:15		
COC Number		298655			298655		
	UNITS	**AEMP-DS-02**	**RDL**	**QC Batch**	**AEMP-DS-02 Lab-Dup**	**RDL**	**QC Batch**
Nutrients							
Total Ammonia (N)	mg/L	<0.015	0.015	B058694			
Orthophosphate (P)	mg/L	<0.0030	0.0030	B054915			
Nitrite (N)	mg/L	<0.010	0.010	B053384			
Nitrate plus Nitrite (N)	mg/L	0.040	0.010	B053384			
Misc. Organics							
Total Oil and grease	mg/L	<2.0	2.0	B054755			
Physical Properties							
True Colour	PtCo units	3.3	2.0	B053536			
Physical Properties							
Turbidity	NTU	10	0.10	B052641			

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C357848
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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ397	BVQ398	BVQ399		
Sampling Date		2023/07/24 12:15	2023/07/26 11:45	2023/07/25 11:15		
COC Number		298655	298655	298655		
	UNITS	**AEMP-DS-06**	**AEMP-DS-01**	**AEMP-DS-02**	**RDL**	**QC Batch**
Polycyclic Aromatics						
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B052557
Acenaphthene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
Acenaphthylene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
Acridine	mg/L	<0.000040	<0.000040	<0.000040	0.000040	B053612
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B053612
Benzo(a)anthracene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Benzo(b&j)fluoranthene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Benzo(k)fluoranthene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Benzo(g,h,i)perylene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Benzo(c)phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Benzo(a)pyrene	mg/L	<0.0000075	<0.0000075	<0.0000075	0.0000075	B053612
Benzo(e)pyrene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Chrysene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
Dibenz(a,h)anthracene	mg/L	<0.0000075	<0.0000075	<0.0000075	0.0000075	B053612
Fluoranthene	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B053612
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
Fluorene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Indeno(1,2,3-cd)pyrene	mg/L	<0.0000085	<0.0000085	<0.0000085	0.0000085	B053612
1-Methylnaphthalene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
2-Methylnaphthalene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
Naphthalene	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B053612
Phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Perylene	mg/L	<0.000050	<0.000050	<0.000050	0.000050	B053612
Retene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C1-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Pyrene	mg/L	<0.000020	<0.000020	<0.000020	0.000020	B053612
C3-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Quinoline	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B053612
C4-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
C2-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B061414
RDL = Reportable Detection Limit						

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Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ397	BVQ398	BVQ399		
Sampling Date		2023/07/24 12:15	2023/07/26 11:45	2023/07/25 11:15		
COC Number		298655	298655	298655		
	UNITS	**AEMP-DS-06**	**AEMP-DS-01**	**AEMP-DS-02**	**RDL**	**QC Batch**
C1-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C2-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C2-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C3-fluorene	ug/L	<0.050	<0.050	0.073	0.050	B061414
Dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1-dibenzothiophene	ug/L	<0.020	<0.020	0.033	0.020	B061414
C2-dibenzothiophene	ug/L	<0.020	<0.020	0.085	0.020	B061414
C3-dibenzothiophene	ug/L	<0.020	<0.020	0.048	0.020	B061414
C4-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B061414
C2 phenanthrene/anthracene	ug/L	<0.050	<0.050	0.098	0.050	B061414
C3 phenanthrene/anthracene	ug/L	<0.050	<0.050	0.14	0.050	B061414
C4 phenanthrene/anthracene	ug/L	<0.050	<0.050	0.050	0.050	B061414
C1 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C2 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C3 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C4 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B061414
C1 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
C2 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
C3 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B061414
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B061414
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B061414
C1-Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B061414
Extraction Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	85	78	88		B061414
D8-ACENAPHTHYLENE (sur.)	%	82	76	80		B061414
D8-NAPHTHALENE (sur.)	%	69	66	68		B061414
TERPHENYL-D14 (sur.)	%	80	73	77		B061414
D10-ANTHRACENE (sur.)	%	101	101	102		B053612
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Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ397	BVQ398	BVQ399		
Sampling Date		2023/07/24 12:15	2023/07/26 11:45	2023/07/25 11:15		
COC Number		298655	298655	298655		
	UNITS	**AEMP-DS-06**	**AEMP-DS-01**	**AEMP-DS-02**	**RDL**	**QC Batch**
D8-ACENAPHTHYLENE (sur.)	%	84	79	81		B053612
D8-NAPHTHALENE (sur.)	%	74	69	72		B053612
TERPHENYL-D14 (sur.)	%	105	118	102		B053612
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ399		
Sampling Date		2023/07/25 11:15		
COC Number		298655		
	UNITS	**AEMP-DS-02 Lab-Dup**	**RDL**	**QC Batch**
Polycyclic Aromatics				
Acenaphthene	mg/L	<0.00010	0.00010	B053612
Acenaphthylene	mg/L	<0.00010	0.00010	B053612
Acridine	mg/L	<0.000040	0.000040	B053612
Anthracene	mg/L	<0.000010	0.000010	B053612
Benzo(a)anthracene	mg/L	<0.0000085	0.0000085	B053612
Benzo(b&j)fluoranthene	mg/L	<0.0000085	0.0000085	B053612
Benzo(k)fluoranthene	mg/L	<0.0000085	0.0000085	B053612
Benzo(g,h,i)perylene	mg/L	<0.0000085	0.0000085	B053612
Benzo(c)phenanthrene	mg/L	<0.000050	0.000050	B053612
Benzo(a)pyrene	mg/L	<0.0000075	0.0000075	B053612
Benzo(e)pyrene	mg/L	<0.000050	0.000050	B053612
Chrysene	mg/L	<0.0000085	0.0000085	B053612
Dibenz(a,h)anthracene	mg/L	<0.0000075	0.0000075	B053612
Fluoranthene	mg/L	<0.000010	0.000010	B053612
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	0.0085	B061414
Fluorene	mg/L	<0.000050	0.000050	B053612
Indeno(1,2,3-cd)pyrene	mg/L	<0.0000085	0.0000085	B053612
1-Methylnaphthalene	mg/L	<0.00010	0.00010	B053612
2-Methylnaphthalene	mg/L	<0.00010	0.00010	B053612
Naphthalene	mg/L	<0.00010	0.00010	B053612
Phenanthrene	mg/L	<0.000050	0.000050	B053612
Perylene	mg/L	<0.000050	0.000050	B053612
Retene	ug/L	<0.050	0.050	B061414
C1-Naphthalene	ug/L	<0.10	0.10	B061414
Pyrene	mg/L	<0.000020	0.000020	B053612
C3-Naphthalene	ug/L	<0.10	0.10	B061414
Quinoline	mg/L	<0.00020	0.00020	B053612
C4-Naphthalene	ug/L	<0.10	0.10	B061414
C2-Naphthalene	ug/L	<0.10	0.10	B061414
Biphenyl	ug/L	<0.020	0.020	B061414

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ399		
Sampling Date		2023/07/25 11:15		
COC Number		298655		
	UNITS	**AEMP-DS-02 Lab-Dup**	**RDL**	**QC Batch**
C1-biphenyl	ug/L	<0.020	0.020	B061414
C2-biphenyl	ug/L	<0.020	0.020	B061414
C1-fluorene	ug/L	<0.050	0.050	B061414
C2-fluorene	ug/L	<0.050	0.050	B061414
C3-fluorene	ug/L	<0.050	0.050	B061414
Dibenzothiophene	ug/L	<0.020	0.020	B061414
C1-dibenzothiophene	ug/L	<0.020	0.020	B061414
C2-dibenzothiophene	ug/L	0.046	0.020	B061414
C3-dibenzothiophene	ug/L	0.021	0.020	B061414
C4-dibenzothiophene	ug/L	<0.020	0.020	B061414
C1 phenanthrene/anthracene	ug/L	<0.050	0.050	B061414
C2 phenanthrene/anthracene	ug/L	<0.050	0.050	B061414
C3 phenanthrene/anthracene	ug/L	0.053	0.050	B061414
C4 phenanthrene/anthracene	ug/L	<0.050	0.050	B061414
C1 fluoranthene/pyrene	ug/L	<0.020	0.020	B061414
C2 fluoranthene/pyrene	ug/L	<0.020	0.020	B061414
C3 fluoranthene/pyrene	ug/L	<0.020	0.020	B061414
C4 fluoranthene/pyrene	ug/L	<0.020	0.020	B061414
C1 benzo(a)anthracene/chrysene	ug/L	<0.0085	0.0085	B061414
C2 benzo(a)anthracene/chrysene	ug/L	<0.0085	0.0085	B061414
C3 benzo(a)anthracene/chrysene	ug/L	<0.0085	0.0085	B061414
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	0.0085	B061414
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	0.0075	B061414
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	0.0075	B061414
C1-Acenaphthene	ug/L	<0.10	0.10	B061414
Extraction Surrogate Recovery (%)				
D10-ANTHRACENE (sur.)	%	83		B061414
D8-ACENAPHTHYLENE (sur.)	%	76		B061414
D8-NAPHTHALENE (sur.)	%	64		B061414
TERPHENYL-D14 (sur.)	%	75		B061414

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BVQ399		
Sampling Date		2023/07/25 11:15		
COC Number		298655		
	UNITS	**AEMP-DS-02 Lab-Dup**	**RDL**	**QC Batch**
D10-ANTHRACENE (sur.)	%	88		B053612
D8-ACENAPHTHYLENE (sur.)	%	82		B053612
D8-NAPHTHALENE (sur.)	%	72		B053612
TERPHENYL-D14 (sur.)	%	105		B053612

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		BVQ397	BVQ398	BVQ398		BVQ399		
Sampling Date		2023/07/24 12:15	2023/07/26 11:45	2023/07/26 11:45		2023/07/25 11:15		
COC Number		298655	298655	298655		298655		
	UNITS	**AEMP-DS-06**	**AEMP-DS-01**	**AEMP-DS-01 Lab-Dup**	**QC Batch**	**AEMP-DS-02**	**RDL**	**QC Batch**
Elements								
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	B058602	0.0020	0.0019	B057560

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BVQ397		BVQ398	BVQ399		
Sampling Date		2023/07/24 12:15		2023/07/26 11:45	2023/07/25 11:15		
COC Number		298655		298655	298655		
	UNITS	**AEMP-DS-06**	**QC Batch**	**AEMP-DS-01**	**AEMP-DS-02**	**RDL**	**QC Batch**
Elements							
Dissolved Aluminum (Al)	mg/L	0.052	B055619	0.0057	0.023	0.0030	B055619
Dissolved Antimony (Sb)	mg/L	<0.00060	B055619	<0.00060	<0.00060	0.00060	B055619
Dissolved Arsenic (As)	mg/L	0.00032	B055619	0.00025	0.00032	0.00020	B055619
Dissolved Barium (Ba)	mg/L	0.056	B057551	0.087	0.048	0.010	B054890
Dissolved Beryllium (Be)	mg/L	<0.0010	B055619	<0.0010	<0.0010	0.0010	B055619
Dissolved Boron (B)	mg/L	<0.020	B057551	0.044	<0.020	0.020	B054890
Dissolved Calcium (Ca)	mg/L	42	B057551	83	35	0.30	B054890
Dissolved Chromium (Cr)	mg/L	<0.0010	B055619	<0.0010	<0.0010	0.0010	B055619
Dissolved Cobalt (Co)	mg/L	<0.00030	B055619	<0.00030	<0.00030	0.00030	B055619
Dissolved Copper (Cu)	mg/L	0.0017	B055619	<0.0010	0.0014	0.0010	B055619
Dissolved Iron (Fe)	mg/L	<0.060	B057551	<0.060	<0.060	0.060	B054890
Dissolved Lead (Pb)	mg/L	<0.00020	B055619	<0.00020	<0.00020	0.00020	B055619
Dissolved Lithium (Li)	mg/L	<0.020	B057551	<0.020	<0.020	0.020	B054890
Dissolved Magnesium (Mg)	mg/L	13	B057551	30	9.9	0.20	B054890
Dissolved Manganese (Mn)	mg/L	0.0048	B057551	0.0063	<0.0040	0.0040	B054890
Dissolved Molybdenum (Mo)	mg/L	0.0015	B055619	0.0018	0.00083	0.00020	B055619
Dissolved Nickel (Ni)	mg/L	0.0012	B055619	0.00068	0.0012	0.00050	B055619
Dissolved Phosphorus (P)	mg/L	<0.10	B057551	<0.10	<0.10	0.10	B054890
Dissolved Potassium (K)	mg/L	0.91	B057551	1.2	0.88	0.30	B054890
Dissolved Selenium (Se)	mg/L	0.00039	B055619	<0.00020	0.00024	0.00020	B055619
Dissolved Silicon (Si)	mg/L	1.5	B057551	2.6	1.6	0.50	B054890
Dissolved Silver (Ag)	mg/L	<0.00010	B055619	<0.00010	<0.00010	0.00010	B055619
Dissolved Sodium (Na)	mg/L	9.2	B057551	27	9.0	0.50	B054890
Dissolved Strontium (Sr)	mg/L	0.28	B057551	1.6	0.26	0.020	B054890
Dissolved Sulphur (S)	mg/L	21	B057551	58	14	0.20	B054890
Dissolved Thallium (Tl)	mg/L	<0.00020	B055619	<0.00020	<0.00020	0.00020	B055619
Dissolved Tin (Sn)	mg/L	<0.0010	B055619	<0.0010	<0.0010	0.0010	B055619
Dissolved Titanium (Ti)	mg/L	<0.0010	B055619	<0.0010	<0.0010	0.0010	B055619
Dissolved Uranium (U)	mg/L	0.00081	B055619	0.00099	0.00061	0.00010	B055619
Dissolved Vanadium (V)	mg/L	<0.0010	B055619	<0.0010	<0.0010	0.0010	B055619
Dissolved Zinc (Zn)	mg/L	<0.0030	B055619	<0.0030	<0.0030	0.0030	B055619
RDL = Reportable Detection Limit							

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ397
Sample ID: AEMP-DS-06
Matrix: Water

Collected: 2023/07/24
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B056378	N/A	2023/08/02	Jeanette Chavol Melo
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B053334	N/A	2023/08/01	Ancheol Jeong
F1-BTEX	CALC/MS	B052555	N/A	2023/08/02	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B052562	N/A	2023/08/01	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B052581	N/A	2023/08/03	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B057034	N/A	2023/08/02	Carlo Truong
COD by Colorimeter	M/PROB	B053851	N/A	2023/07/31	Ly Vu
True Colour	SPEC/COL	B053536	N/A	2023/07/30	Adam Fishleigh
Carbon (DOC)	TECH	B054922	N/A	2023/08/04	Ming Dong
Conductivity @25C	COND	B056385	N/A	2023/08/02	Jeanette Chavol Melo
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Sulphide (as H2S)	CALC	B052584	N/A	2023/07/31	Automated Statchk
Hardness	CALC	B052563	N/A	2023/08/01	Automated Statchk
Mercury (Dissolved) by CV	CV	B058602	2023/08/03	2023/08/03	Kiran Kumari
Mercury (Total) by CV	CV	B058636	2023/08/03	2023/08/03	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B057551	N/A	2023/08/04	Kristijan Kovac
Elements by ICP - Total	ICPA	B057446	2023/08/02	2023/08/03	Vincy Scaria
Elements by ICPMS - Dissolved	ICPM	B055619	N/A	2023/08/01	Kevin Huang
Elements by ICPMS - Total	ICPM	B057423	2023/08/02	2023/08/03	Jason Bao
Ion Balance	CALC	B052564	N/A	2023/08/02	Automated Statchk
Ammonia-N (Total)	KONE	B058694	N/A	2023/08/03	Isabelle White
Nitrate and Nitrite	CALC	B052566	N/A	2023/08/02	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B053384	N/A	2023/07/30	Isabelle White
Nitrate (as N)	CALC	B052567	2023/08/02	2023/08/02	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B054755	2023/08/03	2023/08/03	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B061414	2023/08/08	2023/08/11	Jingyuan Song
Benzo[a]pyrene Equivalency	GC/MSD	B052557	N/A	2023/08/08	Automated Statchk
PAH in Water by GC/MS	GC/MS	B053612	2023/08/04	2023/08/05	Jiby Uthup
pH @25°C	AT/ALK	B056384	N/A	2023/08/02	Jeanette Chavol Melo
Orthophosphate by Konelab	KONE	B054915	N/A	2023/07/31	Mary Anne Dela Cruz
Total Sulphide	SPEC	B054305	N/A	2023/07/31	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B053973	2023/07/31	2023/08/02	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	B052569	N/A	2023/08/03	Automated Statchk
Nitrogen (Total)	AC/COL	B058456	2023/08/03	2023/08/03	Carlo Truong
Carbon (Total Organic)	TECH	B054860	N/A	2023/08/04	Ming Dong
Total Suspended Solids (NFR)	BAL	B053990	2023/07/31	2023/08/01	Haydee Estilong
Turbidity	TURB	B054065	N/A	2023/07/31	Coralynn Topping

Bureau Veritas ID: BVQ398
Sample ID: AEMP-DS-01
Matrix: Water

Collected: 2023/07/26
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B056378	N/A	2023/08/02	Jeanette Chavol Melo

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ398
Sample ID: AEMP-DS-01
Matrix: Water

Collected: 2023/07/26
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B053334	N/A	2023/08/01	Ancheol Jeong
F1-BTEX	CALC/MS	B052555	N/A	2023/08/02	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B052562	N/A	2023/08/01	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B052581	N/A	2023/08/03	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B057051	N/A	2023/08/02	Carlo Truong
COD by Colorimeter	M/PROB	B053851	N/A	2023/07/31	Ly Vu
True Colour	SPEC/COL	B053043	N/A	2023/07/29	Carlo Truong
Carbon (DOC)	TECH	B064719	N/A	2023/08/09	Ye Hyun KIM
Conductivity @25C	COND	B056385	N/A	2023/08/02	Jeanette Chavol Melo
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Sulphide (as H2S)	CALC	B052584	N/A	2023/07/31	Automated Statchk
Hardness	CALC	B052563	N/A	2023/08/01	Automated Statchk
Mercury (Dissolved) by CV	CV	B058602	2023/08/03	2023/08/03	Kiran Kumari
Mercury (Total) by CV	CV	B058636	2023/08/03	2023/08/03	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B054890	N/A	2023/07/31	Mohammad Pousti
Elements by ICP - Total	ICPA	B056845	2023/08/02	2023/08/03	Vincy Scaria
Elements by ICPMS - Dissolved	ICPM	B055619	N/A	2023/08/01	Kevin Huang
Elements by ICPMS - Total	ICPM	B056840	2023/08/02	2023/08/02	Mandeep Kaur
Ion Balance	CALC	B052564	N/A	2023/08/02	Automated Statchk
Ammonia-N (Total)	KONE	B058699	N/A	2023/08/03	Isabelle White
Nitrate and Nitrite	CALC	B052566	N/A	2023/08/02	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B053387	N/A	2023/07/30	Isabelle White
Nitrate (as N)	CALC	B052567	2023/08/02	2023/08/02	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B054755	2023/08/03	2023/08/03	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B061414	2023/08/08	2023/08/11	Jingyuan Song
Benzo[a]pyrene Equivalency	GC/MSD	B052557	N/A	2023/08/09	Automated Statchk
PAH in Water by GC/MS	GC/MS	B053612	2023/08/04	2023/08/05	Jiby Uthup
pH @25°C	AT/ALK	B056384	N/A	2023/08/02	Jeanette Chavol Melo
Orthophosphate by Konelab	KONE	B053044	N/A	2023/07/29	Carlo Truong
Total Sulphide	SPEC	B054305	N/A	2023/07/31	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B057076	2023/08/02	2023/08/03	Coralynn Topping
Total Kjeldahl Nitrogen (Total)	CALC	B052569	N/A	2023/08/03	Automated Statchk
Nitrogen (Total)	AC/COL	B058456	2023/08/03	2023/08/03	Carlo Truong
Carbon (Total Organic)	TECH	B054860	N/A	2023/08/04	Ming Dong
Total Suspended Solids (NFR)	BAL	B057058	2023/08/02	2023/08/03	Amy Phan
Turbidity	TURB	B054065	N/A	2023/07/31	Coralynn Topping

Bureau Veritas ID: BVQ398 Dup
Sample ID: AEMP-DS-01
Matrix: Water

Collected: 2023/07/26
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury (Dissolved) by CV	CV	B058602	2023/08/03	2023/08/03	Kiran Kumari

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ399
Sample ID: AEMP-DS-02
Matrix: Water

Collected: 2023/07/25
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B056378	N/A	2023/08/02	Jeanette Chavol Melo
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B053334	N/A	2023/08/01	Ancheol Jeong
F1-BTEX	CALC/MS	B052555	N/A	2023/08/02	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B052562	N/A	2023/08/01	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B052581	N/A	2023/08/03	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B057051	N/A	2023/08/02	Carlo Truong
COD by Colorimeter	M/PROB	B053851	N/A	2023/07/31	Ly Vu
True Colour	SPEC/COL	B053536	N/A	2023/07/30	Adam Fishleigh
Carbon (DOC)	TECH	B054922	N/A	2023/08/04	Ming Dong
Conductivity @25C	COND	B056385	N/A	2023/08/02	Jeanette Chavol Melo
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Sulphide (as H2S)	CALC	B052584	N/A	2023/07/31	Automated Statchk
Hardness	CALC	B052563	N/A	2023/08/01	Automated Statchk
Mercury (Dissolved) by CV	CV	B057560	2023/08/02	2023/08/02	Kiran Kumari
Mercury (Total) by CV	CV	B058636	2023/08/03	2023/08/03	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B054890	N/A	2023/07/31	Mohammad Pousti
Elements by ICP - Total	ICPA	B057446	2023/08/02	2023/08/03	Vincy Scaria
Elements by ICPMS - Dissolved	ICPM	B055619	N/A	2023/08/01	Kevin Huang
Elements by ICPMS - Total	ICPM	B057423	2023/08/02	2023/08/03	Jason Bao
Ion Balance	CALC	B052564	N/A	2023/08/02	Automated Statchk
Ammonia-N (Total)	KONE	B058694	N/A	2023/08/03	Isabelle White
Nitrate and Nitrite	CALC	B052566	N/A	2023/08/02	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B053384	N/A	2023/07/30	Isabelle White
Nitrate (as N)	CALC	B052567	2023/08/02	2023/08/02	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B054755	2023/08/03	2023/08/03	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B061414	2023/08/08	2023/08/11	Jingyuan Song
Benzo[a]pyrene Equivalency	GC/MSD	B052557	N/A	2023/08/09	Automated Statchk
PAH in Water by GC/MS	GC/MS	B053612	2023/08/04	2023/08/05	Jiby Uthup
pH @25°C	AT/ALK	B056384	N/A	2023/08/02	Jeanette Chavol Melo
Orthophosphate by Konelab	KONE	B054915	N/A	2023/07/31	Mary Anne Dela Cruz
Total Sulphide	SPEC	B054305	N/A	2023/07/31	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B055063	2023/08/01	2023/08/02	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	B052569	N/A	2023/08/03	Automated Statchk
Nitrogen (Total)	AC/COL	B058456	2023/08/03	2023/08/03	Carlo Truong
Carbon (Total Organic)	TECH	B054860	N/A	2023/08/04	Ming Dong
Total Suspended Solids (NFR)	BAL	B055096	2023/08/01	2023/08/01	Haydee Estilong
Turbidity	TURB	B052641	N/A	2023/07/29	Ashhel Zia

Bureau Veritas ID: BVQ399 Dup
Sample ID: AEMP-DS-02
Matrix: Water

Collected: 2023/07/25
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbon (DOC)	TECH	B054922	N/A	2023/08/04	Ming Dong

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: BVQ399 Dup
Sample ID: AEMP-DS-02
Matrix: Water

Collected: 2023/07/25
Relinquished: 2023/07/27
Received: 2023/07/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B053613	2023/08/04	2023/08/04	Abu Dani Alex
Target & Alkylated PAH in Water by GC/MS	GC/MS	B061414	2023/08/08	2023/08/11	Jingyuan Song
PAH in Water by GC/MS	GC/MS	B053612	2023/08/04	2023/08/05	Jiby Uthup

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GENERAL COMMENTS

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

Package 1	1.7°C

Note: Bottles in shipment, but bottles not listed on C of C;Received 250mL amber glass bottles preserved in sodium bisulfate, however there is no analysis request needing such bottles.; Archived bottles and notified Alex Haigh via email.

Sample BVQ397 [AEMP-DS-06] : Sample was analyzed past method specified hold time for True Colour. 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 NO2 (N); NO2 (N) + NO3 (N) in Water. Sample was analyzed past method specified hold time for Turbidity. Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Sample was analyzed past method specified hold time for Target & Alkylated PAH in Water by GC/MS.

Sample BVQ398 [AEMP-DS-01] : Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. 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 Turbidity.

Sample BVQ399 [AEMP-DS-02] : Sample was analyzed past method specified hold time for Turbidity. 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 True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Sample was analyzed past method specified hold time for Orthophosphate by Konelab.

RESULTS OF CHEMICAL ANALYSES OF WATER Comments

Sample BVQ398 [AEMP-DS-01] NO2 (N); NO2 (N) + NO3 (N) in Water: Sample was analyzed after holding time expired.

Results relate only to the items tested.

DATA QUALITY OVERVIEW

Lab ID	Client Sample ID	Matrix	Test Code	Analysis Type	Parameters	Deviation	Root Cause	Potential Impact
BVQ397	AEMP-DS-06	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ397	AEMP-DS-06	Water	PAHALKAB-W	PAH	Sample	#10 Past Hold Time	#16 No Repeat-Late Delivery	This may increase the uncertainty associated with these results.
BVQ397	AEMP-DS-06	Water	TURB	SPP	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ398	AEMP-DS-01	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ398	AEMP-DS-01	Water	TURB	SPP	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ399	AEMP-DS-02	Water	COLOURT-W	PHYS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.

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DATA QUALITY OVERVIEW

Lab ID	Client Sample ID	Matrix	Test Code	Analysis Type	Parameters	Deviation	Root Cause	Potential Impact
BVQ399	AEMP-DS-02	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ399	AEMP-DS-02	Water	PO4AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BVQ399	AEMP-DS-02	Water	TURB	SPP	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B052641	AZI	Method Blank	Turbidity	2023/07/29	<0.10		NTU	
B053043	CTU	Method Blank	True Colour	2023/07/29	<2.0		PtCo units	
B053044	CTU	Method Blank	Orthophosphate (P)	2023/07/29	<0.0030		mg/L	
B053334	AJG	Method Blank	1,4-Difluorobenzene (sur.)	2023/08/01		98	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/01		104	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/01		102	%	50 - 140
			Benzene	2023/08/01	<0.00040		mg/L	
			Toluene	2023/08/01	<0.00040		mg/L	
			Ethylbenzene	2023/08/01	<0.00040		mg/L	
			m & p-Xylene	2023/08/01	<0.00080		mg/L	
			o-Xylene	2023/08/01	<0.00040		mg/L	
			F1 (C6-C10)	2023/08/01	<0.10		mg/L	
B053384	ISW	Method Blank	Nitrite (N)	2023/07/30	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/07/30	<0.010		mg/L	
B053387	ISW	Method Blank	Nitrite (N)	2023/07/30	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/07/30	<0.010		mg/L	
B053536	AFI	Method Blank	True Colour	2023/07/30	<2.0		PtCo units	
B053612	JU2	Method Blank	D10-ANTHRACENE (sur.)	2023/08/05		101	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/05		109	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/05		77	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/05		58	%	50 - 130
			Acenaphthene	2023/08/05	<0.00010		mg/L	
			Acenaphthylene	2023/08/05	<0.00010		mg/L	
			Acridine	2023/08/05	<0.000040		mg/L	
			Anthracene	2023/08/05	<0.000010		mg/L	
			Benzo(a)anthracene	2023/08/05	<0.0000085		mg/L	
			Benzo(b&j)fluoranthene	2023/08/05	<0.0000085		mg/L	
			Benzo(k)fluoranthene	2023/08/05	<0.0000085		mg/L	
			Benzo(g,h,i)perylene	2023/08/05	<0.0000085		mg/L	
			Benzo(c)phenanthrene	2023/08/05	<0.000050		mg/L	
			Benzo(a)pyrene	2023/08/05	<0.0000075		mg/L	
			Benzo(e)pyrene	2023/08/05	<0.000050		mg/L	
			Chrysene	2023/08/05	<0.0000085		mg/L	
			Dibenz(a,h)anthracene	2023/08/05	<0.0000075		mg/L	
			Fluoranthene	2023/08/05	<0.000010		mg/L	
			Fluorene	2023/08/05	<0.000050		mg/L	
			Indeno(1,2,3-cd)pyrene	2023/08/05	<0.0000085		mg/L	
			1-Methylnaphthalene	2023/08/05	<0.00010		mg/L	
			2-Methylnaphthalene	2023/08/05	<0.00010		mg/L	
			Naphthalene	2023/08/05	<0.00010		mg/L	
			Phenanthrene	2023/08/05	<0.000050		mg/L	
			Perylene	2023/08/05	<0.000050		mg/L	
			Pyrene	2023/08/05	<0.000020		mg/L	
			Quinoline	2023/08/05	<0.00020		mg/L	
B053613	AAX	Method Blank	O-TERPHENYL (sur.)	2023/08/04		100	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/04	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2023/08/04	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2023/08/04	<0.20		mg/L	
B053851	LYV	Method Blank	Chemical Oxygen Demand	2023/07/31	<10		mg/L	
B053973	HE1	Method Blank	Total Dissolved Solids	2023/08/02	<10		mg/L	
B053990	HE1	Method Blank	Total Suspended Solids	2023/08/01	<1.0		mg/L	
B054065	CT6	Method Blank	Turbidity	2023/07/31	<0.10		NTU	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B054305	DSX	Method Blank	Total Sulphide	2023/07/31	<0.0018		mg/L	
B054755	JB9	Method Blank	Total Oil and grease	2023/08/03	<2.0		mg/L	
B054860	MDO	Method Blank	Total Organic Carbon (C)	2023/08/04	<0.50		mg/L	
B054890	MPU	Method Blank	Dissolved Iron (Fe)	2023/07/31	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/07/31	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/07/31	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/07/31	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/07/31	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/07/31	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/07/31	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/07/31	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/07/31	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/07/31	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/07/31	<0.50		mg/L	
			Dissolved Boron (B)	2023/07/31	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/07/31	<0.30		mg/L	
B054915	MAP	Method Blank	Orthophosphate (P)	2023/08/01	<0.0030		mg/L	
B054922	MDO	Method Blank	Dissolved Organic Carbon (C)	2023/08/04	<0.50		mg/L	
B055063	HE1	Method Blank	Total Dissolved Solids	2023/08/02	<10		mg/L	
B055096	HE1	Method Blank	Total Suspended Solids	2023/08/01	<1.0		mg/L	
B055619	KH2	Method Blank	Dissolved Aluminum (Al)	2023/08/01	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/08/01	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/08/01	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/08/01	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/08/01	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/08/01	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/08/01	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/08/01	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/08/01	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/08/01	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/08/01	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/08/01	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/08/01	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/08/01	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/08/01	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/08/01	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/08/01	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/08/01	<0.0010		mg/L	
B056378	JVM	Method Blank	Alkalinity (Total as CaCO3)	2023/08/02	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/08/02	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/08/02	<1.0		mg/L	
			Carbonate (CO3)	2023/08/02	<1.0		mg/L	
			Hydroxide (OH)	2023/08/02	<1.0		mg/L	
B056385	JVM	Method Blank	Conductivity	2023/08/02	<2.0		uS/cm	
B056840	MKJ	Method Blank	Total Aluminum (Al)	2023/08/02	<0.0030		mg/L	
			Total Chromium (Cr)	2023/08/02	<0.0010		mg/L	
			Total Cobalt (Co)	2023/08/02	<0.00030		mg/L	
			Total Copper (Cu)	2023/08/02	<0.0010		mg/L	
			Total Lead (Pb)	2023/08/02	<0.00020		mg/L	
			Total Antimony (Sb)	2023/08/02	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/08/02	<0.00020		mg/L	
			Total Nickel (Ni)	2023/08/02	<0.00050		mg/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 Selenium (Se)	2023/08/02	<0.00020		mg/L	
			Total Silver (Ag)	2023/08/02	<0.00010		mg/L	
			Total Arsenic (As)	2023/08/02	<0.00020		mg/L	
			Total Thallium (Tl)	2023/08/02	<0.00020		mg/L	
			Total Tin (Sn)	2023/08/02	<0.0010		mg/L	
			Total Titanium (Ti)	2023/08/02	<0.0010		mg/L	
			Total Uranium (U)	2023/08/02	<0.00010		mg/L	
			Total Vanadium (V)	2023/08/02	<0.0010		mg/L	
			Total Zinc (Zn)	2023/08/02	<0.0030		mg/L	
			Total Beryllium (Be)	2023/08/02	<0.0010		mg/L	
B056845	VSC	Method Blank	Total Iron (Fe)	2023/08/03	<0.060		mg/L	
			Total Lithium (Li)	2023/08/03	<0.020		mg/L	
			Total Magnesium (Mg)	2023/08/03	<0.20		mg/L	
			Total Manganese (Mn)	2023/08/03	<0.0040		mg/L	
			Total Potassium (K)	2023/08/03	<0.30		mg/L	
			Total Sodium (Na)	2023/08/03	<0.50		mg/L	
			Total Strontium (Sr)	2023/08/03	<0.020		mg/L	
			Total Sulphur (S)	2023/08/03	<0.20		mg/L	
			Total Phosphorus (P)	2023/08/03	<0.10		mg/L	
			Total Barium (Ba)	2023/08/03	<0.010		mg/L	
			Total Silicon (Si)	2023/08/03	<0.50		mg/L	
			Total Boron (B)	2023/08/03	<0.020		mg/L	
			Total Calcium (Ca)	2023/08/03	<0.30		mg/L	
B057034	CTU	Method Blank	Chloride (Cl)	2023/08/02	<1.0		mg/L	
			Sulphate (SO4)	2023/08/02	<1.0		mg/L	
B057051	CTU	Method Blank	Chloride (Cl)	2023/08/02	<1.0		mg/L	
			Sulphate (SO4)	2023/08/02	<1.0		mg/L	
B057058	AP1	Method Blank	Total Suspended Solids	2023/08/03	<1.0		mg/L	
B057076	CT6	Method Blank	Total Dissolved Solids	2023/08/03	<10		mg/L	
B057423	JAB	Method Blank	Total Aluminum (Al)	2023/08/03	<0.0030		mg/L	
			Total Chromium (Cr)	2023/08/03	<0.0010		mg/L	
			Total Cobalt (Co)	2023/08/03	<0.00030		mg/L	
			Total Copper (Cu)	2023/08/03	<0.0010		mg/L	
			Total Lead (Pb)	2023/08/03	<0.00020		mg/L	
			Total Antimony (Sb)	2023/08/03	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/08/03	<0.00020		mg/L	
			Total Nickel (Ni)	2023/08/03	<0.00050		mg/L	
			Total Selenium (Se)	2023/08/03	<0.00020		mg/L	
			Total Silver (Ag)	2023/08/03	<0.00010		mg/L	
			Total Arsenic (As)	2023/08/03	<0.00020		mg/L	
			Total Thallium (Tl)	2023/08/03	<0.00020		mg/L	
			Total Tin (Sn)	2023/08/03	<0.0010		mg/L	
			Total Titanium (Ti)	2023/08/03	<0.0010		mg/L	
			Total Uranium (U)	2023/08/03	<0.00010		mg/L	
			Total Vanadium (V)	2023/08/03	<0.0010		mg/L	
			Total Zinc (Zn)	2023/08/03	<0.0030		mg/L	
			Total Beryllium (Be)	2023/08/03	<0.0010		mg/L	
B057446	VSC	Method Blank	Total Iron (Fe)	2023/08/03	<0.060		mg/L	
			Total Lithium (Li)	2023/08/03	<0.020		mg/L	
			Total Magnesium (Mg)	2023/08/03	<0.20		mg/L	
			Total Manganese (Mn)	2023/08/03	<0.0040		mg/L	
			Total Potassium (K)	2023/08/03	<0.30		mg/L	

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Sodium (Na)	2023/08/03	<0.50		mg/L	
			Total Strontium (Sr)	2023/08/03	<0.020		mg/L	
			Total Sulphur (S)	2023/08/03	<0.20		mg/L	
			Total Phosphorus (P)	2023/08/03	<0.10		mg/L	
			Total Barium (Ba)	2023/08/03	<0.010		mg/L	
			Total Silicon (Si)	2023/08/03	<0.50		mg/L	
			Total Boron (B)	2023/08/03	<0.020		mg/L	
			Total Calcium (Ca)	2023/08/03	<0.30		mg/L	
B057551	KKC	Method Blank	Dissolved Iron (Fe)	2023/08/02	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/08/02	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/08/02	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/08/02	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/08/02	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/08/02	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/08/02	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/08/02	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/08/02	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/08/02	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/08/02	<0.50		mg/L	
			Dissolved Boron (B)	2023/08/02	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/08/02	<0.30		mg/L	
B057560	KKM	Method Blank	Dissolved Mercury (Hg)	2023/08/02	<0.0019		ug/L	
B058456	CTU	Method Blank	Total Nitrogen (N)	2023/08/03	<0.020		mg/L	
B058602	KKM	Method Blank	Dissolved Mercury (Hg)	2023/08/03	<0.0019		ug/L	
B058636	KKM	Method Blank	Total Mercury (Hg)	2023/08/03	<0.0019		ug/L	
B058694	ISW	Method Blank	Total Ammonia (N)	2023/08/03	<0.015		mg/L	
B058699	ISW	Method Blank	Total Ammonia (N)	2023/08/03	<0.015		mg/L	
B061414	SJ1	Method Blank	D10-ANTHRACENE (sur.)	2023/08/10		86	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/10		75	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/10		79	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/10		66	%	50 - 130
			Indeno(1,2,3-cd)fluoranthene	2023/08/10	<0.0085		ug/L	
			Retene	2023/08/10	<0.050		ug/L	
			C1-Naphthalene	2023/08/10	<0.10		ug/L	
			C3-Naphthalene	2023/08/10	<0.10		ug/L	
			C4-Naphthalene	2023/08/10	<0.10		ug/L	
			C2-Naphthalene	2023/08/10	<0.10		ug/L	
			Biphenyl	2023/08/10	<0.020		ug/L	
			C1-biphenyl	2023/08/10	<0.020		ug/L	
			C2-biphenyl	2023/08/10	<0.020		ug/L	
			C1-fluorene	2023/08/10	<0.050		ug/L	
			C2-fluorene	2023/08/10	<0.050		ug/L	
			C3-fluorene	2023/08/10	<0.050		ug/L	
			Dibenzothiophene	2023/08/10	<0.020		ug/L	
			C1-dibenzothiophene	2023/08/10	<0.020		ug/L	
			C2-dibenzothiophene	2023/08/10	<0.020		ug/L	
			C3-dibenzothiophene	2023/08/10	<0.020		ug/L	
			C4-dibenzothiophene	2023/08/10	<0.020		ug/L	
			C1 phenanthrene/anthracene	2023/08/10	<0.050		ug/L	
			C2 phenanthrene/anthracene	2023/08/10	<0.050		ug/L	
			C3 phenanthrene/anthracene	2023/08/10	<0.050		ug/L	
			C4 phenanthrene/anthracene	2023/08/10	<0.050		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			C1 fluoranthene/pyrene	2023/08/10	<0.020		ug/L	
			C2 fluoranthene/pyrene	2023/08/10	<0.020		ug/L	
			C3 fluoranthene/pyrene	2023/08/10	<0.020		ug/L	
			C4 fluoranthene/pyrene	2023/08/10	<0.020		ug/L	
			C1 benzo(a)anthracene/chrysene	2023/08/10	<0.0085		ug/L	
			C2 benzo(a)anthracene/chrysene	2023/08/10	<0.0085		ug/L	
			C3 benzo(a)anthracene/chrysene	2023/08/10	<0.0085		ug/L	
			C4 benzo(a)anthracene/chrysene	2023/08/10	<0.0085		ug/L	
			C1benzobjkfluoranthene/benzoapyrene	2023/08/10	<0.0075		ug/L	
			C2benzobjkfluoranthene/benzoapyrene	2023/08/10	<0.0075		ug/L	
			C1-Acenaphthene	2023/08/10	<0.10		ug/L	
B064719	YHK	Method Blank	Dissolved Organic Carbon (C)	2023/08/09	<0.50		mg/L	
B058602	KKM	RPD [BVQ398-14]	Dissolved Mercury (Hg)	2023/08/03	NC		%	20
B053612	JU2	RPD [BVQ399-10]	Acenaphthene	2023/08/05	NC		%	30
			Acenaphthylene	2023/08/05	NC		%	30
			Acridine	2023/08/05	NC		%	30
			Anthracene	2023/08/05	NC		%	30
			Benzo(a)anthracene	2023/08/05	NC		%	30
			Benzo(b&j)fluoranthene	2023/08/05	NC		%	30
			Benzo(k)fluoranthene	2023/08/05	NC		%	30
			Benzo(g,h,i)perylene	2023/08/05	NC		%	30
			Benzo(c)phenanthrene	2023/08/05	NC		%	30
			Benzo(a)pyrene	2023/08/05	NC		%	30
			Benzo(e)pyrene	2023/08/05	NC		%	30
			Chrysene	2023/08/05	NC		%	30
			Dibenz(a,h)anthracene	2023/08/05	NC		%	30
			Fluoranthene	2023/08/05	NC		%	30
			Fluorene	2023/08/05	NC		%	30
			Indeno(1,2,3-cd)pyrene	2023/08/05	NC		%	30
			1-Methylnaphthalene	2023/08/05	NC		%	30
			2-Methylnaphthalene	2023/08/05	NC		%	30
			Naphthalene	2023/08/05	NC		%	30
			Phenanthrene	2023/08/05	NC		%	30
			Perylene	2023/08/05	NC		%	30
			Pyrene	2023/08/05	NC		%	30
			Quinoline	2023/08/05	NC		%	30
B053613	AAX	RPD [BVQ399-10]	F2 (C10-C16 Hydrocarbons)	2023/08/04	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2023/08/04	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2023/08/04	NC		%	30
B054922	MDO	RPD [BVQ399-04]	Dissolved Organic Carbon (C)	2023/08/04	0.25		%	20
B061414	SJ1	RPD [BVQ399-09]	Indeno(1,2,3-cd)fluoranthene	2023/08/11	NC		%	30
			Retene	2023/08/11	NC		%	30
			C1-Naphthalene	2023/08/11	NC		%	30
			C3-Naphthalene	2023/08/11	NC		%	30
			C4-Naphthalene	2023/08/11	NC		%	30
			C2-Naphthalene	2023/08/11	NC		%	30
			Biphenyl	2023/08/11	NC		%	30
			C1-biphenyl	2023/08/11	NC		%	30
			C2-biphenyl	2023/08/11	NC		%	30
			C1-fluorene	2023/08/11	NC		%	30
			C2-fluorene	2023/08/11	NC		%	30
			C3-fluorene	2023/08/11	NC		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dibenzothiophene	2023/08/11	NC		%	30
			C1-dibenzothiophene	2023/08/11	NC		%	30
			C2-dibenzothiophene	2023/08/11	NC		%	30
			C3-dibenzothiophene	2023/08/11	NC		%	30
			C4-dibenzothiophene	2023/08/11	NC		%	30
			C1 phenanthrene/anthracene	2023/08/11	NC		%	30
			C2 phenanthrene/anthracene	2023/08/11	NC		%	30
			C3 phenanthrene/anthracene	2023/08/11	NC		%	30
			C4 phenanthrene/anthracene	2023/08/11	0.80		%	30
			C1 fluoranthene/pyrene	2023/08/11	NC		%	30
			C2 fluoranthene/pyrene	2023/08/11	NC		%	30
			C3 fluoranthene/pyrene	2023/08/11	NC		%	30
			C4 fluoranthene/pyrene	2023/08/11	NC		%	30
			C1 benzo(a)anthracene/chrysene	2023/08/11	NC		%	30
			C2 benzo(a)anthracene/chrysene	2023/08/11	NC		%	30
			C3 benzo(a)anthracene/chrysene	2023/08/11	NC		%	30
			C4 benzo(a)anthracene/chrysene	2023/08/11	NC		%	30
			C1benzobjkfluoranthene/benzoapyrene	2023/08/11	NC		%	30
			C2benzobjkfluoranthene/benzoapyrene	2023/08/11	NC		%	30
			C1-Acenaphthene	2023/08/11	NC		%	30
B054922	MDO	Matrix Spike [BVQ399-04]	Dissolved Organic Carbon (C)	2023/08/04		105	%	80 - 120
B058456	CTU	Matrix Spike [BVQ397-03]	Total Nitrogen (N)	2023/08/03		95	%	80 - 120
B058602	KKM	Matrix Spike [BVQ397-14]	Dissolved Mercury (Hg)	2023/08/03		100	%	80 - 120
B052641	AZI	LCS	Turbidity	2023/07/29		102	%	80 - 120
B053043	CTU	LCS	True Colour	2023/07/29		96	%	80 - 120
B053044	CTU	LCS	Orthophosphate (P)	2023/07/29		101	%	80 - 120
B053334	AJG	LCS	1,4-Difluorobenzene (sur.)	2023/08/01		94	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/01		106	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/01		97	%	50 - 140
			Benzene	2023/08/01		95	%	60 - 130
			Toluene	2023/08/01		95	%	60 - 130
			Ethylbenzene	2023/08/01		103	%	60 - 130
			m & p-Xylene	2023/08/01		104	%	60 - 130
			o-Xylene	2023/08/01		107	%	60 - 130
			F1 (C6-C10)	2023/08/01		102	%	60 - 140
B053384	ISW	LCS	Nitrite (N)	2023/07/30		100	%	80 - 120
			Nitrate plus Nitrite (N)	2023/07/30		104	%	80 - 120
B053387	ISW	LCS	Nitrite (N)	2023/07/30		100	%	80 - 120
			Nitrate plus Nitrite (N)	2023/07/30		97	%	80 - 120
B053536	AFI	LCS	True Colour	2023/07/30		99	%	80 - 120
B053612	JU2	LCS	D10-ANTHRACENE (sur.)	2023/08/05		99	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/05		112	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/05		89	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/05		74	%	50 - 130
			Acenaphthene	2023/08/05		80	%	50 - 130
			Acenaphthylene	2023/08/05		85	%	50 - 130
			Acridine	2023/08/05		85	%	50 - 130
			Anthracene	2023/08/05		72	%	50 - 130
			Benzo(a)anthracene	2023/08/05		103	%	50 - 130
			Benzo(b&j)fluoranthene	2023/08/05		100	%	50 - 130
			Benzo(k)fluoranthene	2023/08/05		95	%	50 - 130
			Benzo(g,h,i)perylene	2023/08/05		91	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(c)phenanthrene	2023/08/05		106	%	50 - 130
			Benzo(a)pyrene	2023/08/05		105	%	50 - 130
			Benzo(e)pyrene	2023/08/05		87	%	50 - 130
			Chrysene	2023/08/05		102	%	50 - 130
			Dibenz(a,h)anthracene	2023/08/05		102	%	50 - 130
			Fluoranthene	2023/08/05		90	%	50 - 130
			Fluorene	2023/08/05		91	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/08/05		91	%	50 - 130
			1-Methylnaphthalene	2023/08/05		66	%	50 - 130
			2-Methylnaphthalene	2023/08/05		76	%	50 - 130
			Naphthalene	2023/08/05		81	%	50 - 130
			Phenanthrene	2023/08/05		97	%	50 - 130
			Perylene	2023/08/05		84	%	50 - 130
			Pyrene	2023/08/05		91	%	50 - 130
			Quinoline	2023/08/05		81	%	50 - 130
B053613	AAX	LCS	O-TERPHENYL (sur.)	2023/08/04		101	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/04		100	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/08/04		110	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/08/04		103	%	60 - 140
B053851	LYV	LCS	Chemical Oxygen Demand	2023/07/31		102	%	80 - 120
B053973	HE1	LCS	Total Dissolved Solids	2023/08/02		97	%	80 - 120
B053990	HE1	LCS	Total Suspended Solids	2023/08/01		98	%	80 - 120
B054065	CT6	LCS	Turbidity	2023/07/31		102	%	80 - 120
B054305	DSX	LCS	Total Sulphide	2023/07/31		90	%	80 - 120
B054755	JB9	LCS	Total Oil and grease	2023/08/03		95	%	70 - 130
B054860	MDO	LCS	Total Organic Carbon (C)	2023/08/04		107	%	80 - 120
B054890	MPU	LCS	Dissolved Iron (Fe)	2023/07/31		105	%	80 - 120
			Dissolved Lithium (Li)	2023/07/31		107	%	80 - 120
			Dissolved Magnesium (Mg)	2023/07/31		102	%	80 - 120
			Dissolved Manganese (Mn)	2023/07/31		105	%	80 - 120
			Dissolved Potassium (K)	2023/07/31		105	%	80 - 120
			Dissolved Sodium (Na)	2023/07/31		102	%	80 - 120
			Dissolved Strontium (Sr)	2023/07/31		100	%	80 - 120
			Dissolved Sulphur (S)	2023/07/31		103	%	80 - 120
			Dissolved Phosphorus (P)	2023/07/31		101	%	80 - 120
			Dissolved Barium (Ba)	2023/07/31		103	%	80 - 120
			Dissolved Silicon (Si)	2023/07/31		96	%	80 - 120
			Dissolved Boron (B)	2023/07/31		104	%	80 - 120
			Dissolved Calcium (Ca)	2023/07/31		103	%	80 - 120
B054915	MAP	LCS	Orthophosphate (P)	2023/07/31		100	%	80 - 120
B054922	MDO	LCS	Dissolved Organic Carbon (C)	2023/08/04		106	%	80 - 120
B055063	HE1	LCS	Total Dissolved Solids	2023/08/02		96	%	80 - 120
B055096	HE1	LCS	Total Suspended Solids	2023/08/01		97	%	80 - 120
B055619	KH2	LCS	Dissolved Aluminum (Al)	2023/08/01		113	%	80 - 120
			Dissolved Chromium (Cr)	2023/08/01		106	%	80 - 120
			Dissolved Cobalt (Co)	2023/08/01		106	%	80 - 120
			Dissolved Copper (Cu)	2023/08/01		110	%	80 - 120
			Dissolved Lead (Pb)	2023/08/01		107	%	80 - 120
			Dissolved Antimony (Sb)	2023/08/01		108	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/08/01		103	%	80 - 120
			Dissolved Nickel (Ni)	2023/08/01		107	%	80 - 120
			Dissolved Selenium (Se)	2023/08/01		108	%	80 - 120

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Silver (Ag)	2023/08/01		98	%	80 - 120
			Dissolved Arsenic (As)	2023/08/01		103	%	80 - 120
			Dissolved Thallium (Tl)	2023/08/01		107	%	80 - 120
			Dissolved Tin (Sn)	2023/08/01		98	%	80 - 120
			Dissolved Titanium (Ti)	2023/08/01		105	%	80 - 120
			Dissolved Uranium (U)	2023/08/01		102	%	80 - 120
			Dissolved Vanadium (V)	2023/08/01		105	%	80 - 120
			Dissolved Zinc (Zn)	2023/08/01		106	%	80 - 120
			Dissolved Beryllium (Be)	2023/08/01		106	%	80 - 120
B056378	JVM	LCS	Alkalinity (Total as CaCO3)	2023/08/02		99	%	80 - 120
B056384	JVM	LCS	pH	2023/08/02		100	%	97 - 103
B056385	JVM	LCS	Conductivity	2023/08/02		104	%	90 - 110
B056840	MKJ	LCS	Total Aluminum (Al)	2023/08/02		105	%	80 - 120
			Total Chromium (Cr)	2023/08/02		94	%	80 - 120
			Total Cobalt (Co)	2023/08/02		94	%	80 - 120
			Total Copper (Cu)	2023/08/02		95	%	80 - 120
			Total Lead (Pb)	2023/08/02		98	%	80 - 120
			Total Antimony (Sb)	2023/08/02		101	%	80 - 120
			Total Molybdenum (Mo)	2023/08/02		99	%	80 - 120
			Total Nickel (Ni)	2023/08/02		94	%	80 - 120
			Total Selenium (Se)	2023/08/02		100	%	80 - 120
			Total Silver (Ag)	2023/08/02		100	%	80 - 120
			Total Arsenic (As)	2023/08/02		93	%	80 - 120
			Total Thallium (Tl)	2023/08/02		100	%	80 - 120
			Total Tin (Sn)	2023/08/02		98	%	80 - 120
			Total Titanium (Ti)	2023/08/02		92	%	80 - 120
			Total Uranium (U)	2023/08/02		97	%	80 - 120
			Total Vanadium (V)	2023/08/02		94	%	80 - 120
			Total Zinc (Zn)	2023/08/02		94	%	80 - 120
			Total Beryllium (Be)	2023/08/02		97	%	80 - 120
B056845	VSC	LCS	Total Iron (Fe)	2023/08/02		108	%	80 - 120
			Total Lithium (Li)	2023/08/02		112	%	80 - 120
			Total Magnesium (Mg)	2023/08/02		108	%	80 - 120
			Total Manganese (Mn)	2023/08/02		110	%	80 - 120
			Total Potassium (K)	2023/08/02		110	%	80 - 120
			Total Sodium (Na)	2023/08/02		103	%	80 - 120
			Total Strontium (Sr)	2023/08/02		97	%	80 - 120
			Total Sulphur (S)	2023/08/02		99	%	80 - 120
			Total Phosphorus (P)	2023/08/02		101	%	80 - 120
			Total Barium (Ba)	2023/08/02		101	%	80 - 120
			Total Silicon (Si)	2023/08/02		100	%	80 - 120
			Total Boron (B)	2023/08/02		99	%	80 - 120
			Total Calcium (Ca)	2023/08/02		109	%	80 - 120
B057034	CTU	LCS	Chloride (Cl)	2023/08/02		102	%	80 - 120
			Sulphate (SO4)	2023/08/02		103	%	80 - 120
B057051	CTU	LCS	Chloride (Cl)	2023/08/02		101	%	80 - 120
			Sulphate (SO4)	2023/08/02		102	%	80 - 120
B057058	AP1	LCS	Total Suspended Solids	2023/08/03		88	%	80 - 120
B057076	CT6	LCS	Total Dissolved Solids	2023/08/03		97	%	80 - 120
B057423	JAB	LCS	Total Aluminum (Al)	2023/08/03		114	%	80 - 120
			Total Chromium (Cr)	2023/08/03		100	%	80 - 120
			Total Cobalt (Co)	2023/08/03		101	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Copper (Cu)	2023/08/03		100	%	80 - 120
			Total Lead (Pb)	2023/08/03		106	%	80 - 120
			Total Antimony (Sb)	2023/08/03		110	%	80 - 120
			Total Molybdenum (Mo)	2023/08/03		106	%	80 - 120
			Total Nickel (Ni)	2023/08/03		99	%	80 - 120
			Total Selenium (Se)	2023/08/03		97	%	80 - 120
			Total Silver (Ag)	2023/08/03		105	%	80 - 120
			Total Arsenic (As)	2023/08/03		97	%	80 - 120
			Total Thallium (Tl)	2023/08/03		106	%	80 - 120
			Total Tin (Sn)	2023/08/03		104	%	80 - 120
			Total Titanium (Ti)	2023/08/03		98	%	80 - 120
			Total Uranium (U)	2023/08/03		105	%	80 - 120
			Total Vanadium (V)	2023/08/03		100	%	80 - 120
			Total Zinc (Zn)	2023/08/03		95	%	80 - 120
			Total Beryllium (Be)	2023/08/03		105	%	80 - 120
B057446	VSC	LCS	Total Iron (Fe)	2023/08/03		105	%	80 - 120
			Total Lithium (Li)	2023/08/03		106	%	80 - 120
			Total Magnesium (Mg)	2023/08/03		101	%	80 - 120
			Total Manganese (Mn)	2023/08/03		105	%	80 - 120
			Total Potassium (K)	2023/08/03		97	%	80 - 120
			Total Sodium (Na)	2023/08/03		102	%	80 - 120
			Total Strontium (Sr)	2023/08/03		98	%	80 - 120
			Total Sulphur (S)	2023/08/03		95	%	80 - 120
			Total Phosphorus (P)	2023/08/03		100	%	80 - 120
			Total Barium (Ba)	2023/08/03		101	%	80 - 120
			Total Silicon (Si)	2023/08/03		95	%	80 - 120
			Total Boron (B)	2023/08/03		99	%	80 - 120
			Total Calcium (Ca)	2023/08/03		101	%	80 - 120
B057551	KKC	LCS	Dissolved Iron (Fe)	2023/08/02		100	%	80 - 120
			Dissolved Lithium (Li)	2023/08/02		105	%	80 - 120
			Dissolved Magnesium (Mg)	2023/08/02		105	%	80 - 120
			Dissolved Manganese (Mn)	2023/08/02		104	%	80 - 120
			Dissolved Potassium (K)	2023/08/02		107	%	80 - 120
			Dissolved Sodium (Na)	2023/08/02		103	%	80 - 120
			Dissolved Strontium (Sr)	2023/08/02		96	%	80 - 120
			Dissolved Sulphur (S)	2023/08/02		98	%	80 - 120
			Dissolved Phosphorus (P)	2023/08/02		98	%	80 - 120
			Dissolved Barium (Ba)	2023/08/02		99	%	80 - 120
			Dissolved Silicon (Si)	2023/08/02		95	%	80 - 120
			Dissolved Boron (B)	2023/08/02		98	%	80 - 120
			Dissolved Calcium (Ca)	2023/08/02		104	%	80 - 120
B057560	KKM	LCS	Dissolved Mercury (Hg)	2023/08/02		101	%	80 - 120
B058456	CTU	LCS	Total Nitrogen (N)	2023/08/03		103	%	80 - 120
B058602	KKM	LCS	Dissolved Mercury (Hg)	2023/08/03		101	%	80 - 120
B058636	KKM	LCS	Total Mercury (Hg)	2023/08/03		103	%	80 - 120
B058694	ISW	LCS	Total Ammonia (N)	2023/08/03		103	%	80 - 120
B058699	ISW	LCS	Total Ammonia (N)	2023/08/03		101	%	80 - 120
B061414	SJ1	LCS	D10-ANTHRACENE (sur.)	2023/08/10		89	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/10		80	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/10		86	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/10		77	%	50 - 130
			C1-Naphthalene	2023/08/10		71	%	50 - 130

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			C3-Naphthalene	2023/08/10		94	%	50 - 130
			C2-Naphthalene	2023/08/10		88	%	50 - 130
			C1-biphenyl	2023/08/10		85	%	50 - 130
			C1 phenanthrene/anthracene	2023/08/10		102	%	50 - 130
			C2 phenanthrene/anthracene	2023/08/10		104	%	50 - 130
			C1 fluoranthene/pyrene	2023/08/10		103	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/08/10		48	%	30 - 130
B064719	YHK	LCS	Dissolved Organic Carbon (C)	2023/08/09		99	%	80 - 120
B058456	CTU	SRM	Total Nitrogen (N)	2023/08/03		105	%	80 - 120

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.

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

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

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

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

NC (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).

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Bureau Veritas Job #: C357848
Report Date: 2023/08/11

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

VALIDATION SIGNATURE PAGE

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

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Rahul Suryawanshi, Senior Analyst

Sandy Yuan, M.Sc., QP, Scientific Specialist

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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Automated Statchk

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 {0}, {1} responsible for {2} {3} laboratory operations.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam
A Bureau Veritas Group Company

☒ Calgary
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Toll Free: (800) 386-7247

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 298655

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: Alex Haugh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C-3E7
Email: alex.haugh@advisian.com
Ph: 587-897-6249
Sampler Name (Print): Alex Haugh / Stacy Gibb

REPORT INFORMATION

Company Name: Advisian
Contact Name: Alex Haugh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C-3E7
Email: alex.haugh@advisian.com
Ph: 587 897-6249
Consultant Project #: 417085-49223-23200

ANALYSIS REQUESTED

FIELD SAMPLE ID	MATRIX: GROUND WATER	MATRIX: SURFACE WATER	MATRIX: SOIL	MATRIX: OTHER	# CONTAINERS	SAMPLING DATE (YYYY/MM/DD)	SAMPLING TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-2 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOTAL ☒ DISSOLVED ☐	MERCURY TOTAL ☒ DISSOLVED ☐	SALINITY SOIL	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY	pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	True color, TSS, TDS, Turbidity	Oil & grease	Tot. DOC	Orthophosphate	Sulphate, total & dissolved	COD	Nitrate, Nitrite, Ammonia (Total) TKN	limited sample
1 AEMP-DS-06		X			16	2023/07/24	12:15	X			X		X						X	X								X	X	X	X	X	X	X	X
2 AEMP-DS-01		X			17	2023/07/26	11:45	X			X		X						X	X								X	X	X	X	X	X	X	X
3 AEMP-DS-02		X			18	2023/07/25	11:15	X			X		X						X	X								X	X	X	X	X	X	X	
4																																				
5																																				
6																																				
7																																				
8																																				
9																																				
10																																				

IOL SITE LOCATION: Norman Wells, NT
IOL PROJECT # (if applicable): NA
MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-49223-23200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) FWAL ☐ Other

SPECIAL INSTRUCTIONS: email: canada.chemistry@worley.com, cacal.10R.datatrack@worley.com, stacy.gibb@worley.com
IES A26 01436

JARS USED & NOT SUBMITTED (Enter N/A for Water): NA

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID #			
SEAL PRESENT	✓		TEMP °C	2	1	2
SEAL INTACT	✓					
COOLING MEDIA PRESENT	✓					

	YES	NO	COOLER ID #	1	2	3
SEAL PRESENT			TEMP °C			
SEAL INTACT						
COOLING MEDIA PRESENT						

	YES	NO	COOLER ID #	1	2	3
SEAL PRESENT			TEMP °C			
SEAL INTACT						
COOLING MEDIA PRESENT						

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1.	STACY GIBB	2023/07/27	10:05	1.	JOSH KINGSBURY	2023/07/28	1520
2.				2.			
3.				3.			

LAB USE ONLY
MAXXAM JOB # C357848
SAMPLES
LABELED BY: NKS
VERIFIED BY: Stacy

COC-1010 (06/2016) IOL-AB
White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-08-18
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C365209	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☒ **Yes** ☐ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☒ **Yes** ☐ **No**

If yes, FLAG type and comments: Extra bottles received. No impact on data quality

Date samples submitted 2023-07-22

Due date for lab report on SRC 2023-08-29

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☒ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☒ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☒ **No**	Turbidity, orthophosphate, true colour, nitrite
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☒ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☐ **Yes** ☒ **No** ☐ **N/A**	PAH Surrogate RPD outside limits – data is acceptable
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☒ **No** ☐ **N/A**	PAH Surrogate; Antimony RPD outside limits – data is acceptable

Data check completed by Alex Haigh **Date** 2024-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	

Data check completed by Alex Haigh **Date** 2024-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Trip Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Equipment Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes	☐ No	☒ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field pH vs. Lab pH RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes	☐ No	☐ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☒ Yes ☐ No

Explain rationale for yes/no:

Request lab to recheck data? If so give details	☐ Yes	☒ No	☐ N/A	**Comments**

If Yes, Lab request to recheck must be approved by Project Manager Name: **Date**

Data check completed by Alex Haigh **Date** 2024-03-26

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223
Your C.O.C. #: 299433

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/29
Report #: R3387099
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C365209
Received: 2023/08/22, 15:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	3	AB SOP-00005	SM 24 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	3	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	3		Auto Calc
Cadmium - low level CCME - Dissolved	3		Auto Calc
Cadmium - low level CCME (Total)	3		Auto Calc
Chloride/Sulphate by Auto Colourimetry	3	AB SOP-00020	SM24-4500-Cl/SO4-E m
COD by Colorimeter	3	AB SOP-00016	SM 23 5220D m
True Colour	3	CAL SOP-00049	SM 24 2120 C m
Carbon (DOC) (1)	3	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	3	AB SOP-00005	SM 24 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	3	AB SOP-00037	CCME PHC-CWS m
Sulphide (as H2S)	3		Auto Calc
Hardness	3		Auto Calc
Mercury (Dissolved) by CV (3)	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	3	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	3	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (3)	3	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	3	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	3		Auto Calc
Ammonia-N (Total)	3	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate and Nitrite	3		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	3	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N)	3		Auto Calc
Oil and Grease (Gravimetric, n-Hexane)	3	AB SOP-00092	SM 23 5520B/5520F m
Target & Alkylated PAH in Water by GC/MS (4)	3	AB SOP-00037 CAL SOP-00250	EPA 8270e m
Benzo[a]pyrene Equivalency (5)	3		Auto Calc
Orthophosphate by Automated Analyzer (6)	3	AB SOP-00025	SM 24 4500-P A,F m
Total Sulphide	3	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	3	AB SOP-00065	SM 24 2540 C m
Total Kjeldahl Nitrogen (Total)	3	BBY WI-00033	Auto Calc

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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223
Your C.O.C. #: 299433

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/29
Report #: R3387099
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C365209
Received: 2023/08/22, 15:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Nitrogen (Total)	3	AB SOP-00093	SM 24 4500-N C m
Carbon (Total Organic) (7)	3	AB SOP-00087	MMCW 119 1996 m
Hydrocarbon by IR (Mineral oil & grease)	3	CAL SOP-00096	SM 23 5520C,F m
Total Suspended Solids (NFR)	3	AB SOP-00061	SM 24 2540 D m
Turbidity	3	CAL SOP-00081	SM 24 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) 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.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Alkylated PAH results are semiquantitative
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(6) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223
Your C.O.C. #: 299433

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/08/29
Report #: R3387099
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C365209
Received: 2023/08/22, 15:00

acceptable levels unless otherwise noted.
(7) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Namita Sahni
Customer Solutions Representative
29 Aug 2023 11:37:17

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614

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Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C365209
Report Date: 2023/08/29

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		BXI565	BXI566	BXI567		
Sampling Date		2023/08/18 13:30	2023/08/18 11:00	2023/08/18 09:30		
COC Number		299433	299433	299433		
	UNITS	**AEMP-US-04**	**AEMP-DS-02**	**AEMP-DS-04**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	B080931
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	<0.10	0.33	0.10	B080931
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.20	B080931
Volatiles						
Benzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B083037
Toluene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B083037
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B083037
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	0.00080	B083037
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B083037
Xylenes (Total)	mg/L	<0.00089	<0.00089	<0.00089	0.00089	B081030
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	0.10	B081030
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	0.10	B083037
Extraction Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	97	98	103		B080931
Instrument Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	107	108	105		B083037
4-Bromofluorobenzene (sur.)	%	100	98	102		B083037
D4-1,2-Dichloroethane (sur.)	%	94	92	94		B083037
RDL = Reportable Detection Limit						

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		BXI565			BXI565			BXI566		
Sampling Date		2023/08/18 13:30			2023/08/18 13:30			2023/08/18 11:00		
COC Number		299433			299433			299433		
	UNITS	**AEMP-US-04**	**RDL**	**QC Batch**	**AEMP-US-04 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-DS-02**	**RDL**	**QC Batch**
Calculated Parameters										
Nitrate (N)	mg/L	0.049	0.010	B086656				0.073	0.010	B086656
Nitrate (NO3)	mg/L	0.22	0.044	B080822				0.32	0.044	B080822
Nitrite (NO2)	mg/L	<0.033	0.033	B080822				<0.033	0.033	B080822
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.082	0.020	B079733				0.16	0.020	B079733
Nutrients										
Nitrite (N)	mg/L	<0.010	0.010	B085949				<0.010	0.010	B085949
Nitrate plus Nitrite (N)	mg/L	0.049	0.010	B085949				0.073	0.010	B085949
Total Nitrogen (N)	mg/L	0.13	0.020	B085453	0.13	0.020	B085453	0.23	0.020	B085453

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas ID		BXI567		
Sampling Date		2023/08/18 09:30		
COC Number		299433		
	UNITS	**AEMP-DS-04**	**RDL**	**QC Batch**
Calculated Parameters				
Nitrate (N)	mg/L	0.089	0.010	B086664
Nitrate (NO3)	mg/L	0.39	0.044	B080822
Nitrite (NO2)	mg/L	<0.033	0.033	B080822
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.22	0.020	B079733
Nutrients				
Nitrite (N)	mg/L	<0.010	0.010	B085949
Nitrate plus Nitrite (N)	mg/L	0.089	0.010	B085949
Total Nitrogen (N)	mg/L	0.31	0.020	B085453

RDL = Reportable Detection Limit

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		BXI565		BXI566	BXI567		
Sampling Date		2023/08/18 13:30		2023/08/18 11:00	2023/08/18 09:30		
COC Number		299433		299433	299433		
	UNITS	**AEMP-US-04**	**RDL**	**AEMP-DS-02**	**AEMP-DS-04**	**RDL**	**QC Batch**
Calculated Parameters							
Hardness (CaCO3)	mg/L	330	0.50	120	120	0.50	B081017
Ion Balance (% Difference)	%	3.7	N/A	5.8	8.1	N/A	B080812
Misc. Inorganics							
Conductivity	uS/cm	740	2.0	280	270	2.0	B086045
Total Dissolved Solids	mg/L	480	10	180	170	10	B082836
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	<1.0	<1.0	1.0	B086048
Alkalinity (Total as CaCO3)	mg/L	200	1.0	97	98	1.0	B086048
Bicarbonate (HCO3)	mg/L	240	1.0	120	120	1.0	B086048
Carbonate (CO3)	mg/L	<1.0	1.0	<1.0	<1.0	1.0	B086048
Hydroxide (OH)	mg/L	<1.0	1.0	<1.0	<1.0	1.0	B086048
Chloride (Cl)	mg/L	34	1.0	10	10	1.0	B086424
Sulphate (SO4)	mg/L	160	5.0	45	46	1.0	B086424
Elements							
Dissolved Calcium (Ca)	mg/L	81	0.30	33	32	0.30	B085363
Dissolved Iron (Fe)	mg/L	<0.060	0.060	<0.060	<0.060	0.060	B085363
Dissolved Magnesium (Mg)	mg/L	30	0.20	10	9.6	0.20	B085363
Dissolved Manganese (Mn)	mg/L	0.0062	0.0040	<0.0040	0.0040	0.0040	B085363
Dissolved Potassium (K)	mg/L	1.1	0.30	0.85	0.84	0.30	B085363
Dissolved Sodium (Na)	mg/L	27	0.50	8.1	7.6	0.50	B085363

RDL = Reportable Detection Limit
N/A = Not Applicable

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BXI565		BXI566	BXI567		
Sampling Date		2023/08/18 13:30		2023/08/18 11:00	2023/08/18 09:30		
COC Number		299433		299433	299433		
	UNITS	**AEMP-US-04**	**QC Batch**	**AEMP-DS-02**	**AEMP-DS-04**	**RDL**	**QC Batch**
Elements							
Total Cadmium (Cd)	mg/L	<0.000020	B080186	0.000089	0.000095	0.000020	B080186
Total Mercury (Hg)	ug/L	<0.0019	B084797	0.0044	0.0057	0.0019	B084797
Total Aluminum (Al)	mg/L	0.033	B084619	1.7	1.9	0.0030	B084343
Total Antimony (Sb)	mg/L	<0.00060	B084619	<0.00060	<0.00060	0.00060	B084343
Total Arsenic (As)	mg/L	<0.00020	B084619	0.0012	0.0014	0.00020	B084343
Total Barium (Ba)	mg/L	0.077	B084628	0.081	0.087	0.010	B084346
Total Beryllium (Be)	mg/L	<0.0010	B084619	<0.0010	<0.0010	0.0010	B084343
Total Boron (B)	mg/L	0.040	B084628	0.039	<0.020	0.020	B084346
Total Calcium (Ca)	mg/L	80	B084628	36	36	0.30	B084346
Total Chromium (Cr)	mg/L	<0.0010	B084619	0.0028	0.0031	0.0010	B084343
Total Cobalt (Co)	mg/L	<0.00030	B084619	0.00097	0.0011	0.00030	B084343
Total Copper (Cu)	mg/L	<0.0010	B084619	0.0030	0.0036	0.0010	B084343
Total Iron (Fe)	mg/L	0.068	B084628	2.1	2.4	0.060	B084346
Total Lead (Pb)	mg/L	<0.00020	B084619	0.0011	0.0014	0.00020	B084343
Total Lithium (Li)	mg/L	<0.020	B084628	<0.020	<0.020	0.020	B084346
Total Magnesium (Mg)	mg/L	29	B084628	11	11	0.20	B084346
Total Manganese (Mn)	mg/L	0.0081	B084628	0.042	0.051	0.0040	B084346
Total Molybdenum (Mo)	mg/L	0.0021	B084619	0.0012	0.0012	0.00020	B084343
Total Nickel (Ni)	mg/L	0.00072	B084619	0.0042	0.0047	0.00050	B084343
Total Phosphorus (P)	mg/L	<0.10	B084628	<0.10	<0.10	0.10	B084346
Total Potassium (K)	mg/L	1.1	B084628	1.5	1.5	0.30	B084346
Total Selenium (Se)	mg/L	0.00025	B084619	0.00042	0.00045	0.00020	B084343
Total Silicon (Si)	mg/L	2.3	B084628	6.7	5.6	0.50	B084346
Total Silver (Ag)	mg/L	<0.00010	B084619	<0.00010	<0.00010	0.00010	B084343
Total Sodium (Na)	mg/L	27	B084628	8.4	8.0	0.50	B084346
Total Strontium (Sr)	mg/L	1.4	B084628	0.24	0.23	0.020	B084346
Total Sulphur (S)	mg/L	52	B084628	14	13	0.20	B084346
Total Thallium (Tl)	mg/L	<0.00020	B084619	<0.00020	<0.00020	0.00020	B084343
Total Tin (Sn)	mg/L	<0.0010	B084619	<0.0010	<0.0010	0.0010	B084343
Total Titanium (Ti)	mg/L	<0.0010	B084619	0.051	0.056	0.0010	B084343
Total Uranium (U)	mg/L	0.0012	B084619	0.00084	0.00090	0.00010	B084343
RDL = Reportable Detection Limit							

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Bureau Veritas Job #: C365209
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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BXI565		BXI566	BXI567		
Sampling Date		2023/08/18 13:30		2023/08/18 11:00	2023/08/18 09:30		
COC Number		299433		299433	299433		
	UNITS	**AEMP-US-04**	**QC Batch**	**AEMP-DS-02**	**AEMP-DS-04**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	<0.0010	B084619	0.0053	0.0059	0.0010	B084343
Total Zinc (Zn)	mg/L	<0.0030	B084619	0.012	0.013	0.0030	B084343
RDL = Reportable Detection Limit							

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RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BXI565	BXI566	BXI567		
Sampling Date		2023/08/18 13:30	2023/08/18 11:00	2023/08/18 09:30		
COC Number		299433	299433	299433		
	UNITS	**AEMP-US-04**	**AEMP-DS-02**	**AEMP-DS-04**	**RDL**	**QC Batch**
Calculated Parameters						
Sulphide (as H2S)	mg/L	<0.0020	<0.0020	<0.0020	0.0020	B080579
Demand Parameters						
Chemical Oxygen Demand	mg/L	11	20	22	10	B085465
Elements						
Dissolved Cadmium (Cd)	mg/L	<0.000020	<0.000020	<0.000020	0.000020	B080802
Misc. Inorganics						
Dissolved Organic Carbon (C)	mg/L	2.3	3.2	3.7	0.50	B086584
Total Organic Carbon (C)	mg/L	2.1	3.1	4.0	0.50	B086421
Total Suspended Solids	mg/L	1.3	52	90	1.0	B084342
Anions						
Total Sulphide	mg/L	<0.0018	<0.0018	<0.0018	0.0018	B083546
Nutrients						
Total Ammonia (N)	mg/L	<0.015	<0.015	<0.015	0.015	B085542
Orthophosphate (P)	mg/L	<0.0030	<0.0030	<0.0030	0.0030	B085900
Misc. Organics						
Total Oil and grease	mg/L	<2.0	<2.0	<2.0	2.0	B085917
Total Petroleum Hydrocarbon	mg/L	<2.0	<2.0	<2.0	2.0	B086402
Physical Properties						
True Colour	PtCo units	5.6	7.9	7.5	2.0	B086143
Physical Properties						
Turbidity	NTU	0.58	53	63	0.10	B081701
RDL = Reportable Detection Limit						

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SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BXI565	BXI566	BXI567		
Sampling Date		2023/08/18 13:30	2023/08/18 11:00	2023/08/18 09:30		
COC Number		299433	299433	299433		
	UNITS	**AEMP-US-04**	**AEMP-DS-02**	**AEMP-DS-04**	**RDL**	**QC Batch**
Polycyclic Aromatics						
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B080682
Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B080928
Acenaphthylene	ug/L	<0.10	<0.10	<0.10	0.10	B080928
Acridine	ug/L	<0.040	<0.040	<0.040	0.040	B080928
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	B080928
Benzo(a)anthracene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B080928
Benzo(b&j)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B080928
Benzo(k)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B080928
Benzo(g,h,i)perylene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B080928
Benzo(c)phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
Benzo(a)pyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B080928
Benzo(e)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
Chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B080928
Dibenz(a,h)anthracene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B080928
Fluoranthene	ug/L	<0.010	<0.010	<0.010	0.010	B080928
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B080928
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B080928
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B080928
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B080928
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
Perylene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B080928
Quinoline	ug/L	<0.20	<0.20	<0.20	0.20	B080928
Retene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
C1-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B080928
C3-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B080928
C4-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B080928
C2-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B080928
Biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B080928
C1-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B080928
RDL = Reportable Detection Limit						

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Project #: 417085-49223

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BXI565	BXI566	BXI567		
Sampling Date		2023/08/18 13:30	2023/08/18 11:00	2023/08/18 09:30		
COC Number		299433	299433	299433		
	UNITS	**AEMP-US-04**	**AEMP-DS-02**	**AEMP-DS-04**	**RDL**	**QC Batch**
C2-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B080928
C1-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
C2-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
C3-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
Dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B080928
C1-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B080928
C2-dibenzothiophene	ug/L	<0.020	<0.020	0.024	0.020	B080928
C3-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B080928
C4-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B080928
C1 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
C2 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
C3 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
C4 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B080928
C1 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B080928
C2 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B080928
C3 fluoranthene/pyrene	ug/L	<0.020	<0.020	0.036	0.020	B080928
C4 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B080928
C1 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B080928
C2 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	0.047	0.0085	B080928
C3 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B080928
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B080928
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B080928
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B080928
C1-Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B080928
1-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B080928
Extraction Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	98	99	101		B080928
D8-ACENAPHTHYLENE (sur.)	%	90	99	90		B080928
D8-NAPHTHALENE (sur.)	%	65	84	71		B080928
TERPHENYL-D14 (sur.)	%	128	131 (1)	124		B080928

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

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Bureau Veritas Job #: C365209
Report Date: 2023/08/29

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		BXI565	BXI566	BXI567		
Sampling Date		2023/08/18 13:30	2023/08/18 11:00	2023/08/18 09:30		
COC Number		299433	299433	299433		
	UNITS	**AEMP-US-04**	**AEMP-DS-02**	**AEMP-DS-04**	**RDL**	**QC Batch**
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	B083672
RDL = Reportable Detection Limit						

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BXI565		BXI566	BXI567		
Sampling Date		2023/08/18 13:30		2023/08/18 11:00	2023/08/18 09:30		
COC Number		299433		299433	299433		
	UNITS	**AEMP-US-04**	**QC Batch**	**AEMP-DS-02**	**AEMP-DS-04**	**RDL**	**QC Batch**
Elements							
Dissolved Aluminum (Al)	mg/L	0.0053	B083828	0.021	0.022	0.0030	B083820
Dissolved Antimony (Sb)	mg/L	<0.00060	B083828	<0.00060	<0.00060	0.00060	B083820
Dissolved Arsenic (As)	mg/L	<0.00020	B083828	0.00034	0.00034	0.00020	B083820
Dissolved Beryllium (Be)	mg/L	<0.0010	B083828	<0.0010	<0.0010	0.0010	B083820
Dissolved Chromium (Cr)	mg/L	<0.0010	B083828	<0.0010	<0.0010	0.0010	B083820
Dissolved Cobalt (Co)	mg/L	<0.00030	B083828	<0.00030	<0.00030	0.00030	B083820
Dissolved Copper (Cu)	mg/L	0.0016	B083828	0.0016	<0.0010	0.0010	B083820
Dissolved Lead (Pb)	mg/L	<0.00020	B083828	<0.00020	<0.00020	0.00020	B083820
Dissolved Molybdenum (Mo)	mg/L	0.0017	B083828	0.0011	0.00086	0.00020	B083820
Dissolved Nickel (Ni)	mg/L	0.00070	B083828	0.00099	0.00083	0.00050	B083820
Dissolved Selenium (Se)	mg/L	<0.00020	B083828	0.00029	0.00034	0.00020	B083820
Dissolved Silver (Ag)	mg/L	<0.00010	B083828	<0.00010	<0.00010	0.00010	B083820
Dissolved Thallium (Tl)	mg/L	<0.00020	B083828	<0.00020	<0.00020	0.00020	B083820
Dissolved Tin (Sn)	mg/L	<0.0010	B083828	<0.0010	<0.0010	0.0010	B083820
Dissolved Titanium (Ti)	mg/L	<0.0010	B083828	<0.0010	<0.0010	0.0010	B083820
Dissolved Uranium (U)	mg/L	0.0010	B083828	0.00063	0.00066	0.00010	B083820
Dissolved Vanadium (V)	mg/L	<0.0010	B083828	<0.0010	<0.0010	0.0010	B083820
Dissolved Zinc (Zn)	mg/L	<0.0030	B083828	<0.0030	<0.0030	0.0030	B083820
RDL = Reportable Detection Limit							

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Bureau Veritas Job #: C365209
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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

TEST SUMMARY

Bureau Veritas ID: BXI565
Sample ID: AEMP-US-04
Matrix: Water

Collected: 2023/08/18
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B086048	N/A	2023/08/27	Karen Graham
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B083037	N/A	2023/08/27	Rahul Suryawanshi
F1-BTEX	CALC/MS	B081030	N/A	2023/08/27	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B080802	N/A	2023/08/25	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B080186	N/A	2023/08/25	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B086424	N/A	2023/08/28	Marjolen Busslinger
COD by Colorimeter	M/PROB	B085465	N/A	2023/08/26	Ly Vu
True Colour	SPEC/COL	B086143	N/A	2023/08/27	Shanna McKort
Carbon (DOC)	TECH	B086584	N/A	2023/08/28	Ye Hyun KIM
Conductivity @25C	COND	B086045	N/A	2023/08/27	Karen Graham
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B080931	2023/08/26	2023/08/26	Bryanna Quach
Sulphide (as H2S)	CALC	B080579	N/A	2023/08/24	Automated Statchk
Hardness	CALC	B081017	N/A	2023/08/26	Automated Statchk
Mercury (Dissolved) by CV	CV	B083672	2023/08/24	2023/08/24	Kiran Kumari
Mercury (Total) by CV	CV	B084797	2023/08/25	2023/08/25	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B085363	N/A	2023/08/25	Mohammad Pousti
Elements by ICP - Total	ICPA	B084628	2023/08/25	2023/08/25	Kristijan Kovac
Elements by ICPMS - Dissolved	ICPM	B083828	N/A	2023/08/25	Mandeep Kaur
Elements by ICPMS - Total	ICPM	B084619	2023/08/25	2023/08/25	Kevin Huang
Ion Balance	CALC	B080812	N/A	2023/08/28	Automated Statchk
Ammonia-N (Total)	KONE	B085542	N/A	2023/08/26	Isabelle White
Nitrate and Nitrite	CALC	B080822	N/A	2023/08/28	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B085949	N/A	2023/08/27	Isabelle White
Nitrate (as N)	CALC	B086656	2023/08/28	2023/08/28	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B085917	2023/08/28	2023/08/28	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B080928	2023/08/26	2023/08/27	Shuang (Jessica) Chen
Benzo[a]pyrene Equivalency	GC/MSD	B080682	N/A	2023/08/28	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B085900	N/A	2023/08/26	Mary Anne Dela Cruz
Total Sulphide	SPEC	B083546	N/A	2023/08/24	Bailey Morrison
Total Dissolved Solids (Filt. Residue)	BAL	B082836	2023/08/24	2023/08/25	Daryl Viktoria Naval
Total Kjeldahl Nitrogen (Total)	CALC	B079733	N/A	2023/08/28	Automated Statchk
Nitrogen (Total)	AC/COL	B085453	2023/08/26	2023/08/26	Yan Lin
Carbon (Total Organic)	TECH	B086421	N/A	2023/08/28	Ye Hyun KIM
Hydrocarbon by IR (Mineral oil & grease)	IR	B086402	2023/08/28	2023/08/28	Abu Dani Alex
Total Suspended Solids (NFR)	BAL	B084342	2023/08/25	2023/08/26	Ashhel Zia
Turbidity	TURB	B081701	N/A	2023/08/23	Amy Phan

Bureau Veritas ID: BXI565 Dup
Sample ID: AEMP-US-04
Matrix: Water

Collected: 2023/08/18
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrogen (Total)	AC/COL	B085453	2023/08/26	2023/08/26	Yan Lin

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Bureau Veritas Job #: C365209
Report Date: 2023/08/29

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

TEST SUMMARY

Bureau Veritas ID: BXI566
Sample ID: AEMP-DS-02
Matrix: Water

Collected: 2023/08/18
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B086048	N/A	2023/08/27	Karen Graham
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B083037	N/A	2023/08/27	Rahul Suryawanshi
F1-BTEX	CALC/MS	B081030	N/A	2023/08/27	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B080802	N/A	2023/08/26	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B080186	N/A	2023/08/25	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B086424	N/A	2023/08/28	Marjolen Busslinger
COD by Colorimeter	M/PROB	B085465	N/A	2023/08/26	Ly Vu
True Colour	SPEC/COL	B086143	N/A	2023/08/27	Shanna McKort
Carbon (DOC)	TECH	B086584	N/A	2023/08/28	Ye Hyun KIM
Conductivity @25C	COND	B086045	N/A	2023/08/27	Karen Graham
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B080931	2023/08/26	2023/08/26	Bryanna Quach
Sulphide (as H2S)	CALC	B080579	N/A	2023/08/24	Automated Statchk
Hardness	CALC	B081017	N/A	2023/08/26	Automated Statchk
Mercury (Dissolved) by CV	CV	B083672	2023/08/24	2023/08/24	Kiran Kumari
Mercury (Total) by CV	CV	B084797	2023/08/25	2023/08/25	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B085363	N/A	2023/08/25	Mohammad Pousti
Elements by ICP - Total	ICPA	B084346	2023/08/25	2023/08/25	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	B083820	N/A	2023/08/25	Jason Bao
Elements by ICPMS - Total	ICPM	B084343	2023/08/25	2023/08/25	Mandeep Kaur
Ion Balance	CALC	B080812	N/A	2023/08/28	Automated Statchk
Ammonia-N (Total)	KONE	B085542	N/A	2023/08/26	Isabelle White
Nitrate and Nitrite	CALC	B080822	N/A	2023/08/28	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B085949	N/A	2023/08/27	Isabelle White
Nitrate (as N)	CALC	B086656	2023/08/28	2023/08/28	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B085917	2023/08/28	2023/08/28	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B080928	2023/08/26	2023/08/27	Shuang (Jessica) Chen
Benzo[a]pyrene Equivalency	GC/MSD	B080682	N/A	2023/08/28	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B085900	N/A	2023/08/26	Mary Anne Dela Cruz
Total Sulphide	SPEC	B083546	N/A	2023/08/24	Bailey Morrison
Total Dissolved Solids (Filt. Residue)	BAL	B082836	2023/08/24	2023/08/25	Daryl Viktoria Naval
Total Kjeldahl Nitrogen (Total)	CALC	B079733	N/A	2023/08/28	Automated Statchk
Nitrogen (Total)	AC/COL	B085453	2023/08/26	2023/08/26	Yan Lin
Carbon (Total Organic)	TECH	B086421	N/A	2023/08/28	Ye Hyun KIM
Hydrocarbon by IR (Mineral oil & grease)	IR	B086402	2023/08/28	2023/08/28	Abu Dani Alex
Total Suspended Solids (NFR)	BAL	B084342	2023/08/25	2023/08/26	Ashhel Zia
Turbidity	TURB	B081701	N/A	2023/08/23	Amy Phan

Bureau Veritas ID: BXI567
Sample ID: AEMP-DS-04
Matrix: Water

Collected: 2023/08/18
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B086048	N/A	2023/08/27	Karen Graham
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B083037	N/A	2023/08/27	Rahul Suryawanshi

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Bureau Veritas Job #: C365209
Report Date: 2023/08/29

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

TEST SUMMARY

Bureau Veritas ID: BXI567
Sample ID: AEMP-DS-04
Matrix: Water

Collected: 2023/08/18
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
F1-BTEX	CALC/MS	B081030	N/A	2023/08/27	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B080802	N/A	2023/08/26	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B080186	N/A	2023/08/25	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B086424	N/A	2023/08/28	Marjolen Busslinger
COD by Colorimeter	M/PROB	B085465	N/A	2023/08/26	Ly Vu
True Colour	SPEC/COL	B086143	N/A	2023/08/27	Shanna McKort
Carbon (DOC)	TECH	B086584	N/A	2023/08/28	Ye Hyun KIM
Conductivity @25C	COND	B086045	N/A	2023/08/27	Karen Graham
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B080931	2023/08/26	2023/08/27	Bryanna Quach
Sulphide (as H2S)	CALC	B080579	N/A	2023/08/24	Automated Statchk
Hardness	CALC	B081017	N/A	2023/08/26	Automated Statchk
Mercury (Dissolved) by CV	CV	B083672	2023/08/24	2023/08/24	Kiran Kumari
Mercury (Total) by CV	CV	B084797	2023/08/25	2023/08/25	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B085363	N/A	2023/08/25	Mohammad Pousti
Elements by ICP - Total	ICPA	B084346	2023/08/25	2023/08/25	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	B083820	N/A	2023/08/25	Jason Bao
Elements by ICPMS - Total	ICPM	B084343	2023/08/25	2023/08/25	Mandeep Kaur
Ion Balance	CALC	B080812	N/A	2023/08/28	Automated Statchk
Ammonia-N (Total)	KONE	B085542	N/A	2023/08/26	Isabelle White
Nitrate and Nitrite	CALC	B080822	N/A	2023/08/28	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B085949	N/A	2023/08/27	Isabelle White
Nitrate (as N)	CALC	B086664	2023/08/28	2023/08/28	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B085917	2023/08/28	2023/08/28	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B080928	2023/08/26	2023/08/27	Shuang (Jessica) Chen
Benzo[a]pyrene Equivalency	GC/MSD	B080682	N/A	2023/08/28	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B085900	N/A	2023/08/26	Mary Anne Dela Cruz
Total Sulphide	SPEC	B083546	N/A	2023/08/24	Bailey Morrison
Total Dissolved Solids (Filt. Residue)	BAL	B082836	2023/08/24	2023/08/25	Daryl Viktoria Naval
Total Kjeldahl Nitrogen (Total)	CALC	B079733	N/A	2023/08/28	Automated Statchk
Nitrogen (Total)	AC/COL	B085453	2023/08/26	2023/08/26	Yan Lin
Carbon (Total Organic)	TECH	B086421	N/A	2023/08/28	Ye Hyun KIM
Hydrocarbon by IR (Mineral oil & grease)	IR	B086402	2023/08/28	2023/08/28	Abu Dani Alex
Total Suspended Solids (NFR)	BAL	B084342	2023/08/25	2023/08/26	Ashhel Zia
Turbidity	TURB	B081701	N/A	2023/08/23	Amy Phan

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GENERAL COMMENTS

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

Package 1	7.7°C

Sample BXI565 [AEMP-US-04] : Sample was analyzed past method specified hold time for Turbidity. 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 Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

Sample BXI566 [AEMP-DS-02] : Sample was analyzed past method specified hold time for Turbidity. 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 Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

Sample BXI567 [AEMP-DS-04] : Sample was analyzed past method specified hold time for Turbidity. 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 Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

RESULTS OF CHEMICAL ANALYSES OF WATER Comments

Sample BXI565 [AEMP-US-04] Hydrocarbon by IR (Mineral oil & grease): Sample required decanting due to sample being shared between two test codes
Sample BXI566 [AEMP-DS-02] Hydrocarbon by IR (Mineral oil & grease): Sample required decanting due to sample being shared between two test codes
Sample BXI567 [AEMP-DS-04] Hydrocarbon by IR (Mineral oil & grease): Sample required decanting due to sample being shared between two test codes

Results relate only to the items tested.

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B080928	JC7	Method Blank	D10-ANTHRACENE (sur.)	2023/08/26		102	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/26		127	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/26		83	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/26		55	%	50 - 130
			Acenaphthene	2023/08/26	<0.10		ug/L	
			Acenaphthylene	2023/08/26	<0.10		ug/L	
			Acridine	2023/08/26	<0.040		ug/L	
			Anthracene	2023/08/26	<0.010		ug/L	
			Benzo(a)anthracene	2023/08/26	<0.0085		ug/L	
			Benzo(b&j)fluoranthene	2023/08/26	<0.0085		ug/L	
			Benzo(k)fluoranthene	2023/08/26	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2023/08/26	<0.0085		ug/L	
			Benzo(c)phenanthrene	2023/08/26	<0.050		ug/L	
			Benzo(a)pyrene	2023/08/26	<0.0075		ug/L	
			Benzo(e)pyrene	2023/08/26	<0.050		ug/L	
			Chrysene	2023/08/26	<0.0085		ug/L	
			Dibenz(a,h)anthracene	2023/08/26	<0.0075		ug/L	
			Fluoranthene	2023/08/26	<0.010		ug/L	
			Fluorene	2023/08/26	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2023/08/26	<0.0085		ug/L	
			Indeno(1,2,3-cd)fluoranthene	2023/08/26	<0.0085		ug/L	
			2-Methylnaphthalene	2023/08/26	<0.10		ug/L	
			Naphthalene	2023/08/26	<0.10		ug/L	
			Phenanthrene	2023/08/26	<0.050		ug/L	
			Perylene	2023/08/26	<0.050		ug/L	
			Pyrene	2023/08/26	<0.020		ug/L	
			Quinoline	2023/08/26	<0.20		ug/L	
			Retene	2023/08/26	<0.050		ug/L	
			C1-Naphthalene	2023/08/26	<0.10		ug/L	
			C3-Naphthalene	2023/08/26	<0.10		ug/L	
			C4-Naphthalene	2023/08/26	<0.10		ug/L	
			C2-Naphthalene	2023/08/26	<0.10		ug/L	
			Biphenyl	2023/08/26	<0.020		ug/L	
			C1-biphenyl	2023/08/26	<0.020		ug/L	
			C2-biphenyl	2023/08/26	<0.020		ug/L	
			C1-fluorene	2023/08/26	<0.050		ug/L	
			C2-fluorene	2023/08/26	<0.050		ug/L	
			C3-fluorene	2023/08/26	<0.050		ug/L	
			Dibenzothiophene	2023/08/26	<0.020		ug/L	
			C1-dibenzothiophene	2023/08/26	<0.020		ug/L	
			C2-dibenzothiophene	2023/08/26	<0.020		ug/L	
			C3-dibenzothiophene	2023/08/26	<0.020		ug/L	
			C4-dibenzothiophene	2023/08/26	<0.020		ug/L	
			C1 phenanthrene/anthracene	2023/08/26	<0.050		ug/L	
			C2 phenanthrene/anthracene	2023/08/26	<0.050		ug/L	
			C3 phenanthrene/anthracene	2023/08/26	<0.050		ug/L	
			C4 phenanthrene/anthracene	2023/08/26	<0.050		ug/L	
			C1 fluoranthene/pyrene	2023/08/26	<0.020		ug/L	
			C2 fluoranthene/pyrene	2023/08/26	<0.020		ug/L	
			C3 fluoranthene/pyrene	2023/08/26	<0.020		ug/L	
			C4 fluoranthene/pyrene	2023/08/26	<0.020		ug/L	
			C1 benzo(a)anthracene/chrysene	2023/08/26	<0.0085		ug/L	

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Report Date: 2023/08/29

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			C2 benzo(a)anthracene/chrysene	2023/08/26	<0.0085		ug/L	
			C3 benzo(a)anthracene/chrysene	2023/08/26	<0.0085		ug/L	
			C4 benzo(a)anthracene/chrysene	2023/08/26	<0.0085		ug/L	
			C1benzobjkfluoranthene/benzoapyrene	2023/08/26	<0.0075		ug/L	
			C2benzobjkfluoranthene/benzoapyrene	2023/08/26	<0.0075		ug/L	
			C1-Acenaphthene	2023/08/26	<0.10		ug/L	
			1-Methylnaphthalene	2023/08/26	<0.10		ug/L	
B080931	BQU	Method Blank	O-TERPHENYL (sur.)	2023/08/27		94	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/27	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2023/08/27	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2023/08/27	<0.20		mg/L	
B081701	AP1	Method Blank	Turbidity	2023/08/23	<0.10		NTU	
B082836	DVN	Method Blank	Total Dissolved Solids	2023/08/25	<10		mg/L	
B083037	RSU	Method Blank	1,4-Difluorobenzene (sur.)	2023/08/27		106	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/27		98	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/27		95	%	50 - 140
			Benzene	2023/08/27	<0.00040		mg/L	
			Toluene	2023/08/27	<0.00040		mg/L	
			Ethylbenzene	2023/08/27	<0.00040		mg/L	
			m & p-Xylene	2023/08/27	<0.00080		mg/L	
			o-Xylene	2023/08/27	<0.00040		mg/L	
			F1 (C6-C10)	2023/08/27	<0.10		mg/L	
B083546	BYM	Method Blank	Total Sulphide	2023/08/24	<0.0018		mg/L	
B083672	KKM	Method Blank	Dissolved Mercury (Hg)	2023/08/24	<0.0019		ug/L	
B083820	JAB	Method Blank	Dissolved Aluminum (Al)	2023/08/25	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/08/25	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/08/25	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/08/25	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/08/25	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/08/25	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/08/25	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/08/25	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/08/25	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/08/25	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/08/25	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/08/25	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/08/25	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/08/25	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/08/25	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/08/25	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/08/25	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/08/25	<0.0010		mg/L	
B083828	MKJ	Method Blank	Dissolved Aluminum (Al)	2023/08/25	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/08/25	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/08/25	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/08/25	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/08/25	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/08/25	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/08/25	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/08/25	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/08/25	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/08/25	<0.00010		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Arsenic (As)	2023/08/25	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/08/25	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/08/25	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/08/25	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/08/25	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/08/25	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/08/25	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/08/25	<0.0010		mg/L	
B084342	AZI	Method Blank	Total Suspended Solids	2023/08/26	<1.0		mg/L	
B084343	MKJ	Method Blank	Total Aluminum (Al)	2023/08/25	<0.0030		mg/L	
			Total Chromium (Cr)	2023/08/25	<0.0010		mg/L	
			Total Cobalt (Co)	2023/08/25	<0.00030		mg/L	
			Total Copper (Cu)	2023/08/25	<0.0010		mg/L	
			Total Lead (Pb)	2023/08/25	<0.00020		mg/L	
			Total Antimony (Sb)	2023/08/25	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/08/25	<0.00020		mg/L	
			Total Nickel (Ni)	2023/08/25	<0.00050		mg/L	
			Total Selenium (Se)	2023/08/25	<0.00020		mg/L	
			Total Silver (Ag)	2023/08/25	<0.00010		mg/L	
			Total Arsenic (As)	2023/08/25	<0.00020		mg/L	
			Total Thallium (Tl)	2023/08/25	<0.00020		mg/L	
			Total Tin (Sn)	2023/08/25	<0.0010		mg/L	
			Total Titanium (Ti)	2023/08/25	<0.0010		mg/L	
			Total Uranium (U)	2023/08/25	<0.00010		mg/L	
			Total Vanadium (V)	2023/08/25	<0.0010		mg/L	
			Total Zinc (Zn)	2023/08/25	<0.0030		mg/L	
			Total Beryllium (Be)	2023/08/25	<0.0010		mg/L	
B084346	MPU	Method Blank	Total Iron (Fe)	2023/08/25	<0.060		mg/L	
			Total Lithium (Li)	2023/08/25	<0.020		mg/L	
			Total Magnesium (Mg)	2023/08/25	<0.20		mg/L	
			Total Manganese (Mn)	2023/08/25	<0.0040		mg/L	
			Total Potassium (K)	2023/08/25	<0.30		mg/L	
			Total Sodium (Na)	2023/08/25	<0.50		mg/L	
			Total Strontium (Sr)	2023/08/25	<0.020		mg/L	
			Total Sulphur (S)	2023/08/25	<0.20		mg/L	
			Total Phosphorus (P)	2023/08/25	<0.10		mg/L	
			Total Barium (Ba)	2023/08/25	<0.010		mg/L	
			Total Silicon (Si)	2023/08/25	<0.50		mg/L	
			Total Boron (B)	2023/08/25	<0.020		mg/L	
			Total Calcium (Ca)	2023/08/25	<0.30		mg/L	
B084619	KH2	Method Blank	Total Aluminum (Al)	2023/08/25	<0.0030		mg/L	
			Total Chromium (Cr)	2023/08/25	<0.0010		mg/L	
			Total Cobalt (Co)	2023/08/25	<0.00030		mg/L	
			Total Copper (Cu)	2023/08/25	<0.0010		mg/L	
			Total Lead (Pb)	2023/08/25	<0.00020		mg/L	
			Total Antimony (Sb)	2023/08/25	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/08/25	<0.00020		mg/L	
			Total Nickel (Ni)	2023/08/25	<0.00050		mg/L	
			Total Selenium (Se)	2023/08/25	<0.00020		mg/L	
			Total Silver (Ag)	2023/08/25	<0.00010		mg/L	
			Total Arsenic (As)	2023/08/25	<0.00020		mg/L	
			Total Thallium (Tl)	2023/08/25	<0.00020		mg/L	

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Bureau Veritas Job #: C365209
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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Tin (Sn)	2023/08/25	<0.0010		mg/L	
			Total Titanium (Ti)	2023/08/25	<0.0010		mg/L	
			Total Uranium (U)	2023/08/25	<0.00010		mg/L	
			Total Vanadium (V)	2023/08/25	<0.0010		mg/L	
			Total Zinc (Zn)	2023/08/25	<0.0030		mg/L	
			Total Beryllium (Be)	2023/08/25	<0.0010		mg/L	
B084628	KKC	Method Blank	Total Iron (Fe)	2023/08/25	<0.060		mg/L	
			Total Lithium (Li)	2023/08/25	<0.020		mg/L	
			Total Magnesium (Mg)	2023/08/25	<0.20		mg/L	
			Total Manganese (Mn)	2023/08/25	<0.0040		mg/L	
			Total Potassium (K)	2023/08/25	<0.30		mg/L	
			Total Sodium (Na)	2023/08/25	<0.50		mg/L	
			Total Strontium (Sr)	2023/08/25	<0.020		mg/L	
			Total Sulphur (S)	2023/08/25	<0.20		mg/L	
			Total Phosphorus (P)	2023/08/25	<0.10		mg/L	
			Total Barium (Ba)	2023/08/25	<0.010		mg/L	
			Total Silicon (Si)	2023/08/25	<0.50		mg/L	
			Total Boron (B)	2023/08/25	<0.020		mg/L	
			Total Calcium (Ca)	2023/08/25	<0.30		mg/L	
B084797	KKM	Method Blank	Total Mercury (Hg)	2023/08/25	<0.0019		ug/L	
B085363	MPU	Method Blank	Dissolved Iron (Fe)	2023/08/25	<0.060		mg/L	
			Dissolved Magnesium (Mg)	2023/08/25	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/08/25	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/08/25	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/08/25	<0.50		mg/L	
			Dissolved Calcium (Ca)	2023/08/25	<0.30		mg/L	
B085453	YL7	Method Blank	Total Nitrogen (N)	2023/08/26	<0.020		mg/L	
B085465	LYV	Method Blank	Chemical Oxygen Demand	2023/08/26	<10		mg/L	
B085542	ISW	Method Blank	Total Ammonia (N)	2023/08/26	<0.015		mg/L	
B085900	MAP	Method Blank	Orthophosphate (P)	2023/08/26	<0.0030		mg/L	
B085917	JB9	Method Blank	Total Oil and grease	2023/08/28	<2.0		mg/L	
B085949	ISW	Method Blank	Nitrite (N)	2023/08/27	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/08/27	<0.010		mg/L	
B086045	KGR	Method Blank	Conductivity	2023/08/27	<2.0		uS/cm	
B086048	KGR	Method Blank	Alkalinity (Total as CaCO3)	2023/08/27	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/08/27	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/08/27	<1.0		mg/L	
			Carbonate (CO3)	2023/08/27	<1.0		mg/L	
			Hydroxide (OH)	2023/08/27	<1.0		mg/L	
B086143	SKM	Method Blank	True Colour	2023/08/27	<2.0		PtCo units	
B086402	AAX	Method Blank	Total Petroleum Hydrocarbon	2023/08/28	<2.0		mg/L	
B086421	YHK	Method Blank	Total Organic Carbon (C)	2023/08/28	<0.50		mg/L	
B086424	MB5	Method Blank	Chloride (Cl)	2023/08/28	<1.0		mg/L	
			Sulphate (SO4)	2023/08/28	<1.0		mg/L	
B086584	YHK	Method Blank	Dissolved Organic Carbon (C)	2023/08/28	<0.50		mg/L	
B085453	YL7	RPD [BXI565-04]	Total Nitrogen (N)	2023/08/26	1.8		%	20
B084628	KKC	Matrix Spike [BXI565-06]	Total Iron (Fe)	2023/08/25		102	%	80 - 120
			Total Lithium (Li)	2023/08/25		98	%	80 - 120
			Total Magnesium (Mg)	2023/08/25		102	%	80 - 120
			Total Manganese (Mn)	2023/08/25		111	%	80 - 120
			Total Potassium (K)	2023/08/25		99	%	80 - 120
			Total Sodium (Na)	2023/08/25		102	%	80 - 120

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Task Order#: 417085-49223
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Site Location: Norman Wells, NWT
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Strontium (Sr)	2023/08/25		94	%	80 - 120
			Total Sulphur (S)	2023/08/25		NC	%	80 - 120
			Total Phosphorus (P)	2023/08/25		97	%	80 - 120
			Total Barium (Ba)	2023/08/25		95	%	80 - 120
			Total Silicon (Si)	2023/08/25		96	%	80 - 120
			Total Boron (B)	2023/08/25		95	%	80 - 120
			Total Calcium (Ca)	2023/08/25		NC	%	80 - 120
B085453	YL7	Matrix Spike [BXI565-04]	Total Nitrogen (N)	2023/08/26		107	%	80 - 120
B080928	JC7	LCS	D10-ANTHRACENE (sur.)	2023/08/26		120	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/26		150 (1)	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/26		102	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/26		75	%	50 - 130
			Acenaphthene	2023/08/26		89	%	50 - 130
			Acenaphthylene	2023/08/26		74	%	50 - 130
			Acridine	2023/08/26		97	%	50 - 130
			Anthracene	2023/08/26		102	%	50 - 130
			Benzo(a)anthracene	2023/08/26		119	%	50 - 130
			Benzo(b&j)fluoranthene	2023/08/26		119	%	50 - 130
			Benzo(k)fluoranthene	2023/08/26		96	%	50 - 130
			Benzo(g,h,i)perylene	2023/08/26		113	%	50 - 130
			Benzo(c)phenanthrene	2023/08/26		115	%	50 - 130
			Benzo(a)pyrene	2023/08/26		90	%	50 - 130
			Benzo(e)pyrene	2023/08/26		106	%	50 - 130
			Chrysene	2023/08/26		102	%	50 - 130
			Dibenz(a,h)anthracene	2023/08/26		124	%	50 - 130
			Fluoranthene	2023/08/26		123	%	50 - 130
			Fluorene	2023/08/26		85	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/08/26		113	%	50 - 130
			2-Methylnaphthalene	2023/08/26		70	%	50 - 130
			Naphthalene	2023/08/26		60	%	50 - 130
			Phenanthrene	2023/08/26		102	%	50 - 130
			Perylene	2023/08/26		96	%	50 - 130
			Pyrene	2023/08/26		110	%	50 - 130
			Quinoline	2023/08/26		73	%	50 - 130
			C1-Naphthalene	2023/08/26		50	%	50 - 130
			C3-Naphthalene	2023/08/26		76	%	50 - 130
			C2-Naphthalene	2023/08/26		55	%	50 - 130
			C1-biphenyl	2023/08/26		43 (1)	%	50 - 130
			C1 phenanthrene/anthracene	2023/08/26		123	%	50 - 130
			C2 phenanthrene/anthracene	2023/08/26		126	%	50 - 130
			C1 fluoranthene/pyrene	2023/08/26		131 (1)	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/08/26		101	%	30 - 130
			1-Methylnaphthalene	2023/08/26		50	%	50 - 130
B080931	BQU	LCS	O-TERPHENYL (sur.)	2023/08/26		109	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/26		103	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/08/26		97	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/08/26		90	%	60 - 140
B081701	AP1	LCS	Turbidity	2023/08/23		100	%	80 - 120
B082836	DVN	LCS	Total Dissolved Solids	2023/08/25		98	%	80 - 120
B083037	RSU	LCS	1,4-Difluorobenzene (sur.)	2023/08/27		91	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/27		98	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/27		88	%	50 - 140

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzene	2023/08/27		82	%	60 - 130
			Toluene	2023/08/27		79	%	60 - 130
			Ethylbenzene	2023/08/27		87	%	60 - 130
			m & p-Xylene	2023/08/27		85	%	60 - 130
			o-Xylene	2023/08/27		86	%	60 - 130
			F1 (C6-C10)	2023/08/27		102	%	60 - 140
B083546	BYM	LCS	Total Sulphide	2023/08/24		99	%	80 - 120
B083672	KKM	LCS	Dissolved Mercury (Hg)	2023/08/24		102	%	80 - 120
B083820	JAB	LCS	Dissolved Aluminum (Al)	2023/08/25		109	%	80 - 120
			Dissolved Chromium (Cr)	2023/08/25		92	%	80 - 120
			Dissolved Cobalt (Co)	2023/08/25		91	%	80 - 120
			Dissolved Copper (Cu)	2023/08/25		92	%	80 - 120
			Dissolved Lead (Pb)	2023/08/25		98	%	80 - 120
			Dissolved Antimony (Sb)	2023/08/25		101	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/08/25		101	%	80 - 120
			Dissolved Nickel (Ni)	2023/08/25		90	%	80 - 120
			Dissolved Selenium (Se)	2023/08/25		88	%	80 - 120
			Dissolved Silver (Ag)	2023/08/25		97	%	80 - 120
			Dissolved Arsenic (As)	2023/08/25		88	%	80 - 120
			Dissolved Thallium (Tl)	2023/08/25		95	%	80 - 120
			Dissolved Tin (Sn)	2023/08/25		98	%	80 - 120
			Dissolved Titanium (Ti)	2023/08/25		86	%	80 - 120
			Dissolved Uranium (U)	2023/08/25		94	%	80 - 120
			Dissolved Vanadium (V)	2023/08/25		94	%	80 - 120
			Dissolved Zinc (Zn)	2023/08/25		91	%	80 - 120
			Dissolved Beryllium (Be)	2023/08/25		92	%	80 - 120
B083828	MKJ	LCS	Dissolved Aluminum (Al)	2023/08/25		110	%	80 - 120
			Dissolved Chromium (Cr)	2023/08/25		98	%	80 - 120
			Dissolved Cobalt (Co)	2023/08/25		99	%	80 - 120
			Dissolved Copper (Cu)	2023/08/25		100	%	80 - 120
			Dissolved Lead (Pb)	2023/08/25		98	%	80 - 120
			Dissolved Antimony (Sb)	2023/08/25		104	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/08/25		101	%	80 - 120
			Dissolved Nickel (Ni)	2023/08/25		99	%	80 - 120
			Dissolved Selenium (Se)	2023/08/25		99	%	80 - 120
			Dissolved Silver (Ag)	2023/08/25		98	%	80 - 120
			Dissolved Arsenic (As)	2023/08/25		98	%	80 - 120
			Dissolved Thallium (Tl)	2023/08/25		99	%	80 - 120
			Dissolved Tin (Sn)	2023/08/25		101	%	80 - 120
			Dissolved Titanium (Ti)	2023/08/25		103	%	80 - 120
			Dissolved Uranium (U)	2023/08/25		98	%	80 - 120
			Dissolved Vanadium (V)	2023/08/25		98	%	80 - 120
			Dissolved Zinc (Zn)	2023/08/25		107	%	80 - 120
			Dissolved Beryllium (Be)	2023/08/25		98	%	80 - 120
B084342	AZI	LCS	Total Suspended Solids	2023/08/26		97	%	80 - 120
B084343	MKJ	LCS	Total Aluminum (Al)	2023/08/25		107	%	80 - 120
			Total Chromium (Cr)	2023/08/25		104	%	80 - 120
			Total Cobalt (Co)	2023/08/25		104	%	80 - 120
			Total Copper (Cu)	2023/08/25		104	%	80 - 120
			Total Lead (Pb)	2023/08/25		103	%	80 - 120
			Total Antimony (Sb)	2023/08/25		110	%	80 - 120
			Total Molybdenum (Mo)	2023/08/25		104	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C365209
Report Date: 2023/08/29

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Nickel (Ni)	2023/08/25		103	%	80 - 120
			Total Selenium (Se)	2023/08/25		105	%	80 - 120
			Total Silver (Ag)	2023/08/25		103	%	80 - 120
			Total Arsenic (As)	2023/08/25		101	%	80 - 120
			Total Thallium (Tl)	2023/08/25		103	%	80 - 120
			Total Tin (Sn)	2023/08/25		102	%	80 - 120
			Total Titanium (Ti)	2023/08/25		108	%	80 - 120
			Total Uranium (U)	2023/08/25		103	%	80 - 120
			Total Vanadium (V)	2023/08/25		105	%	80 - 120
			Total Zinc (Zn)	2023/08/25		104	%	80 - 120
			Total Beryllium (Be)	2023/08/25		102	%	80 - 120
B084346	MPU	LCS	Total Iron (Fe)	2023/08/25		100	%	80 - 120
			Total Lithium (Li)	2023/08/25		98	%	80 - 120
			Total Magnesium (Mg)	2023/08/25		97	%	80 - 120
			Total Manganese (Mn)	2023/08/25		110	%	80 - 120
			Total Potassium (K)	2023/08/25		99	%	80 - 120
			Total Sodium (Na)	2023/08/25		98	%	80 - 120
			Total Strontium (Sr)	2023/08/25		93	%	80 - 120
			Total Sulphur (S)	2023/08/25		97	%	80 - 120
			Total Phosphorus (P)	2023/08/25		96	%	80 - 120
			Total Barium (Ba)	2023/08/25		97	%	80 - 120
			Total Silicon (Si)	2023/08/25		95	%	80 - 120
			Total Boron (B)	2023/08/25		94	%	80 - 120
			Total Calcium (Ca)	2023/08/25		98	%	80 - 120
B084619	KH2	LCS	Total Aluminum (Al)	2023/08/25		113	%	80 - 120
			Total Chromium (Cr)	2023/08/25		109	%	80 - 120
			Total Cobalt (Co)	2023/08/25		110	%	80 - 120
			Total Copper (Cu)	2023/08/25		110	%	80 - 120
			Total Lead (Pb)	2023/08/25		111	%	80 - 120
			Total Antimony (Sb)	2023/08/25		122 (1)	%	80 - 120
			Total Molybdenum (Mo)	2023/08/25		116	%	80 - 120
			Total Nickel (Ni)	2023/08/25		108	%	80 - 120
			Total Selenium (Se)	2023/08/25		112	%	80 - 120
			Total Silver (Ag)	2023/08/25		108	%	80 - 120
			Total Arsenic (As)	2023/08/25		107	%	80 - 120
			Total Thallium (Tl)	2023/08/25		110	%	80 - 120
			Total Tin (Sn)	2023/08/25		114	%	80 - 120
			Total Titanium (Ti)	2023/08/25		118	%	80 - 120
			Total Uranium (U)	2023/08/25		110	%	80 - 120
			Total Vanadium (V)	2023/08/25		111	%	80 - 120
			Total Zinc (Zn)	2023/08/25		111	%	80 - 120
			Total Beryllium (Be)	2023/08/25		108	%	80 - 120
B084628	KKC	LCS	Total Iron (Fe)	2023/08/25		100	%	80 - 120
			Total Lithium (Li)	2023/08/25		99	%	80 - 120
			Total Magnesium (Mg)	2023/08/25		97	%	80 - 120
			Total Manganese (Mn)	2023/08/25		110	%	80 - 120
			Total Potassium (K)	2023/08/25		99	%	80 - 120
			Total Sodium (Na)	2023/08/25		97	%	80 - 120
			Total Strontium (Sr)	2023/08/25		92	%	80 - 120
			Total Sulphur (S)	2023/08/25		94	%	80 - 120
			Total Phosphorus (P)	2023/08/25		95	%	80 - 120
			Total Barium (Ba)	2023/08/25		97	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C365209
Report Date: 2023/08/29

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Silicon (Si)	2023/08/25		95	%	80 - 120
			Total Boron (B)	2023/08/25		96	%	80 - 120
			Total Calcium (Ca)	2023/08/25		98	%	80 - 120
B084797	KKM	LCS	Total Mercury (Hg)	2023/08/25		107	%	80 - 120
B085363	MPU	LCS	Dissolved Iron (Fe)	2023/08/25		101	%	80 - 120
			Dissolved Magnesium (Mg)	2023/08/25		97	%	80 - 120
			Dissolved Manganese (Mn)	2023/08/25		112	%	80 - 120
			Dissolved Potassium (K)	2023/08/25		101	%	80 - 120
			Dissolved Sodium (Na)	2023/08/25		96	%	80 - 120
			Dissolved Calcium (Ca)	2023/08/25		97	%	80 - 120
B085453	YL7	LCS	Total Nitrogen (N)	2023/08/26		100	%	80 - 120
B085465	LYV	LCS	Chemical Oxygen Demand	2023/08/26		104	%	80 - 120
B085542	ISW	LCS	Total Ammonia (N)	2023/08/26		107	%	80 - 120
B085900	MAP	LCS	Orthophosphate (P)	2023/08/26		101	%	80 - 120
B085917	JB9	LCS	Total Oil and grease	2023/08/28		105	%	70 - 130
B085949	ISW	LCS	Nitrite (N)	2023/08/27		102	%	80 - 120
			Nitrate plus Nitrite (N)	2023/08/27		102	%	80 - 120
B086045	KGR	LCS	Conductivity	2023/08/27		101	%	90 - 110
B086048	KGR	LCS	Alkalinity (Total as CaCO3)	2023/08/27		100	%	80 - 120
B086143	SKM	LCS	True Colour	2023/08/27		105	%	80 - 120
B086402	AAX	LCS	Total Petroleum Hydrocarbon	2023/08/28		98	%	70 - 130
B086421	YHK	LCS	Total Organic Carbon (C)	2023/08/28		100	%	80 - 120
B086424	MB5	LCS	Chloride (Cl)	2023/08/28		100	%	80 - 120
			Sulphate (SO4)	2023/08/28		101	%	80 - 120
B086584	YHK	LCS	Dissolved Organic Carbon (C)	2023/08/28		99	%	80 - 120
B085453	YL7	SRM	Total Nitrogen (N)	2023/08/26		102	%	80 - 120

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.

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

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

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

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

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

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

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C365209
Report Date: 2023/08/29

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223

VALIDATION SIGNATURE PAGE

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

Jared Wiseman, B.Sc., P.Chem., QP, Senior Analyst, Organics

Rahul Suryawanshi, Senior Analyst

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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Automated Statchk

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 {0}, {1} responsible for {2} {3} laboratory operations.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam
A Bureau Veritas Group Company

☑ Calgary
4000 19th St. NE, T2E 6P8
Phone: (403) 291-3077
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Toll Free: (800) 386-7247

☐ Edmonton
9331 - 48 Street, T6B 2R4
Phone: (780) 577-7100
Fax: (780) 450-4187
Toll Free: (800) 386-7247

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 299433

INVOICE INFORMATION	REPORT INFORMATION
Company Name: ☑ Imperial Oil ☐ ExxonMobil	Company Name: ADVISIAN
Contact Name: ALEX HAIGH	Contact Name: ALEX HAIGH
Address: 49 QUARRY PARK BLVD SE CALGARY, AB, T2C 3E7	Address: 49 QUARRY PARK BLVD SE CALGARY, AB T2C 3E7
Email: alex.haigh@advisian.com	Email: alex.haigh@advisian.com
Ph: 587-897-6249	Ph: 587-897-6249
Sampler Name (Print): ALEX HAIGH / TINO NGOLUBE	Consultant Project #: 417085-49223.23200

ANALYSIS REQUESTED

FIELD SAMPLE ID	MATRIX: GROUND WATER	MATRIX: SURFACE WATER	MATRIX: SOIL	MATRIX: OTHER	# CONTAINERS	SAMPLING DATE (YYYY/MM/DD)	SAMPLING TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-2 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☑ DIS ☑	MERCURY TOTAL ☑ DISSOLVED ☑	SALINITY SOIL	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY	pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	TRUE COLOUR, TSS, TDS, TURBIDITY	OIL + GREASE	TOC, DOC, SULPHIDE	NITRATE, NITRITE, AMMONIA (TOTAL), TKN	ORTHOPHOSPHATE	SULPHUR - TOTAL + DISSOLVED	COD	ALKYLATED PAH, TPH
1 AEMP-US-04		X			18	2023/08/18	13:30	X			X	X	X						X	X					X			X	X	X	X	X	X	X	X
2 AEMP-DS-02		X			18	↓	11:00	X			X	X	X						X	X					X			X	X	X	X	X	X	X	X
3 AEMP-DS-04		X			18	2023/08/18	09:30	X			X	X	X						X	X					X			X	X	X	X	X	X	X	X
4																																			
5																																			
6																																			
7																																			
8																																			
9																																			
10																																			

mcal-08-3275

IOL SITE LOCATION: NORMAN WELLS, NT

IOL PROJECT # (if applicable): N/A

MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-49223-23200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☑ CCME (incl. level) FAL ☐ Other

SPECIAL INSTRUCTIONS: email canada.chemistry@worley.com CALGL-IOR data track@ " " Stacy.gibb@advisian.com IES A2601436

JARS USED & NOT SUBMITTED (Enter N/A for Water): N/A

TURNAROUND TIME
Standard (5 days) ☑
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID # MYCAC				YES	NO	COOLER ID #				YES	NO	COOLER ID #			
SEAL PRESENT	✓		TEMP °C	9	7	7	SEAL PRESENT		TEMP °C	1	2	3	SEAL PRESENT		TEMP °C	1	2	3
SEAL INTACT	✓			1	2	3	SEAL INTACT						SEAL INTACT					
COOLING MEDIA PRESENT	✓						COOLING MEDIA PRESENT						COOLING MEDIA PRESENT					

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1.	TINO NGOLUBE	2023/08/20	09:00	1.	Nirkamal Sou	2023/08/22	15:00
2.				2.			
3.				3.			

LAB USE ONLY
MAXXAM JOB # C365209
SAMPLES
LABELED BY: VERIFIED BY:

COC-1010 (06/2016) IOL-AB White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-08-19
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C365245	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☐ **Yes** ☒ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☐ **Yes** ☒ **No**

If yes, FLAG type and comments*:*

Date samples submitted 2023-08-22

Due date for lab report on SRC 2023-09-06

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☒ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☒ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☒ **No**	Turbidity, true colour, orthophosphate, nitrite
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☒ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☒ **No** ☐ **N/A**	PAH Surrogate – overall quality meets criteria

Data check completed by Alex Haigh **Date** 2024-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	

Data check completed by Alex Haigh **Date** 2024-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Trip Blank results acceptable?	☒ Yes	☐ No	☐ N/A	**Comments**
Field Blank results acceptable?	☒ Yes	☐ No	☐ N/A	**Comments**
Equipment Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes	☐ No	☒ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field pH vs. Lab pH RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes	☐ No	☐ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☒ Yes ☐ No

Explain rationale for yes/no:

Request lab to recheck data? If so give details	☐ Yes	☒ No	☐ N/A	**Comments**

If Yes, Lab request to recheck must be approved by Project Manager Name: **Date**

Data check completed by Alex Haigh **Date** 2024-03-26

Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200
Your C.O.C. #: 292859

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/09/06
Report #: R3390649
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C365245
Received: 2023/08/22, 15:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	AB SOP-00005	SM 24 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	3	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	3		Auto Calc
Cadmium - low level CCME - Dissolved	1		Auto Calc
Cadmium - low level CCME (Total)	1		Auto Calc
Chloride/Sulphate by Auto Colourimetry	1	AB SOP-00020	SM24-4500-Cl/SO4-E m
COD by Colorimeter	1	AB SOP-00016	SM 23 5220D m
True Colour	1	CAL SOP-00049	SM 24 2120 C m
Carbon (DOC) (1)	1	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	1	AB SOP-00005	SM 24 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	3	AB SOP-00037	CCME PHC-CWS m
Sulphide (as H2S)	1		Auto Calc
Hardness	1		Auto Calc
Mercury (Dissolved) by CV (3)	1	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	1	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	1	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	1	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (3)	1	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	1	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	1		Auto Calc
Ammonia-N (Total)	1	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate and Nitrite	1		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	1	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N)	1		Auto Calc
Oil and Grease (Gravimetric, n-Hexane)	3	AB SOP-00092	SM 23 5520B/5520F m
Target & Alkylated PAH in Water by GC/MS (4)	3	AB SOP-00037 CAL SOP-00250	EPA 8270e m
Benzo[a]pyrene Equivalency (5)	3		Auto Calc
Orthophosphate by Automated Analyzer (6)	1	AB SOP-00025	SM 24 4500-P A,F m
Total Sulphide	1	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	1	AB SOP-00065	SM 24 2540 C m
Total Kjeldahl Nitrogen (Total)	1	BBY WI-00033	Auto Calc

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200
Your C.O.C. #: 292859

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/09/06
Report #: R3390649
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C365245
Received: 2023/08/22, 15:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Nitrogen (Total)	1	AB SOP-00093	SM 24 4500-N C m
Carbon (Total Organic) (7)	1	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR)	1	AB SOP-00061	SM 24 2540 D m
Turbidity	1	CAL SOP-00081	SM 24 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) 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.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Alkylated PAH results are semiquantitative
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(6) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

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Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200
Your C.O.C. #: 292859

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/09/06
Report #: R3390649
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C365245
Received: 2023/08/22, 15:00
(7) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Namita Sahni
Customer Solutions Representative
06 Sep 2023 11:30:04

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614
==========
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 Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

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Bureau Veritas Job #: C365245
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		BXI870	BXI871	BXI872		
Sampling Date		2023/08/19 13:30	2023/08/19 17:00	2023/08/19 16:55		
COC Number		292859	292859	292859		
	UNITS	**AEMP-DS-03**	**AEMP-DUP4-(TRIP BLANK)**	**AEMP-DUP3-(FIELD BLANK)**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	B082724
F3 (C16-C34 Hydrocarbons)	mg/L	0.23	<0.10	<0.10	0.10	B082724
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.20	B082724
Volatiles						
Benzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B085171
Toluene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B085171
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B085171
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	0.00080	B085171
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B085171
Xylenes (Total)	mg/L	<0.00089	<0.00089	<0.00089	0.00089	B083796
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	0.10	B083796
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	0.10	B085171
Extraction Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	84	89	87		B082724
Instrument Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	107	104	103		B085171
4-Bromofluorobenzene (sur.)	%	100	100	103		B085171
D4-1,2-Dichloroethane (sur.)	%	93	94	93		B085171
RDL = Reportable Detection Limit						

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Project #: 417085-49223.23200

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		BXI870		
Sampling Date		2023/08/19 13:30		
COC Number		292859		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**
Calculated Parameters				
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.16	0.020	B083781
Nutrients				
Total Nitrogen (N)	mg/L	0.23	0.020	B087567
RDL = Reportable Detection Limit				

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Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		BXI870		
Sampling Date		2023/08/19 13:30		
COC Number		292859		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**
Calculated Parameters				
Hardness (CaCO3)	mg/L	150	0.50	B083734
Ion Balance (% Difference)	%	9.8	N/A	B083797
Nitrate (N)	mg/L	0.068	0.010	B086664
Nitrate (NO3)	mg/L	0.30	0.044	B083735
Nitrite (NO2)	mg/L	<0.033	0.033	B083735
Misc. Inorganics				
Conductivity	uS/cm	330	2.0	B086045
Total Dissolved Solids	mg/L	200	10	B084328
Anions				
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	B086048
Alkalinity (Total as CaCO3)	mg/L	120	1.0	B086048
Bicarbonate (HCO3)	mg/L	150	1.0	B086048
Carbonate (CO3)	mg/L	<1.0	1.0	B086048
Hydroxide (OH)	mg/L	<1.0	1.0	B086048
Chloride (Cl)	mg/L	8.3	1.0	B086429
Sulphate (SO4)	mg/L	60	1.0	B086429
Nutrients				
Nitrite (N)	mg/L	<0.010	0.010	B085949
Nitrate plus Nitrite (N)	mg/L	0.068	0.010	B085949
Elements				
Dissolved Barium (Ba)	mg/L	0.051	0.010	B084896
Dissolved Boron (B)	mg/L	<0.020	0.020	B084896
Dissolved Calcium (Ca)	mg/L	40	0.30	B084896
Dissolved Iron (Fe)	mg/L	<0.060	0.060	B084896
Dissolved Lithium (Li)	mg/L	<0.020	0.020	B084896
Dissolved Magnesium (Mg)	mg/L	11	0.20	B084896
Dissolved Manganese (Mn)	mg/L	0.0044	0.0040	B084896
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	B084896
Dissolved Potassium (K)	mg/L	0.90	0.30	B084896
Dissolved Silicon (Si)	mg/L	1.7	0.50	B084896

RDL = Reportable Detection Limit
N/A = Not Applicable

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Advisian
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Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		BXI870		
Sampling Date		2023/08/19 13:30		
COC Number		292859		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**
Dissolved Sodium (Na)	mg/L	7.6	0.50	B084896
Dissolved Strontium (Sr)	mg/L	0.24	0.020	B084896
Dissolved Sulphur (S)	mg/L	17	0.20	B084896
RDL = Reportable Detection Limit				

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Bureau Veritas Job #: C365245
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Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BXI870		
Sampling Date		2023/08/19 13:30		
COC Number		292859		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**
Elements				
Total Cadmium (Cd)	mg/L	0.00010	0.000020	B083231
Total Mercury (Hg)	ug/L	0.012	0.0019	B084797
Total Aluminum (Al)	mg/L	2.0	0.0030	B084638
Total Antimony (Sb)	mg/L	<0.00060	0.00060	B084638
Total Arsenic (As)	mg/L	0.0013	0.00020	B084638
Total Barium (Ba)	mg/L	0.087	0.010	B084649
Total Beryllium (Be)	mg/L	<0.0010	0.0010	B084638
Total Boron (B)	mg/L	<0.020	0.020	B084649
Total Calcium (Ca)	mg/L	44	0.30	B084649
Total Chromium (Cr)	mg/L	0.0027	0.0010	B084638
Total Cobalt (Co)	mg/L	0.0010	0.00030	B084638
Total Copper (Cu)	mg/L	0.0037	0.0010	B084638
Total Iron (Fe)	mg/L	2.2	0.060	B084649
Total Lead (Pb)	mg/L	0.0012	0.00020	B084638
Total Lithium (Li)	mg/L	<0.020	0.020	B084649
Total Magnesium (Mg)	mg/L	12	0.20	B084649
Total Manganese (Mn)	mg/L	0.045	0.0040	B084649
Total Molybdenum (Mo)	mg/L	0.0013	0.00020	B084638
Total Nickel (Ni)	mg/L	0.0046	0.00050	B084638
Total Phosphorus (P)	mg/L	<0.10	0.10	B084649
Total Potassium (K)	mg/L	1.5	0.30	B084649
Total Selenium (Se)	mg/L	0.00056	0.00020	B084638
Total Silicon (Si)	mg/L	5.0	0.50	B084649
Total Silver (Ag)	mg/L	<0.00010	0.00010	B084638
Total Sodium (Na)	mg/L	8.1	0.50	B084649
Total Strontium (Sr)	mg/L	0.25	0.020	B084649
Total Sulphur (S)	mg/L	17	0.20	B084649
Total Thallium (Tl)	mg/L	<0.00020	0.00020	B084638
Total Tin (Sn)	mg/L	<0.0010	0.0010	B084638
Total Titanium (Ti)	mg/L	0.079	0.0010	B084638
Total Uranium (U)	mg/L	0.0011	0.00010	B084638
RDL = Reportable Detection Limit				

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BXI870		
Sampling Date		2023/08/19 13:30		
COC Number		292859		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	0.0052	0.0010	B084638
Total Zinc (Zn)	mg/L	0.016	0.0030	B084638
RDL = Reportable Detection Limit				

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Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BXI870			BXI870		
Sampling Date		2023/08/19 13:30			2023/08/19 13:30		
COC Number		292859			292859		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**	**AEMP-DS-03 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters							
Sulphide (as H2S)	mg/L	0.0095	0.0020	B083729			
Demand Parameters							
Chemical Oxygen Demand	mg/L	16	10	B086221			
Elements							
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	B083666			
Misc. Inorganics							
Dissolved Organic Carbon (C)	mg/L	4.0	0.50	B086584	4.0	0.50	B086584
Total Organic Carbon (C)	mg/L	4.0	0.50	B086421			
Total Suspended Solids	mg/L	220	0.99	B084342			
Anions							
Total Sulphide	mg/L	0.0090	0.0018	B084765	0.011	0.0018	B084765
Nutrients							
Total Ammonia (N)	mg/L	<0.015	0.015	B085542			
Orthophosphate (P)	mg/L	<0.0030	0.0030	B085900			
Misc. Organics							
Total Oil and grease	mg/L	<2.0	2.0	B082618			
Physical Properties							
True Colour	PtCo units	9.4	2.0	B086143			
Physical Properties							
Turbidity	NTU	87	0.10	B083495			

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C365245
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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BXI871	BXI872		
Sampling Date		2023/08/19 17:00	2023/08/19 16:55		
COC Number		292859	292859		
	UNITS	**AEMP-DUP4-(TRIP BLANK)**	**AEMP-DUP3-(FIELD BLANK)**	**RDL**	**QC Batch**
Misc. Organics					
Total Oil and grease	mg/L	<2.0	<2.0	2.0	B082618
RDL = Reportable Detection Limit					

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Bureau Veritas Job #: C365245
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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BXI870	BXI871	BXI872		
Sampling Date		2023/08/19 13:30	2023/08/19 17:00	2023/08/19 16:55		
COC Number		292859	292859	292859		
	UNITS	**AEMP-DS-03**	**AEMP-DUP4-(TRIP BLANK)**	**AEMP-DUP3-(FIELD BLANK)**	**RDL**	**QC Batch**
Polycyclic Aromatics						
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B083637
Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
Acenaphthylene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
Acridine	ug/L	<0.040	<0.040	<0.040	0.040	B082722
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	B082722
Benzo(a)anthracene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
Benzo(b&j)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
Benzo(k)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
Benzo(g,h,i)perylene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
Benzo(c)phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
Benzo(a)pyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B082722
Benzo(e)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
Chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
Dibenz(a,h)anthracene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B082722
Fluoranthene	ug/L	<0.010	<0.010	<0.010	0.010	B082722
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
Perylene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
Quinoline	ug/L	<0.20	<0.20	<0.20	0.20	B082722
Retene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C1-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
C3-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
C4-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
C2-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
Biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C1-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B082722
RDL = Reportable Detection Limit						

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BXI870	BXI871	BXI872		
Sampling Date		2023/08/19 13:30	2023/08/19 17:00	2023/08/19 16:55		
COC Number		292859	292859	292859		
	UNITS	**AEMP-DS-03**	**AEMP-DUP4-(TRIP BLANK)**	**AEMP-DUP3-(FIELD BLANK)**	**RDL**	**QC Batch**
C2-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C1-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C2-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C3-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
Dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C1-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C2-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C3-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C4-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C1 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C2 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C3 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C4 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C1 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C2 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C3 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C4 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C1 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
C2 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
C3 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B082722
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B082722
C1-Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
1-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
Extraction Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	101	86	106		B082722
D8-ACENAPHTHYLENE (sur.)	%	102	86	102		B082722
D8-NAPHTHALENE (sur.)	%	98	74	93		B082722
TERPHENYL-D14 (sur.)	%	140 (1)	113	133 (1)		B082722

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

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Bureau Veritas Job #: C365245
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		BXI870		
Sampling Date		2023/08/19 13:30		
COC Number		292859		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**
Elements				
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	B084558
RDL = Reportable Detection Limit				

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BXI870		
Sampling Date		2023/08/19 13:30		
COC Number		292859		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**
Elements				
Dissolved Aluminum (Al)	mg/L	0.036	0.0030	B084933
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	B084933
Dissolved Arsenic (As)	mg/L	0.00032	0.00020	B084933
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	B084933
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	B084933
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	B084933
Dissolved Copper (Cu)	mg/L	0.0023	0.0010	B084933
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	B084933
Dissolved Molybdenum (Mo)	mg/L	0.0011	0.00020	B084933
Dissolved Nickel (Ni)	mg/L	0.0016	0.00050	B084933
Dissolved Selenium (Se)	mg/L	0.00051	0.00020	B084933
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	B084933
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	B084933
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	B084933
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	B084933
Dissolved Uranium (U)	mg/L	0.00092	0.00010	B084933
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	B084933
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	B084933
RDL = Reportable Detection Limit				

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

TEST SUMMARY

Bureau Veritas ID: BXI870
Sample ID: AEMP-DS-03
Matrix: Water

Collected: 2023/08/19
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B086048	N/A	2023/08/27	Karen Graham
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B085171	N/A	2023/08/26	Rahul Suryawanshi
F1-BTEX	CALC/MS	B083796	N/A	2023/08/27	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B083666	N/A	2023/08/26	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B083231	N/A	2023/08/26	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B086429	N/A	2023/08/28	Marjolen Busslinger
COD by Colorimeter	M/PROB	B086221	N/A	2023/08/28	Ly Vu
True Colour	SPEC/COL	B086143	N/A	2023/08/27	Shanna McKort
Carbon (DOC)	TECH	B086584	N/A	2023/08/28	Ye Hyun KIM
Conductivity @25C	COND	B086045	N/A	2023/08/27	Karen Graham
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B082724	2023/08/28	2023/08/28	Bryanna Quach
Sulphide (as H2S)	CALC	B083729	N/A	2023/08/26	Automated Statchk
Hardness	CALC	B083734	N/A	2023/08/26	Automated Statchk
Mercury (Dissolved) by CV	CV	B084558	2023/08/25	2023/08/25	Kiran Kumari
Mercury (Total) by CV	CV	B084797	2023/08/25	2023/08/25	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B084896	N/A	2023/08/25	Kristijan Kovac
Elements by ICP - Total	ICPA	B084649	2023/08/25	2023/08/26	Kristijan Kovac
Elements by ICPMS - Dissolved	ICPM	B084933	N/A	2023/08/25	Mandeep Kaur
Elements by ICPMS - Total	ICPM	B084638	2023/08/25	2023/08/26	Mandeep Kaur
Ion Balance	CALC	B083797	N/A	2023/08/28	Automated Statchk
Ammonia-N (Total)	KONE	B085542	N/A	2023/08/26	Isabelle White
Nitrate and Nitrite	CALC	B083735	N/A	2023/08/28	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B085949	N/A	2023/08/27	Isabelle White
Nitrate (as N)	CALC	B086664	2023/08/28	2023/08/28	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B082618	2023/08/25	2023/08/25	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B082722	2023/08/28	2023/08/29	Don Maxwell
Benzo[a]pyrene Equivalency	GC/MSD	B083637	N/A	2023/08/31	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B085900	N/A	2023/08/26	Mary Anne Dela Cruz
Total Sulphide	SPEC	B084765	N/A	2023/08/25	Bailey Morrison
Total Dissolved Solids (Filt. Residue)	BAL	B084328	2023/08/25	2023/08/28	Daryl Viktoria Naval
Total Kjeldahl Nitrogen (Total)	CALC	B083781	N/A	2023/08/29	Automated Statchk
Nitrogen (Total)	AC/COL	B087567	2023/08/27	2023/08/29	Carlo Truong
Carbon (Total Organic)	TECH	B086421	N/A	2023/08/28	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B084342	2023/08/25	2023/08/26	Ashhel Zia
Turbidity	TURB	B083495	N/A	2023/08/24	Amy Phan

Bureau Veritas ID: BXI870 Dup
Sample ID: AEMP-DS-03
Matrix: Water

Collected: 2023/08/19
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbon (DOC)	TECH	B086584	N/A	2023/08/28	Ye Hyun KIM
Total Sulphide	SPEC	B084765	N/A	2023/08/25	Bailey Morrison

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

TEST SUMMARY

Bureau Veritas ID: BXI871
Sample ID: AEMP-DUP4-(TRIP BLANK)
Matrix: Water

Collected: 2023/08/19
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B085171	N/A	2023/08/26	Rahul Suryawanshi
F1-BTEX	CALC/MS	B083796	N/A	2023/08/27	Automated Statchk
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B082724	2023/08/28	2023/08/28	Bryanna Quach
Oil and Grease (Gravimetric, n-Hexane)	CALC	B082618	2023/08/25	2023/08/25	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B082722	2023/08/28	2023/08/29	Don Maxwell
Benzo[a]pyrene Equivalency	GC/MSD	B083637	N/A	2023/08/31	Automated Statchk

Bureau Veritas ID: BXI872
Sample ID: AEMP-DUP3-(FIELD BLANK)
Matrix: Water

Collected: 2023/08/19
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B085171	N/A	2023/08/26	Rahul Suryawanshi
F1-BTEX	CALC/MS	B083796	N/A	2023/08/27	Automated Statchk
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B082724	2023/08/28	2023/08/28	Bryanna Quach
Oil and Grease (Gravimetric, n-Hexane)	CALC	B082618	2023/08/25	2023/08/25	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B082722	2023/08/28	2023/08/29	Don Maxwell
Benzo[a]pyrene Equivalency	GC/MSD	B083637	N/A	2023/08/31	Automated Statchk

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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 BXI870 [AEMP-DS-03] : Sample was analyzed past method specified hold time for Turbidity. 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 Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

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
B082618	JB9	Method Blank	Total Oil and grease	2023/08/25	<2.0		mg/L	
B082722	DM	Method Blank	D10-ANTHRACENE (sur.)	2023/08/28		100	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/28		128	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/28		93	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/28		84	%	50 - 130
			Acenaphthene	2023/08/28	<0.10		ug/L	
			Acenaphthylene	2023/08/28	<0.10		ug/L	
			Acridine	2023/08/28	<0.040		ug/L	
			Anthracene	2023/08/28	<0.010		ug/L	
			Benzo(a)anthracene	2023/08/28	<0.0085		ug/L	
			Benzo(b&j)fluoranthene	2023/08/28	<0.0085		ug/L	
			Benzo(k)fluoranthene	2023/08/28	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2023/08/28	<0.0085		ug/L	
			Benzo(c)phenanthrene	2023/08/28	<0.050		ug/L	
			Benzo(a)pyrene	2023/08/28	<0.0075		ug/L	
			Benzo(e)pyrene	2023/08/28	<0.050		ug/L	
			Chrysene	2023/08/28	<0.0085		ug/L	
			Dibenz(a,h)anthracene	2023/08/28	<0.0075		ug/L	
			Fluoranthene	2023/08/28	<0.010		ug/L	
			Fluorene	2023/08/28	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2023/08/28	<0.0085		ug/L	
			Indeno(1,2,3-cd)fluoranthene	2023/08/28	<0.0085		ug/L	
			2-Methylnaphthalene	2023/08/28	<0.10		ug/L	
			Naphthalene	2023/08/28	<0.10		ug/L	
			Phenanthrene	2023/08/28	<0.050		ug/L	
			Perylene	2023/08/28	<0.050		ug/L	
			Pyrene	2023/08/28	<0.020		ug/L	
			Quinoline	2023/08/28	<0.20		ug/L	
			Retene	2023/08/28	<0.050		ug/L	
			C1-Naphthalene	2023/08/28	<0.10		ug/L	
			C3-Naphthalene	2023/08/28	<0.10		ug/L	
			C4-Naphthalene	2023/08/28	<0.10		ug/L	
			C2-Naphthalene	2023/08/28	<0.10		ug/L	
			Biphenyl	2023/08/28	<0.020		ug/L	
			C1-biphenyl	2023/08/28	<0.020		ug/L	
			C2-biphenyl	2023/08/28	<0.020		ug/L	
			C1-fluorene	2023/08/28	<0.050		ug/L	
			C2-fluorene	2023/08/28	<0.050		ug/L	
			C3-fluorene	2023/08/28	<0.050		ug/L	
			Dibenzothiophene	2023/08/28	<0.020		ug/L	
			C1-dibenzothiophene	2023/08/28	<0.020		ug/L	
			C2-dibenzothiophene	2023/08/28	<0.020		ug/L	
			C3-dibenzothiophene	2023/08/28	<0.020		ug/L	
			C4-dibenzothiophene	2023/08/28	<0.020		ug/L	
			C1 phenanthrene/anthracene	2023/08/28	<0.050		ug/L	
			C2 phenanthrene/anthracene	2023/08/28	<0.050		ug/L	
			C3 phenanthrene/anthracene	2023/08/28	<0.050		ug/L	
			C4 phenanthrene/anthracene	2023/08/28	<0.050		ug/L	
			C1 fluoranthene/pyrene	2023/08/28	<0.020		ug/L	
			C2 fluoranthene/pyrene	2023/08/28	<0.020		ug/L	
			C3 fluoranthene/pyrene	2023/08/28	<0.020		ug/L	
			C4 fluoranthene/pyrene	2023/08/28	<0.020		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
			C1 benzo(a)anthracene/chrysene	2023/08/28	<0.0085		ug/L	
			C2 benzo(a)anthracene/chrysene	2023/08/28	<0.0085		ug/L	
			C3 benzo(a)anthracene/chrysene	2023/08/28	<0.0085		ug/L	
			C4 benzo(a)anthracene/chrysene	2023/08/28	<0.0085		ug/L	
			C1benzobjkfluoranthene/benzoapyrene	2023/08/28	<0.0075		ug/L	
			C2benzobjkfluoranthene/benzoapyrene	2023/08/28	<0.0075		ug/L	
			C1-Acenaphthene	2023/08/28	<0.10		ug/L	
			1-Methylnaphthalene	2023/08/28	<0.10		ug/L	
B082724	BQU	Method Blank	O-TERPHENYL (sur.)	2023/08/28		91	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/28	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2023/08/28	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2023/08/28	<0.20		mg/L	
B083495	AP1	Method Blank	Turbidity	2023/08/24	<0.10		NTU	
B084328	DVN	Method Blank	Total Dissolved Solids	2023/08/28	<10		mg/L	
B084342	AZI	Method Blank	Total Suspended Solids	2023/08/26	<1.0		mg/L	
B084558	KKM	Method Blank	Dissolved Mercury (Hg)	2023/08/25	<0.0019		ug/L	
B084638	MKJ	Method Blank	Total Aluminum (Al)	2023/08/26	<0.0030		mg/L	
			Total Chromium (Cr)	2023/08/26	<0.0010		mg/L	
			Total Cobalt (Co)	2023/08/26	<0.00030		mg/L	
			Total Copper (Cu)	2023/08/26	<0.0010		mg/L	
			Total Lead (Pb)	2023/08/26	<0.00020		mg/L	
			Total Antimony (Sb)	2023/08/26	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/08/26	<0.00020		mg/L	
			Total Nickel (Ni)	2023/08/26	<0.00050		mg/L	
			Total Selenium (Se)	2023/08/26	<0.00020		mg/L	
			Total Silver (Ag)	2023/08/26	<0.00010		mg/L	
			Total Arsenic (As)	2023/08/26	<0.00020		mg/L	
			Total Thallium (Tl)	2023/08/26	<0.00020		mg/L	
			Total Tin (Sn)	2023/08/26	<0.0010		mg/L	
			Total Titanium (Ti)	2023/08/26	<0.0010		mg/L	
			Total Uranium (U)	2023/08/26	<0.00010		mg/L	
			Total Vanadium (V)	2023/08/26	<0.0010		mg/L	
			Total Zinc (Zn)	2023/08/26	<0.0030		mg/L	
			Total Beryllium (Be)	2023/08/26	<0.0010		mg/L	
B084649	KKC	Method Blank	Total Iron (Fe)	2023/08/26	<0.060		mg/L	
			Total Lithium (Li)	2023/08/26	<0.020		mg/L	
			Total Magnesium (Mg)	2023/08/26	<0.20		mg/L	
			Total Manganese (Mn)	2023/08/26	<0.0040		mg/L	
			Total Potassium (K)	2023/08/26	<0.30		mg/L	
			Total Sodium (Na)	2023/08/26	<0.50		mg/L	
			Total Strontium (Sr)	2023/08/26	<0.020		mg/L	
			Total Sulphur (S)	2023/08/26	<0.20		mg/L	
			Total Phosphorus (P)	2023/08/26	<0.10		mg/L	
			Total Barium (Ba)	2023/08/26	<0.010		mg/L	
			Total Silicon (Si)	2023/08/26	<0.50		mg/L	
			Total Boron (B)	2023/08/26	<0.020		mg/L	
			Total Calcium (Ca)	2023/08/26	<0.30		mg/L	
B084765	BYM	Method Blank	Total Sulphide	2023/08/25	<0.0018		mg/L	
B084797	KKM	Method Blank	Total Mercury (Hg)	2023/08/25	<0.0019		ug/L	
B084896	KKC	Method Blank	Dissolved Iron (Fe)	2023/08/25	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/08/25	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/08/25	<0.20		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Manganese (Mn)	2023/08/25	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/08/25	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/08/25	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/08/25	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/08/25	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/08/25	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/08/25	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/08/25	<0.50		mg/L	
			Dissolved Boron (B)	2023/08/25	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/08/25	<0.30		mg/L	
B084933	MKJ	Method Blank	Dissolved Aluminum (Al)	2023/08/25	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/08/25	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/08/25	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/08/25	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/08/25	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/08/25	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/08/25	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/08/25	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/08/25	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/08/25	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/08/25	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/08/25	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/08/25	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/08/25	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/08/25	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/08/25	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/08/25	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/08/25	<0.0010		mg/L	
B085171	RSU	Method Blank	1,4-Difluorobenzene (sur.)	2023/08/26		105	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/26		101	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/26		94	%	50 - 140
			Benzene	2023/08/26	<0.00040		mg/L	
			Toluene	2023/08/26	<0.00040		mg/L	
			Ethylbenzene	2023/08/26	<0.00040		mg/L	
			m & p-Xylene	2023/08/26	<0.00080		mg/L	
			o-Xylene	2023/08/26	<0.00040		mg/L	
			F1 (C6-C10)	2023/08/26	<0.10		mg/L	
B085542	ISW	Method Blank	Total Ammonia (N)	2023/08/26	<0.015		mg/L	
B085900	MAP	Method Blank	Orthophosphate (P)	2023/08/26	<0.0030		mg/L	
B085949	ISW	Method Blank	Nitrite (N)	2023/08/27	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/08/27	<0.010		mg/L	
B086045	KGR	Method Blank	Conductivity	2023/08/27	<2.0		uS/cm	
B086048	KGR	Method Blank	Alkalinity (Total as CaCO3)	2023/08/27	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/08/27	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/08/27	<1.0		mg/L	
			Carbonate (CO3)	2023/08/27	<1.0		mg/L	
			Hydroxide (OH)	2023/08/27	<1.0		mg/L	
B086143	SKM	Method Blank	True Colour	2023/08/27	<2.0		PtCo units	
B086221	LYV	Method Blank	Chemical Oxygen Demand	2023/08/28	<10		mg/L	
B086421	YHK	Method Blank	Total Organic Carbon (C)	2023/08/28	<0.50		mg/L	
B086429	MB5	Method Blank	Chloride (Cl)	2023/08/28	<1.0		mg/L	
			Sulphate (SO4)	2023/08/28	<1.0		mg/L	

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C365245
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B086584	YHK	Method Blank	Dissolved Organic Carbon (C)	2023/08/28	<0.50		mg/L	
B087567	CTU	Method Blank	Total Nitrogen (N)	2023/08/29	<0.020		mg/L	
B084765	BYM	RPD [BXI870-07]	Total Sulphide	2023/08/25	19		%	20
B086584	YHK	RPD [BXI870-04]	Dissolved Organic Carbon (C)	2023/08/28	0.13		%	20
B086584	YHK	Matrix Spike [BXI870-04]	Dissolved Organic Carbon (C)	2023/08/28		91	%	80 - 120
B082618	JB9	LCS	Total Oil and grease	2023/08/25		105	%	70 - 130
B082722	DM	LCS	D10-ANTHRACENE (sur.)	2023/08/28		109	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/28		143 (1)	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/28		103	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/28		87	%	50 - 130
			Acenaphthene	2023/08/28		88	%	50 - 130
			Acenaphthylene	2023/08/28		84	%	50 - 130
			Acridine	2023/08/28		76	%	50 - 130
			Anthracene	2023/08/28		86	%	50 - 130
			Benzo(a)anthracene	2023/08/28		106	%	50 - 130
			Benzo(b&j)fluoranthene	2023/08/28		100	%	50 - 130
			Benzo(k)fluoranthene	2023/08/28		107	%	50 - 130
			Benzo(g,h,i)perylene	2023/08/28		97	%	50 - 130
			Benzo(c)phenanthrene	2023/08/28		106	%	50 - 130
			Benzo(a)pyrene	2023/08/28		104	%	50 - 130
			Benzo(e)pyrene	2023/08/28		94	%	50 - 130
			Chrysene	2023/08/28		96	%	50 - 130
			Dibenz(a,h)anthracene	2023/08/28		103	%	50 - 130
			Fluoranthene	2023/08/28		100	%	50 - 130
			Fluorene	2023/08/28		86	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/08/28		103	%	50 - 130
			2-Methylnaphthalene	2023/08/28		83	%	50 - 130
			Naphthalene	2023/08/28		76	%	50 - 130
			Phenanthrene	2023/08/28		89	%	50 - 130
			Perylene	2023/08/28		94	%	50 - 130
			Pyrene	2023/08/28		101	%	50 - 130
			Quinoline	2023/08/28		84	%	50 - 130
			C1-Naphthalene	2023/08/28		66	%	50 - 130
			C3-Naphthalene	2023/08/28		87	%	50 - 130
			C2-Naphthalene	2023/08/28		78	%	50 - 130
			C1-biphenyl	2023/08/28		72	%	50 - 130
			C1 phenanthrene/anthracene	2023/08/28		100	%	50 - 130
			C2 phenanthrene/anthracene	2023/08/28		101	%	50 - 130
			C1 fluoranthene/pyrene	2023/08/28		103	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/08/28		59	%	30 - 130
			1-Methylnaphthalene	2023/08/28		66	%	50 - 130
B082724	BQU	LCS	O-TERPHENYL (sur.)	2023/08/28		93	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/28		84	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/08/28		92	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/08/28		88	%	60 - 140
B083495	AP1	LCS	Turbidity	2023/08/24		99	%	80 - 120
B084328	DVN	LCS	Total Dissolved Solids	2023/08/28		97	%	80 - 120
B084342	AZI	LCS	Total Suspended Solids	2023/08/26		97	%	80 - 120
B084558	KKM	LCS	Dissolved Mercury (Hg)	2023/08/25		106	%	80 - 120
B084638	MKJ	LCS	Total Aluminum (Al)	2023/08/25		105	%	80 - 120
			Total Chromium (Cr)	2023/08/25		100	%	80 - 120
			Total Cobalt (Co)	2023/08/25		100	%	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 Copper (Cu)	2023/08/25		102	%	80 - 120
			Total Lead (Pb)	2023/08/25		102	%	80 - 120
			Total Antimony (Sb)	2023/08/25		103	%	80 - 120
			Total Molybdenum (Mo)	2023/08/25		102	%	80 - 120
			Total Nickel (Ni)	2023/08/25		100	%	80 - 120
			Total Selenium (Se)	2023/08/25		99	%	80 - 120
			Total Silver (Ag)	2023/08/25		101	%	80 - 120
			Total Arsenic (As)	2023/08/25		96	%	80 - 120
			Total Thallium (Tl)	2023/08/25		103	%	80 - 120
			Total Tin (Sn)	2023/08/25		99	%	80 - 120
			Total Titanium (Ti)	2023/08/25		100	%	80 - 120
			Total Uranium (U)	2023/08/25		102	%	80 - 120
			Total Vanadium (V)	2023/08/25		101	%	80 - 120
			Total Zinc (Zn)	2023/08/25		100	%	80 - 120
			Total Beryllium (Be)	2023/08/25		97	%	80 - 120
B084649	KKC	LCS	Total Iron (Fe)	2023/08/26		103	%	80 - 120
			Total Lithium (Li)	2023/08/26		99	%	80 - 120
			Total Magnesium (Mg)	2023/08/26		98	%	80 - 120
			Total Manganese (Mn)	2023/08/26		104	%	80 - 120
			Total Potassium (K)	2023/08/26		100	%	80 - 120
			Total Sodium (Na)	2023/08/26		100	%	80 - 120
			Total Strontium (Sr)	2023/08/26		93	%	80 - 120
			Total Sulphur (S)	2023/08/26		96	%	80 - 120
			Total Phosphorus (P)	2023/08/26		97	%	80 - 120
			Total Barium (Ba)	2023/08/26		97	%	80 - 120
			Total Silicon (Si)	2023/08/26		98	%	80 - 120
			Total Boron (B)	2023/08/26		96	%	80 - 120
			Total Calcium (Ca)	2023/08/26		98	%	80 - 120
B084765	BYM	LCS	Total Sulphide	2023/08/25		98	%	80 - 120
B084797	KKM	LCS	Total Mercury (Hg)	2023/08/25		107	%	80 - 120
B084896	KKC	LCS	Dissolved Iron (Fe)	2023/08/25		101	%	80 - 120
			Dissolved Lithium (Li)	2023/08/25		96	%	80 - 120
			Dissolved Magnesium (Mg)	2023/08/25		98	%	80 - 120
			Dissolved Manganese (Mn)	2023/08/25		111	%	80 - 120
			Dissolved Potassium (K)	2023/08/25		100	%	80 - 120
			Dissolved Sodium (Na)	2023/08/25		96	%	80 - 120
			Dissolved Strontium (Sr)	2023/08/25		93	%	80 - 120
			Dissolved Sulphur (S)	2023/08/25		98	%	80 - 120
			Dissolved Phosphorus (P)	2023/08/25		99	%	80 - 120
			Dissolved Barium (Ba)	2023/08/25		96	%	80 - 120
			Dissolved Silicon (Si)	2023/08/25		95	%	80 - 120
			Dissolved Boron (B)	2023/08/25		97	%	80 - 120
			Dissolved Calcium (Ca)	2023/08/25		97	%	80 - 120
B084933	MKJ	LCS	Dissolved Aluminum (Al)	2023/08/25		107	%	80 - 120
			Dissolved Chromium (Cr)	2023/08/25		98	%	80 - 120
			Dissolved Cobalt (Co)	2023/08/25		99	%	80 - 120
			Dissolved Copper (Cu)	2023/08/25		100	%	80 - 120
			Dissolved Lead (Pb)	2023/08/25		99	%	80 - 120
			Dissolved Antimony (Sb)	2023/08/25		102	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/08/25		100	%	80 - 120
			Dissolved Nickel (Ni)	2023/08/25		98	%	80 - 120
			Dissolved Selenium (Se)	2023/08/25		102	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C365245
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Silver (Ag)	2023/08/25		97	%	80 - 120
			Dissolved Arsenic (As)	2023/08/25		96	%	80 - 120
			Dissolved Thallium (Tl)	2023/08/25		99	%	80 - 120
			Dissolved Tin (Sn)	2023/08/25		100	%	80 - 120
			Dissolved Titanium (Ti)	2023/08/25		104	%	80 - 120
			Dissolved Uranium (U)	2023/08/25		97	%	80 - 120
			Dissolved Vanadium (V)	2023/08/25		100	%	80 - 120
			Dissolved Zinc (Zn)	2023/08/25		99	%	80 - 120
			Dissolved Beryllium (Be)	2023/08/25		96	%	80 - 120
B085171	RSU	LCS	1,4-Difluorobenzene (sur.)	2023/08/26		97	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/26		97	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/26		86	%	50 - 140
			Benzene	2023/08/26		85	%	60 - 130
			Toluene	2023/08/26		84	%	60 - 130
			Ethylbenzene	2023/08/26		94	%	60 - 130
			m & p-Xylene	2023/08/26		92	%	60 - 130
			o-Xylene	2023/08/26		92	%	60 - 130
			F1 (C6-C10)	2023/08/26		101	%	60 - 140
B085542	ISW	LCS	Total Ammonia (N)	2023/08/26		107	%	80 - 120
B085900	MAP	LCS	Orthophosphate (P)	2023/08/26		101	%	80 - 120
B085949	ISW	LCS	Nitrite (N)	2023/08/27		102	%	80 - 120
			Nitrate plus Nitrite (N)	2023/08/27		102	%	80 - 120
B086045	KGR	LCS	Conductivity	2023/08/27		101	%	90 - 110
B086048	KGR	LCS	Alkalinity (Total as CaCO3)	2023/08/27		100	%	80 - 120
B086143	SKM	LCS	True Colour	2023/08/27		105	%	80 - 120
B086221	LYV	LCS	Chemical Oxygen Demand	2023/08/28		104	%	80 - 120
B086421	YHK	LCS	Total Organic Carbon (C)	2023/08/28		100	%	80 - 120
B086429	MB5	LCS	Chloride (Cl)	2023/08/28		101	%	80 - 120
			Sulphate (SO4)	2023/08/28		104	%	80 - 120
B086584	YHK	LCS	Dissolved Organic Carbon (C)	2023/08/28		99	%	80 - 120
B087567	CTU	LCS	Total Nitrogen (N)	2023/08/29		99	%	80 - 120
B087567	CTU	SRM	Total Nitrogen (N)	2023/08/29		94	%	80 - 120

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.

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

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

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

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

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

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Bureau Veritas Job #: C365245
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: NORMAN WELLS, NWT
Project #: 417085-49223.23200

VALIDATION SIGNATURE PAGE

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

Jared Wiseman, B.Sc., P.Chem., QP, Senior Analyst, Organics

Maria Magdalena Florescu, Ph.D., P.Chem., QP, Inorganics Manager

Qiliang (Alex) Wu, Senior Analyst

Jingyuan Song, QP, Organics – Senior Analyst

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

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A Bureau Veritas Group Company

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Toll Free: (800) 386-7247

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 292859

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB, T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587 897 6249
Sampler Name (Print): Alex Haigh

REPORT INFORMATION

Company Name: Advisian
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587 897 6249
Consultant Project #: 417085-49223.23200

ANALYSIS REQUESTED

	FIELD SAMPLE ID	MATRIX: GROUND WATER	SURFACE WATER	SOIL	OTHER	# CONTAINERS	SAMPLING: DATE (YYYY/MM/DD)	TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	~~PHCs (FRACTIONS 1-4 PLUS BTEX)~~	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☒ DIS ☒	MERCURY TOTAL ☒ DISSOLVED ☒	~~SALINITY/CONC~~ TPH	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY	pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	True colour, TSS, TDS, Turbidity	Oil + Grease	TOC, DOC, Sulphide	Nitrate, Nitrite, Ammonia (total), TKN	Orthophosphate	Sulphur - total + dissolved	COD	Alkylated PAHs
1	AEMP-DS-03		X			18	2023/08/19	13:30	X			X		X						X	X	X				X			X	X	X	X	X	X	X	X
2	AEMP-DUP4-(TRIP BLANK)				X	3	↓	17:00				X		X								X								X						X
3	AEMP-DUP3-(FIELD BLANK)				X	3	2023/08/19	16:55				X		X								X								X						X
4																																				
5																																				
6																																				
7																																				
8																																				
9																																				
10																																				

mcal-08-3278

IOL SITE LOCATION: Norman Wells, NT
IOL PROJECT # (if applicable): N/A
MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-49223.23200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) FAL ☐ Other

SPECIAL INSTRUCTIONS email: canada.chemistry@worley.com
Cacal_IORdatatrack@
Stacy.sibb@advisian.com
IES A2601436

JARS USED & NOT SUBMITTED Enter N/A for Water: N/A

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID # MUAL				YES	NO	COOLER ID #				YES	NO	COOLER ID #			
SEAL PRESENT	✓		TEMP °C	7	6	7			TEMP °C	1	2	3			TEMP °C	1	2	3
SEAL INTACT	✓																	
COOLING MEDIA PRESENT	✓																	

LAB USE ONLY
MAXXAM JOB # C365245
SAMPLES
LABELED BY: VERIFIED BY:

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1.	Alex Haigh	2023/08/20	0900	1. N=1	Nirkamal Soni	2023/08/22	15:00
2.				2.			
3.				3.			

COC-1010 (06/2016) IOL-AB
White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-08-19
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C365245	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☐ **Yes** ☒ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☐ **Yes** ☒ **No**

If yes, FLAG type and comments:

Date samples submitted 2023-08-22

Due date for lab report on SRC 2023-09-06

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☒ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☒ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☒ **No**	Turbidity, true colour, orthophosphate, nitrite
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☒ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☐ **Yes** ☒ **No** ☐ **N/A**	Exceeds criteria for sulphide – overall quality meets criteria
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☒ **No** ☐ **N/A**	PAH Surrogate – overall quality meets criteria

Data check completed by Alex Haigh **Date** 2024-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	

Data check completed by Alex Haigh **Date** 2024-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Trip Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Equipment Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes	☐ No	☒ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field pH vs. Lab pH RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes	☐ No	☐ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☒ Yes ☐ No

Explain rationale for yes/no:

Request lab to recheck data? If so give details	☐ Yes	☒ No	☐ N/A	**Comments**

If Yes, Lab request to recheck must be approved by Project Manager Name: **Date**

Data check completed by Alex Haigh **Date** 2024-03-26

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200
Your C.O.C. #: 292859

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/09/06
Report #: R3390650
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C365246
Received: 2023/08/22, 15:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	3	AB SOP-00005	SM 24 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	3	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	3		Auto Calc
Cadmium - low level CCME - Dissolved	3		Auto Calc
Cadmium - low level CCME (Total)	3		Auto Calc
Chloride/Sulphate by Auto Colourimetry	3	AB SOP-00020	SM24-4500-Cl/SO4-E m
COD by Colorimeter	3	AB SOP-00016	SM 23 5220D m
True Colour	3	CAL SOP-00049	SM 24 2120 C m
Carbon (DOC) (1)	3	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	3	AB SOP-00005	SM 24 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	3	AB SOP-00037	CCME PHC-CWS m
Sulphide (as H2S)	3		Auto Calc
Hardness	3		Auto Calc
Mercury (Dissolved) by CV (3)	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	3	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	3	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (3)	3	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	3	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	3		Auto Calc
Ammonia-N (Total)	3	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate and Nitrite	3		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	3	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N)	3		Auto Calc
Oil and Grease (Gravimetric, n-Hexane)	3	AB SOP-00092	SM 23 5520B/5520F m
Target & Alkylated PAH in Water by GC/MS (4)	3	AB SOP-00037 CAL SOP-00250	EPA 8270e m
Benzo[a]pyrene Equivalency (5)	3		Auto Calc
Orthophosphate by Automated Analyzer (6)	3	AB SOP-00025	SM 24 4500-P A,F m
Total Sulphide	3	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	3	AB SOP-00065	SM 24 2540 C m
Total Kjeldahl Nitrogen (Total)	3	BBY WI-00033	Auto Calc

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200
Your C.O.C. #: 292859

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/09/06
Report #: R3390650
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C365246
Received: 2023/08/22, 15:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Nitrogen (Total)	3	AB SOP-00093	SM 24 4500-N C m
Carbon (Total Organic) (7)	3	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR)	3	AB SOP-00061	SM 24 2540 D m
Turbidity	3	CAL SOP-00081	SM 24 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) 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.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Alkylated PAH results are semiquantitative
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(6) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200
Your C.O.C. #: 292859

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/09/06
Report #: R3390650
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C365246
Received: 2023/08/22, 15:00
(7) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Namita Sahni
Customer Solutions Representative
06 Sep 2023 11:30:21

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614
==========
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 Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		BXI873			BXI873			BXI874		
Sampling Date		2023/08/19 12:15			2023/08/19 12:15			2023/08/19 10:15		
COC Number		292859			292859			292859		
	UNITS	**AEMP-DS-05**	**RDL**	**QC Batch**	**AEMP-DS-05 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-US-01**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.10	B082724				<0.10	0.10	B082724
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	0.10	B082724				<0.10	0.10	B082724
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	0.20	B082724				<0.20	0.20	B082724
Volatiles										
Benzene	mg/L	<0.00040	0.00040	B085171	<0.00040	0.00040	B085171	<0.00040	0.00040	B085171
Toluene	mg/L	<0.00040	0.00040	B085171	<0.00040	0.00040	B085171	<0.00040	0.00040	B085171
Ethylbenzene	mg/L	<0.00040	0.00040	B085171	<0.00040	0.00040	B085171	<0.00040	0.00040	B085171
m & p-Xylene	mg/L	<0.00080	0.00080	B085171	<0.00080	0.00080	B085171	<0.00080	0.00080	B085171
o-Xylene	mg/L	<0.00040	0.00040	B085171	<0.00040	0.00040	B085171	<0.00040	0.00040	B085171
Xylenes (Total)	mg/L	<0.00089	0.00089	B083796				<0.00089	0.00089	B083796
F1 (C6-C10) - BTEX	mg/L	<0.10	0.10	B083796				<0.10	0.10	B083796
F1 (C6-C10)	mg/L	<0.10	0.10	B085171	<0.10	0.10	B085171	<0.10	0.10	B085171
Extraction Surrogate Recovery (%)										
O-TERPHENYL (sur.)	%	86		B082724				91		B082724
Instrument Surrogate Recovery (%)										
1,4-Difluorobenzene (sur.)	%	104		B085171	103		B085171	103		B085171
4-Bromofluorobenzene (sur.)	%	98		B085171	100		B085171	99		B085171
D4-1,2-Dichloroethane (sur.)	%	94		B085171	95		B085171	93		B085171

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		BXI875		
Sampling Date		2023/08/19 11:15		
COC Number		292859		
	UNITS	**AEMP-US-02**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.10	B082724
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	0.10	B082724
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	0.20	B082724
Volatiles				
Benzene	mg/L	<0.00040	0.00040	B085171
Toluene	mg/L	<0.00040	0.00040	B085171
Ethylbenzene	mg/L	<0.00040	0.00040	B085171
m & p-Xylene	mg/L	<0.00080	0.00080	B085171
o-Xylene	mg/L	<0.00040	0.00040	B085171
Xylenes (Total)	mg/L	<0.00089	0.00089	B083917
F1 (C6-C10) - BTEX	mg/L	<0.10	0.10	B083917
F1 (C6-C10)	mg/L	<0.10	0.10	B085171
Extraction Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	92		B082724
Instrument Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	104		B085171
4-Bromofluorobenzene (sur.)	%	102		B085171
D4-1,2-Dichloroethane (sur.)	%	94		B085171
RDL = Reportable Detection Limit				

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Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		BXI873	BXI874	BXI875		
Sampling Date		2023/08/19 12:15	2023/08/19 10:15	2023/08/19 11:15		
COC Number		292859	292859	292859		
	UNITS	**AEMP-DS-05**	**AEMP-US-01**	**AEMP-US-02**	**RDL**	**QC Batch**
Calculated Parameters						
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.14	0.12	0.18	0.020	B083781
Nutrients						
Total Nitrogen (N)	mg/L	0.19	0.20	0.25	0.020	B087567
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		BXI873		BXI874		BXI875			BXI875		
Sampling Date		2023/08/19 12:15		2023/08/19 10:15		2023/08/19 11:15			2023/08/19 11:15		
COC Number		292859		292859		292859			292859		
	UNITS	**AEMP-DS-05**	**QC Batch**	**AEMP-US-01**	**QC Batch**	**AEMP-US-02**	**RDL**	**QC Batch**	**AEMP-US-02 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters											
Hardness (CaCO3)	mg/L	130	B083893	35	B083893	130	0.50	B083893			
Ion Balance (% Difference)	%	6.9	B083797	59	B083797	5.0	N/A	B083797			
Nitrate (N)	mg/L	0.053	B086664	0.083	B086664	0.071	0.010	B086664			
Nitrate (NO3)	mg/L	0.23	B083854	0.37	B083854	0.31	0.044	B083854			
Nitrite (NO2)	mg/L	<0.033	B083854	<0.033	B083854	<0.033	0.033	B083854			
Misc. Inorganics											
Conductivity	uS/cm	290	B086045	250	B089626	290	2.0	B086045	290	2.0	B086045
Total Dissolved Solids	mg/L	180	B084328	150	B084328	180	10	B084328			
Anions											
Alkalinity (PP as CaCO3)	mg/L	<1.0	B086048	<1.0	B089621	<1.0	1.0	B086048	<1.0	1.0	B086048
Alkalinity (Total as CaCO3)	mg/L	100	B086048	100	B089621	95	1.0	B086048	110	1.0	B086048
Bicarbonate (HCO3)	mg/L	130	B086048	130	B089621	120	1.0	B086048	130	1.0	B086048
Carbonate (CO3)	mg/L	<1.0	B086048	<1.0	B089621	<1.0	1.0	B086048	<1.0	1.0	B086048
Hydroxide (OH)	mg/L	<1.0	B086048	<1.0	B089621	<1.0	1.0	B086048	<1.0	1.0	B086048
Chloride (Cl)	mg/L	9.1	B086424	11	B090945	9.5	1.0	B086424			
Sulphate (SO4)	mg/L	47	B086424	35	B090945	50	1.0	B086424			
Nutrients											
Nitrite (N)	mg/L	<0.010	B085949	<0.010	B085949	<0.010	0.010	B085949			
Nitrate plus Nitrite (N)	mg/L	0.053	B085949	0.083	B085949	0.071	0.010	B085949			
Elements											
Dissolved Barium (Ba)	mg/L	0.046	B084896	0.015	B087934	0.050	0.010	B084896			
Dissolved Boron (B)	mg/L	<0.020	B084896	<0.020	B087934	<0.020	0.020	B084896			
Dissolved Calcium (Ca)	mg/L	35	B084896	9.6	B087934	34	0.30	B084896			
Dissolved Iron (Fe)	mg/L	<0.060	B084896	<0.060	B087934	<0.060	0.060	B084896			
Dissolved Lithium (Li)	mg/L	<0.020	B084896	<0.020	B087934	<0.020	0.020	B084896			
Dissolved Magnesium (Mg)	mg/L	10	B084896	2.7	B087934	10	0.20	B084896			
Dissolved Manganese (Mn)	mg/L	<0.0040	B084896	<0.0040	B087934	0.0075	0.0040	B084896			
Dissolved Phosphorus (P)	mg/L	<0.10	B084896	<0.10	B087934	<0.10	0.10	B084896			
Dissolved Potassium (K)	mg/L	0.85	B084896	<0.30	B087934	0.84	0.30	B084896			

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

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		BXI873		BXI874		BXI875			BXI875		
Sampling Date		2023/08/19 12:15		2023/08/19 10:15		2023/08/19 11:15			2023/08/19 11:15		
COC Number		292859		292859		292859			292859		
	UNITS	**AEMP-DS-05**	**QC Batch**	**AEMP-US-01**	**QC Batch**	**AEMP-US-02**	**RDL**	**QC Batch**	**AEMP-US-02 Lab-Dup**	**RDL**	**QC Batch**
Dissolved Silicon (Si)	mg/L	1.6	B084896	<0.50	B087934	1.4	0.50	B084896			
Dissolved Sodium (Na)	mg/L	7.4	B084896	2.3	B087934	7.8	0.50	B084896			
Dissolved Strontium (Sr)	mg/L	0.21	B084896	0.065	B087934	0.23	0.020	B084896			
Dissolved Sulphur (S)	mg/L	13	B084896	3.8	B087934	13	0.20	B084896			

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BXI873	BXI874	BXI875		
Sampling Date		2023/08/19 12:15	2023/08/19 10:15	2023/08/19 11:15		
COC Number		292859	292859	292859		
	UNITS	**AEMP-DS-05**	**AEMP-US-01**	**AEMP-US-02**	**RDL**	**QC Batch**
Elements						
Total Cadmium (Cd)	mg/L	0.000081	0.000048	0.000067	0.000020	B083886
Total Mercury (Hg)	ug/L	0.0047	0.0028	0.0025	0.0019	B084811
Total Aluminum (Al)	mg/L	1.4	0.70	1.5	0.0030	B084638
Total Antimony (Sb)	mg/L	<0.00060	0.00075	<0.00060	0.00060	B084638
Total Arsenic (As)	mg/L	0.0013	0.00071	0.0012	0.00020	B084638
Total Barium (Ba)	mg/L	0.078	0.054	0.078	0.010	B084649
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B084638
Total Boron (B)	mg/L	<0.020	<0.020	<0.020	0.020	B084649
Total Calcium (Ca)	mg/L	39	30	37	0.30	B084649
Total Chromium (Cr)	mg/L	0.0023	0.0013	0.0026	0.0010	B084638
Total Cobalt (Co)	mg/L	0.00073	0.00036	0.00087	0.00030	B084638
Total Copper (Cu)	mg/L	0.0028	0.0017	0.0027	0.0010	B084638
Total Iron (Fe)	mg/L	1.6	0.78	1.7	0.060	B084649
Total Lead (Pb)	mg/L	0.00094	0.00056	0.00098	0.00020	B084638
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	0.020	B084649
Total Magnesium (Mg)	mg/L	11	9.8	11	0.20	B084649
Total Manganese (Mn)	mg/L	0.034	0.018	0.040	0.0040	B084649
Total Molybdenum (Mo)	mg/L	0.0012	0.00090	0.0013	0.00020	B084638
Total Nickel (Ni)	mg/L	0.0037	0.0021	0.0045	0.00050	B084638
Total Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	0.10	B084649
Total Potassium (K)	mg/L	1.4	1.0	1.4	0.30	B084649
Total Selenium (Se)	mg/L	0.00048	0.00035	0.00045	0.00020	B084638
Total Silicon (Si)	mg/L	4.2	2.6	4.4	0.50	B084649
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B084638
Total Sodium (Na)	mg/L	8.3	8.5	8.4	0.50	B084649
Total Strontium (Sr)	mg/L	0.23	0.21	0.24	0.020	B084649
Total Sulphur (S)	mg/L	15	11	15	0.20	B084649
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B084638
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B084638
Total Titanium (Ti)	mg/L	0.034	0.016	0.046	0.0010	B084638
Total Uranium (U)	mg/L	0.0010	0.00071	0.00098	0.00010	B084638
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		BXI873	BXI874	BXI875		
Sampling Date		2023/08/19 12:15	2023/08/19 10:15	2023/08/19 11:15		
COC Number		292859	292859	292859		
	UNITS	**AEMP-DS-05**	**AEMP-US-01**	**AEMP-US-02**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	0.0042	0.0023	0.0048	0.0010	B084638
Total Zinc (Zn)	mg/L	0.0091	0.0050	0.0095	0.0030	B084638
RDL = Reportable Detection Limit						

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Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BXI873		BXI874			BXI874		
Sampling Date		2023/08/19 12:15		2023/08/19 10:15			2023/08/19 10:15		
COC Number		292859		292859			292859		
	UNITS	**AEMP-DS-05**	**RDL**	**AEMP-US-01**	**RDL**	**QC Batch**	**AEMP-US-01 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters									
Sulphide (as H2S)	mg/L	0.0081	0.0020	0.0061	0.0020	B083729			
Demand Parameters									
Chemical Oxygen Demand	mg/L	18	10	22	10	B086221			
Elements									
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	<0.000020	0.000020	B083885			
Misc. Inorganics									
Dissolved Organic Carbon (C)	mg/L	4.1	0.50	2.6	0.50	B086584			
Total Organic Carbon (C)	mg/L	3.2	0.50	2.5	0.50	B086421			
Total Suspended Solids	mg/L	35	1.0	21	0.97	B084342			
Anions									
Total Sulphide	mg/L	0.0076 (1)	0.0018	0.0057	0.0018	B084765			
Nutrients									
Total Ammonia (N)	mg/L	<0.015	0.015	<0.015	0.015	B085543			
Orthophosphate (P)	mg/L	<0.0030	0.0030	<0.0030	0.0030	B085900	<0.0030	0.0030	B085900
Misc. Organics									
Total Oil and grease	mg/L	<2.0	2.0	<2.0	2.0	B082618			
Physical Properties									
True Colour	PtCo units	9.4	2.0	6.3	2.0	B086143			
Physical Properties									
Turbidity	NTU	41	0.10	23	0.10	B083495			

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
(1) Matrix spike exceeds acceptance limits due to matrix interference.

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Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BXI875		
Sampling Date		2023/08/19 11:15		
COC Number		292859		
	UNITS	**AEMP-US-02**	**RDL**	**QC Batch**
Calculated Parameters				
Sulphide (as H2S)	mg/L	0.0061	0.0020	B083729
Demand Parameters				
Chemical Oxygen Demand	mg/L	<10 (1)	10	B086221
Elements				
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	B083885
Misc. Inorganics				
Dissolved Organic Carbon (C)	mg/L	5.0	0.50	B087721
Total Organic Carbon (C)	mg/L	2.5	0.50	B086810
Total Suspended Solids	mg/L	51	1.0	B084342
Anions				
Total Sulphide	mg/L	0.0057	0.0018	B084765
Nutrients				
Total Ammonia (N)	mg/L	<0.015	0.015	B085543
Orthophosphate (P)	mg/L	<0.0030	0.0030	B085900
Misc. Organics				
Total Oil and grease	mg/L	<2.0	2.0	B082618
Physical Properties				
True Colour	PtCo units	8.6	2.0	B086143
Physical Properties				
Turbidity	NTU	42	0.10	B083495

RDL = Reportable Detection Limit
(1) COD < DOC: Both values fall within the method uncertainty for duplicates and are likely equivalent. COD < TOC: Both values fall within the method uncertainty for duplicates and are likely equivalent.

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Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BXI873	BXI874	BXI875		
Sampling Date		2023/08/19 12:15	2023/08/19 10:15	2023/08/19 11:15		
COC Number		292859	292859	292859		
	UNITS	**AEMP-DS-05**	**AEMP-US-01**	**AEMP-US-02**	**RDL**	**QC Batch**
Polycyclic Aromatics						
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B083637
Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
Acenaphthylene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
Acridine	ug/L	<0.040	<0.040	<0.040	0.040	B082722
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	B082722
Benzo(a)anthracene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
Benzo(b&j)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
Benzo(k)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
Benzo(g,h,i)perylene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
Benzo(c)phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
Benzo(a)pyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B082722
Benzo(e)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
Chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
Dibenz(a,h)anthracene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B082722
Fluoranthene	ug/L	<0.010	<0.010	<0.010	0.010	B082722
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
Perylene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
Quinoline	ug/L	<0.20	<0.20	<0.20	0.20	B082722
Retene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C1-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
C3-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
C4-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
C2-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
Biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C1-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B082722
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BXI873	BXI874	BXI875		
Sampling Date		2023/08/19 12:15	2023/08/19 10:15	2023/08/19 11:15		
COC Number		292859	292859	292859		
	UNITS	**AEMP-DS-05**	**AEMP-US-01**	**AEMP-US-02**	**RDL**	**QC Batch**
C2-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C1-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C2-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C3-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
Dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C1-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C2-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C3-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C4-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C1 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C2 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C3 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C4 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B082722
C1 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C2 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C3 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C4 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B082722
C1 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
C2 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
C3 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B082722
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B082722
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B082722
C1-Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
1-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B082722
Extraction Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	86	99	98		B082722
D8-ACENAPHTHYLENE (sur.)	%	88	96	99		B082722
D8-NAPHTHALENE (sur.)	%	77	87	89		B082722
TERPHENYL-D14 (sur.)	%	116	118	135 (1)		B082722

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

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Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		BXI873	BXI874	BXI875		
Sampling Date		2023/08/19 12:15	2023/08/19 10:15	2023/08/19 11:15		
COC Number		292859	292859	292859		
	UNITS	**AEMP-DS-05**	**AEMP-US-01**	**AEMP-US-02**	**RDL**	**QC Batch**
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	B084558
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BXI873	BXI874	BXI875		
Sampling Date		2023/08/19 12:15	2023/08/19 10:15	2023/08/19 11:15		
COC Number		292859	292859	292859		
	UNITS	**AEMP-DS-05**	**AEMP-US-01**	**AEMP-US-02**	**RDL**	**QC Batch**
Elements						
Dissolved Aluminum (Al)	mg/L	0.025	0.0087	0.018	0.0030	B084933
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	0.00060	B084933
Dissolved Arsenic (As)	mg/L	0.00026	<0.00020	0.00040	0.00020	B084933
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B084933
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B084933
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	0.00030	B084933
Dissolved Copper (Cu)	mg/L	0.0017	0.0011	0.0017	0.0010	B084933
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B084933
Dissolved Molybdenum (Mo)	mg/L	0.00089	0.00030	0.0011	0.00020	B084933
Dissolved Nickel (Ni)	mg/L	0.00096	<0.00050	0.00096	0.00050	B084933
Dissolved Selenium (Se)	mg/L	0.00038	<0.00020	0.00038	0.00020	B084933
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B084933
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B084933
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B084933
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B084933
Dissolved Uranium (U)	mg/L	0.00074	0.00023	0.00073	0.00010	B084933
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B084933
Dissolved Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	0.0030	B084933
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

TEST SUMMARY

Bureau Veritas ID: BXI873
Sample ID: AEMP-DS-05
Matrix: Water

Collected: 2023/08/19
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B086048	N/A	2023/08/27	Karen Graham
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B085171	N/A	2023/08/26	Rahul Suryawanshi
F1-BTEX	CALC/MS	B083796	N/A	2023/08/27	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B083885	N/A	2023/08/26	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B083886	N/A	2023/08/26	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B086424	N/A	2023/08/28	Marjolen Busslinger
COD by Colorimeter	M/PROB	B086221	N/A	2023/08/28	Ly Vu
True Colour	SPEC/COL	B086143	N/A	2023/08/27	Shanna McKort
Carbon (DOC)	TECH	B086584	N/A	2023/08/28	Ye Hyun KIM
Conductivity @25C	COND	B086045	N/A	2023/08/27	Karen Graham
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B082724	2023/08/28	2023/08/28	Bryanna Quach
Sulphide (as H2S)	CALC	B083729	N/A	2023/08/25	Automated Statchk
Hardness	CALC	B083893	N/A	2023/08/26	Automated Statchk
Mercury (Dissolved) by CV	CV	B084558	2023/08/25	2023/08/25	Kiran Kumari
Mercury (Total) by CV	CV	B084811	2023/08/25	2023/08/25	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B084896	N/A	2023/08/25	Kristijan Kovac
Elements by ICP - Total	ICPA	B084649	2023/08/25	2023/08/26	Kristijan Kovac
Elements by ICPMS - Dissolved	ICPM	B084933	N/A	2023/08/25	Mandeep Kaur
Elements by ICPMS - Total	ICPM	B084638	2023/08/25	2023/08/26	Mandeep Kaur
Ion Balance	CALC	B083797	N/A	2023/08/28	Automated Statchk
Ammonia-N (Total)	KONE	B085543	N/A	2023/08/26	Isabelle White
Nitrate and Nitrite	CALC	B083854	N/A	2023/08/28	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B085949	N/A	2023/08/27	Isabelle White
Nitrate (as N)	CALC	B086664	2023/08/28	2023/08/28	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B082618	2023/08/25	2023/08/25	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B082722	2023/08/28	2023/08/29	Don Maxwell
Benzo[a]pyrene Equivalency	GC/MSD	B083637	N/A	2023/08/31	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B085900	N/A	2023/08/26	Mary Anne Dela Cruz
Total Sulphide	SPEC	B084765	N/A	2023/08/25	Bailey Morrison
Total Dissolved Solids (Filt. Residue)	BAL	B084328	2023/08/25	2023/08/28	Daryl Viktoria Naval
Total Kjeldahl Nitrogen (Total)	CALC	B083781	N/A	2023/08/29	Automated Statchk
Nitrogen (Total)	AC/COL	B087567	2023/08/27	2023/08/29	Carlo Truong
Carbon (Total Organic)	TECH	B086421	N/A	2023/08/28	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B084342	2023/08/25	2023/08/26	Ashhel Zia
Turbidity	TURB	B083495	N/A	2023/08/24	Amy Phan

Bureau Veritas ID: BXI873 Dup
Sample ID: AEMP-DS-05
Matrix: Water

Collected: 2023/08/19
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B085171	N/A	2023/08/26	Rahul Suryawanshi

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Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

TEST SUMMARY

Bureau Veritas ID: BXI874
Sample ID: AEMP-US-01
Matrix: Water

Collected: 2023/08/19
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B089621	N/A	2023/08/30	Jeanette Chavol Melo
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B085171	N/A	2023/08/26	Rahul Suryawanshi
F1-BTEX	CALC/MS	B083796	N/A	2023/08/27	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B083885	N/A	2023/08/26	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B083886	N/A	2023/08/26	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B090945	N/A	2023/08/31	Carlo Truong
COD by Colorimeter	M/PROB	B086221	N/A	2023/08/28	Ly Vu
True Colour	SPEC/COL	B086143	N/A	2023/08/27	Shanna McKort
Carbon (DOC)	TECH	B086584	N/A	2023/08/28	Ye Hyun KIM
Conductivity @25C	COND	B089626	N/A	2023/08/30	Jeanette Chavol Melo
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B082724	2023/08/28	2023/08/28	Bryanna Quach
Sulphide (as H2S)	CALC	B083729	N/A	2023/08/25	Automated Statchk
Hardness	CALC	B083893	N/A	2023/08/26	Automated Statchk
Mercury (Dissolved) by CV	CV	B084558	2023/08/25	2023/08/25	Kiran Kumari
Mercury (Total) by CV	CV	B084811	2023/08/25	2023/08/25	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B087934	N/A	2023/08/29	Vincy Scaria
Elements by ICP - Total	ICPA	B084649	2023/08/25	2023/08/26	Kristijan Kovac
Elements by ICPMS - Dissolved	ICPM	B084933	N/A	2023/08/25	Mandeep Kaur
Elements by ICPMS - Total	ICPM	B084638	2023/08/25	2023/08/26	Mandeep Kaur
Ion Balance	CALC	B083797	N/A	2023/08/28	Automated Statchk
Ammonia-N (Total)	KONE	B085543	N/A	2023/08/26	Isabelle White
Nitrate and Nitrite	CALC	B083854	N/A	2023/08/28	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B085949	N/A	2023/08/27	Isabelle White
Nitrate (as N)	CALC	B086664	2023/08/28	2023/08/28	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B082618	2023/08/25	2023/08/25	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B082722	2023/08/28	2023/08/29	Don Maxwell
Benzo[a]pyrene Equivalency	GC/MSD	B083637	N/A	2023/08/31	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B085900	N/A	2023/08/26	Mary Anne Dela Cruz
Total Sulphide	SPEC	B084765	N/A	2023/08/25	Bailey Morrison
Total Dissolved Solids (Filt. Residue)	BAL	B084328	2023/08/25	2023/08/28	Daryl Viktoria Naval
Total Kjeldahl Nitrogen (Total)	CALC	B083781	N/A	2023/08/29	Automated Statchk
Nitrogen (Total)	AC/COL	B087567	2023/08/27	2023/08/29	Carlo Truong
Carbon (Total Organic)	TECH	B086421	N/A	2023/08/28	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B084342	2023/08/25	2023/08/26	Ashhel Zia
Turbidity	TURB	B083495	N/A	2023/08/24	Amy Phan

Bureau Veritas ID: BXI874 Dup
Sample ID: AEMP-US-01
Matrix: Water

Collected: 2023/08/19
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Orthophosphate by Automated Analyzer	KONE	B085900	N/A	2023/08/26	Mary Anne Dela Cruz

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Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

TEST SUMMARY

Bureau Veritas ID: BXI875
Sample ID: AEMP-US-02
Matrix: Water

Collected: 2023/08/19
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B086048	N/A	2023/08/27	Karen Graham
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B085171	N/A	2023/08/26	Rahul Suryawanshi
F1-BTEX	CALC/MS	B083917	N/A	2023/08/27	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B083885	N/A	2023/08/26	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B083886	N/A	2023/08/26	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B086424	N/A	2023/08/28	Marjolen Busslinger
COD by Colorimeter	M/PROB	B086221	N/A	2023/08/28	Ly Vu
True Colour	SPEC/COL	B086143	N/A	2023/08/27	Shanna McKort
Carbon (DOC)	TECH	B087721	N/A	2023/08/29	Ye Hyun KIM
Conductivity @25C	COND	B086045	N/A	2023/08/27	Karen Graham
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B082724	2023/08/28	2023/08/28	Bryanna Quach
Sulphide (as H2S)	CALC	B083729	N/A	2023/08/25	Automated Statchk
Hardness	CALC	B083893	N/A	2023/08/26	Automated Statchk
Mercury (Dissolved) by CV	CV	B084558	2023/08/25	2023/08/25	Kiran Kumari
Mercury (Total) by CV	CV	B084811	2023/08/25	2023/08/25	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B084896	N/A	2023/08/25	Kristijan Kovac
Elements by ICP - Total	ICPA	B084649	2023/08/25	2023/08/26	Kristijan Kovac
Elements by ICPMS - Dissolved	ICPM	B084933	N/A	2023/08/25	Mandeep Kaur
Elements by ICPMS - Total	ICPM	B084638	2023/08/25	2023/08/26	Mandeep Kaur
Ion Balance	CALC	B083797	N/A	2023/08/28	Automated Statchk
Ammonia-N (Total)	KONE	B085543	N/A	2023/08/26	Isabelle White
Nitrate and Nitrite	CALC	B083854	N/A	2023/08/28	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B085949	N/A	2023/08/27	Isabelle White
Nitrate (as N)	CALC	B086664	2023/08/28	2023/08/28	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B082618	2023/08/25	2023/08/25	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B082722	2023/08/28	2023/08/29	Don Maxwell
Benzo[a]pyrene Equivalency	GC/MSD	B083637	N/A	2023/08/31	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B085900	N/A	2023/08/26	Mary Anne Dela Cruz
Total Sulphide	SPEC	B084765	N/A	2023/08/25	Bailey Morrison
Total Dissolved Solids (Filt. Residue)	BAL	B084328	2023/08/25	2023/08/28	Daryl Viktoria Naval
Total Kjeldahl Nitrogen (Total)	CALC	B083781	N/A	2023/08/29	Automated Statchk
Nitrogen (Total)	AC/COL	B087567	2023/08/27	2023/08/29	Carlo Truong
Carbon (Total Organic)	TECH	B086810	N/A	2023/08/29	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B084342	2023/08/25	2023/08/26	Ashhel Zia
Turbidity	TURB	B083495	N/A	2023/08/24	Amy Phan

Bureau Veritas ID: BXI875 Dup
Sample ID: AEMP-US-02
Matrix: Water

Collected: 2023/08/19
Relinquished: 2023/08/20
Received: 2023/08/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B086048	N/A	2023/08/27	Karen Graham
Conductivity @25C	COND	B086045	N/A	2023/08/27	Karen Graham

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Bureau Veritas Job #: C365246
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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

GENERAL COMMENTS

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

Package 1	6.0°C

Sample BXI873 [AEMP-DS-05] : Sample was analyzed past method specified hold time for Turbidity. 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 Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

Sample BXI874 [AEMP-US-01] : Sample was analyzed past method specified hold time for Turbidity. 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 Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.
Sample containers are not containing same sample aliquot in all parts.

Sample BXI875 [AEMP-US-02] : Sample was analyzed past method specified hold time for Turbidity. 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 Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

Results relate only to the items tested.

DATA QUALITY OVERVIEW

Lab ID	Client Sample ID	Matrix	Test Code	Analysis Type	Parameters	Deviation	Root Cause	Potential Impact
BXI873	AEMP-DS-05	Water	COLOURT-W	PHYS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXI873	AEMP-DS-05	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXI873	AEMP-DS-05	Water	PO4AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXI873	AEMP-DS-05	Water	TURB	SPP	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXI874	AEMP-US-01	Water	COLOURT-W	PHYS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXI874	AEMP-US-01	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXI874	AEMP-US-01	Water	PO4AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.

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Site Location: Norman Wells, NWT
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DATA QUALITY OVERVIEW

Lab ID	Client Sample ID	Matrix	Test Code	Analysis Type	Parameters	Deviation	Root Cause	Potential Impact
BXI874	AEMP-US-01	Water	TURB	SPP	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXI875	AEMP-US-02	Water	COLOURT-W	PHYS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXI875	AEMP-US-02	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXI875	AEMP-US-02	Water	PO4AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXI875	AEMP-US-02	Water	TURB	SPP	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B082618	JB9	Method Blank	Total Oil and grease	2023/08/25	<2.0		mg/L	
B082722	DM	Method Blank	D10-ANTHRACENE (sur.)	2023/08/28		100	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/28		128	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/28		93	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/28		84	%	50 - 130
			Acenaphthene	2023/08/28	<0.10		ug/L	
			Acenaphthylene	2023/08/28	<0.10		ug/L	
			Acridine	2023/08/28	<0.040		ug/L	
			Anthracene	2023/08/28	<0.010		ug/L	
			Benzo(a)anthracene	2023/08/28	<0.0085		ug/L	
			Benzo(b&j)fluoranthene	2023/08/28	<0.0085		ug/L	
			Benzo(k)fluoranthene	2023/08/28	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2023/08/28	<0.0085		ug/L	
			Benzo(c)phenanthrene	2023/08/28	<0.050		ug/L	
			Benzo(a)pyrene	2023/08/28	<0.0075		ug/L	
			Benzo(e)pyrene	2023/08/28	<0.050		ug/L	
			Chrysene	2023/08/28	<0.0085		ug/L	
			Dibenz(a,h)anthracene	2023/08/28	<0.0075		ug/L	
			Fluoranthene	2023/08/28	<0.010		ug/L	
			Fluorene	2023/08/28	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2023/08/28	<0.0085		ug/L	
			Indeno(1,2,3-cd)fluoranthene	2023/08/28	<0.0085		ug/L	
			2-Methylnaphthalene	2023/08/28	<0.10		ug/L	
			Naphthalene	2023/08/28	<0.10		ug/L	
			Phenanthrene	2023/08/28	<0.050		ug/L	
			Perylene	2023/08/28	<0.050		ug/L	
			Pyrene	2023/08/28	<0.020		ug/L	
			Quinoline	2023/08/28	<0.20		ug/L	
			Retene	2023/08/28	<0.050		ug/L	
			C1-Naphthalene	2023/08/28	<0.10		ug/L	
			C3-Naphthalene	2023/08/28	<0.10		ug/L	
			C4-Naphthalene	2023/08/28	<0.10		ug/L	
			C2-Naphthalene	2023/08/28	<0.10		ug/L	
			Biphenyl	2023/08/28	<0.020		ug/L	
			C1-biphenyl	2023/08/28	<0.020		ug/L	
			C2-biphenyl	2023/08/28	<0.020		ug/L	
			C1-fluorene	2023/08/28	<0.050		ug/L	
			C2-fluorene	2023/08/28	<0.050		ug/L	
			C3-fluorene	2023/08/28	<0.050		ug/L	
			Dibenzothiophene	2023/08/28	<0.020		ug/L	
			C1-dibenzothiophene	2023/08/28	<0.020		ug/L	
			C2-dibenzothiophene	2023/08/28	<0.020		ug/L	
			C3-dibenzothiophene	2023/08/28	<0.020		ug/L	
			C4-dibenzothiophene	2023/08/28	<0.020		ug/L	
			C1 phenanthrene/anthracene	2023/08/28	<0.050		ug/L	
			C2 phenanthrene/anthracene	2023/08/28	<0.050		ug/L	
			C3 phenanthrene/anthracene	2023/08/28	<0.050		ug/L	
			C4 phenanthrene/anthracene	2023/08/28	<0.050		ug/L	
			C1 fluoranthene/pyrene	2023/08/28	<0.020		ug/L	
			C2 fluoranthene/pyrene	2023/08/28	<0.020		ug/L	
			C3 fluoranthene/pyrene	2023/08/28	<0.020		ug/L	
			C4 fluoranthene/pyrene	2023/08/28	<0.020		ug/L	

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			C1 benzo(a)anthracene/chrysene	2023/08/28	<0.0085		ug/L	
			C2 benzo(a)anthracene/chrysene	2023/08/28	<0.0085		ug/L	
			C3 benzo(a)anthracene/chrysene	2023/08/28	<0.0085		ug/L	
			C4 benzo(a)anthracene/chrysene	2023/08/28	<0.0085		ug/L	
			C1benzobjkfluoranthene/benzoapyrene	2023/08/28	<0.0075		ug/L	
			C2benzobjkfluoranthene/benzoapyrene	2023/08/28	<0.0075		ug/L	
			C1-Acenaphthene	2023/08/28	<0.10		ug/L	
			1-Methylnaphthalene	2023/08/28	<0.10		ug/L	
B082724	BQU	Method Blank	O-TERPHENYL (sur.)	2023/08/28		91	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/28	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2023/08/28	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2023/08/28	<0.20		mg/L	
B083495	AP1	Method Blank	Turbidity	2023/08/24	<0.10		NTU	
B084328	DVN	Method Blank	Total Dissolved Solids	2023/08/28	<10		mg/L	
B084342	AZI	Method Blank	Total Suspended Solids	2023/08/26	<1.0		mg/L	
B084558	KKM	Method Blank	Dissolved Mercury (Hg)	2023/08/25	<0.0019		ug/L	
B084638	MKJ	Method Blank	Total Aluminum (Al)	2023/08/26	<0.0030		mg/L	
			Total Chromium (Cr)	2023/08/26	<0.0010		mg/L	
			Total Cobalt (Co)	2023/08/26	<0.00030		mg/L	
			Total Copper (Cu)	2023/08/26	<0.0010		mg/L	
			Total Lead (Pb)	2023/08/26	<0.00020		mg/L	
			Total Antimony (Sb)	2023/08/26	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/08/26	<0.00020		mg/L	
			Total Nickel (Ni)	2023/08/26	<0.00050		mg/L	
			Total Selenium (Se)	2023/08/26	<0.00020		mg/L	
			Total Silver (Ag)	2023/08/26	<0.00010		mg/L	
			Total Arsenic (As)	2023/08/26	<0.00020		mg/L	
			Total Thallium (Tl)	2023/08/26	<0.00020		mg/L	
			Total Tin (Sn)	2023/08/26	<0.0010		mg/L	
			Total Titanium (Ti)	2023/08/26	<0.0010		mg/L	
			Total Uranium (U)	2023/08/26	<0.00010		mg/L	
			Total Vanadium (V)	2023/08/26	<0.0010		mg/L	
			Total Zinc (Zn)	2023/08/26	<0.0030		mg/L	
			Total Beryllium (Be)	2023/08/26	<0.0010		mg/L	
B084649	KKC	Method Blank	Total Iron (Fe)	2023/08/26	<0.060		mg/L	
			Total Lithium (Li)	2023/08/26	<0.020		mg/L	
			Total Magnesium (Mg)	2023/08/26	<0.20		mg/L	
			Total Manganese (Mn)	2023/08/26	<0.0040		mg/L	
			Total Potassium (K)	2023/08/26	<0.30		mg/L	
			Total Sodium (Na)	2023/08/26	<0.50		mg/L	
			Total Strontium (Sr)	2023/08/26	<0.020		mg/L	
			Total Sulphur (S)	2023/08/26	<0.20		mg/L	
			Total Phosphorus (P)	2023/08/26	<0.10		mg/L	
			Total Barium (Ba)	2023/08/26	<0.010		mg/L	
			Total Silicon (Si)	2023/08/26	<0.50		mg/L	
			Total Boron (B)	2023/08/26	<0.020		mg/L	
			Total Calcium (Ca)	2023/08/26	<0.30		mg/L	
B084765	BYM	Method Blank	Total Sulphide	2023/08/25	<0.0018		mg/L	
B084811	KKM	Method Blank	Total Mercury (Hg)	2023/08/25	<0.0019		ug/L	
B084896	KKC	Method Blank	Dissolved Iron (Fe)	2023/08/25	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/08/25	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/08/25	<0.20		mg/L	

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Task Order#: 417085-49223
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Site Location: Norman Wells, NWT
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Manganese (Mn)	2023/08/25	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/08/25	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/08/25	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/08/25	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/08/25	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/08/25	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/08/25	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/08/25	<0.50		mg/L	
			Dissolved Boron (B)	2023/08/25	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/08/25	<0.30		mg/L	
B084933	MKJ	Method Blank	Dissolved Aluminum (Al)	2023/08/25	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/08/25	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/08/25	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/08/25	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/08/25	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/08/25	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/08/25	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/08/25	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/08/25	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/08/25	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/08/25	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/08/25	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/08/25	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/08/25	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/08/25	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/08/25	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/08/25	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/08/25	<0.0010		mg/L	
B085171	RSU	Method Blank	1,4-Difluorobenzene (sur.)	2023/08/26		105	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/26		101	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/26		94	%	50 - 140
			Benzene	2023/08/26	<0.00040		mg/L	
			Toluene	2023/08/26	<0.00040		mg/L	
			Ethylbenzene	2023/08/26	<0.00040		mg/L	
			m & p-Xylene	2023/08/26	<0.00080		mg/L	
			o-Xylene	2023/08/26	<0.00040		mg/L	
			F1 (C6-C10)	2023/08/26	<0.10		mg/L	
B085543	ISW	Method Blank	Total Ammonia (N)	2023/08/26	<0.015		mg/L	
B085900	MAP	Method Blank	Orthophosphate (P)	2023/08/26	<0.0030		mg/L	
B085949	ISW	Method Blank	Nitrite (N)	2023/08/27	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/08/27	<0.010		mg/L	
B086045	KGR	Method Blank	Conductivity	2023/08/27	<2.0		uS/cm	
B086048	KGR	Method Blank	Alkalinity (Total as CaCO3)	2023/08/27	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/08/27	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/08/27	<1.0		mg/L	
			Carbonate (CO3)	2023/08/27	<1.0		mg/L	
			Hydroxide (OH)	2023/08/27	<1.0		mg/L	
B086143	SKM	Method Blank	True Colour	2023/08/27	<2.0		PtCo units	
B086221	LYV	Method Blank	Chemical Oxygen Demand	2023/08/28	<10		mg/L	
B086421	YHK	Method Blank	Total Organic Carbon (C)	2023/08/28	<0.50		mg/L	
B086424	MB5	Method Blank	Chloride (Cl)	2023/08/28	<1.0		mg/L	
			Sulphate (SO4)	2023/08/28	<1.0		mg/L	

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B086584	YHK	Method Blank	Dissolved Organic Carbon (C)	2023/08/28	<0.50		mg/L	
B086810	YHK	Method Blank	Total Organic Carbon (C)	2023/08/29	<0.50		mg/L	
B087567	CTU	Method Blank	Total Nitrogen (N)	2023/08/29	<0.020		mg/L	
B087721	YHK	Method Blank	Dissolved Organic Carbon (C)	2023/08/29	<0.50		mg/L	
B087934	VSC	Method Blank	Dissolved Iron (Fe)	2023/08/29	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/08/29	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/08/29	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/08/29	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/08/29	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/08/29	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/08/29	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/08/29	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/08/29	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/08/29	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/08/29	<0.50		mg/L	
			Dissolved Boron (B)	2023/08/29	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/08/29	<0.30		mg/L	
B089621	JVM	Method Blank	Alkalinity (Total as CaCO3)	2023/08/30	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/08/30	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/08/30	<1.0		mg/L	
			Carbonate (CO3)	2023/08/30	<1.0		mg/L	
			Hydroxide (OH)	2023/08/30	<1.0		mg/L	
B089626	JVM	Method Blank	Conductivity	2023/08/30	<2.0		uS/cm	
B090945	CTU	Method Blank	Chloride (Cl)	2023/08/31	<1.0		mg/L	
			Sulphate (SO4)	2023/08/31	<1.0		mg/L	
B085171	RSU	RPD [BXI873-11]	Benzene	2023/08/26	NC		%	30
			Toluene	2023/08/26	NC		%	30
			Ethylbenzene	2023/08/26	NC		%	30
			m & p-Xylene	2023/08/26	NC		%	30
			o-Xylene	2023/08/26	NC		%	30
			F1 (C6-C10)	2023/08/26	NC		%	30
B085900	MAP	RPD [BXI874-02]	Orthophosphate (P)	2023/08/26	NC		%	20
B086045	KGR	RPD [BXI875-02]	Conductivity	2023/08/27	0.35		%	10
B086048	KGR	RPD [BXI875-02]	Alkalinity (Total as CaCO3)	2023/08/27	10		%	20
			Alkalinity (PP as CaCO3)	2023/08/27	NC		%	20
			Bicarbonate (HCO3)	2023/08/27	10		%	20
			Carbonate (CO3)	2023/08/27	NC		%	20
			Hydroxide (OH)	2023/08/27	NC		%	20
B084765	BYM	Matrix Spike [BXI873-07]	Total Sulphide	2023/08/25		21 (1)	%	80 - 120
B085171	RSU	Matrix Spike [BXI874-11]	1,4-Difluorobenzene (sur.)	2023/08/26		95	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/26		97	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/26		89	%	50 - 140
			Benzene	2023/08/26		82	%	50 - 140
			Toluene	2023/08/26		79	%	50 - 140
			Ethylbenzene	2023/08/26		88	%	50 - 140
			m & p-Xylene	2023/08/26		86	%	50 - 140
			o-Xylene	2023/08/26		88	%	50 - 140
			F1 (C6-C10)	2023/08/26		103	%	60 - 140
B085900	MAP	Matrix Spike [BXI874-02]	Orthophosphate (P)	2023/08/26		98	%	80 - 120
B082618	JB9	LCS	Total Oil and grease	2023/08/25		105	%	70 - 130
B082722	DM	LCS	D10-ANTHRACENE (sur.)	2023/08/28		109	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/28		143 (1)	%	50 - 130

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Site Location: Norman Wells, NWT
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			D8-ACENAPHTHYLENE (sur.)	2023/08/28		103	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/28		87	%	50 - 130
			Acenaphthene	2023/08/28		88	%	50 - 130
			Acenaphthylene	2023/08/28		84	%	50 - 130
			Acridine	2023/08/28		76	%	50 - 130
			Anthracene	2023/08/28		86	%	50 - 130
			Benzo(a)anthracene	2023/08/28		106	%	50 - 130
			Benzo(b&j)fluoranthene	2023/08/28		100	%	50 - 130
			Benzo(k)fluoranthene	2023/08/28		107	%	50 - 130
			Benzo(g,h,i)perylene	2023/08/28		97	%	50 - 130
			Benzo(c)phenanthrene	2023/08/28		106	%	50 - 130
			Benzo(a)pyrene	2023/08/28		104	%	50 - 130
			Benzo(e)pyrene	2023/08/28		94	%	50 - 130
			Chrysene	2023/08/28		96	%	50 - 130
			Dibenz(a,h)anthracene	2023/08/28		103	%	50 - 130
			Fluoranthene	2023/08/28		100	%	50 - 130
			Fluorene	2023/08/28		86	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/08/28		103	%	50 - 130
			2-Methylnaphthalene	2023/08/28		83	%	50 - 130
			Naphthalene	2023/08/28		76	%	50 - 130
			Phenanthrene	2023/08/28		89	%	50 - 130
			Perylene	2023/08/28		94	%	50 - 130
			Pyrene	2023/08/28		101	%	50 - 130
			Quinoline	2023/08/28		84	%	50 - 130
			C1-Naphthalene	2023/08/28		66	%	50 - 130
			C3-Naphthalene	2023/08/28		87	%	50 - 130
			C2-Naphthalene	2023/08/28		78	%	50 - 130
			C1-biphenyl	2023/08/28		72	%	50 - 130
			C1 phenanthrene/anthracene	2023/08/28		100	%	50 - 130
			C2 phenanthrene/anthracene	2023/08/28		101	%	50 - 130
			C1 fluoranthene/pyrene	2023/08/28		103	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/08/28		59	%	30 - 130
			1-Methylnaphthalene	2023/08/28		66	%	50 - 130
B082724	BQU	LCS	O-TERPHENYL (sur.)	2023/08/28		93	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/28		84	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/08/28		92	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/08/28		88	%	60 - 140
B083495	AP1	LCS	Turbidity	2023/08/24		99	%	80 - 120
B084328	DVN	LCS	Total Dissolved Solids	2023/08/28		97	%	80 - 120
B084342	AZI	LCS	Total Suspended Solids	2023/08/26		97	%	80 - 120
B084558	KKM	LCS	Dissolved Mercury (Hg)	2023/08/25		106	%	80 - 120
B084638	MKJ	LCS	Total Aluminum (Al)	2023/08/25		105	%	80 - 120
			Total Chromium (Cr)	2023/08/25		100	%	80 - 120
			Total Cobalt (Co)	2023/08/25		100	%	80 - 120
			Total Copper (Cu)	2023/08/25		102	%	80 - 120
			Total Lead (Pb)	2023/08/25		102	%	80 - 120
			Total Antimony (Sb)	2023/08/25		103	%	80 - 120
			Total Molybdenum (Mo)	2023/08/25		102	%	80 - 120
			Total Nickel (Ni)	2023/08/25		100	%	80 - 120
			Total Selenium (Se)	2023/08/25		99	%	80 - 120
			Total Silver (Ag)	2023/08/25		101	%	80 - 120
			Total Arsenic (As)	2023/08/25		96	%	80 - 120

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Advisian
Task Order#: 417085-49223
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Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Thallium (Tl)	2023/08/25		103	%	80 - 120
			Total Tin (Sn)	2023/08/25		99	%	80 - 120
			Total Titanium (Ti)	2023/08/25		100	%	80 - 120
			Total Uranium (U)	2023/08/25		102	%	80 - 120
			Total Vanadium (V)	2023/08/25		101	%	80 - 120
			Total Zinc (Zn)	2023/08/25		100	%	80 - 120
			Total Beryllium (Be)	2023/08/25		97	%	80 - 120
B084649	KKC	LCS	Total Iron (Fe)	2023/08/26		103	%	80 - 120
			Total Lithium (Li)	2023/08/26		99	%	80 - 120
			Total Magnesium (Mg)	2023/08/26		98	%	80 - 120
			Total Manganese (Mn)	2023/08/26		104	%	80 - 120
			Total Potassium (K)	2023/08/26		100	%	80 - 120
			Total Sodium (Na)	2023/08/26		100	%	80 - 120
			Total Strontium (Sr)	2023/08/26		93	%	80 - 120
			Total Sulphur (S)	2023/08/26		96	%	80 - 120
			Total Phosphorus (P)	2023/08/26		97	%	80 - 120
			Total Barium (Ba)	2023/08/26		97	%	80 - 120
			Total Silicon (Si)	2023/08/26		98	%	80 - 120
			Total Boron (B)	2023/08/26		96	%	80 - 120
			Total Calcium (Ca)	2023/08/26		98	%	80 - 120
B084765	BYM	LCS	Total Sulphide	2023/08/25		98	%	80 - 120
B084811	KKM	LCS	Total Mercury (Hg)	2023/08/25		107	%	80 - 120
B084896	KKC	LCS	Dissolved Iron (Fe)	2023/08/25		101	%	80 - 120
			Dissolved Lithium (Li)	2023/08/25		96	%	80 - 120
			Dissolved Magnesium (Mg)	2023/08/25		98	%	80 - 120
			Dissolved Manganese (Mn)	2023/08/25		111	%	80 - 120
			Dissolved Potassium (K)	2023/08/25		100	%	80 - 120
			Dissolved Sodium (Na)	2023/08/25		96	%	80 - 120
			Dissolved Strontium (Sr)	2023/08/25		93	%	80 - 120
			Dissolved Sulphur (S)	2023/08/25		98	%	80 - 120
			Dissolved Phosphorus (P)	2023/08/25		99	%	80 - 120
			Dissolved Barium (Ba)	2023/08/25		96	%	80 - 120
			Dissolved Silicon (Si)	2023/08/25		95	%	80 - 120
			Dissolved Boron (B)	2023/08/25		97	%	80 - 120
			Dissolved Calcium (Ca)	2023/08/25		97	%	80 - 120
B084933	MKJ	LCS	Dissolved Aluminum (Al)	2023/08/25		107	%	80 - 120
			Dissolved Chromium (Cr)	2023/08/25		98	%	80 - 120
			Dissolved Cobalt (Co)	2023/08/25		99	%	80 - 120
			Dissolved Copper (Cu)	2023/08/25		100	%	80 - 120
			Dissolved Lead (Pb)	2023/08/25		99	%	80 - 120
			Dissolved Antimony (Sb)	2023/08/25		102	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/08/25		100	%	80 - 120
			Dissolved Nickel (Ni)	2023/08/25		98	%	80 - 120
			Dissolved Selenium (Se)	2023/08/25		102	%	80 - 120
			Dissolved Silver (Ag)	2023/08/25		97	%	80 - 120
			Dissolved Arsenic (As)	2023/08/25		96	%	80 - 120
			Dissolved Thallium (Tl)	2023/08/25		99	%	80 - 120
			Dissolved Tin (Sn)	2023/08/25		100	%	80 - 120
			Dissolved Titanium (Ti)	2023/08/25		104	%	80 - 120
			Dissolved Uranium (U)	2023/08/25		97	%	80 - 120
			Dissolved Vanadium (V)	2023/08/25		100	%	80 - 120
			Dissolved Zinc (Zn)	2023/08/25		99	%	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
			Dissolved Beryllium (Be)	2023/08/25		96	%	80 - 120
B085171	RSU	LCS	1,4-Difluorobenzene (sur.)	2023/08/26		97	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/26		97	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/26		86	%	50 - 140
			Benzene	2023/08/26		85	%	60 - 130
			Toluene	2023/08/26		84	%	60 - 130
			Ethylbenzene	2023/08/26		94	%	60 - 130
			m & p-Xylene	2023/08/26		92	%	60 - 130
			o-Xylene	2023/08/26		92	%	60 - 130
			F1 (C6-C10)	2023/08/26		101	%	60 - 140
B085543	ISW	LCS	Total Ammonia (N)	2023/08/26		107	%	80 - 120
B085900	MAP	LCS	Orthophosphate (P)	2023/08/26		101	%	80 - 120
B085949	ISW	LCS	Nitrite (N)	2023/08/27		102	%	80 - 120
			Nitrate plus Nitrite (N)	2023/08/27		102	%	80 - 120
B086045	KGR	LCS	Conductivity	2023/08/27		101	%	90 - 110
B086048	KGR	LCS	Alkalinity (Total as CaCO3)	2023/08/27		100	%	80 - 120
B086143	SKM	LCS	True Colour	2023/08/27		105	%	80 - 120
B086221	LYV	LCS	Chemical Oxygen Demand	2023/08/28		104	%	80 - 120
B086421	YHK	LCS	Total Organic Carbon (C)	2023/08/28		100	%	80 - 120
B086424	MB5	LCS	Chloride (Cl)	2023/08/28		100	%	80 - 120
			Sulphate (SO4)	2023/08/28		101	%	80 - 120
B086584	YHK	LCS	Dissolved Organic Carbon (C)	2023/08/28		99	%	80 - 120
B086810	YHK	LCS	Total Organic Carbon (C)	2023/08/29		100	%	80 - 120
B087567	CTU	LCS	Total Nitrogen (N)	2023/08/29		99	%	80 - 120
B087721	YHK	LCS	Dissolved Organic Carbon (C)	2023/08/29		109	%	80 - 120
B087934	VSC	LCS	Dissolved Iron (Fe)	2023/08/29		98	%	80 - 120
			Dissolved Lithium (Li)	2023/08/29		97	%	80 - 120
			Dissolved Magnesium (Mg)	2023/08/29		99	%	80 - 120
			Dissolved Manganese (Mn)	2023/08/29		98	%	80 - 120
			Dissolved Potassium (K)	2023/08/29		95	%	80 - 120
			Dissolved Sodium (Na)	2023/08/29		96	%	80 - 120
			Dissolved Strontium (Sr)	2023/08/29		96	%	80 - 120
			Dissolved Sulphur (S)	2023/08/29		93	%	80 - 120
			Dissolved Phosphorus (P)	2023/08/29		97	%	80 - 120
			Dissolved Barium (Ba)	2023/08/29		102	%	80 - 120
			Dissolved Silicon (Si)	2023/08/29		95	%	80 - 120
			Dissolved Boron (B)	2023/08/29		98	%	80 - 120
			Dissolved Calcium (Ca)	2023/08/29		99	%	80 - 120
B089621	JVM	LCS	Alkalinity (Total as CaCO3)	2023/08/30		99	%	80 - 120
B089626	JVM	LCS	Conductivity	2023/08/30		102	%	90 - 110
B090945	CTU	LCS	Chloride (Cl)	2023/08/31		98	%	80 - 120
			Sulphate (SO4)	2023/08/31		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
B087567	CTU	SRM	Total Nitrogen (N)	2023/08/29		94	%	80 - 120

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.

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

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

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

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

NC (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.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C365246
Report Date: 2023/09/06

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

VALIDATION SIGNATURE PAGE

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

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Jared Wiseman, B.Sc., P.Chem., QP, Senior Analyst, Organics

Qiliang (Alex) Wu, Senior Analyst

Jingyuan Song, QP, Organics – Senior Analyst

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

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Automated Statchk

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Maxxam
A Bureau Veritas Group Company

☑ Calgary
4000 19th St. NE, T2E 6P8
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Toll Free: (800) 386-7247

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 299440

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: ALEX HAIGH
Address: 49 QUARRY PARK BLVD SE CALGARY, AB, T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Sampler Name (Print): TINO NGULUBE/ALEX HAIGH

REPORT INFORMATION

Company Name: ADVISIAN
Contact Name: ALEX HAIGH
Address: 49 QUARRY PARK BLVD SE CALGARY, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Consultant Project #: 417085-49223.23200

ANALYSIS REQUESTED

FIELD SAMPLE ID	MATRIX: GROUND WATER	SURFACE WATER	SOIL	OTHER	# CONTAINERS	SAMPLING: DATE (YYYY/MM/DD)	TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☒ DIS ☐	MERCURY TOTAL ☒ DISSOLVED ☑	~~SALINITY/SOIL~~ TPH	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY	pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	TRUE COLOUR, TSS, TDS, TURBIDITY	oil and grease	TOC, DOC, SULPHIDE	NITRATE, NITRITE, AMMONIA (TOTAL), TKN	ORTHOPHOSPHATE	SULPHUR - TOTAL + DISSOLVED	COD	Alkylated PAHs
1 ~~[illegible]~~ AEMP-DS-05		X			18	2023/08/19	12:15	X			X	X							X	X	X				X			X	X	X	X	X	X	X	X
2 AEMP-US-01		X			18	2023/08/19	10:15	X			X	X							X	X	X				X			X	X	X	X	X	X	X	X
3 AEMP-US-02		X			18	2023/08/19	11:15	X			X	X							X	X	X				X			X	X	X	X	X	X	X	X
4																																			
5																																			
6																																			
7																																			
8																																			
9																																			
10																																			

mcal-08-3279

IOL SITE LOCATION: NORMAN WELLS, NT
IOL PROJECT # (if applicable): N/A
MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-49223.23200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) FAL ☐ Other

SPECIAL INSTRUCTIONS: please email canada.chemistry@worley.com CACAL-IORLdatatrack@worley.com Stacy.gibb@advisian.com
IES A2601436

JARS USED & NOT SUBMITTED (Enter N/A for Water): N/A

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID # MCAC				YES	NO	COOLER ID #				YES	NO	COOLER ID #			
SEAL PRESENT	✓		TEMP °C	1: 7	2: 6	3: 5	SEAL PRESENT			TEMP °C	1	2	3	SEAL PRESENT			TEMP °C	1	2	3
SEAL INTACT	✓						SEAL INTACT							SEAL INTACT						
COOLING MEDIA PRESENT	✓						COOLING MEDIA PRESENT							COOLING MEDIA PRESENT						

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1. [signature]	TINO NGULUBE	2023/08/20	09:00	1. [signature]	Nirkamal Sori	2023/08/22	15:00
2.				2.			
3.				3.			

LAB USE ONLY
MAXXAM JOB # C365246
SAMPLES
LABELED BY:
VERIFIED BY:

COC-1010 (06/2016) IOL-AB
White: Maxxam Yellow: Client

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200
Your C.O.C. #: 299623

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/09/08
Report #: R3392276
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C366008
Received: 2023/08/24, 15:00

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	AB SOP-00005	SM 24 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	1	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	1		Auto Calc
Cadmium - low level CCME - Dissolved	1		Auto Calc
Cadmium - low level CCME (Total)	1		Auto Calc
Chloride/Sulphate by Auto Colourimetry	1	AB SOP-00020	SM24-4500-Cl/SO4-E m
COD by Colorimeter	1	AB SOP-00016	SM 23 5220D m
True Colour	1	CAL SOP-00049	SM 24 2120 C m
Carbon (DOC) (1)	1	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	1	AB SOP-00005	SM 24 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	1	AB SOP-00037	CCME PHC-CWS m
Sulphide (as H2S)	1		Auto Calc
Hardness	1		Auto Calc
Mercury (Dissolved) by CV (3)	1	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	1	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	1	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	1	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (3)	1	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	1	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	1		Auto Calc
Ammonia-N (Total)	1	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate and Nitrite	1		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	1	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N)	1		Auto Calc
Oil and Grease (Gravimetric, n-Hexane)	1	AB SOP-00092	SM 23 5520B/5520F m
Target & Alkylated PAH in Water by GC/MS (4)	1	AB SOP-00037 CAL SOP-00250	EPA 8270e m
Benzo[a]pyrene Equivalency (5)	1		Auto Calc
Orthophosphate by Automated Analyzer (6)	1	AB SOP-00025	SM 24 4500-P A,F m
Total Sulphide	1	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	1	AB SOP-00065	SM 24 2540 C m
Total Kjeldahl Nitrogen (Total)	1	BBY WI-00033	Auto Calc

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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200
Your C.O.C. #: 299623

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/09/08
Report #: R3392276
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C366008
Received: 2023/08/24, 15:00

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Laboratory Method	Analytical Method
Nitrogen (Total)	1	AB SOP-00093	SM 24 4500-N C m
Carbon (Total Organic) (7)	1	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR)	1	AB SOP-00061	SM 24 2540 D m
Turbidity	1	CAL SOP-00081	SM 24 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) 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.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Alkylated PAH results are semiquantitative
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(6) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200
Your C.O.C. #: 299623

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/09/08
Report #: R3392276
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C366008
Received: 2023/08/24, 15:00
(7) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Namita Sahni
Customer Solutions Representative
08 Sep 2023 09:51:35

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614
==========
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Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C366008
Report Date: 2023/09/08

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		BXM697			BXM697		
Sampling Date		2023/08/21 10:30			2023/08/21 10:30		
COC Number		299623			299623		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**	**AEMP-DS-06 Lab-Dup**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.10	B082724			
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	0.10	B082724			
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	0.20	B082724			
Volatiles							
Benzene	mg/L	<0.00040	0.00040	B087185	<0.00040	0.00040	B087185
Toluene	mg/L	<0.00040	0.00040	B087185	<0.00040	0.00040	B087185
Ethylbenzene	mg/L	<0.00040	0.00040	B087185	<0.00040	0.00040	B087185
m & p-Xylene	mg/L	<0.00080	0.00080	B087185	<0.00080	0.00080	B087185
o-Xylene	mg/L	<0.00040	0.00040	B087185	<0.00040	0.00040	B087185
Xylenes (Total)	mg/L	<0.00089	0.00089	B084245			
F1 (C6-C10) - BTEX	mg/L	<0.10	0.10	B084245			
F1 (C6-C10)	mg/L	<0.10	0.10	B087185	<0.10	0.10	B087185
Extraction Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	91		B082724			
Instrument Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	106		B087185	103		B087185
4-Bromofluorobenzene (sur.)	%	103		B087185	103		B087185
D4-1,2-Dichloroethane (sur.)	%	100		B087185	103		B087185

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C366008
Report Date: 2023/09/08

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		BXM697		
Sampling Date		2023/08/21 10:30		
COC Number		299623		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Calculated Parameters				
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.16	0.020	B084367
Nutrients				
Total Nitrogen (N)	mg/L	0.21	0.020	B087152
RDL = Reportable Detection Limit				

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Bureau Veritas Job #: C366008
Report Date: 2023/09/08

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		BXM697			BXM697		
Sampling Date		2023/08/21 10:30			2023/08/21 10:30		
COC Number		299623			299623		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**	**AEMP-DS-06 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters							
Hardness (CaCO3)	mg/L	170	0.50	B085174			
Ion Balance (% Difference)	%	6.8	N/A	B084291			
Nitrate (N)	mg/L	0.050	0.010	B087056			
Nitrate (NO3)	mg/L	0.22	0.044	B085175			
Nitrite (NO2)	mg/L	<0.033	0.033	B085175			
Misc. Inorganics							
Conductivity	uS/cm	370	2.0	B088057			
Total Dissolved Solids	mg/L	230	10	B086196			
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	B088051			
Alkalinity (Total as CaCO3)	mg/L	110	1.0	B088051			
Bicarbonate (HCO3)	mg/L	140	1.0	B088051			
Carbonate (CO3)	mg/L	<1.0	1.0	B088051			
Hydroxide (OH)	mg/L	<1.0	1.0	B088051			
Chloride (Cl)	mg/L	9.7	1.0	B086789			
Sulphate (SO4)	mg/L	83	1.0	B086789			
Nutrients							
Nitrite (N)	mg/L	<0.010	0.010	B086125			
Nitrate plus Nitrite (N)	mg/L	0.050	0.010	B086125			
Elements							
Dissolved Barium (Ba)	mg/L	0.059	0.010	B086155	0.057	0.010	B086155
Dissolved Boron (B)	mg/L	0.028	0.020	B086155	0.022	0.020	B086155
Dissolved Calcium (Ca)	mg/L	43	0.30	B086155	43	0.30	B086155
Dissolved Iron (Fe)	mg/L	<0.060	0.060	B086155	<0.060	0.060	B086155
Dissolved Lithium (Li)	mg/L	<0.020	0.020	B086155	<0.020	0.020	B086155
Dissolved Magnesium (Mg)	mg/L	14	0.20	B086155	14	0.20	B086155
Dissolved Manganese (Mn)	mg/L	<0.0040	0.0040	B086155	<0.0040	0.0040	B086155
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	B086155	<0.10	0.10	B086155
Dissolved Potassium (K)	mg/L	0.93	0.30	B086155	0.91	0.30	B086155

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

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C366008
Report Date: 2023/09/08

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		BXM697			BXM697		
Sampling Date		2023/08/21 10:30			2023/08/21 10:30		
COC Number		299623			299623		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**	**AEMP-DS-06 Lab-Dup**	**RDL**	**QC Batch**
Dissolved Silicon (Si)	mg/L	1.6	0.50	B086155	1.6	0.50	B086155
Dissolved Sodium (Na)	mg/L	8.6	0.50	B086155	8.6	0.50	B086155
Dissolved Strontium (Sr)	mg/L	0.26	0.020	B086155	0.26	0.020	B086155
Dissolved Sulphur (S)	mg/L	26	0.20	B086155	26	0.20	B086155

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C366008
Report Date: 2023/09/08

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200

REGULATED METALS (CCME/AT1) - TOTAL

Bureau Veritas ID		BXM697		
Sampling Date		2023/08/21 10:30		
COC Number		299623		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Elements				
Total Cadmium (Cd)	mg/L	0.00010	0.000020	B084359
Total Aluminum (Al)	mg/L	2.3	0.0030	B086325
Total Antimony (Sb)	mg/L	<0.00060	0.00060	B086325
Total Arsenic (As)	mg/L	0.0014	0.00020	B086325
Total Barium (Ba)	mg/L	0.098	0.010	B086327
Total Beryllium (Be)	mg/L	<0.0010	0.0010	B086325
Total Boron (B)	mg/L	0.020	0.020	B086327
Total Calcium (Ca)	mg/L	50	0.30	B086327
Total Chromium (Cr)	mg/L	0.0034	0.0010	B086325
Total Cobalt (Co)	mg/L	0.0013	0.00030	B086325
Total Copper (Cu)	mg/L	0.0032	0.0010	B086325
Total Iron (Fe)	mg/L	2.4	0.060	B086327
Total Lead (Pb)	mg/L	0.0012	0.00020	B086325
Total Lithium (Li)	mg/L	<0.020	0.020	B086327
Total Magnesium (Mg)	mg/L	17	0.20	B086327
Total Manganese (Mn)	mg/L	0.051	0.0040	B086327
Total Molybdenum (Mo)	mg/L	0.0013	0.00020	B086325
Total Nickel (Ni)	mg/L	0.0052	0.00050	B086325
Total Phosphorus (P)	mg/L	<0.10	0.10	B086327
Total Potassium (K)	mg/L	1.7	0.30	B086327
Total Selenium (Se)	mg/L	0.00065	0.00020	B086325
Total Silicon (Si)	mg/L	5.9	0.50	B086327
Total Silver (Ag)	mg/L	<0.00010	0.00010	B086325
Total Sodium (Na)	mg/L	9.5	0.50	B086327
Total Strontium (Sr)	mg/L	0.29	0.020	B086327
Total Sulphur (S)	mg/L	26	0.20	B086327
Total Thallium (Tl)	mg/L	<0.00020	0.00020	B086325
Total Tin (Sn)	mg/L	<0.0010	0.0010	B086325
Total Titanium (Ti)	mg/L	0.060	0.0010	B086325
Total Uranium (U)	mg/L	0.0011	0.00010	B086325
Total Vanadium (V)	mg/L	0.0072	0.0010	B086325
RDL = Reportable Detection Limit				

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200

REGULATED METALS (CCME/AT1) - TOTAL

Bureau Veritas ID		BXM697		
Sampling Date		2023/08/21 10:30		
COC Number		299623		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Total Zinc (Zn)	mg/L	0.016	0.0030	B086325
RDL = Reportable Detection Limit				

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RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BXM697			BXM697		
Sampling Date		2023/08/21 10:30			2023/08/21 10:30		
COC Number		299623			299623		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**	**AEMP-DS-06 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters							
Sulphide (as H2S)	mg/L	<0.0020	0.0020	B084289			
Demand Parameters							
Chemical Oxygen Demand	mg/L	25	10	B086221			
Elements							
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	B084358			
Misc. Inorganics							
Dissolved Organic Carbon (C)	mg/L	3.3	0.50	B086687			
Total Organic Carbon (C)	mg/L	2.8	0.50	B086880			
Total Suspended Solids	mg/L	54	1.0	B086207			
Anions							
Total Sulphide	mg/L	<0.0018	0.0018	B085537			
Nutrients							
Total Ammonia (N)	mg/L	0.016	0.015	B087321			
Orthophosphate (P)	mg/L	<0.0030	0.0030	B087080			
Misc. Organics							
Total Oil and grease	mg/L	<2.0	2.0	B085917			
Physical Properties							
True Colour	PtCo units	8.9	2.0	B086143	9.6	2.0	B086143
Physical Properties							
Turbidity	NTU	49	0.10	B086011			

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BXM697		
Sampling Date		2023/08/21 10:30		
COC Number		299623		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Polycyclic Aromatics				
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	0.000010	B084337
Acenaphthene	ug/L	<0.10	0.10	B082722
Acenaphthylene	ug/L	<0.10	0.10	B082722
Acridine	ug/L	<0.040	0.040	B082722
Anthracene	ug/L	<0.010	0.010	B082722
Benzo(a)anthracene	ug/L	<0.0085	0.0085	B082722
Benzo(b&j)fluoranthene	ug/L	<0.0085	0.0085	B082722
Benzo(k)fluoranthene	ug/L	<0.0085	0.0085	B082722
Benzo(g,h,i)perylene	ug/L	<0.0085	0.0085	B082722
Benzo(c)phenanthrene	ug/L	<0.050	0.050	B082722
Benzo(a)pyrene	ug/L	<0.0075	0.0075	B082722
Benzo(e)pyrene	ug/L	<0.050	0.050	B082722
Chrysene	ug/L	<0.0085	0.0085	B082722
Dibenz(a,h)anthracene	ug/L	<0.0075	0.0075	B082722
Fluoranthene	ug/L	<0.010	0.010	B082722
Fluorene	ug/L	<0.050	0.050	B082722
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	0.0085	B082722
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	0.0085	B082722
2-Methylnaphthalene	ug/L	<0.10	0.10	B082722
Naphthalene	ug/L	<0.10	0.10	B082722
Phenanthrene	ug/L	<0.050	0.050	B082722
Perylene	ug/L	<0.050	0.050	B082722
Pyrene	ug/L	<0.020	0.020	B082722
Quinoline	ug/L	<0.20	0.20	B082722
Retene	ug/L	<0.050	0.050	B082722
C1-Naphthalene	ug/L	<0.10	0.10	B082722
C3-Naphthalene	ug/L	<0.10	0.10	B082722
C4-Naphthalene	ug/L	<0.10	0.10	B082722
C2-Naphthalene	ug/L	<0.10	0.10	B082722
Biphenyl	ug/L	<0.020	0.020	B082722
C1-biphenyl	ug/L	<0.020	0.020	B082722
RDL = Reportable Detection Limit				

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Site Location: Norman Wells, NWT
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SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BXM697		
Sampling Date		2023/08/21 10:30		
COC Number		299623		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
C2-biphenyl	ug/L	<0.020	0.020	B082722
C1-fluorene	ug/L	<0.050	0.050	B082722
C2-fluorene	ug/L	<0.050	0.050	B082722
C3-fluorene	ug/L	<0.050	0.050	B082722
Dibenzothiophene	ug/L	<0.020	0.020	B082722
C1-dibenzothiophene	ug/L	<0.020	0.020	B082722
C2-dibenzothiophene	ug/L	<0.020	0.020	B082722
C3-dibenzothiophene	ug/L	<0.020	0.020	B082722
C4-dibenzothiophene	ug/L	<0.020	0.020	B082722
C1 phenanthrene/anthracene	ug/L	<0.050	0.050	B082722
C2 phenanthrene/anthracene	ug/L	<0.050	0.050	B082722
C3 phenanthrene/anthracene	ug/L	<0.050	0.050	B082722
C4 phenanthrene/anthracene	ug/L	<0.050	0.050	B082722
C1 fluoranthene/pyrene	ug/L	<0.020	0.020	B082722
C2 fluoranthene/pyrene	ug/L	<0.020	0.020	B082722
C3 fluoranthene/pyrene	ug/L	<0.020	0.020	B082722
C4 fluoranthene/pyrene	ug/L	<0.020	0.020	B082722
C1 benzo(a)anthracene/chrysene	ug/L	<0.0085	0.0085	B082722
C2 benzo(a)anthracene/chrysene	ug/L	<0.0085	0.0085	B082722
C3 benzo(a)anthracene/chrysene	ug/L	<0.0085	0.0085	B082722
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	0.0085	B082722
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	0.0075	B082722
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	0.0075	B082722
C1-Acenaphthene	ug/L	<0.10	0.10	B082722
1-Methylnaphthalene	ug/L	<0.10	0.10	B082722
Extraction Surrogate Recovery (%)				
D10-ANTHRACENE (sur.)	%	96		B082722
D8-ACENAPHTHYLENE (sur.)	%	90		B082722
D8-NAPHTHALENE (sur.)	%	75		B082722
TERPHENYL-D14 (sur.)	%	124		B082722
RDL = Reportable Detection Limit				

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MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		BXM697		
Sampling Date		2023/08/21 10:30		
COC Number		299623		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Elements				
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	B085858
Total Mercury (Hg)	ug/L	0.0035	0.0019	B085863
RDL = Reportable Detection Limit				

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BXM697		
Sampling Date		2023/08/21 10:30		
COC Number		299623		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Elements				
Dissolved Aluminum (Al)	mg/L	0.051	0.0030	B085866
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	B085866
Dissolved Arsenic (As)	mg/L	0.00031	0.00020	B085866
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	B085866
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	B085866
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	B085866
Dissolved Copper (Cu)	mg/L	<0.0010	0.0010	B085866
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	B085866
Dissolved Molybdenum (Mo)	mg/L	0.0011	0.00020	B085866
Dissolved Nickel (Ni)	mg/L	0.0011	0.00050	B085866
Dissolved Selenium (Se)	mg/L	0.00050	0.00020	B085866
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	B085866
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	B085866
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	B085866
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	B085866
Dissolved Uranium (U)	mg/L	0.00093	0.00010	B085866
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	B085866
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	B085866
RDL = Reportable Detection Limit				

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200

TEST SUMMARY

Bureau Veritas ID: BXM697
Sample ID: AEMP-DS-06
Matrix: Water

Collected: 2023/08/21
Relinquished: 2023/08/22
Received: 2023/08/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B088051	N/A	2023/08/30	Jeanette Chavol Melo
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B087185	N/A	2023/08/29	Darrus Ong
F1-BTEX	CALC/MS	B084245	N/A	2023/08/29	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B084358	N/A	2023/08/28	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B084359	N/A	2023/08/28	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B086789	N/A	2023/08/28	Marjolen Busslinger
COD by Colorimeter	M/PROB	B086221	N/A	2023/08/28	Ly Vu
True Colour	SPEC/COL	B086143	N/A	2023/08/27	Shanna McKort
Carbon (DOC)	TECH	B086687	N/A	2023/08/28	Ye Hyun KIM
Conductivity @25C	COND	B088057	N/A	2023/08/30	Jeanette Chavol Melo
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B082724	2023/08/28	2023/08/28	Bryanna Quach
Sulphide (as H2S)	CALC	B084289	N/A	2023/08/26	Automated Statchk
Hardness	CALC	B085174	N/A	2023/08/28	Automated Statchk
Mercury (Dissolved) by CV	CV	B085858	2023/08/26	2023/08/29	Kiran Kumari
Mercury (Total) by CV	CV	B085863	2023/08/26	2023/08/29	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B086155	N/A	2023/08/27	Vincy Scaria
Elements by ICP - Total	ICPA	B086327	2023/08/28	2023/08/28	Vincy Scaria
Elements by ICPMS - Dissolved	ICPM	B085866	N/A	2023/08/27	Jason Bao
Elements by ICPMS - Total	ICPM	B086325	2023/08/28	2023/08/28	Jason Bao
Ion Balance	CALC	B084291	N/A	2023/08/30	Automated Statchk
Ammonia-N (Total)	KONE	B087321	N/A	2023/08/29	Shanna McKort
Nitrate and Nitrite	CALC	B085175	N/A	2023/08/28	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B086125	N/A	2023/08/27	Isabelle White
Nitrate (as N)	CALC	B087056	2023/08/28	2023/08/28	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B085917	2023/08/28	2023/08/28	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B082722	2023/08/28	2023/08/29	Don Maxwell
Benzo[a]pyrene Equivalency	GC/MSD	B084337	N/A	2023/08/31	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B087080	N/A	2023/08/28	Mary Anne Dela Cruz
Total Sulphide	SPEC	B085537	N/A	2023/08/26	Irene Donita Villanueva
Total Dissolved Solids (Filt. Residue)	BAL	B086196	2023/08/28	2023/08/29	Ashhel Zia
Total Kjeldahl Nitrogen (Total)	CALC	B084367	N/A	2023/08/29	Automated Statchk
Nitrogen (Total)	AC/COL	B087152	2023/08/28	2023/08/29	Carlo Truong
Carbon (Total Organic)	TECH	B086880	N/A	2023/08/29	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B086207	2023/08/28	2023/08/28	Haydee Estilong
Turbidity	TURB	B086011	N/A	2023/08/27	Ashhel Zia

Bureau Veritas ID: BXM697 Dup
Sample ID: AEMP-DS-06
Matrix: Water

Collected: 2023/08/21
Relinquished: 2023/08/22
Received: 2023/08/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B087185	N/A	2023/08/29	Darrus Ong
True Colour	SPEC/COL	B086143	N/A	2023/08/27	Shanna McKort
Elements by ICP - Dissolved	ICPA	B086155	N/A	2023/08/27	Vincy Scaria

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GENERAL COMMENTS

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

Package 1	6.3°C

Sample BXM697 [AEMP-DS-06] : Sample was analyzed past method specified hold time for Turbidity. 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 True Colour. Sample was analyzed past method specified hold time for Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

Results relate only to the items tested.

DATA QUALITY OVERVIEW

Lab ID	Client Sample ID	Matrix	Test Code	Analysis Type	Parameters	Deviation	Root Cause	Potential Impact
BXM697	AEMP-DS-06	Water	COLOURT-W	PHYS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXM697	AEMP-DS-06	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXM697	AEMP-DS-06	Water	PO4AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
BXM697	AEMP-DS-06	Water	TURB	SPP	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B082722	DM	Method Blank	D10-ANTHRACENE (sur.)	2023/08/28		100	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/28		128	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/28		93	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/28		84	%	50 - 130
			Acenaphthene	2023/08/28	<0.10		ug/L	
			Acenaphthylene	2023/08/28	<0.10		ug/L	
			Acridine	2023/08/28	<0.040		ug/L	
			Anthracene	2023/08/28	<0.010		ug/L	
			Benzo(a)anthracene	2023/08/28	<0.0085		ug/L	
			Benzo(b&j)fluoranthene	2023/08/28	<0.0085		ug/L	
			Benzo(k)fluoranthene	2023/08/28	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2023/08/28	<0.0085		ug/L	
			Benzo(c)phenanthrene	2023/08/28	<0.050		ug/L	
			Benzo(a)pyrene	2023/08/28	<0.0075		ug/L	
			Benzo(e)pyrene	2023/08/28	<0.050		ug/L	
			Chrysene	2023/08/28	<0.0085		ug/L	
			Dibenz(a,h)anthracene	2023/08/28	<0.0075		ug/L	
			Fluoranthene	2023/08/28	<0.010		ug/L	
			Fluorene	2023/08/28	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2023/08/28	<0.0085		ug/L	
			Indeno(1,2,3-cd)fluoranthene	2023/08/28	<0.0085		ug/L	
			2-Methylnaphthalene	2023/08/28	<0.10		ug/L	
			Naphthalene	2023/08/28	<0.10		ug/L	
			Phenanthrene	2023/08/28	<0.050		ug/L	
			Perylene	2023/08/28	<0.050		ug/L	
			Pyrene	2023/08/28	<0.020		ug/L	
			Quinoline	2023/08/28	<0.20		ug/L	
			Retene	2023/08/28	<0.050		ug/L	
			C1-Naphthalene	2023/08/28	<0.10		ug/L	
			C3-Naphthalene	2023/08/28	<0.10		ug/L	
			C4-Naphthalene	2023/08/28	<0.10		ug/L	
			C2-Naphthalene	2023/08/28	<0.10		ug/L	
			Biphenyl	2023/08/28	<0.020		ug/L	
			C1-biphenyl	2023/08/28	<0.020		ug/L	
			C2-biphenyl	2023/08/28	<0.020		ug/L	
			C1-fluorene	2023/08/28	<0.050		ug/L	
			C2-fluorene	2023/08/28	<0.050		ug/L	
			C3-fluorene	2023/08/28	<0.050		ug/L	
			Dibenzothiophene	2023/08/28	<0.020		ug/L	
			C1-dibenzothiophene	2023/08/28	<0.020		ug/L	
			C2-dibenzothiophene	2023/08/28	<0.020		ug/L	
			C3-dibenzothiophene	2023/08/28	<0.020		ug/L	
			C4-dibenzothiophene	2023/08/28	<0.020		ug/L	
			C1 phenanthrene/anthracene	2023/08/28	<0.050		ug/L	
			C2 phenanthrene/anthracene	2023/08/28	<0.050		ug/L	
			C3 phenanthrene/anthracene	2023/08/28	<0.050		ug/L	
			C4 phenanthrene/anthracene	2023/08/28	<0.050		ug/L	
			C1 fluoranthene/pyrene	2023/08/28	<0.020		ug/L	
			C2 fluoranthene/pyrene	2023/08/28	<0.020		ug/L	
			C3 fluoranthene/pyrene	2023/08/28	<0.020		ug/L	
			C4 fluoranthene/pyrene	2023/08/28	<0.020		ug/L	
			C1 benzo(a)anthracene/chrysene	2023/08/28	<0.0085		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
			C2 benzo(a)anthracene/chrysene	2023/08/28	<0.0085		ug/L	
			C3 benzo(a)anthracene/chrysene	2023/08/28	<0.0085		ug/L	
			C4 benzo(a)anthracene/chrysene	2023/08/28	<0.0085		ug/L	
			C1benzobjkfluoranthene/benzoapyrene	2023/08/28	<0.0075		ug/L	
			C2benzobjkfluoranthene/benzoapyrene	2023/08/28	<0.0075		ug/L	
			C1-Acenaphthene	2023/08/28	<0.10		ug/L	
			1-Methylnaphthalene	2023/08/28	<0.10		ug/L	
B082724	BQU	Method Blank	O-TERPHENYL (sur.)	2023/08/28		91	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/28	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2023/08/28	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2023/08/28	<0.20		mg/L	
B085537	IDV	Method Blank	Total Sulphide	2023/08/26	<0.0018		mg/L	
B085858	KKM	Method Blank	Dissolved Mercury (Hg)	2023/08/29	<0.0019		ug/L	
B085863	KKM	Method Blank	Total Mercury (Hg)	2023/08/29	<0.0019		ug/L	
B085866	JAB	Method Blank	Dissolved Aluminum (Al)	2023/08/27	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/08/27	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/08/27	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/08/27	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/08/27	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/08/27	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/08/27	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/08/27	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/08/27	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/08/27	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/08/27	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/08/27	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/08/27	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/08/27	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/08/27	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/08/27	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/08/27	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/08/27	<0.0010		mg/L	
B085917	JB9	Method Blank	Total Oil and grease	2023/08/28	<2.0		mg/L	
B086011	AZI	Method Blank	Turbidity	2023/08/27	<0.10		NTU	
B086125	ISW	Method Blank	Nitrite (N)	2023/08/27	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/08/27	<0.010		mg/L	
B086143	SKM	Method Blank	True Colour	2023/08/27	<2.0		PtCo units	
B086155	VSC	Method Blank	Dissolved Iron (Fe)	2023/08/27	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/08/27	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/08/27	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/08/27	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/08/27	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/08/27	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/08/27	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/08/27	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/08/27	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/08/27	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/08/27	<0.50		mg/L	
			Dissolved Boron (B)	2023/08/27	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/08/27	<0.30		mg/L	
B086196	AZI	Method Blank	Total Dissolved Solids	2023/08/29	<10		mg/L	
B086207	HE1	Method Blank	Total Suspended Solids	2023/08/28	<1.0		mg/L	

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B086221	LYV	Method Blank	Chemical Oxygen Demand	2023/08/28	<10		mg/L	
B086325	JAB	Method Blank	Total Aluminum (Al)	2023/08/28	<0.0030		mg/L	
			Total Chromium (Cr)	2023/08/28	<0.0010		mg/L	
			Total Cobalt (Co)	2023/08/28	<0.00030		mg/L	
			Total Copper (Cu)	2023/08/28	<0.0010		mg/L	
			Total Lead (Pb)	2023/08/28	<0.00020		mg/L	
			Total Antimony (Sb)	2023/08/28	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/08/28	<0.00020		mg/L	
			Total Nickel (Ni)	2023/08/28	<0.00050		mg/L	
			Total Selenium (Se)	2023/08/28	<0.00020		mg/L	
			Total Silver (Ag)	2023/08/28	<0.00010		mg/L	
			Total Arsenic (As)	2023/08/28	<0.00020		mg/L	
			Total Thallium (Tl)	2023/08/28	<0.00020		mg/L	
			Total Tin (Sn)	2023/08/28	<0.0010		mg/L	
			Total Titanium (Ti)	2023/08/28	<0.0010		mg/L	
			Total Uranium (U)	2023/08/28	<0.00010		mg/L	
			Total Vanadium (V)	2023/08/28	<0.0010		mg/L	
			Total Zinc (Zn)	2023/08/28	<0.0030		mg/L	
			Total Beryllium (Be)	2023/08/28	<0.0010		mg/L	
B086327	VSC	Method Blank	Total Iron (Fe)	2023/08/28	<0.060		mg/L	
			Total Lithium (Li)	2023/08/28	<0.020		mg/L	
			Total Magnesium (Mg)	2023/08/28	<0.20		mg/L	
			Total Manganese (Mn)	2023/08/28	<0.0040		mg/L	
			Total Potassium (K)	2023/08/28	<0.30		mg/L	
			Total Sodium (Na)	2023/08/28	<0.50		mg/L	
			Total Strontium (Sr)	2023/08/28	<0.020		mg/L	
			Total Sulphur (S)	2023/08/28	<0.20		mg/L	
			Total Phosphorus (P)	2023/08/28	<0.10		mg/L	
			Total Barium (Ba)	2023/08/28	<0.010		mg/L	
			Total Silicon (Si)	2023/08/28	<0.50		mg/L	
			Total Boron (B)	2023/08/28	<0.020		mg/L	
			Total Calcium (Ca)	2023/08/28	<0.30		mg/L	
B086687	YHK	Method Blank	Dissolved Organic Carbon (C)	2023/08/28	<0.50		mg/L	
B086789	MB5	Method Blank	Chloride (Cl)	2023/08/28	<1.0		mg/L	
			Sulphate (SO4)	2023/08/28	<1.0		mg/L	
B086880	YHK	Method Blank	Total Organic Carbon (C)	2023/08/29	<0.50		mg/L	
B087080	MAP	Method Blank	Orthophosphate (P)	2023/08/28	<0.0030		mg/L	
B087152	CTU	Method Blank	Total Nitrogen (N)	2023/08/29	<0.020		mg/L	
B087185	DO1	Method Blank	1,4-Difluorobenzene (sur.)	2023/08/29		103	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/29		103	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/29		95	%	50 - 140
			Benzene	2023/08/29	<0.00040		mg/L	
			Toluene	2023/08/29	<0.00040		mg/L	
			Ethylbenzene	2023/08/29	<0.00040		mg/L	
			m & p-Xylene	2023/08/29	<0.00080		mg/L	
			o-Xylene	2023/08/29	<0.00040		mg/L	
			F1 (C6-C10)	2023/08/29	<0.10		mg/L	
B087321	SKM	Method Blank	Total Ammonia (N)	2023/08/29	<0.015		mg/L	
B088051	JVM	Method Blank	Alkalinity (Total as CaCO3)	2023/08/30	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/08/30	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/08/30	<1.0		mg/L	
			Carbonate (CO3)	2023/08/30	<1.0		mg/L	

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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Hydroxide (OH)	2023/08/30	<1.0		mg/L	
B088057	JVM	Method Blank	Conductivity	2023/08/30	<2.0		uS/cm	
B086143	SKM	RPD [BXM697-02]	True Colour	2023/08/27	7.7		%	20
B086155	VSC	RPD [BXM697-05]	Dissolved Iron (Fe)	2023/08/27	NC		%	20
			Dissolved Lithium (Li)	2023/08/27	NC		%	20
			Dissolved Magnesium (Mg)	2023/08/27	0.30		%	20
			Dissolved Manganese (Mn)	2023/08/27	NC		%	20
			Dissolved Potassium (K)	2023/08/27	2.1		%	20
			Dissolved Sodium (Na)	2023/08/27	0.054		%	20
			Dissolved Strontium (Sr)	2023/08/27	0.057		%	20
			Dissolved Sulphur (S)	2023/08/27	0.27		%	20
			Dissolved Phosphorus (P)	2023/08/27	NC		%	20
			Dissolved Barium (Ba)	2023/08/27	2.6		%	20
			Dissolved Silicon (Si)	2023/08/27	1.3		%	20
			Dissolved Boron (B)	2023/08/27	NC		%	20
			Dissolved Calcium (Ca)	2023/08/27	0.29		%	20
B087185	DO1	RPD [BXM697-10]	Benzene	2023/08/29	NC		%	30
			Toluene	2023/08/29	NC		%	30
			Ethylbenzene	2023/08/29	NC		%	30
			m & p-Xylene	2023/08/29	NC		%	30
			o-Xylene	2023/08/29	NC		%	30
			F1 (C6-C10)	2023/08/29	NC		%	30
B086143	SKM	Matrix Spike [BXM697-02]	True Colour	2023/08/27		90	%	80 - 120
B086155	VSC	Matrix Spike [BXM697-05]	Dissolved Iron (Fe)	2023/08/27		106	%	80 - 120
			Dissolved Lithium (Li)	2023/08/27		100	%	80 - 120
			Dissolved Magnesium (Mg)	2023/08/27		109	%	80 - 120
			Dissolved Manganese (Mn)	2023/08/27		103	%	80 - 120
			Dissolved Potassium (K)	2023/08/27		100	%	80 - 120
			Dissolved Sodium (Na)	2023/08/27		98	%	80 - 120
			Dissolved Strontium (Sr)	2023/08/27		95	%	80 - 120
			Dissolved Sulphur (S)	2023/08/27		109	%	80 - 120
			Dissolved Phosphorus (P)	2023/08/27		107	%	80 - 120
			Dissolved Barium (Ba)	2023/08/27		99	%	80 - 120
			Dissolved Silicon (Si)	2023/08/27		88	%	80 - 120
			Dissolved Boron (B)	2023/08/27		102	%	80 - 120
			Dissolved Calcium (Ca)	2023/08/27		102	%	80 - 120
B082722	DM	LCS	D10-ANTHRACENE (sur.)	2023/08/28		109	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/08/28		143 (1)	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/08/28		103	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/08/28		87	%	50 - 130
			Acenaphthene	2023/08/28		88	%	50 - 130
			Acenaphthylene	2023/08/28		84	%	50 - 130
			Acridine	2023/08/28		76	%	50 - 130
			Anthracene	2023/08/28		86	%	50 - 130
			Benzo(a)anthracene	2023/08/28		106	%	50 - 130
			Benzo(b&j)fluoranthene	2023/08/28		100	%	50 - 130
			Benzo(k)fluoranthene	2023/08/28		107	%	50 - 130
			Benzo(g,h,i)perylene	2023/08/28		97	%	50 - 130
			Benzo(c)phenanthrene	2023/08/28		106	%	50 - 130
			Benzo(a)pyrene	2023/08/28		104	%	50 - 130

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Advisian
Task Order#: 417085-49223
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Site Location: Norman Wells, NWT
Project #: 417085-49223,23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(e)pyrene	2023/08/28		94	%	50 - 130
			Chrysene	2023/08/28		96	%	50 - 130
			Dibenz(a,h)anthracene	2023/08/28		103	%	50 - 130
			Fluoranthene	2023/08/28		100	%	50 - 130
			Fluorene	2023/08/28		86	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/08/28		103	%	50 - 130
			2-Methylnaphthalene	2023/08/28		83	%	50 - 130
			Naphthalene	2023/08/28		76	%	50 - 130
			Phenanthrene	2023/08/28		89	%	50 - 130
			Perylene	2023/08/28		94	%	50 - 130
			Pyrene	2023/08/28		101	%	50 - 130
			Quinoline	2023/08/28		84	%	50 - 130
			C1-Naphthalene	2023/08/28		66	%	50 - 130
			C3-Naphthalene	2023/08/28		87	%	50 - 130
			C2-Naphthalene	2023/08/28		78	%	50 - 130
			C1-biphenyl	2023/08/28		72	%	50 - 130
			C1 phenanthrene/anthracene	2023/08/28		100	%	50 - 130
			C2 phenanthrene/anthracene	2023/08/28		101	%	50 - 130
			C1 fluoranthene/pyrene	2023/08/28		103	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/08/28		59	%	30 - 130
			1-Methylnaphthalene	2023/08/28		66	%	50 - 130
B082724	BQU	LCS	O-TERPHENYL (sur.)	2023/08/28		93	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/08/28		84	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/08/28		92	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/08/28		88	%	60 - 140
B085537	IDV	LCS	Total Sulphide	2023/08/26		98	%	80 - 120
B085858	KKM	LCS	Dissolved Mercury (Hg)	2023/08/29		104	%	80 - 120
B085863	KKM	LCS	Total Mercury (Hg)	2023/08/29		101	%	80 - 120
B085866	JAB	LCS	Dissolved Aluminum (Al)	2023/08/27		107	%	80 - 120
			Dissolved Chromium (Cr)	2023/08/27		100	%	80 - 120
			Dissolved Cobalt (Co)	2023/08/27		100	%	80 - 120
			Dissolved Copper (Cu)	2023/08/27		99	%	80 - 120
			Dissolved Lead (Pb)	2023/08/27		98	%	80 - 120
			Dissolved Antimony (Sb)	2023/08/27		108	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/08/27		100	%	80 - 120
			Dissolved Nickel (Ni)	2023/08/27		97	%	80 - 120
			Dissolved Selenium (Se)	2023/08/27		105	%	80 - 120
			Dissolved Silver (Ag)	2023/08/27		99	%	80 - 120
			Dissolved Arsenic (As)	2023/08/27		98	%	80 - 120
			Dissolved Thallium (Tl)	2023/08/27		100	%	80 - 120
			Dissolved Tin (Sn)	2023/08/27		99	%	80 - 120
			Dissolved Titanium (Ti)	2023/08/27		101	%	80 - 120
			Dissolved Uranium (U)	2023/08/27		98	%	80 - 120
			Dissolved Vanadium (V)	2023/08/27		98	%	80 - 120
			Dissolved Zinc (Zn)	2023/08/27		100	%	80 - 120
			Dissolved Beryllium (Be)	2023/08/27		97	%	80 - 120
B085917	JB9	LCS	Total Oil and grease	2023/08/28		105	%	70 - 130
B086011	AZI	LCS	Turbidity	2023/08/27		100	%	80 - 120
B086125	ISW	LCS	Nitrite (N)	2023/08/27		104	%	80 - 120
			Nitrate plus Nitrite (N)	2023/08/27		105	%	80 - 120
B086143	SKM	LCS	True Colour	2023/08/27		105	%	80 - 120
B086155	VSC	LCS	Dissolved Iron (Fe)	2023/08/27		110	%	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
			Dissolved Lithium (Li)	2023/08/27		106	%	80 - 120
			Dissolved Magnesium (Mg)	2023/08/27		112	%	80 - 120
			Dissolved Manganese (Mn)	2023/08/27		106	%	80 - 120
			Dissolved Potassium (K)	2023/08/27		103	%	80 - 120
			Dissolved Sodium (Na)	2023/08/27		100	%	80 - 120
			Dissolved Strontium (Sr)	2023/08/27		100	%	80 - 120
			Dissolved Sulphur (S)	2023/08/27		105	%	80 - 120
			Dissolved Phosphorus (P)	2023/08/27		110	%	80 - 120
			Dissolved Barium (Ba)	2023/08/27		105	%	80 - 120
			Dissolved Silicon (Si)	2023/08/27		103	%	80 - 120
			Dissolved Boron (B)	2023/08/27		102	%	80 - 120
			Dissolved Calcium (Ca)	2023/08/27		104	%	80 - 120
B086196	AZI	LCS	Total Dissolved Solids	2023/08/29		96	%	80 - 120
B086207	HE1	LCS	Total Suspended Solids	2023/08/28		101	%	80 - 120
B086221	LYV	LCS	Chemical Oxygen Demand	2023/08/28		104	%	80 - 120
B086325	JAB	LCS	Total Aluminum (Al)	2023/08/28		107	%	80 - 120
			Total Chromium (Cr)	2023/08/28		101	%	80 - 120
			Total Cobalt (Co)	2023/08/28		101	%	80 - 120
			Total Copper (Cu)	2023/08/28		102	%	80 - 120
			Total Lead (Pb)	2023/08/28		106	%	80 - 120
			Total Antimony (Sb)	2023/08/28		111	%	80 - 120
			Total Molybdenum (Mo)	2023/08/28		105	%	80 - 120
			Total Nickel (Ni)	2023/08/28		101	%	80 - 120
			Total Selenium (Se)	2023/08/28		103	%	80 - 120
			Total Silver (Ag)	2023/08/28		105	%	80 - 120
			Total Arsenic (As)	2023/08/28		98	%	80 - 120
			Total Thallium (Tl)	2023/08/28		106	%	80 - 120
			Total Tin (Sn)	2023/08/28		103	%	80 - 120
			Total Titanium (Ti)	2023/08/28		100	%	80 - 120
			Total Uranium (U)	2023/08/28		102	%	80 - 120
			Total Vanadium (V)	2023/08/28		102	%	80 - 120
			Total Zinc (Zn)	2023/08/28		99	%	80 - 120
			Total Beryllium (Be)	2023/08/28		101	%	80 - 120
B086327	VSC	LCS	Total Iron (Fe)	2023/08/28		102	%	80 - 120
			Total Lithium (Li)	2023/08/28		107	%	80 - 120
			Total Magnesium (Mg)	2023/08/28		101	%	80 - 120
			Total Manganese (Mn)	2023/08/28		108	%	80 - 120
			Total Potassium (K)	2023/08/28		102	%	80 - 120
			Total Sodium (Na)	2023/08/28		100	%	80 - 120
			Total Strontium (Sr)	2023/08/28		96	%	80 - 120
			Total Sulphur (S)	2023/08/28		98	%	80 - 120
			Total Phosphorus (P)	2023/08/28		98	%	80 - 120
			Total Barium (Ba)	2023/08/28		99	%	80 - 120
			Total Silicon (Si)	2023/08/28		98	%	80 - 120
			Total Boron (B)	2023/08/28		102	%	80 - 120
			Total Calcium (Ca)	2023/08/28		104	%	80 - 120
B086687	YHK	LCS	Dissolved Organic Carbon (C)	2023/08/28		106	%	80 - 120
B086789	MB5	LCS	Chloride (Cl)	2023/08/28		103	%	80 - 120
			Sulphate (SO4)	2023/08/28		102	%	80 - 120
B086880	YHK	LCS	Total Organic Carbon (C)	2023/08/29		105	%	80 - 120
B087080	MAP	LCS	Orthophosphate (P)	2023/08/28		99	%	80 - 120
B087152	CTU	LCS	Total Nitrogen (N)	2023/08/29		101	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C366008
Report Date: 2023/09/08

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B087185	DO1	LCS	1,4-Difluorobenzene (sur.)	2023/08/29		102	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/08/29		102	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/08/29		91	%	50 - 140
			Benzene	2023/08/29		100	%	60 - 130
			Toluene	2023/08/29		99	%	60 - 130
			Ethylbenzene	2023/08/29		97	%	60 - 130
			m & p-Xylene	2023/08/29		102	%	60 - 130
			o-Xylene	2023/08/29		103	%	60 - 130
			F1 (C6-C10)	2023/08/29		114	%	60 - 140
B087321	SKM	LCS	Total Ammonia (N)	2023/08/30		105	%	80 - 120
B088051	JVM	LCS	Alkalinity (Total as CaCO3)	2023/08/30		100	%	80 - 120
B088057	JVM	LCS	Conductivity	2023/08/30		100	%	90 - 110
B087152	CTU	SRM	Total Nitrogen (N)	2023/08/29		102	%	80 - 120

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.

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

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

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

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

NC (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.

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Bureau Veritas Job #: C366008
Report Date: 2023/09/08

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223,23200

VALIDATION SIGNATURE PAGE

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

Jared Wiseman, B.Sc., P.Chem., QP, Senior Analyst, Organics

Jingyuan Song, QP, Organics – Senior Analyst

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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Automated Statchk

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Maxxam
A Bureau Veritas Group Company

☒ Calgary
4000 19th St. NE, T2E 6P8
Phone: (403) 291-3077
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Fax: (780) 450-4187
Toll Free: (800) 386-7247

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 299623

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE
Calgary, AB
T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587 847 6249
Sampler Name (Print): Alex Haigh

REPORT INFORMATION

Company Name: Advisian
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE
Calgary, AB
T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587 847 6249
Consultant Project #: 417085-49223.23200

ANALYSIS REQUESTED

	FIELD SAMPLE ID	MATRIX: GROUND WATER	MATRIX: SURFACE WATER	MATRIX: SOIL	MATRIX: OTHER	# CONTAINERS	SAMPLING: DATE (YYYY/MM/DD)	SAMPLING: TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-2 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☒ DIS ☒	MERCURY TOTAL ☒ DISSOLVED ☒	SALINITY SOIL	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY	pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	True Colour, TSS, TDS, Turbidity	Oil + Grease	TOC, DOC, Sulphide	Nitrate, Nitrite, Ammonia (total), TKN	Ortho-phosphate	Sulphur - total and dissolved	COD	Alkylated PAHs, TPH
1	AEMP-DS-06		X			18	2023/08/21	10:30	X			X		X						X	X					X			X	X	X	X	X	X	X	X
2																																				
3																																				
4																																				
5																																				
6																																				
7																																				
8																																				
9																																				
10																																				

mcal-08-3481

IOL SITE LOCATION: Norman Wells, NT
IOL PROJECT # (if applicable): N/A
MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-49223.23200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) FAL ☐ Other

SPECIAL INSTRUCTIONS: also email:
Stacy.Gibb@advisian.com
Cacal_IOR_datatrack@worley.com
Canada.chemistry@ "

JARS USED & NOT SUBMITTED Enter N/A for Water: N/A

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID #				YES	NO	COOLER ID #				YES	NO	COOLER ID #			
SEAL PRESENT	✓		TEMP °C	7	5	7	SEAL PRESENT		TEMP °C	1	2	3	SEAL PRESENT		TEMP °C	1	2	3
SEAL INTACT	✓			1	2	3	SEAL INTACT						SEAL INTACT					
COOLING MEDIA PRESENT	✓						COOLING MEDIA PRESENT						COOLING MEDIA PRESENT					

LAB USE ONLY
MAXXAM JOB #

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1.	Alex Haigh	2023/08/22	0930	1.	Amanda Hagen	2023/08/24	15:00
2.				2.			
3.				3.			

SAMPLES
LABELED BY: ____ VERIFIED BY: ____

COC-1010 (06/2016) IOL-AB White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-09-24/25/26
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C378730	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☐ **Yes** ☒ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☐ **Yes** ☒ **No**

If yes, FLAG type and comments*:*

Date samples submitted 2023-09-29

Due date for lab report on SRC 2023-10-13

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☒ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☒ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☒ **No**	Turbidity, true colour, orthophosphate, nitrite, total sulphide, BTEX, F1, TDS, TSS
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☒ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☐ **Yes** ☒ **No** ☐ **N/A**	Total Antimony – overall QC meets criteria
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☒ **Yes** ☐ **No** ☐ **N/A**	

Data check completed by Alex Haigh **Date** 2024-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	

Data check completed by Alex Haigh **Date** 2024-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Trip Blank results acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Field Blank results acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Equipment Blank results acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes ☐ No ☒ N/A	**Comments**	

Data check completed by Alex Haigh **Date** 2024-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Field pH vs. Lab pH RPDs acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes ☐ No ☐ N/A	**Comments**	

Data check completed by Alex Haigh **Date** 2024-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☒ Yes ☐ No

Explain rationale for yes/no:

Request lab to recheck data? If so give details	☐ Yes ☒ No ☐ N/A	**Comments**	
If Yes, Lab request to recheck must be approved by Project Manager Name:		**Date**	

Data check completed by Alex Haigh **Date** 2024-03-26

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200
Your C.O.C. #: 299607

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/10/13
Report #: R3409631
Version: 3 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C378730
Received: 2023/09/29, 15:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	3	AB SOP-00005	SM 24 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	3	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	3		Auto Calc
Cadmium - low level CCME - Dissolved	3		Auto Calc
Cadmium - low level CCME (Total)	3		Auto Calc
Chloride/Sulphate by Auto Colourimetry	3	AB SOP-00020	SM24-4500-Cl/SO4-E m
COD by Colorimeter	3	AB SOP-00016	SM 23 5220D m
True Colour	3	CAL SOP-00049	SM 24 2120 C m
Carbon (DOC) (1)	3	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	3	AB SOP-00005	SM 24 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	3	AB SOP-00037	CCME PHC-CWS m
Sulphide (as H2S)	3		Auto Calc
Hardness	3		Auto Calc
Mercury (Dissolved) by CV (3)	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	3	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	3	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (3)	3	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	3	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	3		Auto Calc
Ammonia-N (Total)	3	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate and Nitrite	3		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	3	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N)	3		Auto Calc
Oil and Grease (Gravimetric, n-Hexane)	3	AB SOP-00092	SM 23 5520B/5520F m
Target & Alkylated PAH in Water by GC/MS (4)	3	AB SOP-00037 CAL SOP-00250	EPA 8270e m
Benzo[a]pyrene Equivalency (5)	3		Auto Calc
Orthophosphate by Automated Analyzer (6)	3	AB SOP-00025	SM 24 4500-P A,F m
Total Sulphide	3	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	3	AB SOP-00065	SM 24 2540 C m
Total Kjeldahl Nitrogen (Total)	3	BBY WI-00033	Auto Calc

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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200
Your C.O.C. #: 299607

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/10/13
Report #: R3409631
Version: 3 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C378730
Received: 2023/09/29, 15:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Nitrogen (Total)	3	AB SOP-00093	SM 24 4500-N C m
Carbon (Total Organic) (7)	3	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR)	3	AB SOP-00061	SM 24 2540 D m
Turbidity	3	CAL SOP-00081	SM 24 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) 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.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Alkylated PAH results are semiquantitative
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(6) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200
Your C.O.C. #: 299607

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/10/13
Report #: R3409631
Version: 3 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C378730
Received: 2023/09/29, 15:00
(7) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Namita Sahni
Customer Solutions Representative
13 Oct 2023 11:10:14

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614
==========
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Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		CAP316			CAP316			CAP317		
Sampling Date		2023/09/25 14:00			2023/09/25 14:00			2023/09/26 10:45		
COC Number		299607			299607			299607		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**	**AEMP-DS-03 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-US-01**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.10	B134729				<0.10	0.10	B134729
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	0.10	B134729				<0.10	0.10	B134729
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	0.20	B134729				<0.20	0.20	B134729
Volatiles										
Benzene	mg/L	<0.00040	0.00040	B135980	<0.00040	0.00040	B135980	<0.00040	0.00040	B135980
Toluene	mg/L	<0.00040	0.00040	B135980	<0.00040	0.00040	B135980	<0.00040	0.00040	B135980
Ethylbenzene	mg/L	<0.00040	0.00040	B135980	<0.00040	0.00040	B135980	<0.00040	0.00040	B135980
m & p-Xylene	mg/L	<0.00080	0.00080	B135980	<0.00080	0.00080	B135980	<0.00080	0.00080	B135980
o-Xylene	mg/L	<0.00040	0.00040	B135980	<0.00040	0.00040	B135980	<0.00040	0.00040	B135980
Xylenes (Total)	mg/L	<0.00089	0.00089	B133486				<0.00089	0.00089	B133486
F1 (C6-C10) - BTEX	mg/L	<0.10	0.10	B133486				<0.10	0.10	B133486
F1 (C6-C10)	mg/L	<0.10	0.10	B135980	<0.10	0.10	B135980	<0.10	0.10	B135980
Extraction Surrogate Recovery (%)										
O-TERPHENYL (sur.)	%	99		B134729				98		B134729
Instrument Surrogate Recovery (%)										
1,4-Difluorobenzene (sur.)	%	107		B135980	106		B135980	105		B135980
4-Bromofluorobenzene (sur.)	%	94		B135980	93		B135980	94		B135980
D4-1,2-Dichloroethane (sur.)	%	98		B135980	100		B135980	103		B135980

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		CAP318		
Sampling Date		2023/09/24 10:25		
COC Number		299607		
	UNITS	**AEMP-DS-04**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.10	B134729
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	0.10	B134729
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	0.20	B134729
Volatiles				
Benzene	mg/L	<0.00040	0.00040	B135980
Toluene	mg/L	<0.00040	0.00040	B135980
Ethylbenzene	mg/L	<0.00040	0.00040	B135980
m & p-Xylene	mg/L	<0.00080	0.00080	B135980
o-Xylene	mg/L	<0.00040	0.00040	B135980
Xylenes (Total)	mg/L	<0.00089	0.00089	B133486
F1 (C6-C10) - BTEX	mg/L	<0.10	0.10	B133486
F1 (C6-C10)	mg/L	<0.10	0.10	B135980
Extraction Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	99		B134729
Instrument Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	106		B135980
4-Bromofluorobenzene (sur.)	%	94		B135980
D4-1,2-Dichloroethane (sur.)	%	98		B135980
RDL = Reportable Detection Limit				

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		CAP316	CAP317	CAP318		
Sampling Date		2023/09/25 14:00	2023/09/26 10:45	2023/09/24 10:25		
COC Number		299607	299607	299607		
	UNITS	**AEMP-DS-03**	**AEMP-US-01**	**AEMP-DS-04**	**RDL**	**QC Batch**
Calculated Parameters						
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.18	0.14	0.11	0.020	B133676
Nutrients						
Total Nitrogen (N)	mg/L	0.23	0.24	0.20	0.020	B137656
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		CAP316			CAP316			CAP317	CAP318		
Sampling Date		2023/09/25 14:00			2023/09/25 14:00			2023/09/26 10:45	2023/09/24 10:25		
COC Number		299607			299607			299607	299607		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**	**AEMP-DS-03 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-US-01**	**AEMP-DS-04**	**RDL**	**QC Batch**
Calculated Parameters											
Hardness (CaCO3)	mg/L	150	0.50	B133889				97	120	0.50	B133889
Ion Balance (% Difference)	%	2.4	N/A	B133807				5.8	2.0	N/A	B133807
Nitrate (N)	mg/L	0.052	0.010	B133994				0.094	0.097	0.010	B133994
Nitrate (NO3)	mg/L	0.23	0.044	B133801				0.42	0.43	0.044	B133801
Nitrite (NO2)	mg/L	<0.033	0.033	B133801				<0.033	<0.033	0.033	B133801
Misc. Inorganics											
Conductivity	uS/cm	340	2.0	B141087	340	2.0	B141087	230	280	2.0	B141087
Total Dissolved Solids	mg/L	170	10	B134391				96	100	10	B134391
Anions											
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	B141062	<1.0	1.0	B141062	<1.0	<1.0	1.0	B141062
Alkalinity (Total as CaCO3)	mg/L	110	1.0	B141062	120	1.0	B141062	86	89	1.0	B141062
Bicarbonate (HCO3)	mg/L	130	1.0	B141062	150	1.0	B141062	100	110	1.0	B141062
Carbonate (CO3)	mg/L	<1.0	1.0	B141062	<1.0	1.0	B141062	<1.0	<1.0	1.0	B141062
Hydroxide (OH)	mg/L	<1.0	1.0	B141062	<1.0	1.0	B141062	<1.0	<1.0	1.0	B141062
Chloride (Cl)	mg/L	13	1.0	B137885				10	12	1.0	B137885
Sulphate (SO4)	mg/L	56	1.0	B137885				28	40	1.0	B137885
Nutrients											
Nitrite (N)	mg/L	<0.010	0.010	B138135				<0.010	<0.010	0.010	B138135
Nitrate plus Nitrite (N)	mg/L	0.052	0.010	B138135				0.094	0.097	0.010	B138135
Elements											
Dissolved Barium (Ba)	mg/L	0.052	0.010	B139994				0.034	0.043	0.010	B139994
Dissolved Boron (B)	mg/L	<0.020	0.020	B139994				<0.020	<0.020	0.020	B139994
Dissolved Calcium (Ca)	mg/L	42	0.30	B139994				24	32	0.30	B139994
Dissolved Iron (Fe)	mg/L	<0.060	0.060	B139994				<0.060	<0.060	0.060	B139994
Dissolved Lithium (Li)	mg/L	<0.020	0.020	B139994				<0.020	<0.020	0.020	B139994
Dissolved Magnesium (Mg)	mg/L	12	0.20	B139994				8.9	10	0.20	B139994
Dissolved Manganese (Mn)	mg/L	<0.0040	0.0040	B139994				<0.0040	<0.0040	0.0040	B139994
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	B139994				<0.10	<0.10	0.10	B139994
Dissolved Potassium (K)	mg/L	1.0	0.30	B139994				0.77	0.88	0.30	B139994

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

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Bureau Veritas Job #: C378730
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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		CAP316			CAP316			CAP317	CAP318		
Sampling Date		2023/09/25 14:00			2023/09/25 14:00			2023/09/26 10:45	2023/09/24 10:25		
COC Number		299607			299607			299607	299607		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**	**AEMP-DS-03 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-US-01**	**AEMP-DS-04**	**RDL**	**QC Batch**
Dissolved Silicon (Si)	mg/L	1.6	0.50	B139994				1.1	1.3	0.50	B139994
Dissolved Sodium (Na)	mg/L	10	0.50	B139994				7.7	8.8	0.50	B139994
Dissolved Strontium (Sr)	mg/L	0.28	0.020	B139994				0.19	0.23	0.020	B139994
Dissolved Sulphur (S)	mg/L	18	0.20	B139994				8.6	12	0.20	B139994

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas ID		CAP318		
Sampling Date		2023/09/24 10:25		
COC Number		299607		
	UNITS	**AEMP-DS-04 Lab-Dup**	**RDL**	**QC Batch**
Misc. Inorganics				
Total Dissolved Solids	mg/L	100	10	B134391

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		CAP316		CAP317	CAP318		
Sampling Date		2023/09/25 14:00		2023/09/26 10:45	2023/09/24 10:25		
COC Number		299607		299607	299607		
	UNITS	**AEMP-DS-03**	**QC Batch**	**AEMP-US-01**	**AEMP-DS-04**	**RDL**	**QC Batch**
Elements							
Total Cadmium (Cd)	mg/L	0.000038	B133886	<0.000020	0.000032	0.000020	B133886
Total Mercury (Hg)	ug/L	<0.0019	B140297	<0.0019	<0.0019	0.0019	B140297
Total Aluminum (Al)	mg/L	0.23	B135298	0.079	0.30	0.0030	B135308
Total Antimony (Sb)	mg/L	<0.00060	B135298	<0.00060	<0.00060 (1)	0.00060	B135308
Total Arsenic (As)	mg/L	0.00031	B135298	0.00026	0.00044	0.00020	B135308
Total Barium (Ba)	mg/L	0.059	B135300	0.035	0.055	0.010	B135312
Total Beryllium (Be)	mg/L	<0.0010	B135298	<0.0010	<0.0010	0.0010	B135308
Total Boron (B)	mg/L	<0.020	B135300	<0.020	<0.020	0.020	B135312
Total Calcium (Ca)	mg/L	42	B135300	24	33	0.30	B135312
Total Chromium (Cr)	mg/L	<0.0010	B135298	<0.0010	<0.0010	0.0010	B135308
Total Cobalt (Co)	mg/L	<0.00030	B135298	<0.00030	0.00034	0.00030	B135308
Total Copper (Cu)	mg/L	0.0013	B135298	<0.0010	0.0013	0.0010	B135308
Total Iron (Fe)	mg/L	0.32	B135300	0.11	0.55	0.060	B135312
Total Lead (Pb)	mg/L	<0.00020	B135298	<0.00020	<0.00020	0.00020	B135308
Total Lithium (Li)	mg/L	<0.020	B135300	<0.020	<0.020	0.020	B135312
Total Magnesium (Mg)	mg/L	13	B135300	8.9	10	0.20	B135312
Total Manganese (Mn)	mg/L	0.011	B135300	0.0045	0.015	0.0040	B135312
Total Molybdenum (Mo)	mg/L	0.0011	B135298	0.00058	0.00098	0.00020	B135308
Total Nickel (Ni)	mg/L	0.0017	B135298	0.00071	0.0016	0.00050	B135308
Total Phosphorus (P)	mg/L	<0.10	B135300	<0.10	<0.10	0.10	B135312
Total Potassium (K)	mg/L	1.0	B135300	0.82	1.1	0.30	B135312
Total Selenium (Se)	mg/L	0.00040	B135298	<0.00020	0.00028	0.00020	B135308
Total Silicon (Si)	mg/L	2.2	B135300	1.3	1.8	0.50	B135312
Total Silver (Ag)	mg/L	<0.00010	B135298	<0.00010	<0.00010	0.00010	B135308
Total Sodium (Na)	mg/L	9.9	B135300	7.7	8.9	0.50	B135312
Total Strontium (Sr)	mg/L	0.28	B135300	0.18	0.23	0.020	B135312
Total Sulphur (S)	mg/L	17	B135300	8.3	12	0.20	B135312
Total Thallium (Tl)	mg/L	<0.00020	B135298	<0.00020	<0.00020	0.00020	B135308
Total Tin (Sn)	mg/L	<0.0010	B135298	<0.0010	<0.0010	0.0010	B135308
Total Titanium (Ti)	mg/L	0.0031	B135298	0.0019	0.0065	0.0010	B135308

RDL = Reportable Detection Limit
(1) Matrix Spike exceeds acceptance limits due to matrix interference. Reanalysis yields similar results.

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		CAP316		CAP317	CAP318		
Sampling Date		2023/09/25 14:00		2023/09/26 10:45	2023/09/24 10:25		
COC Number		299607		299607	299607		
	UNITS	**AEMP-DS-03**	**QC Batch**	**AEMP-US-01**	**AEMP-DS-04**	**RDL**	**QC Batch**
Total Uranium (U)	mg/L	0.00087	B135298	0.00048	0.00075	0.00010	B135308
Total Vanadium (V)	mg/L	<0.0010	B135298	<0.0010	<0.0010	0.0010	B135308
Total Zinc (Zn)	mg/L	<0.0030	B135298	<0.0030	0.0041	0.0030	B135308
RDL = Reportable Detection Limit							

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Site Location: Norman Wells, NWT
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RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		CAP316			CAP317		
Sampling Date		2023/09/25 14:00			2023/09/26 10:45		
COC Number		299607			299607		
	UNITS	**AEMP-DS-03**	**RDL**	**QC Batch**	**AEMP-US-01**	**RDL**	**QC Batch**
Calculated Parameters							
Sulphide (as H2S)	mg/L	<0.0020	0.0020	B133765	<0.0020	0.0020	B133765
Demand Parameters							
Chemical Oxygen Demand	mg/L	21	10	B137526	16	10	B137526
Elements							
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	B133885	<0.000020	0.000020	B133885
Misc. Inorganics							
Dissolved Organic Carbon (C)	mg/L	3.5	0.50	B138498	2.5	0.50	B138498
Total Organic Carbon (C)	mg/L	3.2	0.50	B136655	2.5	0.50	B136685
Total Suspended Solids	mg/L	14	1.0	B134064	2.2	0.99	B134064
Anions							
Total Sulphide	mg/L	<0.0018	0.0018	B135582	<0.0018	0.0018	B135582
Nutrients							
Total Ammonia (N)	mg/L	<0.015	0.015	B140252	0.023	0.015	B140256
Orthophosphate (P)	mg/L	<0.0030	0.0030	B136552	<0.0030	0.0030	B136552
Misc. Organics							
Total Oil and grease	mg/L	<2.0	2.0	B140144	<2.0	2.0	B140144
Physical Properties							
True Colour	PtCo units	7.3	2.0	B136668	3.8	2.0	B136668
Physical Properties							
Turbidity	NTU	13	0.10	B134519	4.5	0.10	B134519
RDL = Reportable Detection Limit							

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RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		CAP318		
Sampling Date		2023/09/24 10:25		
COC Number		299607		
	UNITS	**AEMP-DS-04**	**RDL**	**QC Batch**
Calculated Parameters				
Sulphide (as H2S)	mg/L	<0.0020	0.0020	B133765
Demand Parameters				
Chemical Oxygen Demand	mg/L	21	10	B137526
Elements				
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	B133885
Misc. Inorganics				
Dissolved Organic Carbon (C)	mg/L	2.6	0.50	B138498
Total Organic Carbon (C)	mg/L	2.2	0.50	B136655
Total Suspended Solids	mg/L	12	0.97	B134064
Anions				
Total Sulphide	mg/L	<0.0018	0.0018	B135582
Nutrients				
Total Ammonia (N)	mg/L	<0.015	0.015	B140256
Orthophosphate (P)	mg/L	<0.0030	0.0030	B136552
Misc. Organics				
Total Oil and grease	mg/L	<2.0	2.0	B140144
Physical Properties				
True Colour	PtCo units	3.9	2.0	B136668
Physical Properties				
Turbidity	NTU	9.4	0.10	B134519
RDL = Reportable Detection Limit				

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SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		CAP316	CAP317	CAP318		
Sampling Date		2023/09/25 14:00	2023/09/26 10:45	2023/09/24 10:25		
COC Number		299607	299607	299607		
	UNITS	**AEMP-DS-03**	**AEMP-US-01**	**AEMP-DS-04**	**RDL**	**QC Batch**
Polycyclic Aromatics						
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B133487
Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
Acenaphthylene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
Acridine	ug/L	<0.040	<0.040	<0.040	0.040	B134725
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	B134725
Benzo(a)anthracene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
Benzo(b&j)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
Benzo(k)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
Benzo(g,h,i)perylene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
Benzo(c)phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
Benzo(a)pyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B134725
Benzo(e)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
Chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
Dibenz(a,h)anthracene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B134725
Fluoranthene	ug/L	<0.010	<0.010	<0.010	0.010	B134725
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
Perylene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
Quinoline	ug/L	<0.20	<0.20	<0.20	0.20	B134725
Retene	ug/L	<0.050	0.057	<0.050	0.050	B134725
C1-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
C3-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
C4-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
C2-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
Biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C1-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B134725
RDL = Reportable Detection Limit						

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SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		CAP316	CAP317	CAP318		
Sampling Date		2023/09/25 14:00	2023/09/26 10:45	2023/09/24 10:25		
COC Number		299607	299607	299607		
	UNITS	**AEMP-DS-03**	**AEMP-US-01**	**AEMP-DS-04**	**RDL**	**QC Batch**
C2-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C1-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
C2-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
C3-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
Dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C1-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C2-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C3-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C4-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C1 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
C2 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
C3 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
C4 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
C1 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C2 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C3 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C4 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C1 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
C2 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
C3 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B134725
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B134725
C1-Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
1-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
Extraction Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	99	75	95		B134725
D8-ACENAPHTHYLENE (sur.)	%	98	78	91		B134725
D8-NAPHTHALENE (sur.)	%	84	71	77		B134725
TERPHENYL-D14 (sur.)	%	114	82	110		B134725
RDL = Reportable Detection Limit						

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		CAP316	CAP317	CAP318		
Sampling Date		2023/09/25 14:00	2023/09/26 10:45	2023/09/24 10:25		
COC Number		299607	299607	299607		
	UNITS	**AEMP-DS-03**	**AEMP-US-01**	**AEMP-DS-04**	**RDL**	**QC Batch**
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	B140449
RDL = Reportable Detection Limit						

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Advisian
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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		CAP316	CAP317	CAP318		
Sampling Date		2023/09/25 14:00	2023/09/26 10:45	2023/09/24 10:25		
COC Number		299607	299607	299607		
	UNITS	**AEMP-DS-03**	**AEMP-US-01**	**AEMP-DS-04**	**RDL**	**QC Batch**
Elements						
Dissolved Aluminum (Al)	mg/L	0.030	0.010	0.017	0.0030	B138690
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	0.00060	B138690
Dissolved Arsenic (As)	mg/L	0.00026	<0.00020	0.00028	0.00020	B138690
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B138690
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B138690
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	0.00030	B138690
Dissolved Copper (Cu)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B138690
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B138690
Dissolved Molybdenum (Mo)	mg/L	0.0011	0.00055	0.00081	0.00020	B138690
Dissolved Nickel (Ni)	mg/L	0.0017	0.00068	0.0011	0.00050	B138690
Dissolved Selenium (Se)	mg/L	0.00038	<0.00020	0.00022	0.00020	B138690
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B138690
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B138690
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B138690
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B138690
Dissolved Uranium (U)	mg/L	0.00082	0.00044	0.00064	0.00010	B138690
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B138690
Dissolved Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	0.0030	B138690
RDL = Reportable Detection Limit						

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

TEST SUMMARY

Bureau Veritas ID: CAP316
Sample ID: AEMP-DS-03
Matrix: Water

Collected: 2023/09/25
Relinquished: 2023/09/27
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B141062	N/A	2023/10/06	Ayesha Shakoor
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B135980	N/A	2023/10/10	Richard Ly
F1-BTEX	CALC/MS	B133486	N/A	2023/10/11	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B133885	N/A	2023/10/05	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B133886	N/A	2023/10/04	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B137885	N/A	2023/10/04	Tyler Orr
COD by Colorimeter	M/PROB	B137526	N/A	2023/10/04	Dafne Strozake Maximo
True Colour	SPEC/COL	B136668	N/A	2023/10/03	Shanna McKort
Carbon (DOC)	TECH	B138498	N/A	2023/10/05	Ye Hyun KIM
Conductivity @25C	COND	B141087	N/A	2023/10/06	Ayesha Shakoor
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B134729	2023/10/07	2023/10/07	Chuhan Huang
Sulphide (as H2S)	CALC	B133765	N/A	2023/10/03	Automated Statchk
Hardness	CALC	B133889	N/A	2023/10/05	Automated Statchk
Mercury (Dissolved) by CV	CV	B140449	2023/10/05	2023/10/05	Kiran Kumari
Mercury (Total) by CV	CV	B140297	2023/10/05	2023/10/05	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B139994	N/A	2023/10/05	Ilonka Kovac
Elements by ICP - Total	ICPA	B135300	2023/10/03	2023/10/04	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	B138690	N/A	2023/10/04	Jason Bao
Elements by ICPMS - Total	ICPM	B135298	2023/10/03	2023/10/04	Kevin Huang
Ion Balance	CALC	B133807	N/A	2023/10/06	Automated Statchk
Ammonia-N (Total)	KONE	B140252	N/A	2023/10/05	Adam Fishleigh
Nitrate and Nitrite	CALC	B133801	N/A	2023/10/04	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B138135	N/A	2023/10/04	Adam Fishleigh
Nitrate (as N)	CALC	B133994	2023/10/04	2023/10/04	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B140144	2023/10/05	2023/10/05	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B134725	2023/10/07	2023/10/08	Shuang (Jessica) Chen
Benzo[a]pyrene Equivalency	GC/MSD	B133487	N/A	2023/10/11	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B136552	N/A	2023/10/03	Carlo Truong
Total Sulphide	SPEC	B135582	N/A	2023/10/03	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B134391	2023/10/02	2023/10/03	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	B133676	N/A	2023/10/05	Automated Statchk
Nitrogen (Total)	AC/COL	B137656	2023/10/04	2023/10/05	Carlo Truong
Carbon (Total Organic)	TECH	B136655	N/A	2023/10/04	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B134064	2023/10/02	2023/10/03	Ashhel Zia
Turbidity	TURB	B134519	N/A	2023/10/02	Rachel Tomecek

Bureau Veritas ID: CAP316 Dup
Sample ID: AEMP-DS-03
Matrix: Water

Collected: 2023/09/25
Relinquished: 2023/09/27
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B141062	N/A	2023/10/06	Ayesha Shakoor
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B135980	N/A	2023/10/10	Richard Ly
Conductivity @25C	COND	B141087	N/A	2023/10/06	Ayesha Shakoor

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Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

TEST SUMMARY

Bureau Veritas ID: CAP317
Sample ID: AEMP-US-01
Matrix: Water

Collected: 2023/09/26
Relinquished: 2023/09/27
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B141062	N/A	2023/10/06	Ayesha Shakoor
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B135980	N/A	2023/10/10	Richard Ly
F1-BTEX	CALC/MS	B133486	N/A	2023/10/11	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B133885	N/A	2023/10/05	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B133886	N/A	2023/10/05	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B137885	N/A	2023/10/04	Tyler Orr
COD by Colorimeter	M/PROB	B137526	N/A	2023/10/04	Dafne Strozake Maximo
True Colour	SPEC/COL	B136668	N/A	2023/10/03	Shanna McKort
Carbon (DOC)	TECH	B138498	N/A	2023/10/05	Ye Hyun KIM
Conductivity @25C	COND	B141087	N/A	2023/10/06	Ayesha Shakoor
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B134729	2023/10/07	2023/10/07	Chuhan Huang
Sulphide (as H2S)	CALC	B133765	N/A	2023/10/03	Automated Statchk
Hardness	CALC	B133889	N/A	2023/10/05	Automated Statchk
Mercury (Dissolved) by CV	CV	B140449	2023/10/05	2023/10/05	Kiran Kumari
Mercury (Total) by CV	CV	B140297	2023/10/05	2023/10/05	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B139994	N/A	2023/10/05	Ilonka Kovac
Elements by ICP - Total	ICPA	B135312	2023/10/03	2023/10/05	Hue Quyen Vuong
Elements by ICPMS - Dissolved	ICPM	B138690	N/A	2023/10/04	Jason Bao
Elements by ICPMS - Total	ICPM	B135308	2023/10/03	2023/10/05	Jason Bao
Ion Balance	CALC	B133807	N/A	2023/10/06	Automated Statchk
Ammonia-N (Total)	KONE	B140256	N/A	2023/10/05	Adam Fishleigh
Nitrate and Nitrite	CALC	B133801	N/A	2023/10/04	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B138135	N/A	2023/10/04	Adam Fishleigh
Nitrate (as N)	CALC	B133994	2023/10/04	2023/10/04	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B140144	2023/10/05	2023/10/05	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B134725	2023/10/07	2023/10/08	Shuang (Jessica) Chen
Benzo[a]pyrene Equivalency	GC/MSD	B133487	N/A	2023/10/11	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B136552	N/A	2023/10/03	Carlo Truong
Total Sulphide	SPEC	B135582	N/A	2023/10/03	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B134391	2023/10/02	2023/10/03	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	B133676	N/A	2023/10/05	Automated Statchk
Nitrogen (Total)	AC/COL	B137656	2023/10/04	2023/10/05	Carlo Truong
Carbon (Total Organic)	TECH	B136685	N/A	2023/10/05	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B134064	2023/10/02	2023/10/03	Ashhel Zia
Turbidity	TURB	B134519	N/A	2023/10/02	Rachel Tomecek

Bureau Veritas ID: CAP318
Sample ID: AEMP-DS-04
Matrix: Water

Collected: 2023/09/24
Relinquished: 2023/09/27
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B141062	N/A	2023/10/06	Ayesha Shakoor
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B135980	N/A	2023/10/10	Richard Ly
F1-BTEX	CALC/MS	B133486	N/A	2023/10/11	Automated Statchk

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Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

TEST SUMMARY

Bureau Veritas ID: CAP318
Sample ID: AEMP-DS-04
Matrix: Water

Collected: 2023/09/24
Relinquished: 2023/09/27
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Cadmium - low level CCME - Dissolved	CALC/MS	B133885	N/A	2023/10/05	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B133886	N/A	2023/10/05	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B137885	N/A	2023/10/04	Tyler Orr
COD by Colorimeter	M/PROB	B137526	N/A	2023/10/04	Dafne Strozake Maximo
True Colour	SPEC/COL	B136668	N/A	2023/10/03	Shanna McKort
Carbon (DOC)	TECH	B138498	N/A	2023/10/05	Ye Hyun KIM
Conductivity @25C	COND	B141087	N/A	2023/10/06	Ayesha Shakoor
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B134729	2023/10/07	2023/10/07	Chuhan Huang
Sulphide (as H2S)	CALC	B133765	N/A	2023/10/03	Automated Statchk
Hardness	CALC	B133889	N/A	2023/10/05	Automated Statchk
Mercury (Dissolved) by CV	CV	B140449	2023/10/05	2023/10/05	Kiran Kumari
Mercury (Total) by CV	CV	B140297	2023/10/05	2023/10/05	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B139994	N/A	2023/10/05	Ilonka Kovac
Elements by ICP - Total	ICPA	B135312	2023/10/03	2023/10/05	Hue Quyen Vuong
Elements by ICPMS - Dissolved	ICPM	B138690	N/A	2023/10/04	Jason Bao
Elements by ICPMS - Total	ICPM	B135308	2023/10/03	2023/10/05	Jason Bao
Ion Balance	CALC	B133807	N/A	2023/10/06	Automated Statchk
Ammonia-N (Total)	KONE	B140256	N/A	2023/10/05	Adam Fishleigh
Nitrate and Nitrite	CALC	B133801	N/A	2023/10/04	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B138135	N/A	2023/10/04	Adam Fishleigh
Nitrate (as N)	CALC	B133994	2023/10/04	2023/10/04	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B140144	2023/10/05	2023/10/05	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B134725	2023/10/07	2023/10/08	Shuang (Jessica) Chen
Benzo[a]pyrene Equivalency	GC/MSD	B133487	N/A	2023/10/11	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B136552	N/A	2023/10/03	Carlo Truong
Total Sulphide	SPEC	B135582	N/A	2023/10/03	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B134391	2023/10/02	2023/10/03	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	B133676	N/A	2023/10/05	Automated Statchk
Nitrogen (Total)	AC/COL	B137656	2023/10/04	2023/10/05	Carlo Truong
Carbon (Total Organic)	TECH	B136655	N/A	2023/10/04	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B134064	2023/10/02	2023/10/03	Ashhel Zia
Turbidity	TURB	B134519	N/A	2023/10/02	Rachel Tomecek

Bureau Veritas ID: CAP318 Dup
Sample ID: AEMP-DS-04
Matrix: Water

Collected: 2023/09/24
Relinquished: 2023/09/27
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids (Filt. Residue)	BAL	B134391	2023/10/02	2023/10/03	Haydee Estilong

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

GENERAL COMMENTS

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

Package 1	2.7°C

Sample CAP316 [AEMP-DS-03] : Sample was analyzed past method specified hold time for Turbidity. 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 Total Sulphide. Sample was analyzed past method specified hold time for Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample CAP317 [AEMP-US-01] : Sample was analyzed past method specified hold time for Turbidity. 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 Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

Sample CAP318 [AEMP-DS-04] : Sample was analyzed past method specified hold time for Turbidity. 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 Total Dissolved Solids (Filt. Residue). Sample was analyzed past method specified hold time for Total Suspended Solids (NFR). Sample was analyzed past method specified hold time for Total Sulphide. Sample was analyzed past method specified hold time for Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Results relate only to the items tested.

DATA QUALITY OVERVIEW

Lab ID	Client Sample ID	Matrix	Test Code	Analysis Type	Parameters	Deviation	Root Cause	Potential Impact
CAP316	AEMP-DS-03	Water	SIDE	MAI	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
CAP318	AEMP-DS-04	Water	SIDE	MAI	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.

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Task Order#: 417085-49223
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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B134064	AZI	Method Blank	Total Suspended Solids	2023/10/03	<1.0		mg/L	
B134391	HE1	Method Blank	Total Dissolved Solids	2023/10/03	<10		mg/L	
B134519	RTM	Method Blank	Turbidity	2023/10/02	<0.10		NTU	
B134725	JC7	Method Blank	D10-ANTHRACENE (sur.)	2023/10/08		102	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/10/08		106	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/10/08		103	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/10/08		80	%	50 - 130
			Acenaphthene	2023/10/08	<0.10		ug/L	
			Acenaphthylene	2023/10/08	<0.10		ug/L	
			Acridine	2023/10/08	<0.040		ug/L	
			Anthracene	2023/10/08	<0.010		ug/L	
			Benzo(a)anthracene	2023/10/08	<0.0085		ug/L	
			Benzo(b&j)fluoranthene	2023/10/08	<0.0085		ug/L	
			Benzo(k)fluoranthene	2023/10/08	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2023/10/08	<0.0085		ug/L	
			Benzo(c)phenanthrene	2023/10/08	<0.050		ug/L	
			Benzo(a)pyrene	2023/10/08	<0.0075		ug/L	
			Benzo(e)pyrene	2023/10/08	<0.050		ug/L	
			Chrysene	2023/10/08	<0.0085		ug/L	
			Dibenz(a,h)anthracene	2023/10/08	<0.0075		ug/L	
			Fluoranthene	2023/10/08	<0.010		ug/L	
			Fluorene	2023/10/08	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2023/10/08	<0.0085		ug/L	
			Indeno(1,2,3-cd)fluoranthene	2023/10/08	<0.0085		ug/L	
			2-Methylnaphthalene	2023/10/08	<0.10		ug/L	
			Naphthalene	2023/10/08	<0.10		ug/L	
			Phenanthrene	2023/10/08	<0.050		ug/L	
			Perylene	2023/10/08	<0.050		ug/L	
			Pyrene	2023/10/08	<0.020		ug/L	
			Quinoline	2023/10/08	<0.20		ug/L	
			Retene	2023/10/08	<0.050		ug/L	
			C1-Naphthalene	2023/10/08	<0.10		ug/L	
			C3-Naphthalene	2023/10/08	<0.10		ug/L	
			C4-Naphthalene	2023/10/08	<0.10		ug/L	
			C2-Naphthalene	2023/10/08	<0.10		ug/L	
			Biphenyl	2023/10/08	<0.020		ug/L	
			C1-biphenyl	2023/10/08	<0.020		ug/L	
			C2-biphenyl	2023/10/08	<0.020		ug/L	
			C1-fluorene	2023/10/08	<0.050		ug/L	
			C2-fluorene	2023/10/08	<0.050		ug/L	
			C3-fluorene	2023/10/08	<0.050		ug/L	
			Dibenzothiophene	2023/10/08	<0.020		ug/L	
			C1-dibenzothiophene	2023/10/08	<0.020		ug/L	
			C2-dibenzothiophene	2023/10/08	<0.020		ug/L	
			C3-dibenzothiophene	2023/10/08	<0.020		ug/L	
			C4-dibenzothiophene	2023/10/08	<0.020		ug/L	
			C1 phenanthrene/anthracene	2023/10/08	<0.050		ug/L	
			C2 phenanthrene/anthracene	2023/10/08	<0.050		ug/L	
			C3 phenanthrene/anthracene	2023/10/08	<0.050		ug/L	
			C4 phenanthrene/anthracene	2023/10/08	<0.050		ug/L	
			C1 fluoranthene/pyrene	2023/10/08	<0.020		ug/L	
			C2 fluoranthene/pyrene	2023/10/08	<0.020		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
			C3 fluoranthene/pyrene	2023/10/08	<0.020		ug/L	
			C4 fluoranthene/pyrene	2023/10/08	<0.020		ug/L	
			C1 benzo(a)anthracene/chrysene	2023/10/08	<0.0085		ug/L	
			C2 benzo(a)anthracene/chrysene	2023/10/08	<0.0085		ug/L	
			C3 benzo(a)anthracene/chrysene	2023/10/08	<0.0085		ug/L	
			C4 benzo(a)anthracene/chrysene	2023/10/08	<0.0085		ug/L	
			C1benzobjkfluoranthene/benzoapyrene	2023/10/08	<0.0075		ug/L	
			C2benzobjkfluoranthene/benzoapyrene	2023/10/08	<0.0075		ug/L	
			C1-Acenaphthene	2023/10/08	<0.10		ug/L	
			1-Methylnaphthalene	2023/10/08	<0.10		ug/L	
B134729	CHA	Method Blank	O-TERPHENYL (sur.)	2023/10/07		101	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/10/07	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2023/10/07	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2023/10/07	<0.20		mg/L	
B135298	KH2	Method Blank	Total Aluminum (Al)	2023/10/03	<0.0030		mg/L	
			Total Chromium (Cr)	2023/10/03	<0.0010		mg/L	
			Total Cobalt (Co)	2023/10/03	<0.00030		mg/L	
			Total Copper (Cu)	2023/10/03	<0.0010		mg/L	
			Total Lead (Pb)	2023/10/03	<0.00020		mg/L	
			Total Antimony (Sb)	2023/10/03	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/10/03	<0.00020		mg/L	
			Total Nickel (Ni)	2023/10/03	<0.00050		mg/L	
			Total Selenium (Se)	2023/10/03	<0.00020		mg/L	
			Total Silver (Ag)	2023/10/03	<0.00010		mg/L	
			Total Arsenic (As)	2023/10/03	<0.00020		mg/L	
			Total Thallium (Tl)	2023/10/03	<0.00020		mg/L	
			Total Tin (Sn)	2023/10/03	<0.0010		mg/L	
			Total Titanium (Ti)	2023/10/03	<0.0010		mg/L	
			Total Uranium (U)	2023/10/03	<0.00010		mg/L	
			Total Vanadium (V)	2023/10/03	<0.0010		mg/L	
			Total Zinc (Zn)	2023/10/03	<0.0030		mg/L	
			Total Beryllium (Be)	2023/10/03	<0.0010		mg/L	
B135300	MPU	Method Blank	Total Iron (Fe)	2023/10/04	<0.060		mg/L	
			Total Lithium (Li)	2023/10/04	<0.020		mg/L	
			Total Magnesium (Mg)	2023/10/04	<0.20		mg/L	
			Total Manganese (Mn)	2023/10/04	<0.0040		mg/L	
			Total Potassium (K)	2023/10/04	<0.30		mg/L	
			Total Sodium (Na)	2023/10/04	<0.50		mg/L	
			Total Strontium (Sr)	2023/10/04	<0.020		mg/L	
			Total Sulphur (S)	2023/10/04	<0.20		mg/L	
			Total Phosphorus (P)	2023/10/04	<0.10		mg/L	
			Total Barium (Ba)	2023/10/04	<0.010		mg/L	
			Total Silicon (Si)	2023/10/04	<0.50		mg/L	
			Total Boron (B)	2023/10/04	<0.020		mg/L	
			Total Calcium (Ca)	2023/10/04	<0.30		mg/L	
B135308	JAB	Method Blank	Total Aluminum (Al)	2023/10/05	<0.0030		mg/L	
			Total Chromium (Cr)	2023/10/05	<0.0010		mg/L	
			Total Cobalt (Co)	2023/10/05	<0.00030		mg/L	
			Total Copper (Cu)	2023/10/05	<0.0010		mg/L	
			Total Lead (Pb)	2023/10/05	<0.00020		mg/L	
			Total Antimony (Sb)	2023/10/05	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/10/05	<0.00020		mg/L	

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Nickel (Ni)	2023/10/05	<0.00050		mg/L	
			Total Selenium (Se)	2023/10/05	<0.00020		mg/L	
			Total Silver (Ag)	2023/10/05	<0.00010		mg/L	
			Total Arsenic (As)	2023/10/05	<0.00020		mg/L	
			Total Thallium (Tl)	2023/10/05	<0.00020		mg/L	
			Total Tin (Sn)	2023/10/05	<0.0010		mg/L	
			Total Titanium (Ti)	2023/10/05	<0.0010		mg/L	
			Total Uranium (U)	2023/10/05	<0.00010		mg/L	
			Total Vanadium (V)	2023/10/05	<0.0010		mg/L	
			Total Zinc (Zn)	2023/10/05	<0.0030		mg/L	
			Total Beryllium (Be)	2023/10/05	<0.0010		mg/L	
B135312	HQV	Method Blank	Total Iron (Fe)	2023/10/05	<0.060		mg/L	
			Total Lithium (Li)	2023/10/05	<0.020		mg/L	
			Total Magnesium (Mg)	2023/10/05	<0.20		mg/L	
			Total Manganese (Mn)	2023/10/05	<0.0040		mg/L	
			Total Potassium (K)	2023/10/05	<0.30		mg/L	
			Total Sodium (Na)	2023/10/05	<0.50		mg/L	
			Total Strontium (Sr)	2023/10/05	<0.020		mg/L	
			Total Sulphur (S)	2023/10/05	<0.20		mg/L	
			Total Phosphorus (P)	2023/10/05	<0.10		mg/L	
			Total Barium (Ba)	2023/10/05	<0.010		mg/L	
			Total Silicon (Si)	2023/10/05	<0.50		mg/L	
			Total Boron (B)	2023/10/05	<0.020		mg/L	
			Total Calcium (Ca)	2023/10/05	<0.30		mg/L	
B135582	DSX	Method Blank	Total Sulphide	2023/10/03	<0.0018		mg/L	
B135980	RIL	Method Blank	1,4-Difluorobenzene (sur.)	2023/10/10		105	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/10/10		95	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/10/10		100	%	50 - 140
			Benzene	2023/10/10	<0.00040		mg/L	
			Toluene	2023/10/10	<0.00040		mg/L	
			Ethylbenzene	2023/10/10	<0.00040		mg/L	
			m & p-Xylene	2023/10/10	<0.00080		mg/L	
			o-Xylene	2023/10/10	<0.00040		mg/L	
			F1 (C6-C10)	2023/10/10	<0.10		mg/L	
B136552	CTU	Method Blank	Orthophosphate (P)	2023/10/03	<0.0030		mg/L	
B136655	YHK	Method Blank	Total Organic Carbon (C)	2023/10/04	<0.50		mg/L	
B136668	SKM	Method Blank	True Colour	2023/10/03	<2.0		PtCo units	
B136685	YHK	Method Blank	Total Organic Carbon (C)	2023/10/05	<0.50		mg/L	
B137526	DSX	Method Blank	Chemical Oxygen Demand	2023/10/04	<10		mg/L	
B137656	CTU	Method Blank	Total Nitrogen (N)	2023/10/05	<0.020		mg/L	
B137885	TOR	Method Blank	Chloride (Cl)	2023/10/04	<1.0		mg/L	
			Sulphate (SO4)	2023/10/04	<1.0		mg/L	
B138135	AFI	Method Blank	Nitrite (N)	2023/10/04	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/10/04	<0.010		mg/L	
B138498	YHK	Method Blank	Dissolved Organic Carbon (C)	2023/10/05	<0.50		mg/L	
B138690	JAB	Method Blank	Dissolved Aluminum (Al)	2023/10/04	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/10/04	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/10/04	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/10/04	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/10/04	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/10/04	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/10/04	<0.00020		mg/L	

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Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Nickel (Ni)	2023/10/04	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/10/04	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/10/04	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/10/04	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/10/04	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/10/04	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/10/04	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/10/04	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/10/04	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/10/04	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/10/04	<0.0010		mg/L	
B139994	IK0	Method Blank	Dissolved Iron (Fe)	2023/10/05	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/10/05	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/10/05	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/10/05	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/10/05	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/10/05	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/10/05	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/10/05	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/10/05	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/10/05	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/10/05	<0.50		mg/L	
			Dissolved Boron (B)	2023/10/05	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/10/05	<0.30		mg/L	
B140144	JB9	Method Blank	Total Oil and grease	2023/10/05	<2.0		mg/L	
B140252	AFI	Method Blank	Total Ammonia (N)	2023/10/05	<0.015		mg/L	
B140256	AFI	Method Blank	Total Ammonia (N)	2023/10/05	<0.015		mg/L	
B140297	KKM	Method Blank	Total Mercury (Hg)	2023/10/05	<0.0019		ug/L	
B140449	KKM	Method Blank	Dissolved Mercury (Hg)	2023/10/05	<0.0019		ug/L	
B141062	A5S	Method Blank	Alkalinity (Total as CaCO3)	2023/10/06	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/10/06	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/10/06	<1.0		mg/L	
			Carbonate (CO3)	2023/10/06	<1.0		mg/L	
			Hydroxide (OH)	2023/10/06	<1.0		mg/L	
B141087	A5S	Method Blank	Conductivity	2023/10/06	<2.0		uS/cm	
B135980	RIL	RPD [CAP316-14]	Benzene	2023/10/10	NC		%	30
			Toluene	2023/10/10	NC		%	30
			Ethylbenzene	2023/10/10	NC		%	30
			m & p-Xylene	2023/10/10	NC		%	30
			o-Xylene	2023/10/10	NC		%	30
			F1 (C6-C10)	2023/10/10	NC		%	30
B141062	A5S	RPD [CAP316-02]	Alkalinity (Total as CaCO3)	2023/10/06	12		%	20
			Alkalinity (PP as CaCO3)	2023/10/06	NC		%	20
			Bicarbonate (HCO3)	2023/10/06	12		%	20
			Carbonate (CO3)	2023/10/06	NC		%	20
			Hydroxide (OH)	2023/10/06	NC		%	20
B141087	A5S	RPD [CAP316-02]	Conductivity	2023/10/06	0		%	10
B134391	HE1	RPD [CAP318-01]	Total Dissolved Solids	2023/10/03	0		%	20
B134391	HE1	Matrix Spike [CAP318-01]	Total Dissolved Solids	2023/10/03		102	%	80 - 120
B134725	JC7	Matrix Spike [CAP316-12]	D10-ANTHRACENE (sur.)	2023/10/08		100	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/10/08		108	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/10/08		97	%	50 - 130

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Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			D8-NAPHTHALENE (sur.)	2023/10/08		80	%	50 - 130
			Acenaphthene	2023/10/08		73	%	50 - 130
			Acenaphthylene	2023/10/08		74	%	50 - 130
			Acridine	2023/10/08		64	%	50 - 130
			Anthracene	2023/10/08		74	%	50 - 130
			Benzo(a)anthracene	2023/10/08		94	%	50 - 130
			Benzo(b&j)fluoranthene	2023/10/08		93	%	50 - 130
			Benzo(k)fluoranthene	2023/10/08		102	%	50 - 130
			Benzo(g,h,i)perylene	2023/10/08		89	%	50 - 130
			Benzo(c)phenanthrene	2023/10/08		97	%	50 - 130
			Benzo(a)pyrene	2023/10/08		103	%	50 - 130
			Benzo(e)pyrene	2023/10/08		86	%	50 - 130
			Chrysene	2023/10/08		97	%	50 - 130
			Dibenz(a,h)anthracene	2023/10/08		85	%	50 - 130
			Fluoranthene	2023/10/08		101	%	50 - 130
			Fluorene	2023/10/08		76	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/10/08		82	%	50 - 130
			2-Methylnaphthalene	2023/10/08		66	%	50 - 130
			Naphthalene	2023/10/08		65	%	50 - 130
			Phenanthrene	2023/10/08		101	%	50 - 130
			Perylene	2023/10/08		88	%	50 - 130
			Pyrene	2023/10/08		107	%	50 - 130
			Quinoline	2023/10/08		78	%	50 - 130
			C1-Naphthalene	2023/10/08		55	%	50 - 130
			C3-Naphthalene	2023/10/08		80	%	50 - 130
			C2-Naphthalene	2023/10/08		70	%	50 - 130
			C1-biphenyl	2023/10/08		71	%	50 - 130
			C1 phenanthrene/anthracene	2023/10/08		112	%	50 - 130
			C2 phenanthrene/anthracene	2023/10/08		101	%	50 - 130
			C1 fluoranthene/pyrene	2023/10/08		91	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/10/08		74	%	30 - 130
			1-Methylnaphthalene	2023/10/08		55	%	50 - 130
B134729	CHA	Matrix Spike [CAP317-13]	O-TERPHENYL (sur.)	2023/10/07		100	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/10/07		97	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/10/07		112	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/10/07		104	%	60 - 140
B135308	JAB	Matrix Spike [CAP318-04]	Total Aluminum (Al)	2023/10/05		NC	%	80 - 120
			Total Chromium (Cr)	2023/10/05		116	%	80 - 120
			Total Cobalt (Co)	2023/10/05		116	%	80 - 120
			Total Copper (Cu)	2023/10/05		115	%	80 - 120
			Total Lead (Pb)	2023/10/05		115	%	80 - 120
			Total Antimony (Sb)	2023/10/05		134 (1)	%	80 - 120
			Total Molybdenum (Mo)	2023/10/05		119	%	80 - 120
			Total Nickel (Ni)	2023/10/05		114	%	80 - 120
			Total Selenium (Se)	2023/10/05		119	%	80 - 120
			Total Silver (Ag)	2023/10/05		112	%	80 - 120
			Total Arsenic (As)	2023/10/05		119	%	80 - 120
			Total Thallium (Tl)	2023/10/05		115	%	80 - 120
			Total Tin (Sn)	2023/10/05		117	%	80 - 120
			Total Titanium (Ti)	2023/10/05		117	%	80 - 120
			Total Uranium (U)	2023/10/05		115	%	80 - 120
			Total Vanadium (V)	2023/10/05		117	%	80 - 120

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Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Zinc (Zn)	2023/10/05		117	%	80 - 120
			Total Beryllium (Be)	2023/10/05		118	%	80 - 120
B135312	HQV	Matrix Spike [CAP317-04]	Total Iron (Fe)	2023/10/05		99	%	80 - 120
			Total Lithium (Li)	2023/10/05		94	%	80 - 120
			Total Magnesium (Mg)	2023/10/05		100	%	80 - 120
			Total Manganese (Mn)	2023/10/05		103	%	80 - 120
			Total Potassium (K)	2023/10/05		97	%	80 - 120
			Total Sodium (Na)	2023/10/05		98	%	80 - 120
			Total Strontium (Sr)	2023/10/05		94	%	80 - 120
			Total Sulphur (S)	2023/10/05		94	%	80 - 120
			Total Phosphorus (P)	2023/10/05		96	%	80 - 120
			Total Barium (Ba)	2023/10/05		94	%	80 - 120
			Total Silicon (Si)	2023/10/05		94	%	80 - 120
			Total Boron (B)	2023/10/05		92	%	80 - 120
			Total Calcium (Ca)	2023/10/05		98	%	80 - 120
B135980	RIL	Matrix Spike [CAP317-14]	1,4-Difluorobenzene (sur.)	2023/10/10		100	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/10/10		94	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/10/10		91	%	50 - 140
			Benzene	2023/10/10		91	%	50 - 140
			Toluene	2023/10/10		92	%	50 - 140
			Ethylbenzene	2023/10/10		89	%	50 - 140
			m & p-Xylene	2023/10/10		97	%	50 - 140
			o-Xylene	2023/10/10		95	%	50 - 140
			F1 (C6-C10)	2023/10/10		99	%	60 - 140
B134064	AZI	LCS	Total Suspended Solids	2023/10/03		102	%	80 - 120
B134391	HE1	LCS	Total Dissolved Solids	2023/10/03		94	%	80 - 120
B134519	RTM	LCS	Turbidity	2023/10/02		101	%	80 - 120
B134725	JC7	LCS	D10-ANTHRACENE (sur.)	2023/10/08		98	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/10/08		107	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/10/08		85	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/10/08		64	%	50 - 130
			Acenaphthene	2023/10/08		82	%	50 - 130
			Acenaphthylene	2023/10/08		80	%	50 - 130
			Acridine	2023/10/08		72	%	50 - 130
			Anthracene	2023/10/08		82	%	50 - 130
			Benzo(a)anthracene	2023/10/08		102	%	50 - 130
			Benzo(b&j)fluoranthene	2023/10/08		100	%	50 - 130
			Benzo(k)fluoranthene	2023/10/08		117	%	50 - 130
			Benzo(g,h,i)perylene	2023/10/08		110	%	50 - 130
			Benzo(c)phenanthrene	2023/10/08		114	%	50 - 130
			Benzo(a)pyrene	2023/10/08		105	%	50 - 130
			Benzo(e)pyrene	2023/10/08		97	%	50 - 130
			Chrysene	2023/10/08		110	%	50 - 130
			Dibenz(a,h)anthracene	2023/10/08		106	%	50 - 130
			Fluoranthene	2023/10/08		114	%	50 - 130
			Fluorene	2023/10/08		79	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/10/08		96	%	50 - 130
			2-Methylnaphthalene	2023/10/08		85	%	50 - 130
			Naphthalene	2023/10/08		68	%	50 - 130
			Phenanthrene	2023/10/08		112	%	50 - 130
			Perylene	2023/10/08		101	%	50 - 130
			Pyrene	2023/10/08		104	%	50 - 130

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Quinoline	2023/10/08		84	%	50 - 130
			C1-Naphthalene	2023/10/08		59	%	50 - 130
			C3-Naphthalene	2023/10/08		82	%	50 - 130
			C2-Naphthalene	2023/10/08		73	%	50 - 130
			C1-biphenyl	2023/10/08		76	%	50 - 130
			C1 phenanthrene/anthracene	2023/10/08		125	%	50 - 130
			C2 phenanthrene/anthracene	2023/10/08		110	%	50 - 130
			C1 fluoranthene/pyrene	2023/10/08		103	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/10/08		80	%	30 - 130
			1-Methylnaphthalene	2023/10/08		59	%	50 - 130
B134729	CHA	LCS	O-TERPHENYL (sur.)	2023/10/07		99	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/10/07		100	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/10/07		114	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/10/07		106	%	60 - 140
B135298	KH2	LCS	Total Aluminum (Al)	2023/10/03		96	%	80 - 120
			Total Chromium (Cr)	2023/10/03		92	%	80 - 120
			Total Cobalt (Co)	2023/10/03		92	%	80 - 120
			Total Copper (Cu)	2023/10/03		93	%	80 - 120
			Total Lead (Pb)	2023/10/03		93	%	80 - 120
			Total Antimony (Sb)	2023/10/03		98	%	80 - 120
			Total Molybdenum (Mo)	2023/10/03		96	%	80 - 120
			Total Nickel (Ni)	2023/10/03		91	%	80 - 120
			Total Selenium (Se)	2023/10/03		97	%	80 - 120
			Total Silver (Ag)	2023/10/03		93	%	80 - 120
			Total Arsenic (As)	2023/10/03		95	%	80 - 120
			Total Thallium (Tl)	2023/10/03		94	%	80 - 120
			Total Tin (Sn)	2023/10/03		96	%	80 - 120
			Total Titanium (Ti)	2023/10/03		90	%	80 - 120
			Total Uranium (U)	2023/10/03		92	%	80 - 120
			Total Vanadium (V)	2023/10/03		92	%	80 - 120
			Total Zinc (Zn)	2023/10/03		92	%	80 - 120
			Total Beryllium (Be)	2023/10/03		94	%	80 - 120
B135300	MPU	LCS	Total Iron (Fe)	2023/10/04		106	%	80 - 120
			Total Lithium (Li)	2023/10/04		97	%	80 - 120
			Total Magnesium (Mg)	2023/10/04		112	%	80 - 120
			Total Manganese (Mn)	2023/10/04		104	%	80 - 120
			Total Potassium (K)	2023/10/04		99	%	80 - 120
			Total Sodium (Na)	2023/10/04		96	%	80 - 120
			Total Strontium (Sr)	2023/10/04		98	%	80 - 120
			Total Sulphur (S)	2023/10/04		96	%	80 - 120
			Total Phosphorus (P)	2023/10/04		102	%	80 - 120
			Total Barium (Ba)	2023/10/04		102	%	80 - 120
			Total Silicon (Si)	2023/10/04		101	%	80 - 120
			Total Boron (B)	2023/10/04		97	%	80 - 120
			Total Calcium (Ca)	2023/10/04		101	%	80 - 120
B135308	JAB	LCS	Total Aluminum (Al)	2023/10/05		98	%	80 - 120
			Total Chromium (Cr)	2023/10/05		99	%	80 - 120
			Total Cobalt (Co)	2023/10/05		99	%	80 - 120
			Total Copper (Cu)	2023/10/05		99	%	80 - 120
			Total Lead (Pb)	2023/10/05		98	%	80 - 120
			Total Antimony (Sb)	2023/10/05		114	%	80 - 120
			Total Molybdenum (Mo)	2023/10/05		100	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Nickel (Ni)	2023/10/05		97	%	80 - 120
			Total Selenium (Se)	2023/10/05		105	%	80 - 120
			Total Silver (Ag)	2023/10/05		96	%	80 - 120
			Total Arsenic (As)	2023/10/05		103	%	80 - 120
			Total Thallium (Tl)	2023/10/05		99	%	80 - 120
			Total Tin (Sn)	2023/10/05		98	%	80 - 120
			Total Titanium (Ti)	2023/10/05		99	%	80 - 120
			Total Uranium (U)	2023/10/05		97	%	80 - 120
			Total Vanadium (V)	2023/10/05		99	%	80 - 120
			Total Zinc (Zn)	2023/10/05		101	%	80 - 120
			Total Beryllium (Be)	2023/10/05		99	%	80 - 120
B135312	HQV	LCS	Total Iron (Fe)	2023/10/05		98	%	80 - 120
			Total Lithium (Li)	2023/10/05		92	%	80 - 120
			Total Magnesium (Mg)	2023/10/05		98	%	80 - 120
			Total Manganese (Mn)	2023/10/05		101	%	80 - 120
			Total Potassium (K)	2023/10/05		95	%	80 - 120
			Total Sodium (Na)	2023/10/05		96	%	80 - 120
			Total Strontium (Sr)	2023/10/05		93	%	80 - 120
			Total Sulphur (S)	2023/10/05		92	%	80 - 120
			Total Phosphorus (P)	2023/10/05		94	%	80 - 120
			Total Barium (Ba)	2023/10/05		93	%	80 - 120
			Total Silicon (Si)	2023/10/05		92	%	80 - 120
			Total Boron (B)	2023/10/05		90	%	80 - 120
			Total Calcium (Ca)	2023/10/05		95	%	80 - 120
B135582	DSX	LCS	Total Sulphide	2023/10/03		101	%	80 - 120
B135980	RIL	LCS	1,4-Difluorobenzene (sur.)	2023/10/10		100	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/10/10		95	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/10/10		90	%	50 - 140
			Benzene	2023/10/10		90	%	60 - 130
			Toluene	2023/10/10		91	%	60 - 130
			Ethylbenzene	2023/10/10		90	%	60 - 130
			m & p-Xylene	2023/10/10		96	%	60 - 130
			o-Xylene	2023/10/10		94	%	60 - 130
			F1 (C6-C10)	2023/10/10		88	%	60 - 140
B136552	CTU	LCS	Orthophosphate (P)	2023/10/03		101	%	80 - 120
B136655	YHK	LCS	Total Organic Carbon (C)	2023/10/04		96	%	80 - 120
B136668	SKM	LCS	True Colour	2023/10/03		97	%	80 - 120
B136685	YHK	LCS	Total Organic Carbon (C)	2023/10/05		98	%	80 - 120
B137526	DSX	LCS	Chemical Oxygen Demand	2023/10/04		104	%	80 - 120
B137656	CTU	LCS	Total Nitrogen (N)	2023/10/05		103	%	80 - 120
B137885	TOR	LCS	Chloride (Cl)	2023/10/04		99	%	80 - 120
			Sulphate (SO4)	2023/10/04		99	%	80 - 120
B138135	AFI	LCS	Nitrite (N)	2023/10/04		101	%	80 - 120
			Nitrate plus Nitrite (N)	2023/10/04		101	%	80 - 120
B138498	YHK	LCS	Dissolved Organic Carbon (C)	2023/10/05		99	%	80 - 120
B138690	JAB	LCS	Dissolved Aluminum (Al)	2023/10/04		111	%	80 - 120
			Dissolved Chromium (Cr)	2023/10/04		108	%	80 - 120
			Dissolved Cobalt (Co)	2023/10/04		108	%	80 - 120
			Dissolved Copper (Cu)	2023/10/04		109	%	80 - 120
			Dissolved Lead (Pb)	2023/10/04		105	%	80 - 120
			Dissolved Antimony (Sb)	2023/10/04		117	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/10/04		110	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Nickel (Ni)	2023/10/04		108	%	80 - 120
			Dissolved Selenium (Se)	2023/10/04		113	%	80 - 120
			Dissolved Silver (Ag)	2023/10/04		103	%	80 - 120
			Dissolved Arsenic (As)	2023/10/04		112	%	80 - 120
			Dissolved Thallium (Tl)	2023/10/04		102	%	80 - 120
			Dissolved Tin (Sn)	2023/10/04		107	%	80 - 120
			Dissolved Titanium (Ti)	2023/10/04		106	%	80 - 120
			Dissolved Uranium (U)	2023/10/04		106	%	80 - 120
			Dissolved Vanadium (V)	2023/10/04		107	%	80 - 120
			Dissolved Zinc (Zn)	2023/10/04		109	%	80 - 120
			Dissolved Beryllium (Be)	2023/10/04		101	%	80 - 120
B139994	IK0	LCS	Dissolved Iron (Fe)	2023/10/05		100	%	80 - 120
			Dissolved Lithium (Li)	2023/10/05		95	%	80 - 120
			Dissolved Magnesium (Mg)	2023/10/05		101	%	80 - 120
			Dissolved Manganese (Mn)	2023/10/05		105	%	80 - 120
			Dissolved Potassium (K)	2023/10/05		101	%	80 - 120
			Dissolved Sodium (Na)	2023/10/05		99	%	80 - 120
			Dissolved Strontium (Sr)	2023/10/05		97	%	80 - 120
			Dissolved Sulphur (S)	2023/10/05		95	%	80 - 120
			Dissolved Phosphorus (P)	2023/10/05		98	%	80 - 120
			Dissolved Barium (Ba)	2023/10/05		97	%	80 - 120
			Dissolved Silicon (Si)	2023/10/05		94	%	80 - 120
			Dissolved Boron (B)	2023/10/05		93	%	80 - 120
			Dissolved Calcium (Ca)	2023/10/05		98	%	80 - 120
B140144	JB9	LCS	Total Oil and grease	2023/10/05		105	%	70 - 130
B140252	AFI	LCS	Total Ammonia (N)	2023/10/05		101	%	80 - 120
B140256	AFI	LCS	Total Ammonia (N)	2023/10/05		105	%	80 - 120
B140297	KKM	LCS	Total Mercury (Hg)	2023/10/05		105	%	80 - 120
B140449	KKM	LCS	Dissolved Mercury (Hg)	2023/10/05		101	%	80 - 120
B141062	A5S	LCS	Alkalinity (Total as CaCO3)	2023/10/06		99	%	80 - 120
B141087	A5S	LCS	Conductivity	2023/10/06		101	%	90 - 110
B137656	CTU	SRM	Total Nitrogen (N)	2023/10/05		109	%	80 - 120

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.

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

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

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

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

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

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.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378730
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

VALIDATION SIGNATURE PAGE

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

Elizabeth Chacko

Elizabeth Chacko, Senior Analyst, Organics

Qiliang (Alex) Wu, Senior Analyst

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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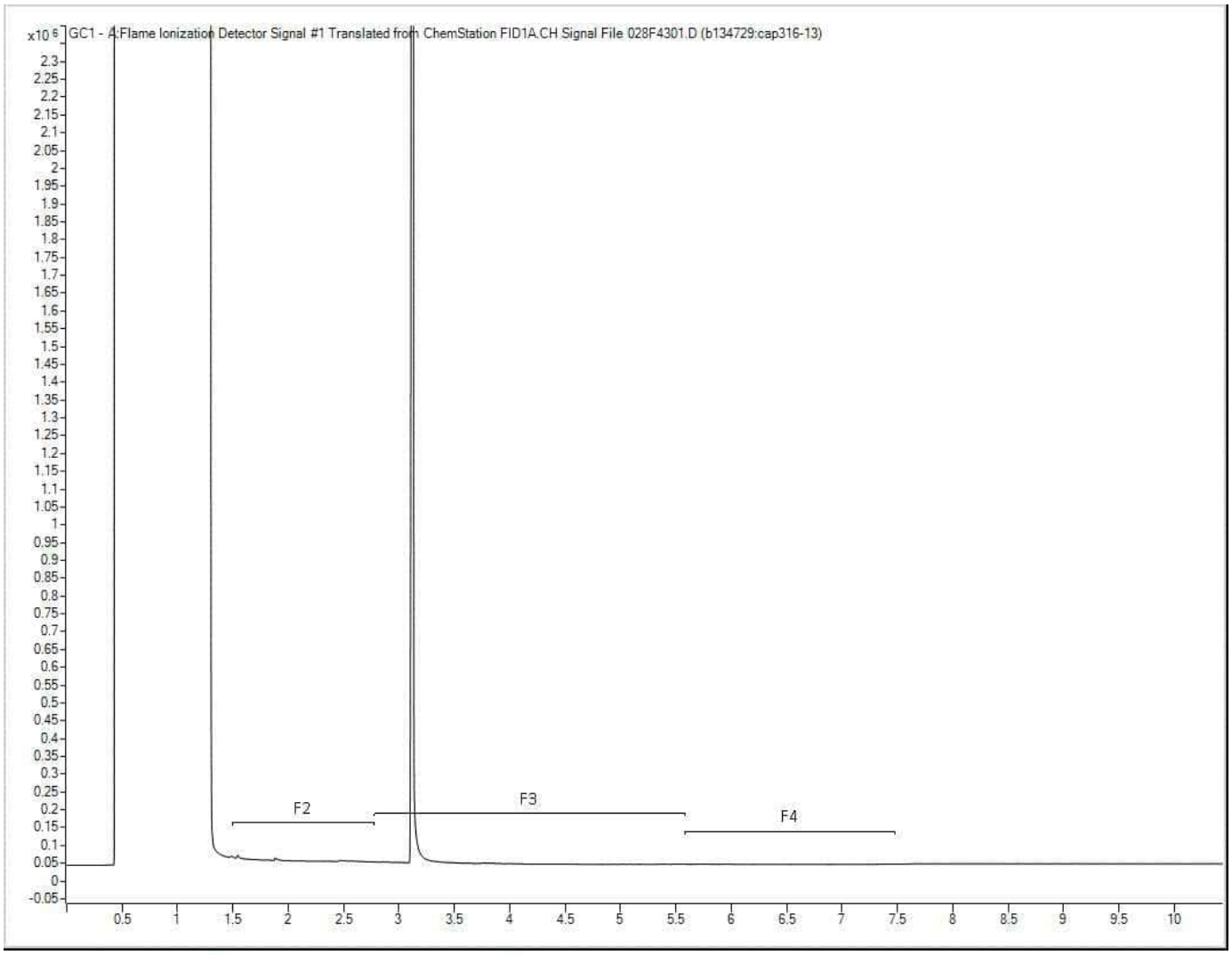
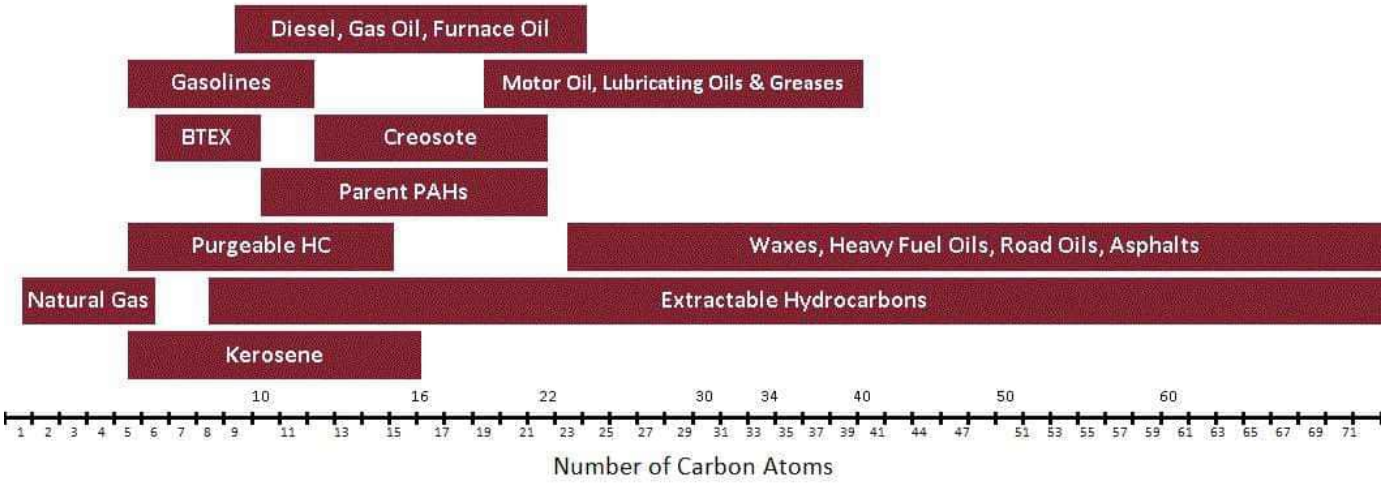
Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378730
Report Date: 2023/10/13
Bureau Veritas Sample: CAP316

Advisian
Task Order#:417085-49223Line Item:
Site#: N/A
Site Location: Norman Wells, NWT
Client ID: AEMP-DS-03

CCME Hydrocarbons (F2-F4 in water) Chromatogram





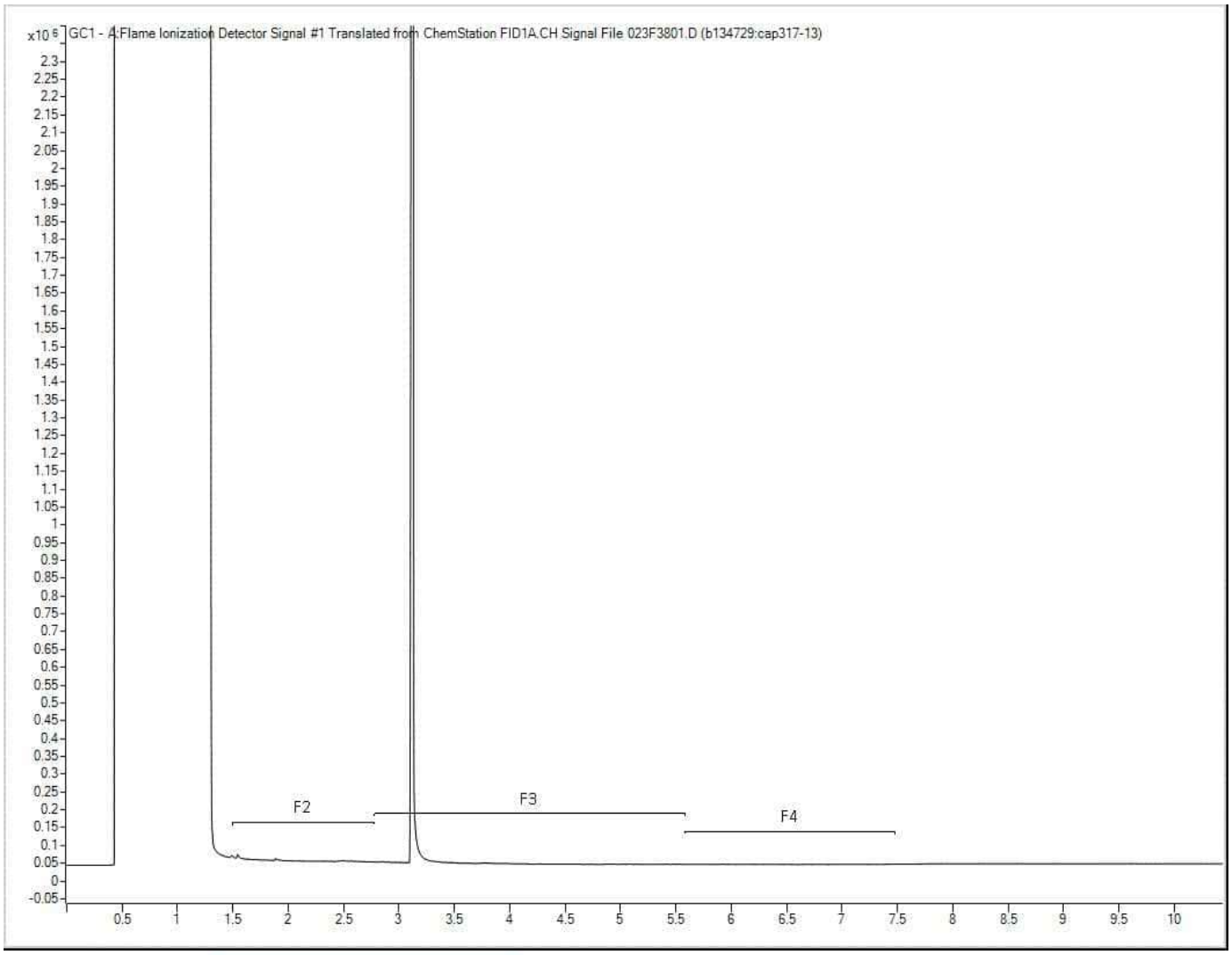
hpchem20\HPchem\1\DATA\2023\10\RUN1007

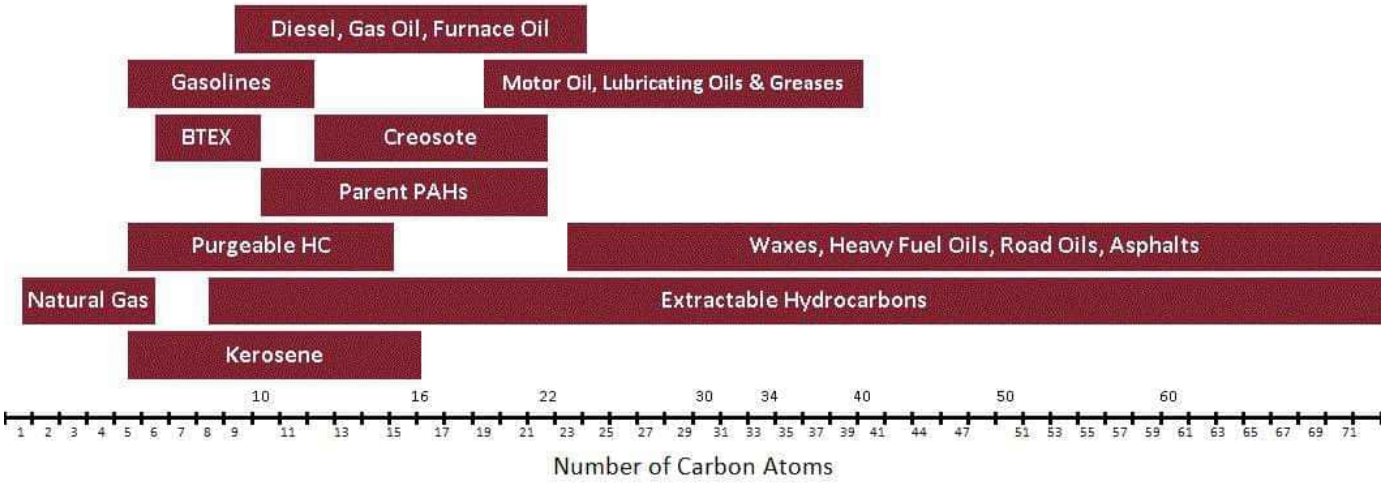
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C378730
Report Date: 2023/10/13
Bureau Veritas Sample: CAP317

Advisian
Task Order#:417085-49223Line Item:
Site#: N/A
Site Location: Norman Wells, NWT
Client ID: AEMP-US-01

CCME Hydrocarbons (F2-F4 in water) Chromatogram





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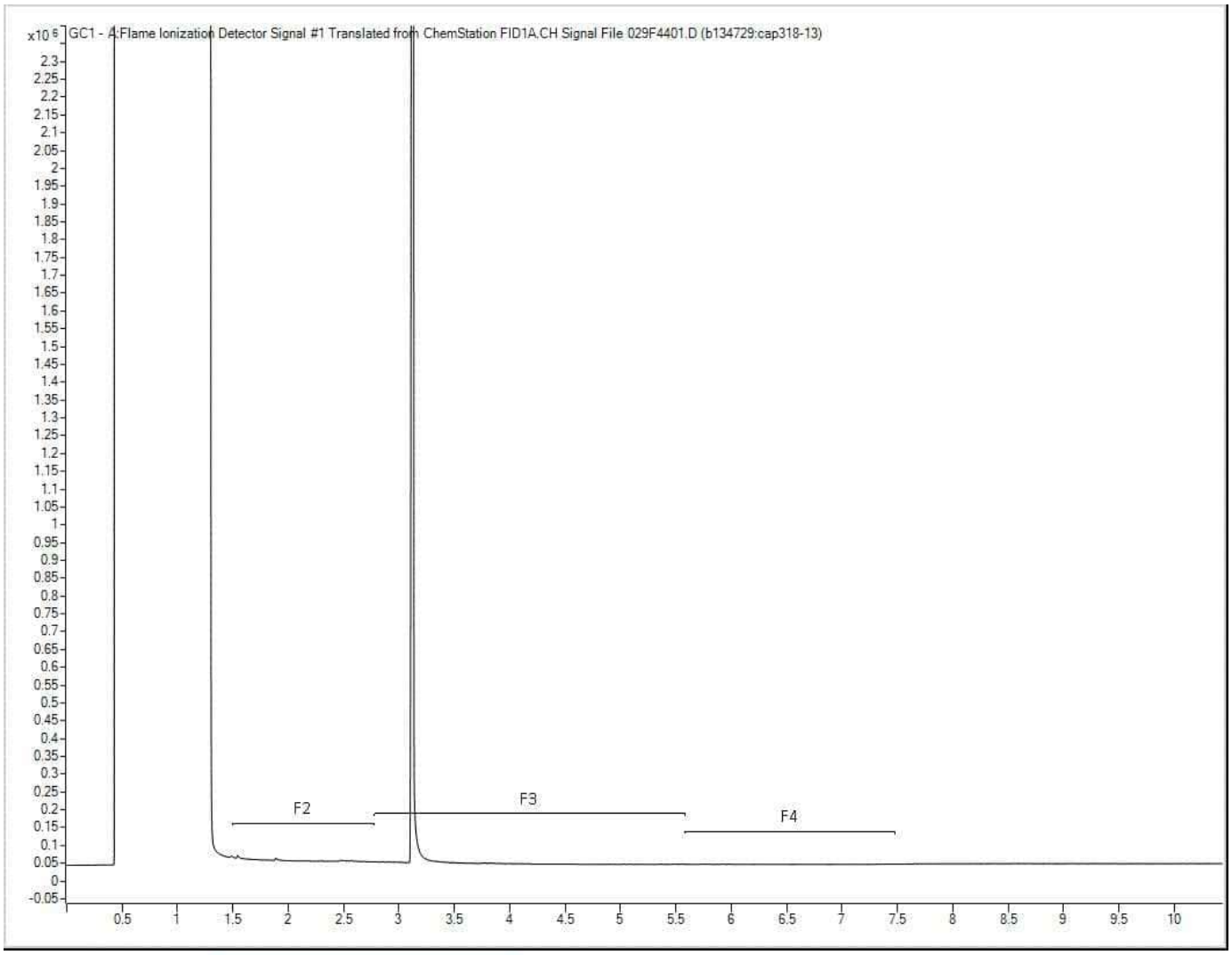
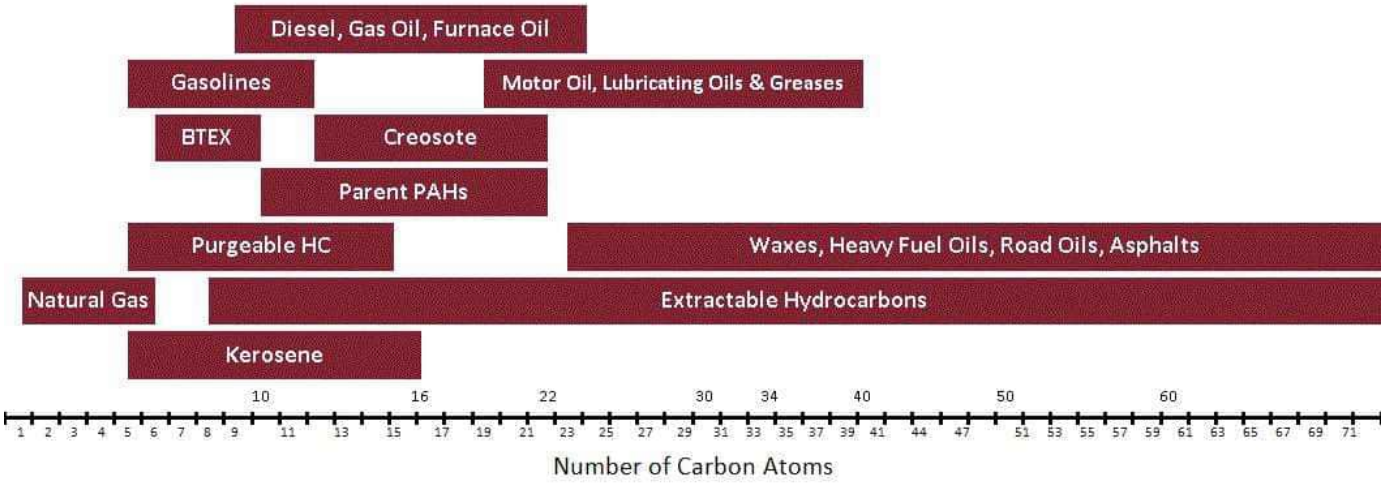
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C378730
Report Date: 2023/10/13
Bureau Veritas Sample: CAP318

Advisian
Task Order#:417085-49223Line Item:
Site#: N/A
Site Location: Norman Wells, NWT
Client ID: AEMP-DS-04

CCME Hydrocarbons (F2-F4 in water) Chromatogram





hpchem20\HPchem\1\DATA\2023\10\RUN1007

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Maxxam
A Bureau Veritas Group Company

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Toll Free: (800) 386-7247

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 299607

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Sampler Name (Print): Alex Haigh / Stacy Gibb

REPORT INFORMATION

Company Name: Advisian
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Consultant Project #: 417085-49223-23200

ANALYSIS REQUESTED

	FIELD SAMPLE ID	MATRIX: GROUND WATER	MATRIX: SURFACE WATER	MATRIX: SOIL	MATRIX: OTHER	# CONTAINERS	SAMPLING DATE (YYYY/MM/DD)	SAMPLING TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-2 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☒ DIS ☒	MERCURY TOTAL ☒ DISSOLVED ☒	SALINITY SOIL	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY	pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	True Color, TSS, TDS, Turbidity	Oil + Grease	TOC, DOC, Sulphide	Nitrate, Nitrite, Ammonia (Total), TKN	Orthophosphate	Sulphur - Total & Dissolved	COD	Alkylated PAHs + TPH
1	AEMP-DS-03	GW*	X			18	2023/09/25	14:00	X			X		X						X	X					X			X	X	X	X	X	X	X	X
2	AEMP-US-01		X			18	2023/09/26	10:45	X			X		X						X	X					X			X	X	X	X	X	X	X	X
3	AEMP-DS-04		X			18	2023/09/24	10:25	X			X	55	X						X	X					X			X	X	X	X	X	X	X	X
4																																				
5																																				
6																																				
7																																				
8																																				
9																																				
10																																				

mcal-09-2844

Y1

IOL SITE LOCATION: Norman Wells, NT

IOL PROJECT # (if applicable): N/A

MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-49223.23200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) EAL ☐ Other

SPECIAL INSTRUCTIONS: email canada.chemistry@worley.com cacal-10R data track@worley.com stacy.gibb@worley.com IES A2601436

JARS USED & NOT SUBMITTED (Enter N/A for Water): N/A

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID #				YES	NO	COOLER ID #				YES	NO	COOLER ID #			
SEAL PRESENT	✓		TEMP °C	3	3	2	SEAL PRESENT		TEMP °C	1	2	3	SEAL PRESENT		TEMP °C	1	2	3
SEAL INTACT	✓			1	2	3	SEAL INTACT						SEAL INTACT					
COOLING MEDIA PRESENT	✓						COOLING MEDIA PRESENT						COOLING MEDIA PRESENT					

LAB USE ONLY
MAXXAM JOB #

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1.	Stacy Gibb	2023/09/27	10:00	1.	AJRAVERGIL	2023/09/29	15:00
2.				2.			
3.				3.			

SAMPLES
LABELED BY: VERIFIED BY:

COC-1010 (06/2016) IOL-AB White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-09-24/25
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C378736	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☐ **Yes** ☒ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☐ **Yes** ☒ **No**

If yes, FLAG type and comments*:*

Date samples submitted 2023-09-29

Due date for lab report on SRC 2023-10-13

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☒ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☒ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☒ **No**	Turbidity, true colour, orthophosphate, nitrite, BTEX, F1, TDS, TSS
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☒ **Yes** ☐ **No**	

Lab QA/QC samples are within Acceptance Criteria?

Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☒ **Yes** ☐ **No** ☐ **N/A**	

Data check completed by Alex Haigh **Date** 2024-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	

Data check completed by Alex Haigh **Date** 2024-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Trip Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Equipment Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes	☐ No	☒ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field pH vs. Lab pH RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes	☐ No	☐ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☒ Yes ☐ No

Explain rationale for yes/no:

Request lab to recheck data? If so give details	☐ Yes	☒ No	☐ N/A	**Comments**

If Yes, Lab request to recheck must be approved by Project Manager Name: **Date**

Data check completed by Alex Haigh **Date** 2024-03-26

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200
Your C.O.C. #: 299608

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/10/13
Report #: R3409640
Version: 3 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C378736
Received: 2023/09/29, 15:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	3	AB SOP-00005	SM 24 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	3	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	3		Auto Calc
Cadmium - low level CCME - Dissolved	3		Auto Calc
Cadmium - low level CCME (Total)	3		Auto Calc
Chloride/Sulphate by Auto Colourimetry	3	AB SOP-00020	SM24-4500-Cl/SO4-E m
COD by Colorimeter	3	AB SOP-00016	SM 23 5220D m
True Colour	3	CAL SOP-00049	SM 24 2120 C m
Carbon (DOC) (1)	3	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	3	AB SOP-00005	SM 24 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	3	AB SOP-00037	CCME PHC-CWS m
Sulphide (as H2S)	3		Auto Calc
Hardness	3		Auto Calc
Mercury (Dissolved) by CV (3)	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	3	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	3	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (3)	3	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	3	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	3		Auto Calc
Ammonia-N (Total)	3	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate and Nitrite	3		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	3	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N)	3		Auto Calc
Oil and Grease (Gravimetric, n-Hexane)	3	AB SOP-00092	SM 23 5520B/5520F m
Target & Alkylated PAH in Water by GC/MS (4)	3	AB SOP-00037 CAL SOP-00250	EPA 8270e m
Benzo[a]pyrene Equivalency (5)	3		Auto Calc
Orthophosphate by Automated Analyzer (6)	3	AB SOP-00025	SM 24 4500-P A,F m
Total Sulphide	3	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	3	AB SOP-00065	SM 24 2540 C m
Total Kjeldahl Nitrogen (Total)	3	BBY WI-00033	Auto Calc

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200
Your C.O.C. #: 299608

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/10/13
Report #: R3409640
Version: 3 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C378736
Received: 2023/09/29, 15:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Nitrogen (Total)	3	AB SOP-00093	SM 24 4500-N C m
Carbon (Total Organic) (7)	3	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR)	3	AB SOP-00061	SM 24 2540 D m
Turbidity	3	CAL SOP-00081	SM 24 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) 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.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Alkylated PAH results are semiquantitative
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(6) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200
Your C.O.C. #: 299608

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/10/13
Report #: R3409640
Version: 3 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C378736
Received: 2023/09/29, 15:00
(7) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Namita Sahni
Customer Solutions Representative
13 Oct 2023 11:09:25

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614
==========
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 Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		CAP376	CAP377	CAP378		
Sampling Date		2023/09/25 09:50	2023/09/24 14:25	2023/09/24 11:40		
COC Number		299608	299608	299608		
	UNITS	**AMEP-DS-01**	**AMEP-US-04**	**AMEP-DS-02**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	B134729
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	B134729
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.20	B134729
Volatiles						
Benzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B135980
Toluene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B135980
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B135980
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	0.00080	B135980
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	B135980
Xylenes (Total)	mg/L	<0.00089	<0.00089	<0.00089	0.00089	B133486
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	0.10	B133486
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	0.10	B135980
Extraction Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	99	99	98		B134729
Instrument Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	105	105	105		B135980
4-Bromofluorobenzene (sur.)	%	94	94	93		B135980
D4-1,2-Dichloroethane (sur.)	%	100	99	99		B135980
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		CAP376		CAP377		CAP378		
Sampling Date		2023/09/25 09:50		2023/09/24 14:25		2023/09/24 11:40		
COC Number		299608		299608		299608		
	UNITS	**AMEP-DS-01**	**QC Batch**	**AMEP-US-04**	**QC Batch**	**AMEP-DS-02**	**RDL**	**QC Batch**
Calculated Parameters								
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.088	B133676	0.16	B133676	0.12	0.020	B133676
Nutrients								
Total Nitrogen (N)	mg/L	0.14	B137656	0.21	B135309	0.18	0.020	B137656
RDL = Reportable Detection Limit								

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		CAP376		CAP377			CAP378		
Sampling Date		2023/09/25 09:50		2023/09/24 14:25			2023/09/24 11:40		
COC Number		299608		299608			299608		
	UNITS	**AMEP-DS-01**	**QC Batch**	**AMEP-US-04**	**RDL**	**QC Batch**	**AMEP-DS-02**	**RDL**	**QC Batch**
Calculated Parameters									
Hardness (CaCO3)	mg/L	0.80	B133889	340	0.50	B133889	130	0.50	B133889
Ion Balance (% Difference)	%	NC	B133807	0.81	N/A	B133807	0.45	N/A	B133807
Nitrate (N)	mg/L	0.048	B133661	0.048	0.010	B133661	0.056	0.010	B133661
Nitrate (NO3)	mg/L	0.21	B133801	0.21	0.044	B133801	0.25	0.044	B133801
Nitrite (NO2)	mg/L	<0.033	B133801	<0.033	0.033	B133801	<0.033	0.033	B133801
Misc. Inorganics									
Conductivity	uS/cm	710	B144208	720	2.0	B141174	290	2.0	B141174
Total Dissolved Solids	mg/L	400	B134391	380	10	B134391	130	10	B134391
Anions									
Alkalinity (PP as CaCO3)	mg/L	<1.0	B141169	<1.0	1.0	B141169	<1.0	1.0	B141169
Alkalinity (Total as CaCO3)	mg/L	200	B141169	200	1.0	B141169	90	1.0	B141169
Bicarbonate (HCO3)	mg/L	240	B141169	240	1.0	B141169	110	1.0	B141169
Carbonate (CO3)	mg/L	<1.0	B141169	<1.0	1.0	B141169	<1.0	1.0	B141169
Hydroxide (OH)	mg/L	<1.0	B141169	<1.0	1.0	B141169	<1.0	1.0	B141169
Chloride (Cl)	mg/L	29	B135952	30	1.0	B138031	12	1.0	B138025
Sulphate (SO4)	mg/L	170	B135952	170	5.0	B138031	46	1.0	B138025
Nutrients									
Nitrite (N)	mg/L	<0.010	B136274	<0.010	0.010	B136274	<0.010	0.010	B136274
Nitrate plus Nitrite (N)	mg/L	0.048	B136274	0.048	0.010	B136274	0.056	0.010	B136274
Elements									
Dissolved Barium (Ba)	mg/L	<0.010	B136630	0.083	0.010	B139557	0.050	0.010	B139557
Dissolved Boron (B)	mg/L	<0.020	B136630	0.035	0.020	B139557	<0.020	0.020	B139557
Dissolved Calcium (Ca)	mg/L	0.33	B136630	83	0.30	B139557	34	0.30	B139557
Dissolved Iron (Fe)	mg/L	<0.060	B136630	<0.060	0.060	B139557	<0.060	0.060	B139557
Dissolved Lithium (Li)	mg/L	<0.020	B136630	<0.020	0.020	B139557	<0.020	0.020	B139557
Dissolved Magnesium (Mg)	mg/L	<0.20	B136630	33	0.20	B139557	11	0.20	B139557
Dissolved Manganese (Mn)	mg/L	<0.0040	B136630	0.0052	0.0040	B139557	<0.0040	0.0040	B139557
Dissolved Phosphorus (P)	mg/L	<0.10	B136630	<0.10	0.10	B139557	<0.10	0.10	B139557
Dissolved Potassium (K)	mg/L	<0.30	B136630	1.2	0.30	B139557	0.95	0.30	B139557
Dissolved Silicon (Si)	mg/L	<0.50	B136630	2.6	0.50	B139557	1.4	0.50	B139557

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		CAP376		CAP377			CAP378		
Sampling Date		2023/09/25 09:50		2023/09/24 14:25			2023/09/24 11:40		
COC Number		299608		299608			299608		
	UNITS	**AMEP-DS-01**	**QC Batch**	**AMEP-US-04**	**RDL**	**QC Batch**	**AMEP-DS-02**	**RDL**	**QC Batch**
Dissolved Sodium (Na)	mg/L	<0.50	B136630	27	0.50	B139557	10	0.50	B139557
Dissolved Strontium (Sr)	mg/L	<0.020	B136630	1.6	0.020	B139557	0.29	0.020	B139557
Dissolved Sulphur (S)	mg/L	<0.20	B136630	55	0.20	B139557	15	0.20	B139557
RDL = Reportable Detection Limit									

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		CAP376			CAP377			CAP378		
Sampling Date		2023/09/25 09:50			2023/09/24 14:25			2023/09/24 11:40		
COC Number		299608			299608			299608		
	UNITS	**AMEP-DS-01**	**RDL**	**QC Batch**	**AMEP-US-04**	**RDL**	**QC Batch**	**AMEP-DS-02**	**RDL**	**QC Batch**
Elements										
Total Cadmium (Cd)	mg/L	<0.000020	0.000020	B133886	<0.000020	0.000020	B133886	<0.000020	0.000020	B133886
Total Mercury (Hg)	ug/L	<0.0019	0.0019	B140297	<0.0019	0.0019	B140297	<0.0019	0.0019	B140297
Total Aluminum (Al)	mg/L	0.024	0.0030	B135298	0.22	0.0030	B137761	0.16	0.0030	B135308
Total Antimony (Sb)	mg/L	<0.00060	0.00060	B135298	<0.00060	0.00060	B137761	<0.00060	0.00060	B135308
Total Arsenic (As)	mg/L	<0.00020	0.00020	B135298	0.00030	0.00020	B137761	0.00035	0.00020	B135308
Total Barium (Ba)	mg/L	0.084	0.010	B135300	0.083	0.010	B137791	0.046	0.010	B135312
Total Beryllium (Be)	mg/L	<0.0010	0.0010	B135298	<0.0010	0.0010	B137761	<0.0010	0.0010	B135308
Total Boron (B)	mg/L	0.041	0.020	B135300	0.030	0.020	B137791	<0.020	0.020	B135312
Total Calcium (Ca)	mg/L	86	0.30	B135300	82	0.30	B137791	33	0.30	B135312
Total Chromium (Cr)	mg/L	<0.0010	0.0010	B135298	<0.0010	0.0010	B137761	<0.0010	0.0010	B135308
Total Cobalt (Co)	mg/L	<0.00030	0.00030	B135298	<0.00030	0.00030	B137761	<0.00030	0.00030	B135308
Total Copper (Cu)	mg/L	<0.0010	0.0010	B135298	<0.0010	0.0010	B137761	0.0011	0.0010	B135308
Total Iron (Fe)	mg/L	0.084	0.060	B135300	0.45	0.060	B137791	0.23	0.060	B135312
Total Lead (Pb)	mg/L	<0.00020	0.00020	B135298	<0.00020	0.00020	B137761	<0.00020	0.00020	B135308
Total Lithium (Li)	mg/L	<0.020	0.020	B135300	<0.020	0.020	B137791	<0.020	0.020	B135312
Total Magnesium (Mg)	mg/L	36	0.20	B135300	32	0.20	B137791	11	0.20	B135312
Total Manganese (Mn)	mg/L	0.0079	0.0040	B135300	0.023	0.0067	B137791	0.0099	0.0040	B135312
Total Molybdenum (Mo)	mg/L	0.0017	0.00020	B135298	0.0021	0.00020	B137761	0.00094	0.00020	B135308
Total Nickel (Ni)	mg/L	0.00067	0.00050	B135298	0.0011	0.00050	B137761	0.0011	0.00050	B135308
Total Phosphorus (P)	mg/L	<0.10	0.10	B135300	<0.10	0.10	B137791	<0.10	0.10	B135312
Total Potassium (K)	mg/L	1.2	0.30	B135300	1.2	0.30	B137791	0.92	0.30	B135312
Total Selenium (Se)	mg/L	<0.00020	0.00020	B135298	0.00022	0.00020	B137761	0.00031	0.00020	B135308
Total Silicon (Si)	mg/L	2.6	0.50	B135300	2.9	0.50	B137791	1.6	0.50	B135312
Total Silver (Ag)	mg/L	<0.00010	0.00010	B135298	<0.00010	0.00010	B137761	<0.00010	0.00010	B135308
Total Sodium (Na)	mg/L	27	0.50	B135300	25	0.50	B137791	9.1	0.50	B135312
Total Strontium (Sr)	mg/L	1.6	0.020	B135300	1.5	0.020	B137791	0.26	0.020	B135312
Total Sulphur (S)	mg/L	55	0.20	B135300	52	0.20	B137791	13	0.20	B135312
Total Thallium (Tl)	mg/L	<0.00020	0.00020	B135298	<0.00020	0.00020	B137761	<0.00020	0.00020	B135308
Total Tin (Sn)	mg/L	<0.0010	0.0010	B135298	<0.0010	0.0010	B137761	<0.0010	0.0010	B135308
Total Titanium (Ti)	mg/L	<0.0010	0.0010	B135298	0.0028	0.0010	B137761	0.0024	0.0010	B135308
Total Uranium (U)	mg/L	0.0011	0.00010	B135298	0.0014	0.00010	B137761	0.00069	0.00010	B135308
RDL = Reportable Detection Limit										

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		CAP376			CAP377			CAP378		
Sampling Date		2023/09/25 09:50			2023/09/24 14:25			2023/09/24 11:40		
COC Number		299608			299608			299608		
	UNITS	**AMEP-DS-01**	**RDL**	**QC Batch**	**AMEP-US-04**	**RDL**	**QC Batch**	**AMEP-DS-02**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	<0.0010	0.0010	B135298	<0.0010	0.0010	B137761	<0.0010	0.0010	B135308
Total Zinc (Zn)	mg/L	<0.0030	0.0030	B135298	<0.0030	0.0030	B137761	<0.0030	0.0030	B135308
RDL = Reportable Detection Limit										

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		CAP376			CAP376			CAP377		
Sampling Date		2023/09/25 09:50			2023/09/25 09:50			2023/09/24 14:25		
COC Number		299608			299608			299608		
	UNITS	**AMEP-DS-01**	**RDL**	**QC Batch**	**AMEP-DS-01 Lab-Dup**	**RDL**	**QC Batch**	**AMEP-US-04**	**RDL**	**QC Batch**
Calculated Parameters										
Sulphide (as H2S)	mg/L	0.018	0.0020	B133765				<0.0020	0.0020	B133765
Demand Parameters										
Chemical Oxygen Demand	mg/L	18	10	B137526				19	10	B136139
Elements										
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	B133885				<0.000020	0.000020	B133885
Misc. Inorganics										
Dissolved Organic Carbon (C)	mg/L	<0.50	0.50	B138498				2.2	0.50	B138498
Total Organic Carbon (C)	mg/L	2.0	0.50	B136685	1.9	0.50	B136685	1.6	0.50	B136655
Total Suspended Solids	mg/L	<1.0	1.0	B134064				<1.0	1.0	B134064
Anions										
Total Sulphide	mg/L	0.017	0.0018	B133470				<0.0018	0.0018	B133470
Nutrients										
Total Ammonia (N)	mg/L	<0.015	0.015	B140256				<0.015	0.015	B140256
Orthophosphate (P)	mg/L	<0.0030	0.0030	B136552				<0.0030	0.0030	B136552
Misc. Organics										
Total Oil and grease	mg/L	<2.0	2.0	B140144				<2.0	2.0	B140144
Physical Properties										
True Colour	PtCo units	5.0	2.0	B136668	4.7	2.0	B136668	2.1	2.0	B136668
Physical Properties										
Turbidity	NTU	<0.10	0.10	B134519				<0.10	0.10	B134519

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		CAP378			CAP378		
Sampling Date		2023/09/24 11:40			2023/09/24 11:40		
COC Number		299608			299608		
	UNITS	**AMEP-DS-02**	**RDL**	**QC Batch**	**AMEP-DS-02 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters							
Sulphide (as H2S)	mg/L	<0.0020	0.0020	B133765			
Demand Parameters							
Chemical Oxygen Demand	mg/L	22	10	B137526			
Elements							
Dissolved Cadmium (Cd)	mg/L	<0.000020	0.000020	B133885			
Misc. Inorganics							
Dissolved Organic Carbon (C)	mg/L	2.7	0.50	B138498	2.7	0.50	B138498
Total Organic Carbon (C)	mg/L	2.4	0.50	B136685			
Total Suspended Solids	mg/L	6.1	1.0	B134064			
Anions							
Total Sulphide	mg/L	<0.0018	0.0018	B133470			
Nutrients							
Total Ammonia (N)	mg/L	<0.015	0.015	B140252			
Orthophosphate (P)	mg/L	<0.0030	0.0030	B136552			
Misc. Organics							
Total Oil and grease	mg/L	<2.0	2.0	B140144			
Physical Properties							
True Colour	PtCo units	9.6	2.0	B136668			
Physical Properties							
Turbidity	NTU	7.4	0.10	B134519			

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		CAP376	CAP377	CAP378		
Sampling Date		2023/09/25 09:50	2023/09/24 14:25	2023/09/24 11:40		
COC Number		299608	299608	299608		
	UNITS	**AMEP-DS-01**	**AMEP-US-04**	**AMEP-DS-02**	**RDL**	**QC Batch**
Polycyclic Aromatics						
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B133487
Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
Acenaphthylene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
Acridine	ug/L	<0.040	<0.040	<0.040	0.040	B134725
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	B134725
Benzo(a)anthracene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
Benzo(b&j)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
Benzo(k)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
Benzo(g,h,i)perylene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
Benzo(c)phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
Benzo(a)pyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B134725
Benzo(e)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
Chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
Dibenz(a,h)anthracene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B134725
Fluoranthene	ug/L	<0.010	<0.010	<0.010	0.010	B134725
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
Perylene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
Quinoline	ug/L	<0.20	<0.20	<0.20	0.20	B134725
Retene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
C1-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
C3-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
C4-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
C2-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
Biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C1-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B134725
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		CAP376	CAP377	CAP378		
Sampling Date		2023/09/25 09:50	2023/09/24 14:25	2023/09/24 11:40		
COC Number		299608	299608	299608		
	UNITS	**AMEP-DS-01**	**AMEP-US-04**	**AMEP-DS-02**	**RDL**	**QC Batch**
C2-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C1-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
C2-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
C3-fluorene	ug/L	<0.050	<0.050	0.087	0.050	B134725
Dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C1-dibenzothiophene	ug/L	<0.020	<0.020	0.032	0.020	B134725
C2-dibenzothiophene	ug/L	<0.020	<0.020	0.081	0.020	B134725
C3-dibenzothiophene	ug/L	<0.020	<0.020	0.040	0.020	B134725
C4-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C1 phenanthrene/anthracene	ug/L	<0.050	<0.050	0.057	0.050	B134725
C2 phenanthrene/anthracene	ug/L	<0.050	<0.050	0.083	0.050	B134725
C3 phenanthrene/anthracene	ug/L	<0.050	<0.050	0.092	0.050	B134725
C4 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B134725
C1 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C2 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C3 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C4 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B134725
C1 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
C2 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
C3 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B134725
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B134725
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B134725
C1-Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
1-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B134725
Extraction Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	88	101	90		B134725
D8-ACENAPHTHYLENE (sur.)	%	84	107	86		B134725
D8-NAPHTHALENE (sur.)	%	72	90	71		B134725
TERPHENYL-D14 (sur.)	%	93	110	98		B134725
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		CAP376	CAP377	CAP378		
Sampling Date		2023/09/25 09:50	2023/09/24 14:25	2023/09/24 11:40		
COC Number		299608	299608	299608		
	UNITS	**AMEP-DS-01**	**AMEP-US-04**	**AMEP-DS-02**	**RDL**	**QC Batch**
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	B140124
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		CAP376	CAP377	CAP378		
Sampling Date		2023/09/25 09:50	2023/09/24 14:25	2023/09/24 11:40		
COC Number		299608	299608	299608		
	UNITS	**AMEP-DS-01**	**AMEP-US-04**	**AMEP-DS-02**	**RDL**	**QC Batch**
Elements						
Dissolved Aluminum (Al)	mg/L	0.0054	0.0077	0.021	0.0030	B135564
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	0.00060	B135564
Dissolved Arsenic (As)	mg/L	<0.00020	<0.00020	0.00032	0.00020	B135564
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B135564
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B135564
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	0.00030	B135564
Dissolved Copper (Cu)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B135564
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B135564
Dissolved Molybdenum (Mo)	mg/L	<0.00020	0.0018	0.00083	0.00020	B135564
Dissolved Nickel (Ni)	mg/L	<0.00050	0.00070	0.00099	0.00050	B135564
Dissolved Selenium (Se)	mg/L	<0.00020	<0.00020	0.00024	0.00020	B135564
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B135564
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B135564
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B135564
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B135564
Dissolved Uranium (U)	mg/L	<0.00010	0.0011	0.00065	0.00010	B135564
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B135564
Dissolved Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	0.0030	B135564
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

TEST SUMMARY

Bureau Veritas ID: CAP376
Sample ID: AMEP-DS-01
Matrix: Water

Collected: 2023/09/25
Relinquished: 2023/09/27
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B141169	N/A	2023/10/05	Ayesha Shakoor
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B135980	N/A	2023/10/10	Richard Ly
F1-BTEX	CALC/MS	B133486	N/A	2023/10/11	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B133885	N/A	2023/10/04	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B133886	N/A	2023/10/04	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B135952	N/A	2023/10/03	Tyler Orr
COD by Colorimeter	M/PROB	B137526	N/A	2023/10/04	Dafne Strozake Maximo
True Colour	SPEC/COL	B136668	N/A	2023/10/03	Shanna McKort
Carbon (DOC)	TECH	B138498	N/A	2023/10/05	Ye Hyun KIM
Conductivity @25C	COND	B144208	N/A	2023/10/10	Lesley Quan-Choi
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B134729	2023/10/07	2023/10/07	Chuhan Huang
Sulphide (as H2S)	CALC	B133765	N/A	2023/10/02	Automated Statchk
Hardness	CALC	B133889	N/A	2023/10/05	Automated Statchk
Mercury (Dissolved) by CV	CV	B140124	2023/10/05	2023/10/05	Kiran Kumari
Mercury (Total) by CV	CV	B140297	2023/10/05	2023/10/05	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B136630	N/A	2023/10/06	Vincy Scaria
Elements by ICP - Total	ICPA	B135300	2023/10/03	2023/10/04	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	B135564	N/A	2023/10/03	Kevin Huang
Elements by ICPMS - Total	ICPM	B135298	2023/10/03	2023/10/04	Kevin Huang
Ion Balance	CALC	B133807	N/A	2023/10/06	Automated Statchk
Ammonia-N (Total)	KONE	B140256	N/A	2023/10/05	Adam Fishleigh
Nitrate and Nitrite	CALC	B133801	N/A	2023/10/06	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B136274	N/A	2023/10/05	Adam Fishleigh
Nitrate (as N)	CALC	B133661	2023/10/06	2023/10/06	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B140144	2023/10/05	2023/10/05	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B134725	2023/10/07	2023/10/08	Shuang (Jessica) Chen
Benzo[a]pyrene Equivalency	GC/MSD	B133487	N/A	2023/10/11	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B136552	N/A	2023/10/03	Carlo Truong
Total Sulphide	SPEC	B133470	N/A	2023/10/02	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B134391	2023/10/02	2023/10/03	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	B133676	N/A	2023/10/06	Automated Statchk
Nitrogen (Total)	AC/COL	B137656	2023/10/04	2023/10/05	Carlo Truong
Carbon (Total Organic)	TECH	B136685	N/A	2023/10/05	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B134064	2023/10/02	2023/10/03	Ashhel Zia
Turbidity	TURB	B134519	N/A	2023/10/02	Rachel Tomecek

Bureau Veritas ID: CAP376 Dup
Sample ID: AMEP-DS-01
Matrix: Water

Collected: 2023/09/25
Relinquished: 2023/09/27
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
True Colour	SPEC/COL	B136668	N/A	2023/10/03	Shanna McKort
Carbon (Total Organic)	TECH	B136685	N/A	2023/10/05	Ye Hyun KIM

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

TEST SUMMARY

Bureau Veritas ID: CAP377
Sample ID: AMEP-US-04
Matrix: Water

Collected: 2023/09/24
Relinquished: 2023/09/27
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B141169	N/A	2023/10/05	Ayesha Shakoor
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B135980	N/A	2023/10/10	Richard Ly
F1-BTEX	CALC/MS	B133486	N/A	2023/10/11	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B133885	N/A	2023/10/04	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B133886	N/A	2023/10/05	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B138031	N/A	2023/10/04	Tyler Orr
COD by Colorimeter	M/PROB	B136139	N/A	2023/10/04	Dafne Strozake Maximo
True Colour	SPEC/COL	B136668	N/A	2023/10/03	Shanna McKort
Carbon (DOC)	TECH	B138498	N/A	2023/10/05	Ye Hyun KIM
Conductivity @25C	COND	B141174	N/A	2023/10/05	Ayesha Shakoor
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B134729	2023/10/07	2023/10/07	Chuhan Huang
Sulphide (as H2S)	CALC	B133765	N/A	2023/10/02	Automated Statchk
Hardness	CALC	B133889	N/A	2023/10/05	Automated Statchk
Mercury (Dissolved) by CV	CV	B140124	2023/10/05	2023/10/05	Kiran Kumari
Mercury (Total) by CV	CV	B140297	2023/10/05	2023/10/05	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B139557	N/A	2023/10/04	Mohammad Pousti
Elements by ICP - Total	ICPA	B137791	2023/10/04	2023/10/05	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	B135564	N/A	2023/10/03	Kevin Huang
Elements by ICPMS - Total	ICPM	B137761	2023/10/04	2023/10/05	Jason Bao
Ion Balance	CALC	B133807	N/A	2023/10/06	Automated Statchk
Ammonia-N (Total)	KONE	B140256	N/A	2023/10/05	Adam Fishleigh
Nitrate and Nitrite	CALC	B133801	N/A	2023/10/06	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B136274	N/A	2023/10/05	Adam Fishleigh
Nitrate (as N)	CALC	B133661	2023/10/06	2023/10/06	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B140144	2023/10/05	2023/10/05	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B134725	2023/10/07	2023/10/08	Shuang (Jessica) Chen
Benzo[a]pyrene Equivalency	GC/MSD	B133487	N/A	2023/10/11	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B136552	N/A	2023/10/03	Carlo Truong
Total Sulphide	SPEC	B133470	N/A	2023/10/02	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B134391	2023/10/02	2023/10/03	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	B133676	N/A	2023/10/06	Automated Statchk
Nitrogen (Total)	AC/COL	B135309	2023/10/03	2023/10/03	Carlo Truong
Carbon (Total Organic)	TECH	B136655	N/A	2023/10/04	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B134064	2023/10/02	2023/10/03	Ashhel Zia
Turbidity	TURB	B134519	N/A	2023/10/02	Rachel Tomecek

Bureau Veritas ID: CAP378
Sample ID: AMEP-DS-02
Matrix: Water

Collected: 2023/09/24
Relinquished: 2023/09/27
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B141169	N/A	2023/10/05	Ayesha Shakoor
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B135980	N/A	2023/10/10	Richard Ly
F1-BTEX	CALC/MS	B133486	N/A	2023/10/11	Automated Statchk

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

TEST SUMMARY

Bureau Veritas ID: CAP378
Sample ID: AMEP-DS-02
Matrix: Water

Collected: 2023/09/24
Relinquished: 2023/09/27
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Cadmium - low level CCME - Dissolved	CALC/MS	B133885	N/A	2023/10/04	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B133886	N/A	2023/10/05	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B138025	N/A	2023/10/04	Tyler Orr
COD by Colorimeter	M/PROB	B137526	N/A	2023/10/04	Dafne Strozake Maximo
True Colour	SPEC/COL	B136668	N/A	2023/10/03	Shanna McKort
Carbon (DOC)	TECH	B138498	N/A	2023/10/05	Ye Hyun KIM
Conductivity @25C	COND	B141174	N/A	2023/10/05	Ayesha Shakoor
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B134729	2023/10/07	2023/10/07	Chuhan Huang
Sulphide (as H2S)	CALC	B133765	N/A	2023/10/02	Automated Statchk
Hardness	CALC	B133889	N/A	2023/10/05	Automated Statchk
Mercury (Dissolved) by CV	CV	B140124	2023/10/05	2023/10/05	Kiran Kumari
Mercury (Total) by CV	CV	B140297	2023/10/05	2023/10/05	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B139557	N/A	2023/10/04	Mohammad Pousti
Elements by ICP - Total	ICPA	B135312	2023/10/03	2023/10/05	Hue Quyen Vuong
Elements by ICPMS - Dissolved	ICPM	B135564	N/A	2023/10/03	Kevin Huang
Elements by ICPMS - Total	ICPM	B135308	2023/10/03	2023/10/05	Jason Bao
Ion Balance	CALC	B133807	N/A	2023/10/06	Automated Statchk
Ammonia-N (Total)	KONE	B140252	N/A	2023/10/05	Adam Fishleigh
Nitrate and Nitrite	CALC	B133801	N/A	2023/10/06	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B136274	N/A	2023/10/05	Adam Fishleigh
Nitrate (as N)	CALC	B133661	2023/10/06	2023/10/06	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B140144	2023/10/05	2023/10/05	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B134725	2023/10/07	2023/10/08	Shuang (Jessica) Chen
Benzo[a]pyrene Equivalency	GC/MSD	B133487	N/A	2023/10/11	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B136552	N/A	2023/10/03	Carlo Truong
Total Sulphide	SPEC	B133470	N/A	2023/10/02	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B134391	2023/10/02	2023/10/03	Haydee Estilong
Total Kjeldahl Nitrogen (Total)	CALC	B133676	N/A	2023/10/06	Automated Statchk
Nitrogen (Total)	AC/COL	B137656	2023/10/04	2023/10/05	Carlo Truong
Carbon (Total Organic)	TECH	B136685	N/A	2023/10/05	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B134064	2023/10/02	2023/10/03	Ashhel Zia
Turbidity	TURB	B134519	N/A	2023/10/02	Rachel Tomecek

Bureau Veritas ID: CAP378 Dup
Sample ID: AMEP-DS-02
Matrix: Water

Collected: 2023/09/24
Relinquished: 2023/09/27
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbon (DOC)	TECH	B138498	N/A	2023/10/05	Ye Hyun KIM

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

GENERAL COMMENTS

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

Package 1	5.0°C

Sample CAP376 [AMEP-DS-01] : Sample was analyzed past method specified hold time for Turbidity. 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 Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample CAP377 [AMEP-US-04] : Sample was analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). Sample was analyzed past method specified hold time for Total Sulphide. 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 Total Suspended Solids (NFR). Sample was analyzed past method specified hold time for Turbidity. Sample was analyzed past method specified hold time for Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample CAP378 [AMEP-DS-02] : Sample was analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). Sample was analyzed past method specified hold time for Total Sulphide. 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 Total Suspended Solids (NFR). Sample was analyzed past method specified hold time for Turbidity. Sample was analyzed past method specified hold time for Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Results relate only to the items tested.

DATA QUALITY OVERVIEW

Lab ID	Client Sample ID	Matrix	Test Code	Analysis Type	Parameters	Deviation	Root Cause	Potential Impact
CAP376	AMEP-DS-01	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
CAP377	AMEP-US-04	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.
CAP378	AMEP-DS-02	Water	NO23AC-W	NUTS	Sample	#10 Past Hold Time	#10 Lab Error	This may increase the uncertainty associated with these results.

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Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B133470	DSX	Method Blank	Total Sulphide	2023/10/01	<0.0018		mg/L	
B134064	AZI	Method Blank	Total Suspended Solids	2023/10/03	<1.0		mg/L	
B134391	HE1	Method Blank	Total Dissolved Solids	2023/10/03	<10		mg/L	
B134519	RTM	Method Blank	Turbidity	2023/10/02	<0.10		NTU	
B134725	JC7	Method Blank	D10-ANTHRACENE (sur.)	2023/10/08		102	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/10/08		106	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/10/08		103	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/10/08		80	%	50 - 130
			Acenaphthene	2023/10/08	<0.10		ug/L	
			Acenaphthylene	2023/10/08	<0.10		ug/L	
			Acridine	2023/10/08	<0.040		ug/L	
			Anthracene	2023/10/08	<0.010		ug/L	
			Benzo(a)anthracene	2023/10/08	<0.0085		ug/L	
			Benzo(b&j)fluoranthene	2023/10/08	<0.0085		ug/L	
			Benzo(k)fluoranthene	2023/10/08	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2023/10/08	<0.0085		ug/L	
			Benzo(c)phenanthrene	2023/10/08	<0.050		ug/L	
			Benzo(a)pyrene	2023/10/08	<0.0075		ug/L	
			Benzo(e)pyrene	2023/10/08	<0.050		ug/L	
			Chrysene	2023/10/08	<0.0085		ug/L	
			Dibenz(a,h)anthracene	2023/10/08	<0.0075		ug/L	
			Fluoranthene	2023/10/08	<0.010		ug/L	
			Fluorene	2023/10/08	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2023/10/08	<0.0085		ug/L	
			Indeno(1,2,3-cd)fluoranthene	2023/10/08	<0.0085		ug/L	
			2-Methylnaphthalene	2023/10/08	<0.10		ug/L	
			Naphthalene	2023/10/08	<0.10		ug/L	
			Phenanthrene	2023/10/08	<0.050		ug/L	
			Perylene	2023/10/08	<0.050		ug/L	
			Pyrene	2023/10/08	<0.020		ug/L	
			Quinoline	2023/10/08	<0.20		ug/L	
			Retene	2023/10/08	<0.050		ug/L	
			C1-Naphthalene	2023/10/08	<0.10		ug/L	
			C3-Naphthalene	2023/10/08	<0.10		ug/L	
			C4-Naphthalene	2023/10/08	<0.10		ug/L	
			C2-Naphthalene	2023/10/08	<0.10		ug/L	
			Biphenyl	2023/10/08	<0.020		ug/L	
			C1-biphenyl	2023/10/08	<0.020		ug/L	
			C2-biphenyl	2023/10/08	<0.020		ug/L	
			C1-fluorene	2023/10/08	<0.050		ug/L	
			C2-fluorene	2023/10/08	<0.050		ug/L	
			C3-fluorene	2023/10/08	<0.050		ug/L	
			Dibenzothiophene	2023/10/08	<0.020		ug/L	
			C1-dibenzothiophene	2023/10/08	<0.020		ug/L	
			C2-dibenzothiophene	2023/10/08	<0.020		ug/L	
			C3-dibenzothiophene	2023/10/08	<0.020		ug/L	
			C4-dibenzothiophene	2023/10/08	<0.020		ug/L	
			C1 phenanthrene/anthracene	2023/10/08	<0.050		ug/L	
			C2 phenanthrene/anthracene	2023/10/08	<0.050		ug/L	
			C3 phenanthrene/anthracene	2023/10/08	<0.050		ug/L	
			C4 phenanthrene/anthracene	2023/10/08	<0.050		ug/L	
			C1 fluoranthene/pyrene	2023/10/08	<0.020		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
			C2 fluoranthene/pyrene	2023/10/08	<0.020		ug/L	
			C3 fluoranthene/pyrene	2023/10/08	<0.020		ug/L	
			C4 fluoranthene/pyrene	2023/10/08	<0.020		ug/L	
			C1 benzo(a)anthracene/chrysene	2023/10/08	<0.0085		ug/L	
			C2 benzo(a)anthracene/chrysene	2023/10/08	<0.0085		ug/L	
			C3 benzo(a)anthracene/chrysene	2023/10/08	<0.0085		ug/L	
			C4 benzo(a)anthracene/chrysene	2023/10/08	<0.0085		ug/L	
			C1benzobjkfluoranthene/benzoapyrene	2023/10/08	<0.0075		ug/L	
			C2benzobjkfluoranthene/benzoapyrene	2023/10/08	<0.0075		ug/L	
			C1-Acenaphthene	2023/10/08	<0.10		ug/L	
			1-Methylnaphthalene	2023/10/08	<0.10		ug/L	
B134729	CHA	Method Blank	O-TERPHENYL (sur.)	2023/10/07		101	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/10/07	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2023/10/07	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2023/10/07	<0.20		mg/L	
B135298	KH2	Method Blank	Total Aluminum (Al)	2023/10/03	<0.0030		mg/L	
			Total Chromium (Cr)	2023/10/03	<0.0010		mg/L	
			Total Cobalt (Co)	2023/10/03	<0.00030		mg/L	
			Total Copper (Cu)	2023/10/03	<0.0010		mg/L	
			Total Lead (Pb)	2023/10/03	<0.00020		mg/L	
			Total Antimony (Sb)	2023/10/03	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/10/03	<0.00020		mg/L	
			Total Nickel (Ni)	2023/10/03	<0.00050		mg/L	
			Total Selenium (Se)	2023/10/03	<0.00020		mg/L	
			Total Silver (Ag)	2023/10/03	<0.00010		mg/L	
			Total Arsenic (As)	2023/10/03	<0.00020		mg/L	
			Total Thallium (Tl)	2023/10/03	<0.00020		mg/L	
			Total Tin (Sn)	2023/10/03	<0.0010		mg/L	
			Total Titanium (Ti)	2023/10/03	<0.0010		mg/L	
			Total Uranium (U)	2023/10/03	<0.00010		mg/L	
			Total Vanadium (V)	2023/10/03	<0.0010		mg/L	
			Total Zinc (Zn)	2023/10/03	<0.0030		mg/L	
			Total Beryllium (Be)	2023/10/03	<0.0010		mg/L	
B135300	MPU	Method Blank	Total Iron (Fe)	2023/10/04	<0.060		mg/L	
			Total Lithium (Li)	2023/10/04	<0.020		mg/L	
			Total Magnesium (Mg)	2023/10/04	<0.20		mg/L	
			Total Manganese (Mn)	2023/10/04	<0.0040		mg/L	
			Total Potassium (K)	2023/10/04	<0.30		mg/L	
			Total Sodium (Na)	2023/10/04	<0.50		mg/L	
			Total Strontium (Sr)	2023/10/04	<0.020		mg/L	
			Total Sulphur (S)	2023/10/04	<0.20		mg/L	
			Total Phosphorus (P)	2023/10/04	<0.10		mg/L	
			Total Barium (Ba)	2023/10/04	<0.010		mg/L	
			Total Silicon (Si)	2023/10/04	<0.50		mg/L	
			Total Boron (B)	2023/10/04	<0.020		mg/L	
			Total Calcium (Ca)	2023/10/04	<0.30		mg/L	
B135308	JAB	Method Blank	Total Aluminum (Al)	2023/10/05	<0.0030		mg/L	
			Total Chromium (Cr)	2023/10/05	<0.0010		mg/L	
			Total Cobalt (Co)	2023/10/05	<0.00030		mg/L	
			Total Copper (Cu)	2023/10/05	<0.0010		mg/L	
			Total Lead (Pb)	2023/10/05	<0.00020		mg/L	
			Total Antimony (Sb)	2023/10/05	<0.00060		mg/L	

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Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Molybdenum (Mo)	2023/10/05	<0.00020		mg/L	
			Total Nickel (Ni)	2023/10/05	<0.00050		mg/L	
			Total Selenium (Se)	2023/10/05	<0.00020		mg/L	
			Total Silver (Ag)	2023/10/05	<0.00010		mg/L	
			Total Arsenic (As)	2023/10/05	<0.00020		mg/L	
			Total Thallium (Tl)	2023/10/05	<0.00020		mg/L	
			Total Tin (Sn)	2023/10/05	<0.0010		mg/L	
			Total Titanium (Ti)	2023/10/05	<0.0010		mg/L	
			Total Uranium (U)	2023/10/05	<0.00010		mg/L	
			Total Vanadium (V)	2023/10/05	<0.0010		mg/L	
			Total Zinc (Zn)	2023/10/05	<0.0030		mg/L	
			Total Beryllium (Be)	2023/10/05	<0.0010		mg/L	
B135309	CTU	Method Blank	Total Nitrogen (N)	2023/10/03	<0.020		mg/L	
B135312	HQV	Method Blank	Total Iron (Fe)	2023/10/05	<0.060		mg/L	
			Total Lithium (Li)	2023/10/05	<0.020		mg/L	
			Total Magnesium (Mg)	2023/10/05	<0.20		mg/L	
			Total Manganese (Mn)	2023/10/05	<0.0040		mg/L	
			Total Potassium (K)	2023/10/05	<0.30		mg/L	
			Total Sodium (Na)	2023/10/05	<0.50		mg/L	
			Total Strontium (Sr)	2023/10/05	<0.020		mg/L	
			Total Sulphur (S)	2023/10/05	<0.20		mg/L	
			Total Phosphorus (P)	2023/10/05	<0.10		mg/L	
			Total Barium (Ba)	2023/10/05	<0.010		mg/L	
			Total Silicon (Si)	2023/10/05	<0.50		mg/L	
			Total Boron (B)	2023/10/05	<0.020		mg/L	
			Total Calcium (Ca)	2023/10/05	<0.30		mg/L	
B135564	KH2	Method Blank	Dissolved Aluminum (Al)	2023/10/03	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/10/03	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/10/03	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/10/03	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/10/03	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/10/03	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/10/03	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/10/03	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/10/03	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/10/03	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/10/03	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/10/03	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/10/03	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/10/03	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/10/03	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/10/03	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/10/03	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/10/03	<0.0010		mg/L	
B135952	TOR	Method Blank	Chloride (Cl)	2023/10/03	<1.0		mg/L	
			Sulphate (SO4)	2023/10/03	<1.0		mg/L	
B135980	RIL	Method Blank	1,4-Difluorobenzene (sur.)	2023/10/10		105	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/10/10		95	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/10/10		100	%	50 - 140
			Benzene	2023/10/10	<0.00040		mg/L	
			Toluene	2023/10/10	<0.00040		mg/L	
			Ethylbenzene	2023/10/10	<0.00040		mg/L	

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Site Location: Norman Wells, NWT
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			m & p-Xylene	2023/10/10	<0.00080		mg/L	
			o-Xylene	2023/10/10	<0.00040		mg/L	
			F1 (C6-C10)	2023/10/10	<0.10		mg/L	
B136139	DSX	Method Blank	Chemical Oxygen Demand	2023/10/04	<10		mg/L	
B136274	AFI	Method Blank	Nitrite (N)	2023/10/05	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/10/05	<0.010		mg/L	
B136552	CTU	Method Blank	Orthophosphate (P)	2023/10/03	<0.0030		mg/L	
B136630	VSC	Method Blank	Dissolved Iron (Fe)	2023/10/05	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/10/05	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/10/05	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/10/05	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/10/05	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/10/05	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/10/05	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/10/05	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/10/05	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/10/05	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/10/05	<0.50		mg/L	
			Dissolved Boron (B)	2023/10/05	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/10/05	<0.30		mg/L	
B136655	YHK	Method Blank	Total Organic Carbon (C)	2023/10/04	<0.50		mg/L	
B136668	SKM	Method Blank	True Colour	2023/10/03	<2.0		PtCo units	
B136685	YHK	Method Blank	Total Organic Carbon (C)	2023/10/05	<0.50		mg/L	
B137526	DSX	Method Blank	Chemical Oxygen Demand	2023/10/04	<10		mg/L	
B137656	CTU	Method Blank	Total Nitrogen (N)	2023/10/05	<0.020		mg/L	
B137761	JAB	Method Blank	Total Aluminum (Al)	2023/10/05	<0.0030		mg/L	
			Total Chromium (Cr)	2023/10/05	<0.0010		mg/L	
			Total Cobalt (Co)	2023/10/05	<0.00030		mg/L	
			Total Copper (Cu)	2023/10/05	<0.0010		mg/L	
			Total Lead (Pb)	2023/10/05	<0.00020		mg/L	
			Total Antimony (Sb)	2023/10/05	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/10/05	<0.00020		mg/L	
			Total Nickel (Ni)	2023/10/05	<0.00050		mg/L	
			Total Selenium (Se)	2023/10/05	<0.00020		mg/L	
			Total Silver (Ag)	2023/10/05	<0.00010		mg/L	
			Total Arsenic (As)	2023/10/05	<0.00020		mg/L	
			Total Thallium (Tl)	2023/10/05	<0.00020		mg/L	
			Total Tin (Sn)	2023/10/05	<0.0010		mg/L	
			Total Titanium (Ti)	2023/10/05	<0.0010		mg/L	
			Total Uranium (U)	2023/10/05	<0.00010		mg/L	
			Total Vanadium (V)	2023/10/05	<0.0010		mg/L	
			Total Zinc (Zn)	2023/10/05	<0.0030		mg/L	
			Total Beryllium (Be)	2023/10/05	<0.0010		mg/L	
B137791	MPU	Method Blank	Total Iron (Fe)	2023/10/05	<0.060		mg/L	
			Total Lithium (Li)	2023/10/05	<0.020		mg/L	
			Total Magnesium (Mg)	2023/10/05	<0.20		mg/L	
			Total Manganese (Mn)	2023/10/05	0.0067, RDL=0.0067		mg/L	
			Total Potassium (K)	2023/10/05	<0.30		mg/L	
			Total Sodium (Na)	2023/10/05	<0.50		mg/L	
			Total Strontium (Sr)	2023/10/05	<0.020		mg/L	
			Total Sulphur (S)	2023/10/05	<0.20		mg/L	

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Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Phosphorus (P)	2023/10/05	<0.10		mg/L	
			Total Barium (Ba)	2023/10/05	<0.010		mg/L	
			Total Silicon (Si)	2023/10/05	<0.50		mg/L	
			Total Boron (B)	2023/10/05	<0.020		mg/L	
			Total Calcium (Ca)	2023/10/05	<0.30		mg/L	
B138025	TOR	Method Blank	Chloride (Cl)	2023/10/04	<1.0		mg/L	
			Sulphate (SO4)	2023/10/04	<1.0		mg/L	
B138031	TOR	Method Blank	Chloride (Cl)	2023/10/04	<1.0		mg/L	
			Sulphate (SO4)	2023/10/04	<1.0		mg/L	
B138498	YHK	Method Blank	Dissolved Organic Carbon (C)	2023/10/05	<0.50		mg/L	
B139557	MPU	Method Blank	Dissolved Iron (Fe)	2023/10/04	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/10/04	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/10/04	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/10/04	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/10/04	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/10/04	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/10/04	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/10/04	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/10/04	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/10/04	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/10/04	<0.50		mg/L	
			Dissolved Boron (B)	2023/10/04	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/10/04	<0.30		mg/L	
B140124	KKM	Method Blank	Dissolved Mercury (Hg)	2023/10/05	<0.0019		ug/L	
B140144	JB9	Method Blank	Total Oil and grease	2023/10/05	<2.0		mg/L	
B140252	AFI	Method Blank	Total Ammonia (N)	2023/10/05	<0.015		mg/L	
B140256	AFI	Method Blank	Total Ammonia (N)	2023/10/05	<0.015		mg/L	
B140297	KKM	Method Blank	Total Mercury (Hg)	2023/10/05	<0.0019		ug/L	
B141169	A5S	Method Blank	Alkalinity (Total as CaCO3)	2023/10/05	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/10/05	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/10/05	<1.0		mg/L	
			Carbonate (CO3)	2023/10/05	<1.0		mg/L	
			Hydroxide (OH)	2023/10/05	<1.0		mg/L	
B141174	A5S	Method Blank	Conductivity	2023/10/05	<2.0		uS/cm	
B144208	LQ1	Method Blank	Conductivity	2023/10/10	<2.0		uS/cm	
B136668	SKM	RPD [CAP376-02]	True Colour	2023/10/03	5.5		%	20
B136685	YHK	RPD [CAP376-06]	Total Organic Carbon (C)	2023/10/05	3.4		%	20
B138498	YHK	RPD [CAP378-05]	Dissolved Organic Carbon (C)	2023/10/05	0.074		%	20
B136668	SKM	Matrix Spike [CAP376-02]	True Colour	2023/10/03		91	%	80 - 120
B136685	YHK	Matrix Spike [CAP376-06]	Total Organic Carbon (C)	2023/10/05		98	%	80 - 120
B138498	YHK	Matrix Spike [CAP378-05]	Dissolved Organic Carbon (C)	2023/10/05		91	%	80 - 120
B133470	DSX	LCS	Total Sulphide	2023/10/01		100	%	80 - 120
B134064	AZI	LCS	Total Suspended Solids	2023/10/03		102	%	80 - 120
B134391	HE1	LCS	Total Dissolved Solids	2023/10/03		94	%	80 - 120
B134519	RTM	LCS	Turbidity	2023/10/02		101	%	80 - 120
B134725	JC7	LCS	D10-ANTHRACENE (sur.)	2023/10/08		98	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/10/08		107	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/10/08		85	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/10/08		64	%	50 - 130
			Acenaphthene	2023/10/08		82	%	50 - 130
			Acenaphthylene	2023/10/08		80	%	50 - 130
			Acridine	2023/10/08		72	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Anthracene	2023/10/08		82	%	50 - 130
			Benzo(a)anthracene	2023/10/08		102	%	50 - 130
			Benzo(b&j)fluoranthene	2023/10/08		100	%	50 - 130
			Benzo(k)fluoranthene	2023/10/08		117	%	50 - 130
			Benzo(g,h,i)perylene	2023/10/08		110	%	50 - 130
			Benzo(c)phenanthrene	2023/10/08		114	%	50 - 130
			Benzo(a)pyrene	2023/10/08		105	%	50 - 130
			Benzo(e)pyrene	2023/10/08		97	%	50 - 130
			Chrysene	2023/10/08		110	%	50 - 130
			Dibenz(a,h)anthracene	2023/10/08		106	%	50 - 130
			Fluoranthene	2023/10/08		114	%	50 - 130
			Fluorene	2023/10/08		79	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/10/08		96	%	50 - 130
			2-Methylnaphthalene	2023/10/08		85	%	50 - 130
			Naphthalene	2023/10/08		68	%	50 - 130
			Phenanthrene	2023/10/08		112	%	50 - 130
			Perylene	2023/10/08		101	%	50 - 130
			Pyrene	2023/10/08		104	%	50 - 130
			Quinoline	2023/10/08		84	%	50 - 130
			C1-Naphthalene	2023/10/08		59	%	50 - 130
			C3-Naphthalene	2023/10/08		82	%	50 - 130
			C2-Naphthalene	2023/10/08		73	%	50 - 130
			C1-biphenyl	2023/10/08		76	%	50 - 130
			C1 phenanthrene/anthracene	2023/10/08		125	%	50 - 130
			C2 phenanthrene/anthracene	2023/10/08		110	%	50 - 130
			C1 fluoranthene/pyrene	2023/10/08		103	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/10/08		80	%	30 - 130
			1-Methylnaphthalene	2023/10/08		59	%	50 - 130
B134729	CHA	LCS	O-TERPHENYL (sur.)	2023/10/07		99	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/10/07		100	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/10/07		114	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/10/07		106	%	60 - 140
B135298	KH2	LCS	Total Aluminum (Al)	2023/10/03		96	%	80 - 120
			Total Chromium (Cr)	2023/10/03		92	%	80 - 120
			Total Cobalt (Co)	2023/10/03		92	%	80 - 120
			Total Copper (Cu)	2023/10/03		93	%	80 - 120
			Total Lead (Pb)	2023/10/03		93	%	80 - 120
			Total Antimony (Sb)	2023/10/03		98	%	80 - 120
			Total Molybdenum (Mo)	2023/10/03		96	%	80 - 120
			Total Nickel (Ni)	2023/10/03		91	%	80 - 120
			Total Selenium (Se)	2023/10/03		97	%	80 - 120
			Total Silver (Ag)	2023/10/03		93	%	80 - 120
			Total Arsenic (As)	2023/10/03		95	%	80 - 120
			Total Thallium (Tl)	2023/10/03		94	%	80 - 120
			Total Tin (Sn)	2023/10/03		96	%	80 - 120
			Total Titanium (Ti)	2023/10/03		90	%	80 - 120
			Total Uranium (U)	2023/10/03		92	%	80 - 120
			Total Vanadium (V)	2023/10/03		92	%	80 - 120
			Total Zinc (Zn)	2023/10/03		92	%	80 - 120
			Total Beryllium (Be)	2023/10/03		94	%	80 - 120
B135300	MPU	LCS	Total Iron (Fe)	2023/10/04		106	%	80 - 120
			Total Lithium (Li)	2023/10/04		97	%	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 Magnesium (Mg)	2023/10/04		112	%	80 - 120
			Total Manganese (Mn)	2023/10/04		104	%	80 - 120
			Total Potassium (K)	2023/10/04		99	%	80 - 120
			Total Sodium (Na)	2023/10/04		96	%	80 - 120
			Total Strontium (Sr)	2023/10/04		98	%	80 - 120
			Total Sulphur (S)	2023/10/04		96	%	80 - 120
			Total Phosphorus (P)	2023/10/04		102	%	80 - 120
			Total Barium (Ba)	2023/10/04		102	%	80 - 120
			Total Silicon (Si)	2023/10/04		101	%	80 - 120
			Total Boron (B)	2023/10/04		97	%	80 - 120
			Total Calcium (Ca)	2023/10/04		101	%	80 - 120
B135308	JAB	LCS	Total Aluminum (Al)	2023/10/05		98	%	80 - 120
			Total Chromium (Cr)	2023/10/05		99	%	80 - 120
			Total Cobalt (Co)	2023/10/05		99	%	80 - 120
			Total Copper (Cu)	2023/10/05		99	%	80 - 120
			Total Lead (Pb)	2023/10/05		98	%	80 - 120
			Total Antimony (Sb)	2023/10/05		114	%	80 - 120
			Total Molybdenum (Mo)	2023/10/05		100	%	80 - 120
			Total Nickel (Ni)	2023/10/05		97	%	80 - 120
			Total Selenium (Se)	2023/10/05		105	%	80 - 120
			Total Silver (Ag)	2023/10/05		96	%	80 - 120
			Total Arsenic (As)	2023/10/05		103	%	80 - 120
			Total Thallium (Tl)	2023/10/05		99	%	80 - 120
			Total Tin (Sn)	2023/10/05		98	%	80 - 120
			Total Titanium (Ti)	2023/10/05		99	%	80 - 120
			Total Uranium (U)	2023/10/05		97	%	80 - 120
			Total Vanadium (V)	2023/10/05		99	%	80 - 120
			Total Zinc (Zn)	2023/10/05		101	%	80 - 120
			Total Beryllium (Be)	2023/10/05		99	%	80 - 120
B135309	CTU	LCS	Total Nitrogen (N)	2023/10/03		107	%	80 - 120
B135312	HQV	LCS	Total Iron (Fe)	2023/10/05		98	%	80 - 120
			Total Lithium (Li)	2023/10/05		92	%	80 - 120
			Total Magnesium (Mg)	2023/10/05		98	%	80 - 120
			Total Manganese (Mn)	2023/10/05		101	%	80 - 120
			Total Potassium (K)	2023/10/05		95	%	80 - 120
			Total Sodium (Na)	2023/10/05		96	%	80 - 120
			Total Strontium (Sr)	2023/10/05		93	%	80 - 120
			Total Sulphur (S)	2023/10/05		92	%	80 - 120
			Total Phosphorus (P)	2023/10/05		94	%	80 - 120
			Total Barium (Ba)	2023/10/05		93	%	80 - 120
			Total Silicon (Si)	2023/10/05		92	%	80 - 120
			Total Boron (B)	2023/10/05		90	%	80 - 120
			Total Calcium (Ca)	2023/10/05		95	%	80 - 120
B135564	KH2	LCS	Dissolved Aluminum (Al)	2023/10/03		111	%	80 - 120
			Dissolved Chromium (Cr)	2023/10/03		98	%	80 - 120
			Dissolved Cobalt (Co)	2023/10/03		97	%	80 - 120
			Dissolved Copper (Cu)	2023/10/03		97	%	80 - 120
			Dissolved Lead (Pb)	2023/10/03		98	%	80 - 120
			Dissolved Antimony (Sb)	2023/10/03		103	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/10/03		99	%	80 - 120
			Dissolved Nickel (Ni)	2023/10/03		97	%	80 - 120
			Dissolved Selenium (Se)	2023/10/03		105	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Silver (Ag)	2023/10/03		96	%	80 - 120
			Dissolved Arsenic (As)	2023/10/03		99	%	80 - 120
			Dissolved Thallium (Tl)	2023/10/03		97	%	80 - 120
			Dissolved Tin (Sn)	2023/10/03		98	%	80 - 120
			Dissolved Titanium (Ti)	2023/10/03		95	%	80 - 120
			Dissolved Uranium (U)	2023/10/03		97	%	80 - 120
			Dissolved Vanadium (V)	2023/10/03		98	%	80 - 120
			Dissolved Zinc (Zn)	2023/10/03		98	%	80 - 120
			Dissolved Beryllium (Be)	2023/10/03		98	%	80 - 120
B135952	TOR	LCS	Chloride (Cl)	2023/10/03		98	%	80 - 120
			Sulphate (SO4)	2023/10/03		103	%	80 - 120
B135980	RIL	LCS	1,4-Difluorobenzene (sur.)	2023/10/10		100	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/10/10		95	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/10/10		90	%	50 - 140
			Benzene	2023/10/10		90	%	60 - 130
			Toluene	2023/10/10		91	%	60 - 130
			Ethylbenzene	2023/10/10		90	%	60 - 130
			m & p-Xylene	2023/10/10		96	%	60 - 130
			o-Xylene	2023/10/10		94	%	60 - 130
			F1 (C6-C10)	2023/10/10		88	%	60 - 140
B136139	DSX	LCS	Chemical Oxygen Demand	2023/10/04		103	%	80 - 120
B136274	AFI	LCS	Nitrite (N)	2023/10/03		102	%	80 - 120
			Nitrate plus Nitrite (N)	2023/10/03		105	%	80 - 120
B136552	CTU	LCS	Orthophosphate (P)	2023/10/03		101	%	80 - 120
B136630	VSC	LCS	Dissolved Iron (Fe)	2023/10/05		102	%	80 - 120
			Dissolved Lithium (Li)	2023/10/05		99	%	80 - 120
			Dissolved Magnesium (Mg)	2023/10/05		109	%	80 - 120
			Dissolved Manganese (Mn)	2023/10/05		105	%	80 - 120
			Dissolved Potassium (K)	2023/10/05		105	%	80 - 120
			Dissolved Sodium (Na)	2023/10/05		103	%	80 - 120
			Dissolved Strontium (Sr)	2023/10/05		100	%	80 - 120
			Dissolved Sulphur (S)	2023/10/05		97	%	80 - 120
			Dissolved Phosphorus (P)	2023/10/05		100	%	80 - 120
			Dissolved Barium (Ba)	2023/10/05		100	%	80 - 120
			Dissolved Silicon (Si)	2023/10/05		96	%	80 - 120
			Dissolved Boron (B)	2023/10/05		96	%	80 - 120
			Dissolved Calcium (Ca)	2023/10/05		103	%	80 - 120
B136655	YHK	LCS	Total Organic Carbon (C)	2023/10/04		96	%	80 - 120
B136668	SKM	LCS	True Colour	2023/10/03		97	%	80 - 120
B136685	YHK	LCS	Total Organic Carbon (C)	2023/10/05		98	%	80 - 120
B137526	DSX	LCS	Chemical Oxygen Demand	2023/10/04		104	%	80 - 120
B137656	CTU	LCS	Total Nitrogen (N)	2023/10/05		103	%	80 - 120
B137761	JAB	LCS	Total Aluminum (Al)	2023/10/05		99	%	80 - 120
			Total Chromium (Cr)	2023/10/05		99	%	80 - 120
			Total Cobalt (Co)	2023/10/05		99	%	80 - 120
			Total Copper (Cu)	2023/10/05		99	%	80 - 120
			Total Lead (Pb)	2023/10/05		98	%	80 - 120
			Total Antimony (Sb)	2023/10/05		115	%	80 - 120
			Total Molybdenum (Mo)	2023/10/05		102	%	80 - 120
			Total Nickel (Ni)	2023/10/05		98	%	80 - 120
			Total Selenium (Se)	2023/10/05		103	%	80 - 120
			Total Silver (Ag)	2023/10/05		96	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Arsenic (As)	2023/10/05		101	%	80 - 120
			Total Thallium (Tl)	2023/10/05		100	%	80 - 120
			Total Tin (Sn)	2023/10/05		100	%	80 - 120
			Total Titanium (Ti)	2023/10/05		101	%	80 - 120
			Total Uranium (U)	2023/10/05		97	%	80 - 120
			Total Vanadium (V)	2023/10/05		100	%	80 - 120
			Total Zinc (Zn)	2023/10/05		99	%	80 - 120
			Total Beryllium (Be)	2023/10/05		98	%	80 - 120
B137791	MPU	LCS	Total Iron (Fe)	2023/10/05		106	%	80 - 120
			Total Lithium (Li)	2023/10/05		94	%	80 - 120
			Total Magnesium (Mg)	2023/10/05		102	%	80 - 120
			Total Manganese (Mn)	2023/10/05		108	%	80 - 120
			Total Potassium (K)	2023/10/05		98	%	80 - 120
			Total Sodium (Na)	2023/10/05		98	%	80 - 120
			Total Strontium (Sr)	2023/10/05		96	%	80 - 120
			Total Sulphur (S)	2023/10/05		98	%	80 - 120
			Total Phosphorus (P)	2023/10/05		100	%	80 - 120
			Total Barium (Ba)	2023/10/05		97	%	80 - 120
			Total Silicon (Si)	2023/10/05		98	%	80 - 120
			Total Boron (B)	2023/10/05		94	%	80 - 120
			Total Calcium (Ca)	2023/10/05		97	%	80 - 120
B138025	TOR	LCS	Chloride (Cl)	2023/10/04		98	%	80 - 120
			Sulphate (SO4)	2023/10/04		102	%	80 - 120
B138031	TOR	LCS	Chloride (Cl)	2023/10/04		99	%	80 - 120
			Sulphate (SO4)	2023/10/04		102	%	80 - 120
B138498	YHK	LCS	Dissolved Organic Carbon (C)	2023/10/05		99	%	80 - 120
B139557	MPU	LCS	Dissolved Iron (Fe)	2023/10/04		106	%	80 - 120
			Dissolved Lithium (Li)	2023/10/04		97	%	80 - 120
			Dissolved Magnesium (Mg)	2023/10/04		107	%	80 - 120
			Dissolved Manganese (Mn)	2023/10/04		109	%	80 - 120
			Dissolved Potassium (K)	2023/10/04		104	%	80 - 120
			Dissolved Sodium (Na)	2023/10/04		104	%	80 - 120
			Dissolved Strontium (Sr)	2023/10/04		101	%	80 - 120
			Dissolved Sulphur (S)	2023/10/04		99	%	80 - 120
			Dissolved Phosphorus (P)	2023/10/04		101	%	80 - 120
			Dissolved Barium (Ba)	2023/10/04		105	%	80 - 120
			Dissolved Silicon (Si)	2023/10/04		99	%	80 - 120
			Dissolved Boron (B)	2023/10/04		103	%	80 - 120
			Dissolved Calcium (Ca)	2023/10/04		100	%	80 - 120
B140124	KKM	LCS	Dissolved Mercury (Hg)	2023/10/05		104	%	80 - 120
B140144	JB9	LCS	Total Oil and grease	2023/10/05		105	%	70 - 130
B140252	AFI	LCS	Total Ammonia (N)	2023/10/05		101	%	80 - 120
B140256	AFI	LCS	Total Ammonia (N)	2023/10/05		105	%	80 - 120
B140297	KKM	LCS	Total Mercury (Hg)	2023/10/05		105	%	80 - 120
B141169	A5S	LCS	Alkalinity (Total as CaCO3)	2023/10/05		96	%	80 - 120
B141174	A5S	LCS	Conductivity	2023/10/05		101	%	90 - 110
B144208	LQ1	LCS	Conductivity	2023/10/10		98	%	90 - 110
B135309	CTU	SRM	Total Nitrogen (N)	2023/10/03		109	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B137656	CTU	SRM	Total Nitrogen (N)	2023/10/05		109	%	80 - 120

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.

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

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

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

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

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378736
Report Date: 2023/10/13

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223.23200

VALIDATION SIGNATURE PAGE

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

Elizabeth Chacko, Senior Analyst, Organics

Qiliang (Alex) Wu, Senior Analyst

Sandy Yuan, M.Sc., QP, Scientific Specialist

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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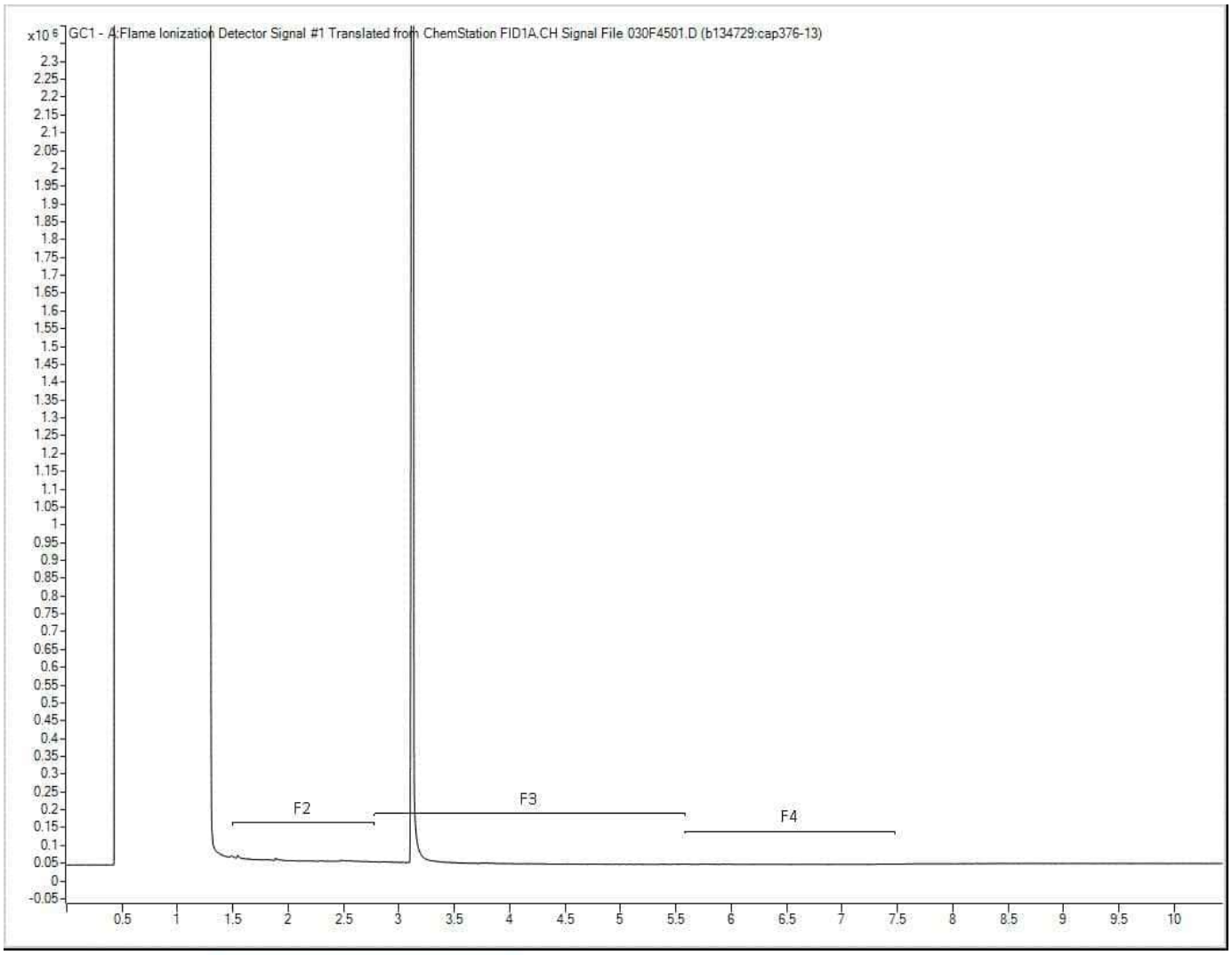
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. 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 Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

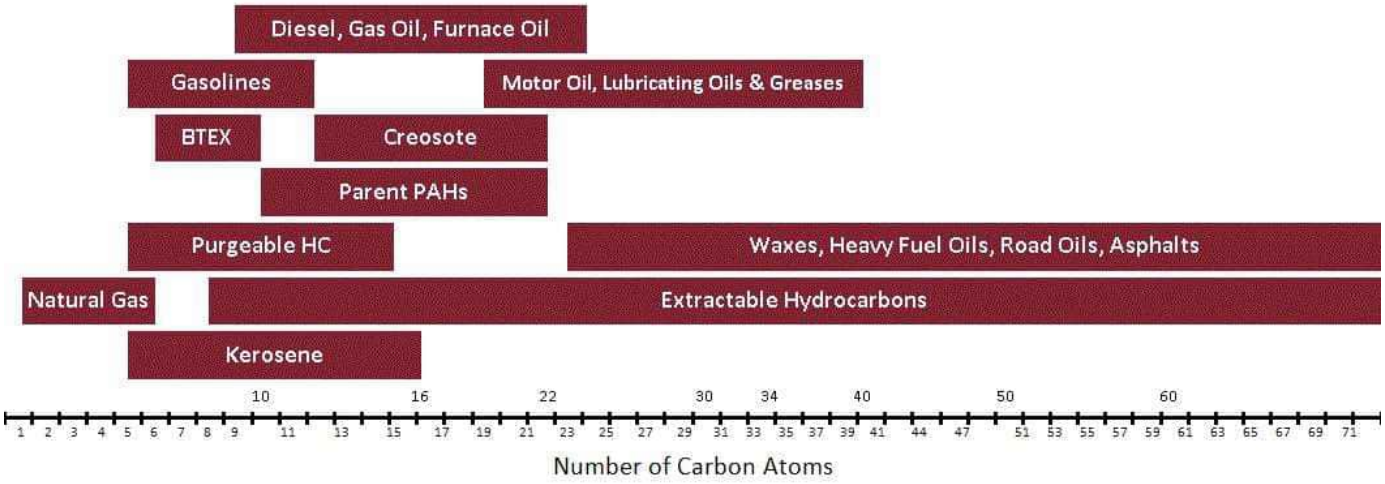
Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378736
Report Date: 2023/10/13
Bureau Veritas Sample: CAP376

Advisian
Task Order#:417085-49223Line Item:
Site#: N/A
Site Location: Norman Wells, NWT
Client ID: AMEP-DS-01

CCME Hydrocarbons (F2-F4 in water) Chromatogram





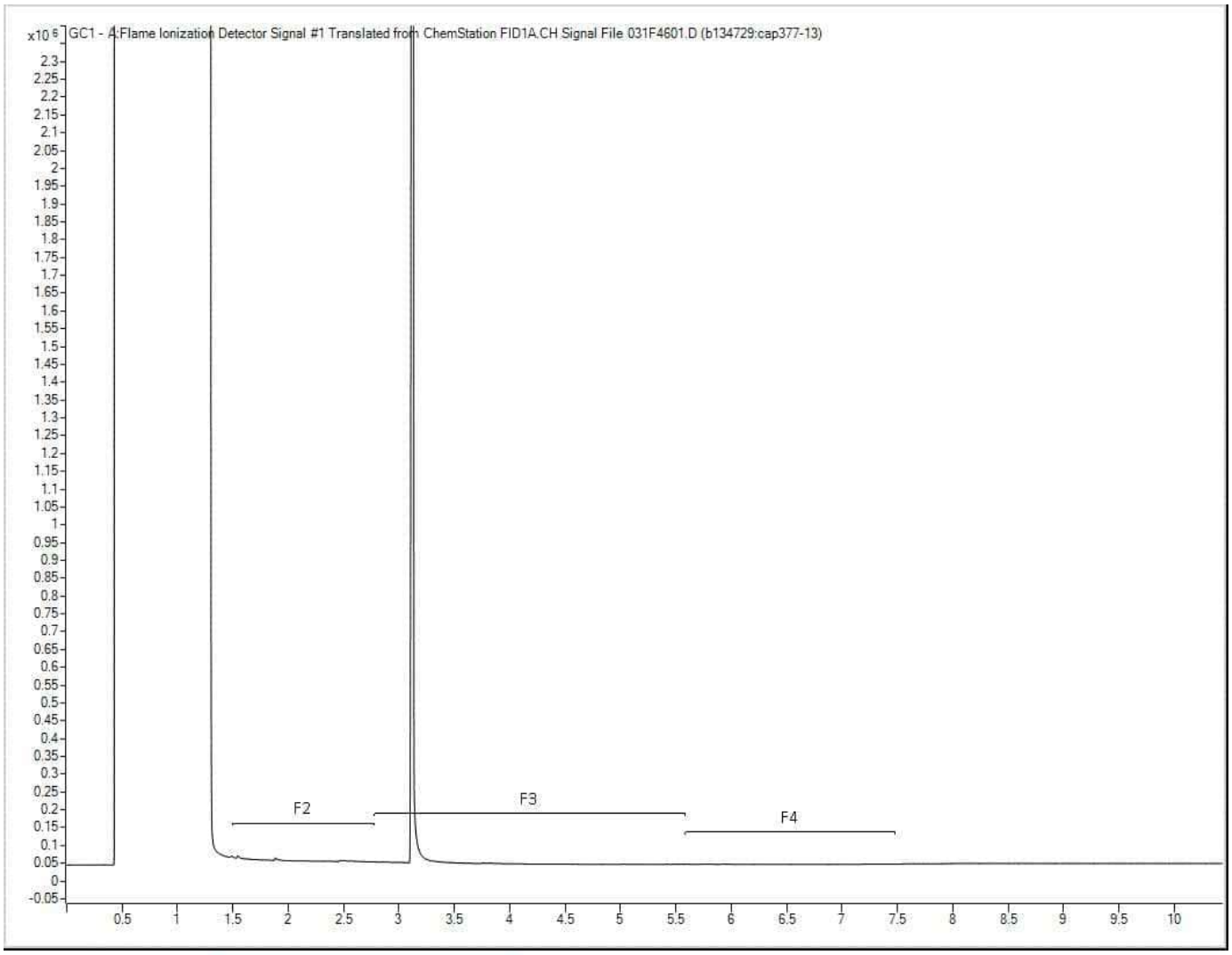
hpchem20\HPchem\1\DATA\2023\10\RUN1007

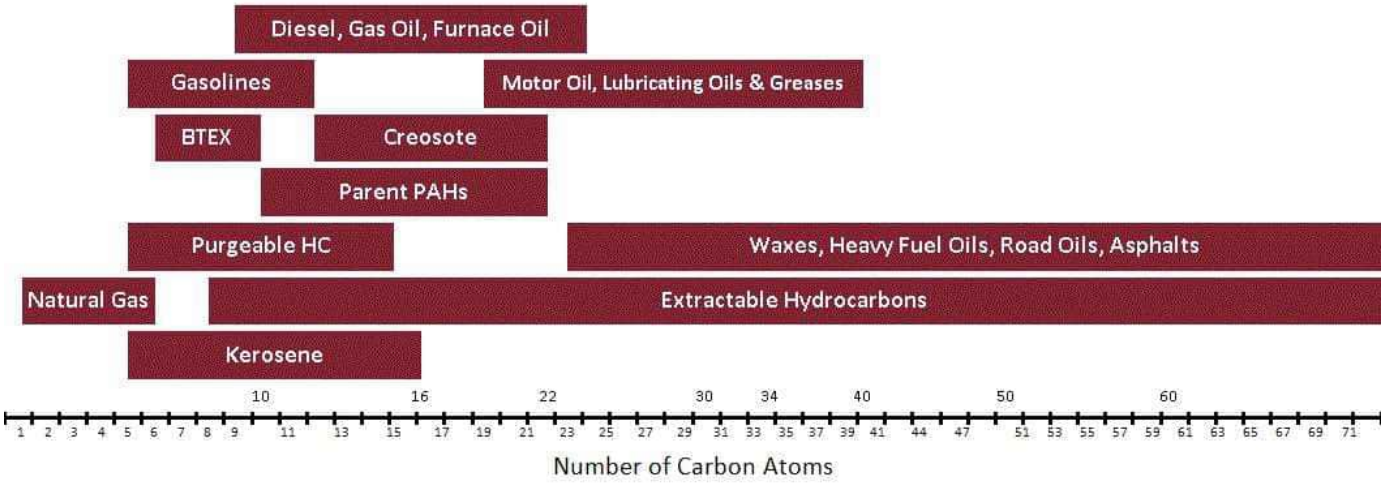
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C378736
Report Date: 2023/10/13
Bureau Veritas Sample: CAP377

Advisian
Task Order#:417085-49223Line Item:
Site#: N/A
Site Location: Norman Wells, NWT
Client ID: AMEP-US-04

CCME Hydrocarbons (F2-F4 in water) Chromatogram





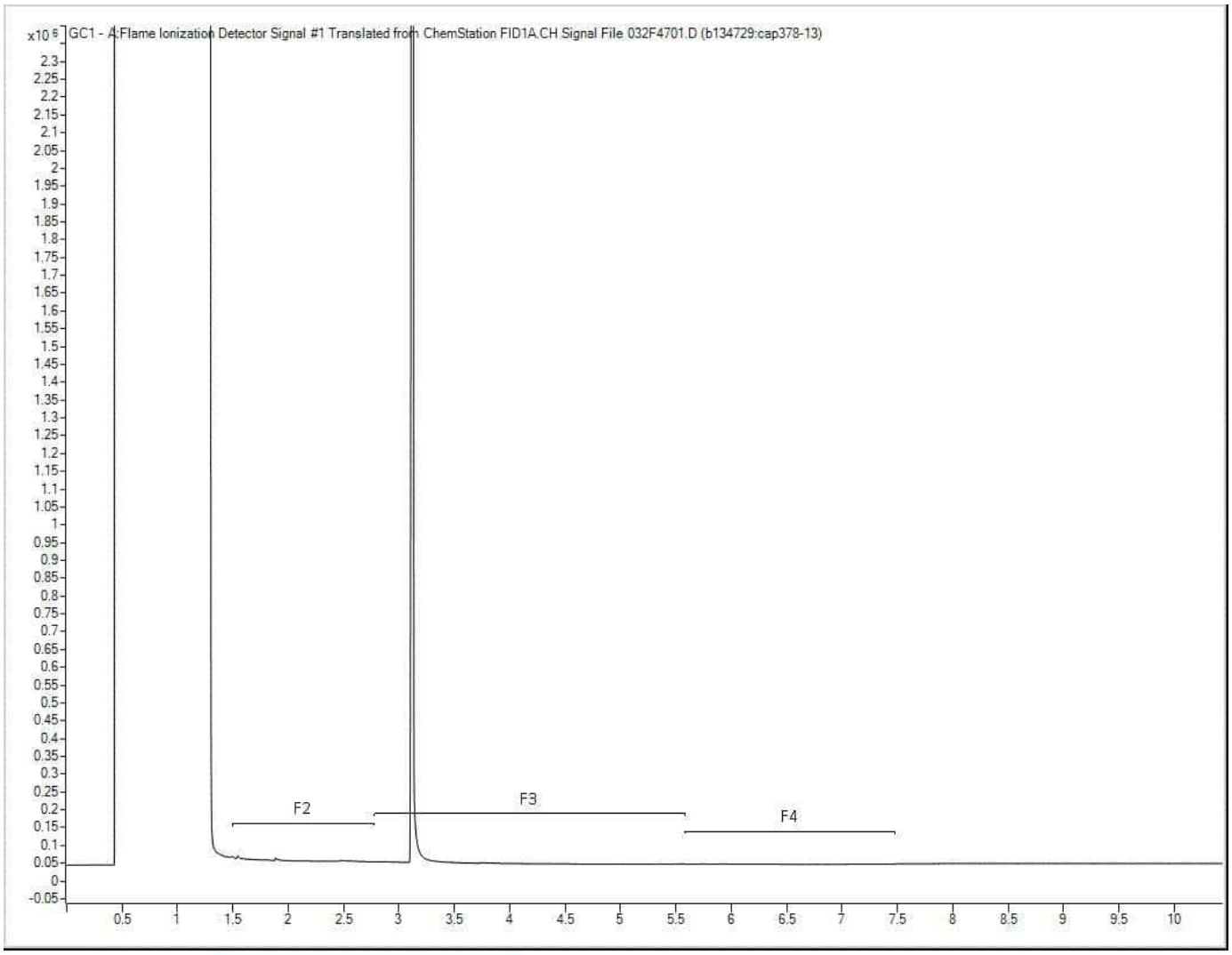
hpchem20\HPchem\1\DATA\2023\10\RUN1007

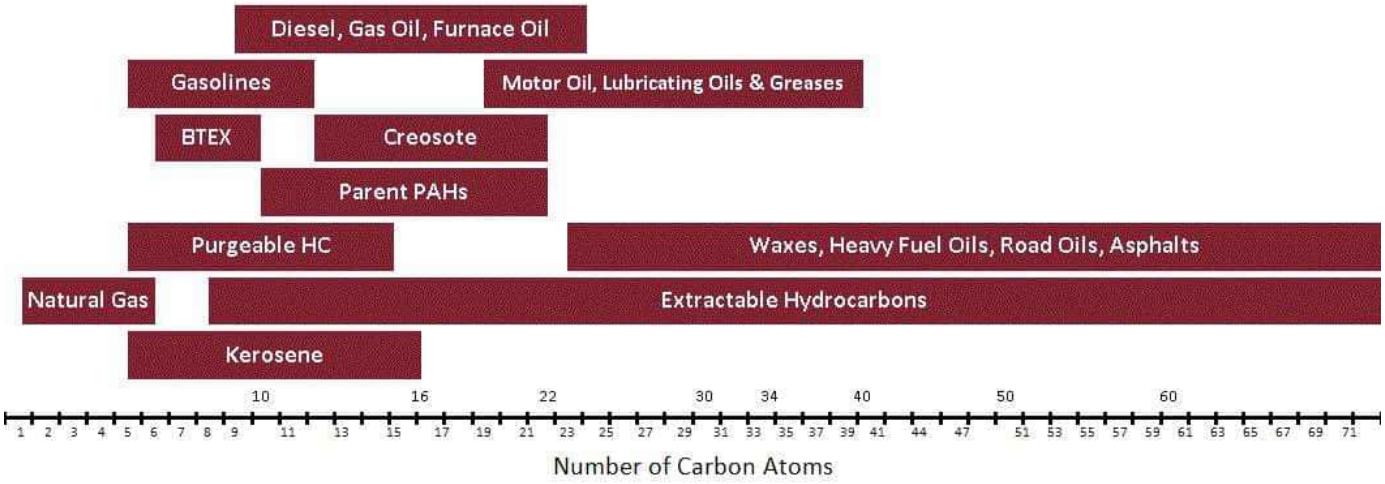
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C378736
Report Date: 2023/10/13
Bureau Veritas Sample: CAP378

Advisian
Task Order#:417085-49223Line Item:
Site#: N/A
Site Location: Norman Wells, NWT
Client ID: AMEP-DS-02

CCME Hydrocarbons (F2-F4 in water) Chromatogram





hpchem20\HPchem\1\DATA\2023\10\RUN1007

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam
A Bureau Veritas Group Company

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9331 - 48 Street, T6B 2R4
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Toll Free: (800) 386-7247

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 299608

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587 897 6249
Sampler Name (Print): Stacy Gibbs / RAJIV TANWA

REPORT INFORMATION

Company Name: Advisian
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587 897 6249
Consultant Project #: 417085-49223.23200

ANALYSIS REQUESTED

FIELD SAMPLE ID	GROUND WATER	SURFACE WATER	SOIL	OTHER	# CONTAINERS	DATE (YYYY/MM/DD)	TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-2 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☒ DIS ☒	MERCURY TOTAL ☒ DISSOLVED ☒	SALINITY SOIL	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	True color, TSS, TDS, Turbidity	Oil & Grease	TOC, DOC, Sulphide	Nitrate, Nitrite, Ammonia (total), TKN	Orthophosphate	Sulphur - total & diss. hyd	COD	Alkylated PAHs, TPH
1 AEMP-DS-01		X			18	2023/09/25	9:50	X			+		X						X	X					X		X	X	X	X	X	X	X	X
2 AEMP-US-04		X			18	2023/09/24	14:25	X			+		X						X	X					X		X	X	X	X	X	X	X	X
3 AEMP-DS-02		X			18	2023/09/24	11:40	X			+		X						X	X					X		X	X	X	X	X	X	X	X
4																																		
5																																		
6																																		
7																																		
8																																		
9																																		
10																																		

mcal-09-2842

Y1

IOL SITE LOCATION: Norman Wells, NT
IOL PROJECT # (if applicable): N/A
MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-49223.23200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) FAL ☐ Other

SPECIAL INSTRUCTIONS: email canada.chemistry@worley.com
cacal_ion.datatrack@worley.com
stacy.gibbs@worley.com
IES A2601436

JARS USED & NOT SUBMITTED Enter N/A for Water: N/A

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID #				YES	NO	COOLER ID #				YES	NO	COOLER ID #			
SEAL PRESENT	—		TEMP °C	5	5	5	SEAL PRESENT			TEMP °C			SEAL PRESENT			TEMP °C		
SEAL INTACT	—			1	2	3	SEAL INTACT				1	2	SEAL INTACT				1	2
COOLING MEDIA PRESENT	—						COOLING MEDIA PRESENT				3		COOLING MEDIA PRESENT				3	

LAB USE ONLY
MAXXAM JOB #

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1. Stacy	STACY GIBBS	2023/09/27	10:00	1.	AJR AVRGII	2023/09/29	15:00
2.				2.			
3.				3.			

SAMPLES
LABELED BY:
VERIFIED BY:

COC-1010 (06/2016) IOL-AB White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-09-25/26
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C378739	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☐ **Yes** ☒ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☐ **Yes** ☒ **No**

If yes, FLAG type and comments*:*

Date samples submitted 2023-09-29

Due date for lab report on SRC 2023-10-12

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☒ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☒ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☒ **No**	Turbidity, true colour, orthophosphate, nitrite, BTEX, F1, TDS, alkalinity
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☒ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☒ **No** ☐ **N/A**	Antimony – overall QC meets criteria

Data check completed by Alex Haigh **Date** 2024-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	

Data check completed by Alex Haigh **Date** 2024-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☒ Yes	☐ No	☐ N/A	**Comments**
Trip Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Equipment Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes	☐ No	☒ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field pH vs. Lab pH RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes	☐ No	☐ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☒ Yes ☐ No

Explain rationale for yes/no:

Request lab to recheck data? If so give details	☐ Yes	☒ No	☐ N/A	**Comments**

If Yes, Lab request to recheck must be approved by Project Manager Name: **Date**

Data check completed by Alex Haigh **Date** 2024-03-26

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 289609

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/10/12
Report #: R3409313
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C378739
Received: 2023/09/29, 15:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	3	AB SOP-00005	SM 24 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	3	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	3		Auto Calc
Cadmium - low level CCME - Dissolved	3		Auto Calc
Cadmium - low level CCME (Total)	3		Auto Calc
Chloride/Sulphate by Auto Colourimetry	3	AB SOP-00020	SM24-4500-Cl/SO4-E m
COD by Colorimeter	3	AB SOP-00016	SM 23 5220D m
True Colour	3	CAL SOP-00049	SM 24 2120 C m
Carbon (DOC) (1)	3	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	3	AB SOP-00005	SM 24 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	3	AB SOP-00037	CCME PHC-CWS m
Sulphide (as H2S)	3		Auto Calc
Hardness	3		Auto Calc
Mercury (Dissolved) by CV (3)	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	3	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	3	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	3	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (3)	3	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	3	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	3		Auto Calc
Ammonia-N (Total)	3	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate and Nitrite	3		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	3	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N)	3		Auto Calc
Oil and Grease (Gravimetric, n-Hexane)	3	AB SOP-00092	SM 23 5520B/5520F m
Target & Alkylated PAH in Water by GC/MS (4)	3	AB SOP-00037 CAL SOP-00250	EPA 8270e m
Benzo[a]pyrene Equivalency (5)	3		Auto Calc
Orthophosphate by Automated Analyzer (6)	3	AB SOP-00025	SM 24 4500-P A,F m
Total Sulphide	3	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	3	AB SOP-00065	SM 24 2540 C m
Carbon (Total Organic) (7)	3	AB SOP-00087	MMCW 119 1996 m

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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 289609

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/10/12
Report #: R3409313
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C378739
Received: 2023/09/29, 15:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Laboratory Method	Analytical Method
Total Suspended Solids (NFR)	3	AB SOP-00061	SM 24 2540 D m
Turbidity	3	CAL SOP-00081	SM 24 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) 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.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Alkylated PAH results are semiquantitative
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(6) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
(7) TOC present in the sample should be considered as non-purgeable TOC.

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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 289609

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
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Report Date: 2023/10/12
Report #: R3409313
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C378739
Received: 2023/09/29, 15:00

Encryption Key

Namita Sahni
Customer Solutions Representative
12 Oct 2023 15:20:36

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614

==========

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 Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		CAP396			CAP396			CAP397		
Sampling Date		2023/09/26 13:45			2023/09/26 13:45			2023/09/25 09:50		
COC Number		289609			289609			289609		
	UNITS	**AEMP-DS-05**	**RDL**	**QC Batch**	**AEMP-DS-05 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-DUP 1**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.10	B132825				<0.10	0.10	B132825
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	0.10	B132825				<0.10	0.10	B132825
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	0.20	B132825				<0.20	0.20	B132825
Volatiles										
Benzene	mg/L	<0.00040	0.00040	B133814	<0.00040	0.00040	B133814	<0.00040	0.00040	B133814
Toluene	mg/L	<0.00040	0.00040	B133814	<0.00040	0.00040	B133814	<0.00040	0.00040	B133814
Ethylbenzene	mg/L	<0.00040	0.00040	B133814	<0.00040	0.00040	B133814	<0.00040	0.00040	B133814
m & p-Xylene	mg/L	<0.00080	0.00080	B133814	<0.00080	0.00080	B133814	<0.00080	0.00080	B133814
o-Xylene	mg/L	<0.00040	0.00040	B133814	<0.00040	0.00040	B133814	<0.00040	0.00040	B133814
Xylenes (Total)	mg/L	<0.00089	0.00089	B132829				<0.00089	0.00089	B132829
F1 (C6-C10) - BTEX	mg/L	<0.10	0.10	B132829				<0.10	0.10	B132829
F1 (C6-C10)	mg/L	<0.10	0.10	B133814	<0.10	0.10	B133814	<0.10	0.10	B133814
Extraction Surrogate Recovery (%)										
O-TERPHENYL (sur.)	%	96		B132825				95		B132825
Instrument Surrogate Recovery (%)										
1,4-Difluorobenzene (sur.)	%	116		B133814	114		B133814	114		B133814
4-Bromofluorobenzene (sur.)	%	94		B133814	97		B133814	96		B133814
D4-1,2-Dichloroethane (sur.)	%	92		B133814	92		B133814	89		B133814

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		CAP398		
Sampling Date		2023/09/24 11:40		
COC Number		289609		
	UNITS	**AEMP-US-02**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.10	B132825
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	0.10	B132825
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	0.20	B132825
Volatiles				
Benzene	mg/L	<0.00040	0.00040	B133814
Toluene	mg/L	<0.00040	0.00040	B133814
Ethylbenzene	mg/L	<0.00040	0.00040	B133814
m & p-Xylene	mg/L	<0.00080	0.00080	B133814
o-Xylene	mg/L	<0.00040	0.00040	B133814
Xylenes (Total)	mg/L	<0.00089	0.00089	B132829
F1 (C6-C10) - BTEX	mg/L	<0.10	0.10	B132829
F1 (C6-C10)	mg/L	<0.10	0.10	B133814
Extraction Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	94		B132825
Instrument Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	115		B133814
4-Bromofluorobenzene (sur.)	%	93		B133814
D4-1,2-Dichloroethane (sur.)	%	90		B133814
RDL = Reportable Detection Limit				

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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		CAP396			CAP396			CAP397		
Sampling Date		2023/09/26 13:45			2023/09/26 13:45			2023/09/25 09:50		
COC Number		289609			289609			289609		
	UNITS	**AEMP-DS-05**	**RDL**	**QC Batch**	**AEMP-DS-05 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-DUP 1**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	130	0.50	B132932				<0.50	0.50	B132932
Ion Balance (% Difference)	%	4.2	N/A	B132931				NC	N/A	B132931
Nitrate (N)	mg/L	0.064	0.010	B132918				0.059	0.010	B132918
Nitrate (NO3)	mg/L	0.28	0.044	B132930				0.26	0.044	B132930
Nitrite (NO2)	mg/L	<0.033	0.033	B132930				<0.033	0.033	B132930
Misc. Inorganics										
Conductivity	uS/cm	300	2.0	B141461				730	2.0	B141461
Total Dissolved Solids	mg/L	170	10	B146723				530	10	B132975
Anions										
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	B141405				<1.0	1.0	B141405
Alkalinity (Total as CaCO3)	mg/L	110	1.0	B141405				190	1.0	B141405
Bicarbonate (HCO3)	mg/L	130	1.0	B141405				230	1.0	B141405
Carbonate (CO3)	mg/L	<1.0	1.0	B141405				<1.0	1.0	B141405
Hydroxide (OH)	mg/L	<1.0	1.0	B141405				<1.0	1.0	B141405
Chloride (Cl)	mg/L	12	1.0	B139531	11	1.0	B139531	31	1.0	B139531
Sulphate (SO4)	mg/L	44	1.0	B139531	43	1.0	B139531	170	5.0	B139531
Nutrients										
Nitrite (N)	mg/L	<0.010	0.010	B133985				<0.010	0.010	B133985
Nitrate plus Nitrite (N)	mg/L	0.064	0.010	B133985				0.059	0.010	B133985
Elements										
Dissolved Barium (Ba)	mg/L	0.045	0.010	B141110				<0.050	0.050	B145365
Dissolved Boron (B)	mg/L	0.022	0.020	B141110				<0.10	0.10	B145365
Dissolved Calcium (Ca)	mg/L	35	0.30	B141110				<1.5	1.5	B145365
Dissolved Iron (Fe)	mg/L	0.10	0.060	B141110				<0.30	0.30	B145365
Dissolved Lithium (Li)	mg/L	<0.020	0.020	B141110				<0.10	0.10	B145365
Dissolved Magnesium (Mg)	mg/L	11	0.20	B141110				<1.0	1.0	B145365
Dissolved Manganese (Mn)	mg/L	0.0080	0.0073	B141110				<0.020	0.020	B145365
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	B141110				<0.50	0.50	B145365
Dissolved Potassium (K)	mg/L	0.97	0.30	B141110				<1.5	1.5	B145365

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

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		CAP396			CAP396			CAP397		
Sampling Date		2023/09/26 13:45			2023/09/26 13:45			2023/09/25 09:50		
COC Number		289609			289609			289609		
	UNITS	**AEMP-DS-05**	**RDL**	**QC Batch**	**AEMP-DS-05 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-DUP 1**	**RDL**	**QC Batch**
Dissolved Silicon (Si)	mg/L	1.5	0.50	B141110				<2.5	2.5	B145365
Dissolved Sodium (Na)	mg/L	9.5	0.50	B141110				<2.5	2.5	B145365
Dissolved Strontium (Sr)	mg/L	0.24	0.020	B141110				<0.10	0.10	B145365
Dissolved Sulphur (S)	mg/L	14	0.20	B141110				<1.0	1.0	B145365

RDL = Reportable Detection Limit
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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		CAP398			CAP398		
Sampling Date		2023/09/24 11:40			2023/09/24 11:40		
COC Number		289609			289609		
	UNITS	**AEMP-US-02**	**RDL**	**QC Batch**	**AEMP-US-02 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters							
Hardness (CaCO3)	mg/L	170	0.50	B132932			
Ion Balance (% Difference)	%	9.4	N/A	B132931			
Nitrate (N)	mg/L	0.076	0.010	B132918			
Nitrate (NO3)	mg/L	0.34	0.044	B132930			
Nitrite (NO2)	mg/L	<0.033	0.033	B132930			
Misc. Inorganics							
Conductivity	uS/cm	310	2.0	B141461			
Total Dissolved Solids	mg/L	220	10	B132975	240	10	B132975
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	B141405			
Alkalinity (Total as CaCO3)	mg/L	100	1.0	B141405			
Bicarbonate (HCO3)	mg/L	120	1.0	B141405			
Carbonate (CO3)	mg/L	<1.0	1.0	B141405			
Hydroxide (OH)	mg/L	<1.0	1.0	B141405			
Chloride (Cl)	mg/L	11	1.0	B139531			
Sulphate (SO4)	mg/L	49	1.0	B139531			
Nutrients							
Nitrite (N)	mg/L	<0.010	0.010	B133985			
Nitrate plus Nitrite (N)	mg/L	0.076	0.010	B133985			
Elements							
Dissolved Barium (Ba)	mg/L	0.055	0.010	B141090			
Dissolved Boron (B)	mg/L	0.021	0.020	B141090			
Dissolved Calcium (Ca)	mg/L	44	0.30	B141090			
Dissolved Iron (Fe)	mg/L	0.091	0.060	B141090			
Dissolved Lithium (Li)	mg/L	<0.020	0.020	B141090			
Dissolved Magnesium (Mg)	mg/L	15	0.20	B141090			
Dissolved Manganese (Mn)	mg/L	0.018	0.0040	B141090			
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	B141090			
Dissolved Potassium (K)	mg/L	1.2	0.30	B141090			

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

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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		CAP398			CAP398		
Sampling Date		2023/09/24 11:40			2023/09/24 11:40		
COC Number		289609			289609		
	UNITS	**AEMP-US-02**	**RDL**	**QC Batch**	**AEMP-US-02 Lab-Dup**	**RDL**	**QC Batch**
Dissolved Silicon (Si)	mg/L	1.3	0.50	B141090			
Dissolved Sodium (Na)	mg/L	13	0.50	B141090			
Dissolved Strontium (Sr)	mg/L	0.28	0.020	B141090			
Dissolved Sulphur (S)	mg/L	14	0.20	B141090			

RDL = Reportable Detection Limit
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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		CAP396			CAP397	CAP398		
Sampling Date		2023/09/26 13:45			2023/09/25 09:50	2023/09/24 11:40		
COC Number		289609			289609	289609		
	UNITS	**AEMP-DS-05**	**RDL**	**QC Batch**	**AEMP-DUP 1**	**AEMP-US-02**	**RDL**	**QC Batch**
Elements								
Total Cadmium (Cd)	mg/L	0.000079	0.000020	B132648	<0.000020	0.000063	0.000020	B132648
Total Mercury (Hg)	ug/L	0.0021	0.0019	B141897	<0.0019	<0.0019	0.0019	B141897
Total Aluminum (Al)	mg/L	1.4	0.0030	B142597	0.018	0.96	0.0030	B142604
Total Antimony (Sb)	mg/L	<0.00060	0.00060	B142597	<0.00060	<0.00060	0.00060	B142604
Total Arsenic (As)	mg/L	0.00095	0.00020	B142597	0.00025	0.00095	0.00020	B142604
Total Barium (Ba)	mg/L	0.075	0.010	B142599	0.085	0.072	0.010	B142612
Total Beryllium (Be)	mg/L	<0.0010	0.0010	B142597	<0.0010	<0.0010	0.0010	B142604
Total Boron (B)	mg/L	<0.020	0.020	B142599	0.037	<0.020	0.020	B142612
Total Calcium (Ca)	mg/L	40	0.30	B142599	83	36	0.30	B142612
Total Chromium (Cr)	mg/L	0.0023	0.0010	B142597	<0.0010	0.0015	0.0010	B142604
Total Cobalt (Co)	mg/L	0.00092	0.00030	B142597	<0.00030	0.00084	0.00030	B142604
Total Copper (Cu)	mg/L	0.0027	0.0010	B142597	<0.0010	0.0026	0.0010	B142604
Total Iron (Fe)	mg/L	2.0	0.060	B142599	0.13	1.6	0.060	B142612
Total Lead (Pb)	mg/L	0.00099	0.00020	B142597	<0.00020	0.00097	0.00020	B142604
Total Lithium (Li)	mg/L	<0.020	0.020	B142599	<0.020	<0.020	0.020	B142612
Total Magnesium (Mg)	mg/L	12	0.20	B142599	32	12	0.20	B142612
Total Manganese (Mn)	mg/L	0.051	0.0040	B142599	0.0090	0.040	0.0052	B142612
Total Molybdenum (Mo)	mg/L	0.0011	0.00020	B142597	0.0024	0.0014	0.00020	B142604
Total Nickel (Ni)	mg/L	0.0037	0.00050	B142597	<0.00050	0.0052	0.00050	B142604
Total Phosphorus (P)	mg/L	<0.10	0.10	B142599	<0.10	<0.10	0.10	B142612
Total Potassium (K)	mg/L	1.5	0.30	B142599	1.2	1.2	0.30	B142612
Total Selenium (Se)	mg/L	0.00036	0.00020	B142597	0.00024	0.00038	0.00020	B142604
Total Silicon (Si)	mg/L	4.5	0.50	B142599	2.5	2.8	0.50	B142612
Total Silver (Ag)	mg/L	<0.00010	0.00010	B142597	<0.00010	<0.00010	0.00010	B142604
Total Sodium (Na)	mg/L	9.2	0.50	B142599	27	9.9	0.50	B142612
Total Strontium (Sr)	mg/L	0.24	0.020	B142599	1.6	0.26	0.020	B142612
Total Sulphur (S)	mg/L	14	0.20	B142599	54	15	0.20	B142612
Total Thallium (Tl)	mg/L	<0.00020	0.00020	B142597	<0.00020	<0.00020	0.00020	B142604
Total Tin (Sn)	mg/L	<0.0010	0.0010	B142597	<0.0010	<0.0010	0.0010	B142604
Total Titanium (Ti)	mg/L	0.031	0.0010	B142597	<0.0010	0.017	0.0010	B142604
Total Uranium (U)	mg/L	0.00089	0.00010	B142597	0.0015	0.0010	0.00010	B142604
RDL = Reportable Detection Limit								

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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		CAP396			CAP397	CAP398		
Sampling Date		2023/09/26 13:45			2023/09/25 09:50	2023/09/24 11:40		
COC Number		289609			289609	289609		
	UNITS	**AEMP-DS-05**	**RDL**	**QC Batch**	**AEMP-DUP 1**	**AEMP-US-02**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	0.0033	0.0010	B142597	<0.0010	0.0024	0.0010	B142604
Total Zinc (Zn)	mg/L	0.011	0.0030	B142597	<0.0030	0.0093	0.0030	B142604
RDL = Reportable Detection Limit								

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		CAP396			CAP396			CAP397		
Sampling Date		2023/09/26 13:45			2023/09/26 13:45			2023/09/25 09:50		
COC Number		289609			289609			289609		
	UNITS	**AEMP-DS-05**	**RDL**	**QC Batch**	**AEMP-DS-05 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-DUP 1**	**RDL**	**QC Batch**
Calculated Parameters										
Sulphide (as H2S)	mg/L	0.0037	0.0020	B132282				0.026	0.0020	B132282
Demand Parameters										
Chemical Oxygen Demand	mg/L	28	10	B137526				20	10	B137526
Elements										
Dissolved Cadmium (Cd)	mg/L	0.000021	0.000020	B132839				<0.000020	0.000020	B132839
Misc. Inorganics										
Dissolved Organic Carbon (C)	mg/L	3.1	0.50	B141888				<0.50	0.50	B141888
Total Organic Carbon (C)	mg/L	3.0	0.50	B141893	3.2	0.50	B141893	2.2	0.50	B141893
Total Suspended Solids	mg/L	120	1.0	B133572				<1.0	1.0	B133560
Anions										
Total Sulphide	mg/L	0.0034	0.0018	B133470	0.0048	0.0018	B133470	0.024	0.0018	B133470
Nutrients										
Total Ammonia (N)	mg/L	<0.015	0.015	B142361				<0.015	0.015	B142365
Orthophosphate (P)	mg/L	<0.0030	0.0030	B134833				<0.0030	0.0030	B134833
Misc. Organics										
Total Oil and grease	mg/L	3.0	2.0	B140144				<2.0	2.0	B140144
Physical Properties										
True Colour	PtCo units	9.9	2.0	B134588				<2.0	2.0	B134588
Physical Properties										
Turbidity	NTU	69	0.10	B132988	57	0.10	B132988	<0.10	0.10	B132988

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		CAP397			CAP398			CAP398		
Sampling Date		2023/09/25 09:50			2023/09/24 11:40			2023/09/24 11:40		
COC Number		289609			289609			289609		
	UNITS	**AEMP-DUP 1 Lab-Dup**	**RDL**	**QC Batch**	**AEMP-US-02**	**RDL**	**QC Batch**	**AEMP-US-02 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters										
Sulphide (as H2S)	mg/L				0.0037	0.0020	B132282			
Demand Parameters										
Chemical Oxygen Demand	mg/L				15	10	B137526			
Elements										
Dissolved Cadmium (Cd)	mg/L				<0.000020	0.000020	B132839			
Misc. Inorganics										
Dissolved Organic Carbon (C)	mg/L	<0.50	0.50	B141888	3.1	0.50	B141888			
Total Organic Carbon (C)	mg/L				3.0	0.50	B141893			
Total Suspended Solids	mg/L				170	1.0	B132968			
Anions										
Total Sulphide	mg/L				0.0034	0.0018	B133470			
Nutrients										
Total Ammonia (N)	mg/L				0.026	0.015	B142365			
Orthophosphate (P)	mg/L				<0.0030	0.0030	B134833			
Misc. Organics										
Total Oil and grease	mg/L				<2.0	2.0	B140144			
Physical Properties										
True Colour	PtCo units				4.0	2.0	B134588	3.7	2.0	B134588
Physical Properties										
Turbidity	NTU				46	0.10	B132983			

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		CAP396	CAP397	CAP398		
Sampling Date		2023/09/26 13:45	2023/09/25 09:50	2023/09/24 11:40		
COC Number		289609	289609	289609		
	UNITS	**AEMP-DS-05**	**AEMP-DUP 1**	**AEMP-US-02**	**RDL**	**QC Batch**
Polycyclic Aromatics						
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	<0.000010	<0.000010	0.000010	B132761
Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B132824
Acenaphthylene	ug/L	<0.10	<0.10	<0.10	0.10	B132824
Acridine	ug/L	<0.040	<0.040	<0.040	0.040	B132824
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	B132824
Benzo(a)anthracene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B132824
Benzo(b&j)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B132824
Benzo(k)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B132824
Benzo(g,h,i)perylene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B132824
Benzo(c)phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B132824
Benzo(a)pyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B132824
Benzo(e)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	B132824
Chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B132824
Dibenz(a,h)anthracene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B132824
Fluoranthene	ug/L	<0.010	<0.010	<0.010	0.010	B132824
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B132824
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B132824
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B132824
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B132824
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B132824
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	B132824
Perylene	ug/L	<0.050	<0.050	<0.050	0.050	B132824
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B132824
Quinoline	ug/L	<0.20	<0.20	<0.20	0.20	B132824
Retene	ug/L	<0.050	<0.050	<0.050	0.050	B132824
C1-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B132824
C3-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B132824
C4-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B132824
C2-Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B132824
Biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B132824
C1-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B132824
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		CAP396	CAP397	CAP398		
Sampling Date		2023/09/26 13:45	2023/09/25 09:50	2023/09/24 11:40		
COC Number		289609	289609	289609		
	UNITS	**AEMP-DS-05**	**AEMP-DUP 1**	**AEMP-US-02**	**RDL**	**QC Batch**
C2-biphenyl	ug/L	<0.020	<0.020	<0.020	0.020	B132824
C1-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B132824
C2-fluorene	ug/L	<0.050	<0.050	<0.050	0.050	B132824
C3-fluorene	ug/L	0.058	<0.050	<0.050	0.050	B132824
Dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B132824
C1-dibenzothiophene	ug/L	<0.020	<0.020	<0.020	0.020	B132824
C2-dibenzothiophene	ug/L	0.047	<0.020	<0.020	0.020	B132824
C3-dibenzothiophene	ug/L	0.044	<0.020	<0.020	0.020	B132824
C4-dibenzothiophene	ug/L	0.022	<0.020	<0.020	0.020	B132824
C1 phenanthrene/anthracene	ug/L	<0.050	<0.050	<0.050	0.050	B132824
C2 phenanthrene/anthracene	ug/L	0.062	<0.050	<0.050	0.050	B132824
C3 phenanthrene/anthracene	ug/L	0.14	<0.050	<0.050	0.050	B132824
C4 phenanthrene/anthracene	ug/L	0.074	<0.050	<0.050	0.050	B132824
C1 fluoranthene/pyrene	ug/L	<0.020	<0.020	<0.020	0.020	B132824
C2 fluoranthene/pyrene	ug/L	0.031	<0.020	<0.020	0.020	B132824
C3 fluoranthene/pyrene	ug/L	0.078	<0.020	<0.020	0.020	B132824
C4 fluoranthene/pyrene	ug/L	0.042	<0.020	<0.020	0.020	B132824
C1 benzo(a)anthracene/chrysene	ug/L	0.012	<0.0085	<0.0085	0.0085	B132824
C2 benzo(a)anthracene/chrysene	ug/L	0.034	<0.0085	<0.0085	0.0085	B132824
C3 benzo(a)anthracene/chrysene	ug/L	0.010	<0.0085	<0.0085	0.0085	B132824
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	B132824
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B132824
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	B132824
C1-Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	B132824
1-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	B132824
Extraction Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	112	107	114		B132824
D8-ACENAPHTHYLENE (sur.)	%	106	101	105		B132824
D8-NAPHTHALENE (sur.)	%	89	85	89		B132824
TERPHENYL-D14 (sur.)	%	121	115	121		B132824
RDL = Reportable Detection Limit						

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Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		CAP396	CAP397		CAP398		
Sampling Date		2023/09/26 13:45	2023/09/25 09:50		2023/09/24 11:40		
COC Number		289609	289609		289609		
	UNITS	**AEMP-DS-05**	**AEMP-DUP 1**	**QC Batch**	**AEMP-US-02**	**RDL**	**QC Batch**
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	B140449	0.0026	0.0019	B141723
RDL = Reportable Detection Limit							

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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
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Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		CAP396	CAP397	CAP398		
Sampling Date		2023/09/26 13:45	2023/09/25 09:50	2023/09/24 11:40		
COC Number		289609	289609	289609		
	UNITS	**AEMP-DS-05**	**AEMP-DUP 1**	**AEMP-US-02**	**RDL**	**QC Batch**
Elements						
Dissolved Aluminum (Al)	mg/L	0.023	0.0066	0.017	0.0030	B134031
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00081	<0.00060	0.00060	B134031
Dissolved Arsenic (As)	mg/L	0.00028	<0.00020	0.00027	0.00020	B134031
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B134031
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B134031
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	0.00030	B134031
Dissolved Copper (Cu)	mg/L	<0.0010	<0.0010	0.0026	0.0010	B134031
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B134031
Dissolved Molybdenum (Mo)	mg/L	0.00094	<0.00020	0.0012	0.00020	B134031
Dissolved Nickel (Ni)	mg/L	0.0012	<0.00050	0.0016	0.00050	B134031
Dissolved Selenium (Se)	mg/L	0.00030	<0.00020	0.00028	0.00020	B134031
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	B134031
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	B134031
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B134031
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B134031
Dissolved Uranium (U)	mg/L	0.00072	<0.00010	0.00079	0.00010	B134031
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	B134031
Dissolved Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	0.0030	B134031
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: CAP396
Sample ID: AEMP-DS-05
Matrix: Water

Collected: 2023/09/26
Relinquished: 2023/09/29
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B141405	N/A	2023/10/09	Lesley Quan-Choi
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B133814	N/A	2023/10/12	Ancheol Jeong
F1-BTEX	CALC/MS	B132829	N/A	2023/10/12	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B132839	N/A	2023/10/03	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B132648	N/A	2023/10/07	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B139531	N/A	2023/10/05	Tyler Orr
COD by Colorimeter	M/PROB	B137526	N/A	2023/10/04	Dafne Strozake Maximo
True Colour	SPEC/COL	B134588	N/A	2023/10/03	Shanna McKort
Carbon (DOC)	TECH	B141888	N/A	2023/10/06	Ming Dong
Conductivity @25C	COND	B141461	N/A	2023/10/09	Lesley Quan-Choi
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B132825	2023/10/02	2023/10/02	Chuhan Huang
Sulphide (as H2S)	CALC	B132282	N/A	2023/10/02	Automated Statchk
Hardness	CALC	B132932	N/A	2023/10/06	Automated Statchk
Mercury (Dissolved) by CV	CV	B140449	2023/10/05	2023/10/05	Kiran Kumari
Mercury (Total) by CV	CV	B141897	2023/10/05	2023/10/06	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B141110	N/A	2023/10/05	Vincy Scaria
Elements by ICP - Total	ICPA	B142599	2023/10/06	2023/10/06	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	B134031	N/A	2023/10/02	Jason Bao
Elements by ICPMS - Total	ICPM	B142597	2023/10/06	2023/10/06	Kristijan Kovac
Ion Balance	CALC	B132931	N/A	2023/10/10	Automated Statchk
Ammonia-N (Total)	KONE	B142361	N/A	2023/10/06	Nikita Vohra
Nitrate and Nitrite	CALC	B132930	N/A	2023/10/03	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B133985	N/A	2023/10/02	Isabelle White
Nitrate (as N)	CALC	B132918	2023/10/03	2023/10/03	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B140144	2023/10/05	2023/10/05	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B132824	2023/10/02	2023/10/02	Don Maxwell
Benzo[a]pyrene Equivalency	GC/MSD	B132761	N/A	2023/10/03	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B134833	N/A	2023/10/02	Mary Anne Dela Cruz
Total Sulphide	SPEC	B133470	N/A	2023/10/01	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B146723	2023/10/10	2023/10/11	Rachel Tomecek
Carbon (Total Organic)	TECH	B141893	N/A	2023/10/06	Ming Dong
Total Suspended Solids (NFR)	BAL	B133572	2023/10/02	2023/10/02	Haydee Estilong
Turbidity	TURB	B132988	N/A	2023/10/01	Rachel Tomecek

Bureau Veritas ID: CAP396 Dup
Sample ID: AEMP-DS-05
Matrix: Water

Collected: 2023/09/26
Relinquished: 2023/09/29
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B133814	N/A	2023/10/12	Ancheol Jeong
Chloride/Sulphate by Auto Colourimetry	KONE	B139531	N/A	2023/10/05	Tyler Orr
Total Sulphide	SPEC	B133470	N/A	2023/10/01	Dafne Strozake Maximo
Carbon (Total Organic)	TECH	B141893	N/A	2023/10/06	Ming Dong
Turbidity	TURB	B132988	N/A	2023/10/01	Rachel Tomecek

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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: CAP397
Sample ID: AEMP-DUP 1
Matrix: Water

Collected: 2023/09/25
Relinquished: 2023/09/29
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B141405	N/A	2023/10/09	Lesley Quan-Choi
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B133814	N/A	2023/10/12	Ancheol Jeong
F1-BTEX	CALC/MS	B132829	N/A	2023/10/12	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B132839	N/A	2023/10/03	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B132648	N/A	2023/10/07	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B139531	N/A	2023/10/05	Tyler Orr
COD by Colorimeter	M/PROB	B137526	N/A	2023/10/04	Dafne Strozake Maximo
True Colour	SPEC/COL	B134588	N/A	2023/10/02	Shanna McKort
Carbon (DOC)	TECH	B141888	N/A	2023/10/06	Ming Dong
Conductivity @25C	COND	B141461	N/A	2023/10/09	Lesley Quan-Choi
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B132825	2023/10/02	2023/10/02	Chuhan Huang
Sulphide (as H2S)	CALC	B132282	N/A	2023/10/02	Automated Statchk
Hardness	CALC	B132932	N/A	2023/10/06	Automated Statchk
Mercury (Dissolved) by CV	CV	B140449	2023/10/05	2023/10/05	Kiran Kumari
Mercury (Total) by CV	CV	B141897	2023/10/05	2023/10/06	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B145365	N/A	2023/10/09	Kristijan Kovac
Elements by ICP - Total	ICPA	B142612	2023/10/06	2023/10/06	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	B134031	N/A	2023/10/02	Jason Bao
Elements by ICPMS - Total	ICPM	B142604	2023/10/06	2023/10/06	Kristijan Kovac
Ion Balance	CALC	B132931	N/A	2023/10/10	Automated Statchk
Ammonia-N (Total)	KONE	B142365	N/A	2023/10/06	Adam Fishleigh
Nitrate and Nitrite	CALC	B132930	N/A	2023/10/03	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B133985	N/A	2023/10/02	Isabelle White
Nitrate (as N)	CALC	B132918	2023/10/03	2023/10/03	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B140144	2023/10/05	2023/10/05	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B132824	2023/10/02	2023/10/02	Don Maxwell
Benzo[a]pyrene Equivalency	GC/MSD	B132761	N/A	2023/10/03	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B134833	N/A	2023/10/02	Mary Anne Dela Cruz
Total Sulphide	SPEC	B133470	N/A	2023/10/01	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B132975	2023/10/01	2023/10/02	Ashhel Zia
Carbon (Total Organic)	TECH	B141893	N/A	2023/10/06	Ming Dong
Total Suspended Solids (NFR)	BAL	B133560	2023/10/02	2023/10/03	Haydee Estilong
Turbidity	TURB	B132988	N/A	2023/10/01	Rachel Tomecek

Bureau Veritas ID: CAP397 Dup
Sample ID: AEMP-DUP 1
Matrix: Water

Collected: 2023/09/25
Relinquished: 2023/09/29
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbon (DOC)	TECH	B141888	N/A	2023/10/06	Ming Dong

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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: CAP398
Sample ID: AEMP-US-02
Matrix: Water

Collected: 2023/09/24
Relinquished: 2023/09/29
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B141405	N/A	2023/10/09	Lesley Quan-Choi
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B133814	N/A	2023/10/12	Ancheol Jeong
F1-BTEX	CALC/MS	B132829	N/A	2023/10/12	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B132839	N/A	2023/10/03	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B132648	N/A	2023/10/07	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B139531	N/A	2023/10/05	Tyler Orr
COD by Colorimeter	M/PROB	B137526	N/A	2023/10/04	Dafne Strozake Maximo
True Colour	SPEC/COL	B134588	N/A	2023/10/02	Shanna McKort
Carbon (DOC)	TECH	B141888	N/A	2023/10/06	Ming Dong
Conductivity @25C	COND	B141461	N/A	2023/10/09	Lesley Quan-Choi
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B132825	2023/10/02	2023/10/02	Chuhan Huang
Sulphide (as H2S)	CALC	B132282	N/A	2023/10/02	Automated Statchk
Hardness	CALC	B132932	N/A	2023/10/06	Automated Statchk
Mercury (Dissolved) by CV	CV	B141723	2023/10/05	2023/10/06	Kiran Kumari
Mercury (Total) by CV	CV	B141897	2023/10/05	2023/10/06	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B141090	N/A	2023/10/06	Hue Quyen Vuong
Elements by ICP - Total	ICPA	B142612	2023/10/06	2023/10/06	Mohammad Pousti
Elements by ICPMS - Dissolved	ICPM	B134031	N/A	2023/10/02	Jason Bao
Elements by ICPMS - Total	ICPM	B142604	2023/10/06	2023/10/06	Kristijan Kovac
Ion Balance	CALC	B132931	N/A	2023/10/10	Automated Statchk
Ammonia-N (Total)	KONE	B142365	N/A	2023/10/06	Adam Fishleigh
Nitrate and Nitrite	CALC	B132930	N/A	2023/10/03	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B133985	N/A	2023/10/02	Isabelle White
Nitrate (as N)	CALC	B132918	2023/10/03	2023/10/03	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B140144	2023/10/05	2023/10/05	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B132824	2023/10/02	2023/10/02	Don Maxwell
Benzo[a]pyrene Equivalency	GC/MSD	B132761	N/A	2023/10/03	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B134833	N/A	2023/10/02	Mary Anne Dela Cruz
Total Sulphide	SPEC	B133470	N/A	2023/10/01	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B132975	2023/10/01	2023/10/02	Ashhel Zia
Carbon (Total Organic)	TECH	B141893	N/A	2023/10/06	Ming Dong
Total Suspended Solids (NFR)	BAL	B132968	2023/10/01	2023/10/02	Ashhel Zia
Turbidity	TURB	B132983	N/A	2023/10/01	Rachel Tomecek

Bureau Veritas ID: CAP398 Dup
Sample ID: AEMP-US-02
Matrix: Water

Collected: 2023/09/24
Relinquished: 2023/09/29
Received: 2023/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
True Colour	SPEC/COL	B134588	N/A	2023/10/02	Shanna McKort
Total Dissolved Solids (Filt. Residue)	BAL	B132975	2023/10/01	2023/10/02	Ashhel Zia

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Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

GENERAL COMMENTS

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

Package 1	4.3°C

Sample CAP396 [AEMP-DS-05] : Sample was analyzed past method specified hold time for Turbidity. 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 NO2 (N); NO2 (N) + NO3 (N) in Water. Sample was analyzed past method specified hold time for Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample CAP397 [AEMP-DUP 1] : Sample was analyzed past method specified hold time for Turbidity. 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 NO2 (N); NO2 (N) + NO3 (N) in Water. Sample was analyzed past method specified hold time for Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample CAP398 [AEMP-US-02] : Sample was analyzed past method specified hold time for Turbidity. 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 NO2 (N); NO2 (N) + NO3 (N) in Water. Sample was analyzed past method specified hold time for Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

IOL ROUTINE WATER (WATER) Comments

Sample CAP397 [AEMP-DUP 1] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

DATA QUALITY OVERVIEW

Lab ID	Client Sample ID	Matrix	Test Code	Analysis Type	Parameters	Deviation	Root Cause	Potential Impact
CAP396	AEMP-DS-05	Water	TDS	INORG	Sample	#10 Past Hold Time	#4 Re-Analysis Required	This may increase the uncertainty associated with these results.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B132824	DM	Method Blank	D10-ANTHRACENE (sur.)	2023/10/02		108	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/10/02		121	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/10/02		99	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/10/02		83	%	50 - 130
			Acenaphthene	2023/10/02	<0.10		ug/L	
			Acenaphthylene	2023/10/02	<0.10		ug/L	
			Acridine	2023/10/02	<0.040		ug/L	
			Anthracene	2023/10/02	<0.010		ug/L	
			Benzo(a)anthracene	2023/10/02	<0.0085		ug/L	
			Benzo(b&j)fluoranthene	2023/10/02	<0.0085		ug/L	
			Benzo(k)fluoranthene	2023/10/02	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2023/10/02	<0.0085		ug/L	
			Benzo(c)phenanthrene	2023/10/02	<0.050		ug/L	
			Benzo(a)pyrene	2023/10/02	<0.0075		ug/L	
			Benzo(e)pyrene	2023/10/02	<0.050		ug/L	
			Chrysene	2023/10/02	<0.0085		ug/L	
			Dibenz(a,h)anthracene	2023/10/02	<0.0075		ug/L	
			Fluoranthene	2023/10/02	<0.010		ug/L	
			Fluorene	2023/10/02	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2023/10/02	<0.0085		ug/L	
			Indeno(1,2,3-cd)fluoranthene	2023/10/02	<0.0085		ug/L	
			2-Methylnaphthalene	2023/10/02	<0.10		ug/L	
			Naphthalene	2023/10/02	<0.10		ug/L	
			Phenanthrene	2023/10/02	<0.050		ug/L	
			Perylene	2023/10/02	<0.050		ug/L	
			Pyrene	2023/10/02	<0.020		ug/L	
			Quinoline	2023/10/02	<0.20		ug/L	
			Retene	2023/10/02	<0.050		ug/L	
			C1-Naphthalene	2023/10/02	<0.10		ug/L	
			C3-Naphthalene	2023/10/02	<0.10		ug/L	
			C4-Naphthalene	2023/10/02	<0.10		ug/L	
			C2-Naphthalene	2023/10/02	<0.10		ug/L	
			Biphenyl	2023/10/02	<0.020		ug/L	
			C1-biphenyl	2023/10/02	<0.020		ug/L	
			C2-biphenyl	2023/10/02	<0.020		ug/L	
			C1-fluorene	2023/10/02	<0.050		ug/L	
			C2-fluorene	2023/10/02	<0.050		ug/L	
			C3-fluorene	2023/10/02	<0.050		ug/L	
			Dibenzothiophene	2023/10/02	<0.020		ug/L	
			C1-dibenzothiophene	2023/10/02	<0.020		ug/L	
			C2-dibenzothiophene	2023/10/02	<0.020		ug/L	
			C3-dibenzothiophene	2023/10/02	<0.020		ug/L	
			C4-dibenzothiophene	2023/10/02	<0.020		ug/L	
			C1 phenanthrene/anthracene	2023/10/02	<0.050		ug/L	
			C2 phenanthrene/anthracene	2023/10/02	<0.050		ug/L	
			C3 phenanthrene/anthracene	2023/10/02	<0.050		ug/L	
			C4 phenanthrene/anthracene	2023/10/02	<0.050		ug/L	
			C1 fluoranthene/pyrene	2023/10/02	<0.020		ug/L	
			C2 fluoranthene/pyrene	2023/10/02	<0.020		ug/L	
			C3 fluoranthene/pyrene	2023/10/02	<0.020		ug/L	
			C4 fluoranthene/pyrene	2023/10/02	<0.020		ug/L	
			C1 benzo(a)anthracene/chrysene	2023/10/02	<0.0085		ug/L	

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			C2 benzo(a)anthracene/chrysene	2023/10/02	<0.0085		ug/L	
			C3 benzo(a)anthracene/chrysene	2023/10/02	<0.0085		ug/L	
			C4 benzo(a)anthracene/chrysene	2023/10/02	<0.0085		ug/L	
			C1benzobjkfluoranthene/benzoapyrene	2023/10/02	<0.0075		ug/L	
			C2benzobjkfluoranthene/benzoapyrene	2023/10/02	<0.0075		ug/L	
			C1-Acenaphthene	2023/10/02	<0.10		ug/L	
			1-Methylnaphthalene	2023/10/02	<0.10		ug/L	
B132825	CHA	Method Blank	O-TERPHENYL (sur.)	2023/10/02		91	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/10/02	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2023/10/02	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2023/10/02	<0.20		mg/L	
B132968	AZI	Method Blank	Total Suspended Solids	2023/10/02	<1.0		mg/L	
B132975	AZI	Method Blank	Total Dissolved Solids	2023/10/02	<10		mg/L	
B132983	RTM	Method Blank	Turbidity	2023/10/01	<0.10		NTU	
B132988	RTM	Method Blank	Turbidity	2023/10/01	<0.10		NTU	
B133470	DSX	Method Blank	Total Sulphide	2023/10/01	<0.0018		mg/L	
B133560	HE1	Method Blank	Total Suspended Solids	2023/10/03	<1.0		mg/L	
B133572	HE1	Method Blank	Total Suspended Solids	2023/10/02	<1.0		mg/L	
B133814	AJG	Method Blank	1,4-Difluorobenzene (sur.)	2023/10/12		115	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/10/12		99	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/10/12		92	%	50 - 140
			Benzene	2023/10/12	<0.00040		mg/L	
			Toluene	2023/10/12	<0.00040		mg/L	
			Ethylbenzene	2023/10/12	<0.00040		mg/L	
			m & p-Xylene	2023/10/12	<0.00080		mg/L	
			o-Xylene	2023/10/12	<0.00040		mg/L	
			F1 (C6-C10)	2023/10/12	<0.10		mg/L	
B133985	ISW	Method Blank	Nitrite (N)	2023/10/02	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/10/02	<0.010		mg/L	
B134031	JAB	Method Blank	Dissolved Aluminum (Al)	2023/10/02	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/10/02	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/10/02	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/10/02	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/10/02	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/10/02	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/10/02	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/10/02	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/10/02	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/10/02	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/10/02	<0.00020		mg/L	
			Dissolved Thallium (Tl)	2023/10/02	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/10/02	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/10/02	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/10/02	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/10/02	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/10/02	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/10/02	<0.0010		mg/L	
B134588	SKM	Method Blank	True Colour	2023/10/02	<2.0		PtCo units	
B134833	MAP	Method Blank	Orthophosphate (P)	2023/10/02	<0.0030		mg/L	
B137526	DSX	Method Blank	Chemical Oxygen Demand	2023/10/04	<10		mg/L	
B139531	TOR	Method Blank	Chloride (Cl)	2023/10/05	<1.0		mg/L	
			Sulphate (SO4)	2023/10/05	<1.0		mg/L	

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Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B140144	JB9	Method Blank	Total Oil and grease	2023/10/05	<2.0		mg/L	
B140449	KKM	Method Blank	Dissolved Mercury (Hg)	2023/10/05	<0.0019		ug/L	
B141090	HQV	Method Blank	Dissolved Iron (Fe)	2023/10/06	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/10/06	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/10/06	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/10/06	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/10/06	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/10/06	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/10/06	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/10/06	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/10/06	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/10/06	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/10/06	<0.50		mg/L	
			Dissolved Boron (B)	2023/10/06	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/10/06	<0.30		mg/L	
B141110	VSC	Method Blank	Dissolved Iron (Fe)	2023/10/05	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/10/05	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/10/05	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/10/05	0.0073, RDL=0.0073		mg/L	
			Dissolved Potassium (K)	2023/10/05	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/10/05	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/10/05	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/10/05	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/10/05	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/10/05	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/10/05	<0.50		mg/L	
			Dissolved Boron (B)	2023/10/05	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/10/05	<0.30		mg/L	
B141405	LQ1	Method Blank	Alkalinity (Total as CaCO3)	2023/10/09	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/10/09	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/10/09	<1.0		mg/L	
			Carbonate (CO3)	2023/10/09	<1.0		mg/L	
			Hydroxide (OH)	2023/10/09	<1.0		mg/L	
B141461	LQ1	Method Blank	Conductivity	2023/10/09	<2.0		uS/cm	
B141723	KKM	Method Blank	Dissolved Mercury (Hg)	2023/10/06	<0.0019		ug/L	
B141888	MDO	Method Blank	Dissolved Organic Carbon (C)	2023/10/06	<0.50		mg/L	
B141893	MDO	Method Blank	Total Organic Carbon (C)	2023/10/06	<0.50		mg/L	
B141897	KKM	Method Blank	Total Mercury (Hg)	2023/10/06	<0.0019		ug/L	
B142361	NVO	Method Blank	Total Ammonia (N)	2023/10/06	<0.015		mg/L	
B142365	AFI	Method Blank	Total Ammonia (N)	2023/10/06	<0.015		mg/L	
B142597	KKC	Method Blank	Total Aluminum (Al)	2023/10/06	<0.0030		mg/L	
			Total Chromium (Cr)	2023/10/06	<0.0010		mg/L	
			Total Cobalt (Co)	2023/10/06	<0.00030		mg/L	
			Total Copper (Cu)	2023/10/06	<0.0010		mg/L	
			Total Lead (Pb)	2023/10/06	<0.00020		mg/L	
			Total Antimony (Sb)	2023/10/06	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/10/06	<0.00020		mg/L	
			Total Nickel (Ni)	2023/10/06	<0.00050		mg/L	
			Total Selenium (Se)	2023/10/06	<0.00020		mg/L	
			Total Silver (Ag)	2023/10/06	<0.00010		mg/L	
			Total Arsenic (As)	2023/10/06	<0.00020		mg/L	

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Thallium (Tl)	2023/10/06	<0.00020		mg/L	
			Total Tin (Sn)	2023/10/06	<0.0010		mg/L	
			Total Titanium (Ti)	2023/10/06	<0.0010		mg/L	
			Total Uranium (U)	2023/10/06	<0.00010		mg/L	
			Total Vanadium (V)	2023/10/06	<0.0010		mg/L	
			Total Zinc (Zn)	2023/10/06	<0.0030		mg/L	
			Total Beryllium (Be)	2023/10/06	<0.0010		mg/L	
B142599	MPU	Method Blank	Total Iron (Fe)	2023/10/07	<0.060		mg/L	
			Total Lithium (Li)	2023/10/07	<0.020		mg/L	
			Total Magnesium (Mg)	2023/10/07	<0.20		mg/L	
			Total Manganese (Mn)	2023/10/07	<0.0040		mg/L	
			Total Potassium (K)	2023/10/07	<0.30		mg/L	
			Total Sodium (Na)	2023/10/07	<0.50		mg/L	
			Total Strontium (Sr)	2023/10/07	<0.020		mg/L	
			Total Sulphur (S)	2023/10/07	<0.20		mg/L	
			Total Phosphorus (P)	2023/10/07	<0.10		mg/L	
			Total Barium (Ba)	2023/10/07	<0.010		mg/L	
			Total Silicon (Si)	2023/10/07	<0.50		mg/L	
			Total Boron (B)	2023/10/07	<0.020		mg/L	
			Total Calcium (Ca)	2023/10/07	<0.30		mg/L	
B142604	KKC	Method Blank	Total Aluminum (Al)	2023/10/06	<0.0030		mg/L	
			Total Chromium (Cr)	2023/10/06	<0.0010		mg/L	
			Total Cobalt (Co)	2023/10/06	<0.00030		mg/L	
			Total Copper (Cu)	2023/10/06	<0.0010		mg/L	
			Total Lead (Pb)	2023/10/06	<0.00020		mg/L	
			Total Antimony (Sb)	2023/10/06	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/10/06	<0.00020		mg/L	
			Total Nickel (Ni)	2023/10/06	<0.00050		mg/L	
			Total Selenium (Se)	2023/10/06	<0.00020		mg/L	
			Total Silver (Ag)	2023/10/06	<0.00010		mg/L	
			Total Arsenic (As)	2023/10/06	<0.00020		mg/L	
			Total Thallium (Tl)	2023/10/06	<0.00020		mg/L	
			Total Tin (Sn)	2023/10/06	<0.0010		mg/L	
			Total Titanium (Ti)	2023/10/06	<0.0010		mg/L	
			Total Uranium (U)	2023/10/06	<0.00010		mg/L	
			Total Vanadium (V)	2023/10/06	<0.0010		mg/L	
			Total Zinc (Zn)	2023/10/06	<0.0030		mg/L	
			Total Beryllium (Be)	2023/10/06	<0.0010		mg/L	
B142612	MPU	Method Blank	Total Iron (Fe)	2023/10/07	<0.060		mg/L	
			Total Lithium (Li)	2023/10/07	<0.020		mg/L	
			Total Magnesium (Mg)	2023/10/07	<0.20		mg/L	
			Total Manganese (Mn)	2023/10/07	0.0052, RDL=0.0052		mg/L	
			Total Potassium (K)	2023/10/07	<0.30		mg/L	
			Total Sodium (Na)	2023/10/07	<0.50		mg/L	
			Total Strontium (Sr)	2023/10/07	<0.020		mg/L	
			Total Sulphur (S)	2023/10/07	<0.20		mg/L	
			Total Phosphorus (P)	2023/10/07	<0.10		mg/L	
			Total Barium (Ba)	2023/10/07	<0.010		mg/L	
			Total Silicon (Si)	2023/10/07	<0.50		mg/L	
			Total Boron (B)	2023/10/07	<0.020		mg/L	
			Total Calcium (Ca)	2023/10/07	<0.30		mg/L	

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B145365	KKC	Method Blank	Dissolved Iron (Fe)	2023/10/09	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/10/09	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/10/09	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/10/09	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/10/09	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/10/09	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/10/09	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/10/09	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/10/09	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/10/09	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/10/09	<0.50		mg/L	
			Dissolved Boron (B)	2023/10/09	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/10/09	<0.30		mg/L	
B146723	RTM	Method Blank	Total Dissolved Solids	2023/10/11	<10		mg/L	
B132988	RTM	RPD [CAP396-01]	Turbidity	2023/10/01	18		%	20
B133470	DSX	RPD [CAP396-07]	Total Sulphide	2023/10/01	NC		%	20
B133814	AJG	RPD [CAP396-14]	Benzene	2023/10/12	NC		%	30
			Toluene	2023/10/12	NC		%	30
			Ethylbenzene	2023/10/12	NC		%	30
			m & p-Xylene	2023/10/12	NC		%	30
			o-Xylene	2023/10/12	NC		%	30
			F1 (C6-C10)	2023/10/12	NC		%	30
B139531	TOR	RPD [CAP396-02]	Chloride (Cl)	2023/10/05	4.4		%	20
			Sulphate (SO4)	2023/10/05	0.57		%	20
B141893	MDO	RPD [CAP396-06]	Total Organic Carbon (C)	2023/10/06	5.2		%	20
B141888	MDO	RPD [CAP397-05]	Dissolved Organic Carbon (C)	2023/10/06	NC		%	20
B132975	AZI	RPD [CAP398-01]	Total Dissolved Solids	2023/10/02	6.9		%	20
B134588	SKM	RPD [CAP398-02]	True Colour	2023/10/02	7.0		%	20
B132968	AZI	Matrix Spike [CAP398-01]	Total Suspended Solids	2023/10/02		NC	%	80 - 120
B132975	AZI	Matrix Spike [CAP398-01]	Total Dissolved Solids	2023/10/02		95	%	80 - 120
B133470	DSX	Matrix Spike [CAP397-07]	Total Sulphide	2023/10/01		113	%	80 - 120
B133814	AJG	Matrix Spike [CAP397-14]	1,4-Difluorobenzene (sur.)	2023/10/12		112	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/10/12		98	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/10/12		94	%	50 - 140
			Benzene	2023/10/12		78	%	50 - 140
			Toluene	2023/10/12		76	%	50 - 140
			Ethylbenzene	2023/10/12		75	%	50 - 140
			m & p-Xylene	2023/10/12		74	%	50 - 140
			o-Xylene	2023/10/12		75	%	50 - 140
			F1 (C6-C10)	2023/10/12		85	%	60 - 140
B134588	SKM	Matrix Spike [CAP398-02]	True Colour	2023/10/02		102	%	80 - 120
B139531	TOR	Matrix Spike [CAP396-02]	Chloride (Cl)	2023/10/05		101	%	80 - 120
			Sulphate (SO4)	2023/10/05		95	%	80 - 120
B141888	MDO	Matrix Spike [CAP397-05]	Dissolved Organic Carbon (C)	2023/10/06		92	%	80 - 120
B141893	MDO	Matrix Spike [CAP396-06]	Total Organic Carbon (C)	2023/10/06		96	%	80 - 120
B142612	MPU	Matrix Spike [CAP397-04]	Total Iron (Fe)	2023/10/06		95	%	80 - 120
			Total Lithium (Li)	2023/10/06		96	%	80 - 120
			Total Magnesium (Mg)	2023/10/06		92	%	80 - 120
			Total Manganese (Mn)	2023/10/06		106	%	80 - 120
			Total Potassium (K)	2023/10/06		96	%	80 - 120
			Total Sodium (Na)	2023/10/06		89	%	80 - 120
			Total Strontium (Sr)	2023/10/06		87	%	80 - 120

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Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Sulphur (S)	2023/10/06		NC	%	80 - 120
			Total Phosphorus (P)	2023/10/06		94	%	80 - 120
			Total Barium (Ba)	2023/10/06		95	%	80 - 120
			Total Silicon (Si)	2023/10/06		90	%	80 - 120
			Total Boron (B)	2023/10/06		91	%	80 - 120
			Total Calcium (Ca)	2023/10/06		NC	%	80 - 120
B132824	DM	LCS	D10-ANTHRACENE (sur.)	2023/10/02		101	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/10/02		112	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/10/02		97	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/10/02		92	%	50 - 130
			Acenaphthene	2023/10/02		85	%	50 - 130
			Acenaphthylene	2023/10/02		86	%	50 - 130
			Acridine	2023/10/02		86	%	50 - 130
			Anthracene	2023/10/02		75	%	50 - 130
			Benzo(a)anthracene	2023/10/02		94	%	50 - 130
			Benzo(b&j)fluoranthene	2023/10/02		97	%	50 - 130
			Benzo(k)fluoranthene	2023/10/02		108	%	50 - 130
			Benzo(g,h,i)perylene	2023/10/02		94	%	50 - 130
			Benzo(c)phenanthrene	2023/10/02		101	%	50 - 130
			Benzo(a)pyrene	2023/10/02		105	%	50 - 130
			Benzo(e)pyrene	2023/10/02		87	%	50 - 130
			Chrysene	2023/10/02		96	%	50 - 130
			Dibenz(a,h)anthracene	2023/10/02		100	%	50 - 130
			Fluoranthene	2023/10/02		104	%	50 - 130
			Fluorene	2023/10/02		88	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/10/02		92	%	50 - 130
			2-Methylnaphthalene	2023/10/02		84	%	50 - 130
			Naphthalene	2023/10/02		83	%	50 - 130
			Phenanthrene	2023/10/02		103	%	50 - 130
			Perylene	2023/10/02		89	%	50 - 130
			Pyrene	2023/10/02		105	%	50 - 130
			Quinoline	2023/10/02		72	%	50 - 130
			C1-Naphthalene	2023/10/02		67	%	50 - 130
			C3-Naphthalene	2023/10/02		89	%	50 - 130
			C2-Naphthalene	2023/10/02		84	%	50 - 130
			C1-biphenyl	2023/10/02		82	%	50 - 130
			C1 phenanthrene/anthracene	2023/10/02		113	%	50 - 130
			C2 phenanthrene/anthracene	2023/10/02		106	%	50 - 130
			C1 fluoranthene/pyrene	2023/10/02		98	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/10/02		95	%	30 - 130
			1-Methylnaphthalene	2023/10/02		67	%	50 - 130
B132825	CHA	LCS	O-TERPHENYL (sur.)	2023/10/02		92	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/10/02		95	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/10/02		107	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/10/02		100	%	60 - 140
B132968	AZI	LCS	Total Suspended Solids	2023/10/02		95	%	80 - 120
B132975	AZI	LCS	Total Dissolved Solids	2023/10/02		106	%	80 - 120
B132983	RTM	LCS	Turbidity	2023/10/01		100	%	80 - 120
B132988	RTM	LCS	Turbidity	2023/10/01		99	%	80 - 120
B133470	DSX	LCS	Total Sulphide	2023/10/01		100	%	80 - 120
B133560	HE1	LCS	Total Suspended Solids	2023/10/03		107	%	80 - 120
B133572	HE1	LCS	Total Suspended Solids	2023/10/02		101	%	80 - 120

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Bureau Veritas Job #: C378739
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Advisian
Task Order#: 417085-49223
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Site Location: Norman Wells, NWT
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B133814	AJG	LCS	1,4-Difluorobenzene (sur.)	2023/10/12		111	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/10/12		99	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/10/12		92	%	50 - 140
			Benzene	2023/10/12		81	%	60 - 130
			Toluene	2023/10/12		80	%	60 - 130
			Ethylbenzene	2023/10/12		79	%	60 - 130
			m & p-Xylene	2023/10/12		78	%	60 - 130
			o-Xylene	2023/10/12		79	%	60 - 130
			F1 (C6-C10)	2023/10/12		104	%	60 - 140
B133985	ISW	LCS	Nitrite (N)	2023/10/02		103	%	80 - 120
			Nitrate plus Nitrite (N)	2023/10/02		106	%	80 - 120
B134031	JAB	LCS	Dissolved Aluminum (Al)	2023/10/02		116	%	80 - 120
			Dissolved Chromium (Cr)	2023/10/02		94	%	80 - 120
			Dissolved Cobalt (Co)	2023/10/02		97	%	80 - 120
			Dissolved Copper (Cu)	2023/10/02		95	%	80 - 120
			Dissolved Lead (Pb)	2023/10/02		96	%	80 - 120
			Dissolved Antimony (Sb)	2023/10/02		102	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/10/02		99	%	80 - 120
			Dissolved Nickel (Ni)	2023/10/02		96	%	80 - 120
			Dissolved Selenium (Se)	2023/10/02		101	%	80 - 120
			Dissolved Silver (Ag)	2023/10/02		96	%	80 - 120
			Dissolved Arsenic (As)	2023/10/02		96	%	80 - 120
			Dissolved Thallium (Tl)	2023/10/02		95	%	80 - 120
			Dissolved Tin (Sn)	2023/10/02		102	%	80 - 120
			Dissolved Titanium (Ti)	2023/10/02		96	%	80 - 120
			Dissolved Uranium (U)	2023/10/02		96	%	80 - 120
			Dissolved Vanadium (V)	2023/10/02		98	%	80 - 120
			Dissolved Zinc (Zn)	2023/10/02		92	%	80 - 120
			Dissolved Beryllium (Be)	2023/10/02		96	%	80 - 120
B134588	SKM	LCS	True Colour	2023/10/02		99	%	80 - 120
B134833	MAP	LCS	Orthophosphate (P)	2023/10/02		99	%	80 - 120
B137526	DSX	LCS	Chemical Oxygen Demand	2023/10/04		104	%	80 - 120
B139531	TOR	LCS	Chloride (Cl)	2023/10/05		100	%	80 - 120
			Sulphate (SO4)	2023/10/05		102	%	80 - 120
B140144	JB9	LCS	Total Oil and grease	2023/10/05		105	%	70 - 130
B140449	KKM	LCS	Dissolved Mercury (Hg)	2023/10/05		101	%	80 - 120
B141090	HQV	LCS	Dissolved Iron (Fe)	2023/10/06		99	%	80 - 120
			Dissolved Lithium (Li)	2023/10/06		97	%	80 - 120
			Dissolved Magnesium (Mg)	2023/10/06		100	%	80 - 120
			Dissolved Manganese (Mn)	2023/10/06		103	%	80 - 120
			Dissolved Potassium (K)	2023/10/06		101	%	80 - 120
			Dissolved Sodium (Na)	2023/10/06		97	%	80 - 120
			Dissolved Strontium (Sr)	2023/10/06		96	%	80 - 120
			Dissolved Sulphur (S)	2023/10/06		92	%	80 - 120
			Dissolved Phosphorus (P)	2023/10/06		95	%	80 - 120
			Dissolved Barium (Ba)	2023/10/06		99	%	80 - 120
			Dissolved Silicon (Si)	2023/10/06		93	%	80 - 120
			Dissolved Boron (B)	2023/10/06		94	%	80 - 120
			Dissolved Calcium (Ca)	2023/10/06		96	%	80 - 120
B141110	VSC	LCS	Dissolved Iron (Fe)	2023/10/05		103	%	80 - 120
			Dissolved Lithium (Li)	2023/10/05		94	%	80 - 120
			Dissolved Magnesium (Mg)	2023/10/05		104	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Manganese (Mn)	2023/10/05		107	%	80 - 120
			Dissolved Potassium (K)	2023/10/05		101	%	80 - 120
			Dissolved Sodium (Na)	2023/10/05		100	%	80 - 120
			Dissolved Strontium (Sr)	2023/10/05		98	%	80 - 120
			Dissolved Sulphur (S)	2023/10/05		97	%	80 - 120
			Dissolved Phosphorus (P)	2023/10/05		100	%	80 - 120
			Dissolved Barium (Ba)	2023/10/05		98	%	80 - 120
			Dissolved Silicon (Si)	2023/10/05		96	%	80 - 120
			Dissolved Boron (B)	2023/10/05		95	%	80 - 120
			Dissolved Calcium (Ca)	2023/10/05		99	%	80 - 120
B141405	LQ1	LCS	Alkalinity (Total as CaCO3)	2023/10/09		96	%	80 - 120
B141461	LQ1	LCS	Conductivity	2023/10/09		100	%	90 - 110
B141723	KKM	LCS	Dissolved Mercury (Hg)	2023/10/06		94	%	80 - 120
B141888	MDO	LCS	Dissolved Organic Carbon (C)	2023/10/06		101	%	80 - 120
B141893	MDO	LCS	Total Organic Carbon (C)	2023/10/06		100	%	80 - 120
B141897	KKM	LCS	Total Mercury (Hg)	2023/10/06		106	%	80 - 120
B142361	NVO	LCS	Total Ammonia (N)	2023/10/06		101	%	80 - 120
B142365	AFI	LCS	Total Ammonia (N)	2023/10/06		103	%	80 - 120
B142597	KKC	LCS	Total Aluminum (Al)	2023/10/06		111	%	80 - 120
			Total Chromium (Cr)	2023/10/06		105	%	80 - 120
			Total Cobalt (Co)	2023/10/06		104	%	80 - 120
			Total Copper (Cu)	2023/10/06		104	%	80 - 120
			Total Lead (Pb)	2023/10/06		106	%	80 - 120
			Total Antimony (Sb)	2023/10/06		109	%	80 - 120
			Total Molybdenum (Mo)	2023/10/06		106	%	80 - 120
			Total Nickel (Ni)	2023/10/06		103	%	80 - 120
			Total Selenium (Se)	2023/10/06		103	%	80 - 120
			Total Silver (Ag)	2023/10/06		106	%	80 - 120
			Total Arsenic (As)	2023/10/06		104	%	80 - 120
			Total Thallium (Tl)	2023/10/06		106	%	80 - 120
			Total Tin (Sn)	2023/10/06		106	%	80 - 120
			Total Titanium (Ti)	2023/10/06		102	%	80 - 120
			Total Uranium (U)	2023/10/06		105	%	80 - 120
			Total Vanadium (V)	2023/10/06		104	%	80 - 120
			Total Zinc (Zn)	2023/10/06		102	%	80 - 120
			Total Beryllium (Be)	2023/10/06		106	%	80 - 120
B142599	MPU	LCS	Total Iron (Fe)	2023/10/06		110	%	80 - 120
			Total Lithium (Li)	2023/10/06		97	%	80 - 120
			Total Magnesium (Mg)	2023/10/06		104	%	80 - 120
			Total Manganese (Mn)	2023/10/06		108	%	80 - 120
			Total Potassium (K)	2023/10/06		100	%	80 - 120
			Total Sodium (Na)	2023/10/06		96	%	80 - 120
			Total Strontium (Sr)	2023/10/06		97	%	80 - 120
			Total Sulphur (S)	2023/10/06		104	%	80 - 120
			Total Phosphorus (P)	2023/10/06		105	%	80 - 120
			Total Barium (Ba)	2023/10/06		102	%	80 - 120
			Total Silicon (Si)	2023/10/06		102	%	80 - 120
			Total Boron (B)	2023/10/06		98	%	80 - 120
			Total Calcium (Ca)	2023/10/06		102	%	80 - 120
B142604	KKC	LCS	Total Aluminum (Al)	2023/10/06		108	%	80 - 120
			Total Chromium (Cr)	2023/10/06		98	%	80 - 120
			Total Cobalt (Co)	2023/10/06		98	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Copper (Cu)	2023/10/06		98	%	80 - 120
			Total Lead (Pb)	2023/10/06		110	%	80 - 120
			Total Antimony (Sb)	2023/10/06		128 (1)	%	80 - 120
			Total Molybdenum (Mo)	2023/10/06		112	%	80 - 120
			Total Nickel (Ni)	2023/10/06		96	%	80 - 120
			Total Selenium (Se)	2023/10/06		109	%	80 - 120
			Total Silver (Ag)	2023/10/06		109	%	80 - 120
			Total Arsenic (As)	2023/10/06		103	%	80 - 120
			Total Thallium (Tl)	2023/10/06		112	%	80 - 120
			Total Tin (Sn)	2023/10/06		111	%	80 - 120
			Total Titanium (Ti)	2023/10/06		95	%	80 - 120
			Total Uranium (U)	2023/10/06		108	%	80 - 120
			Total Vanadium (V)	2023/10/06		98	%	80 - 120
			Total Zinc (Zn)	2023/10/06		102	%	80 - 120
			Total Beryllium (Be)	2023/10/06		110	%	80 - 120
B142612	MPU	LCS	Total Iron (Fe)	2023/10/06		102	%	80 - 120
			Total Lithium (Li)	2023/10/06		95	%	80 - 120
			Total Magnesium (Mg)	2023/10/06		95	%	80 - 120
			Total Manganese (Mn)	2023/10/06		105	%	80 - 120
			Total Potassium (K)	2023/10/06		95	%	80 - 120
			Total Sodium (Na)	2023/10/06		92	%	80 - 120
			Total Strontium (Sr)	2023/10/06		93	%	80 - 120
			Total Sulphur (S)	2023/10/06		92	%	80 - 120
			Total Phosphorus (P)	2023/10/06		93	%	80 - 120
			Total Barium (Ba)	2023/10/06		96	%	80 - 120
			Total Silicon (Si)	2023/10/06		92	%	80 - 120
			Total Boron (B)	2023/10/06		91	%	80 - 120
			Total Calcium (Ca)	2023/10/06		92	%	80 - 120
B145365	KKC	LCS	Dissolved Iron (Fe)	2023/10/09		104	%	80 - 120
			Dissolved Lithium (Li)	2023/10/09		93	%	80 - 120
			Dissolved Magnesium (Mg)	2023/10/09		103	%	80 - 120
			Dissolved Manganese (Mn)	2023/10/09		102	%	80 - 120
			Dissolved Potassium (K)	2023/10/09		98	%	80 - 120
			Dissolved Sodium (Na)	2023/10/09		95	%	80 - 120
			Dissolved Strontium (Sr)	2023/10/09		93	%	80 - 120
			Dissolved Sulphur (S)	2023/10/09		97	%	80 - 120
			Dissolved Phosphorus (P)	2023/10/09		102	%	80 - 120
			Dissolved Barium (Ba)	2023/10/09		96	%	80 - 120
			Dissolved Silicon (Si)	2023/10/09		97	%	80 - 120
			Dissolved Boron (B)	2023/10/09		94	%	80 - 120
			Dissolved Calcium (Ca)	2023/10/09		97	%	80 - 120

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B146723	RTM	LCS	Total Dissolved Solids	2023/10/11		100	%	80 - 120

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.

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

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

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

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

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.

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378739
Report Date: 2023/10/12

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

VALIDATION SIGNATURE PAGE

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

Luba Shymushovska, B.Sc., QP, Senior Analyst, Organics

Qiliang (Alex) Wu, Senior Analyst

Sandy Yuan, M.Sc., QP, Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

Bureau Veritas Proprietary Software
Logiciel Propriétaire de Bureau Veritas

Automated Statchk

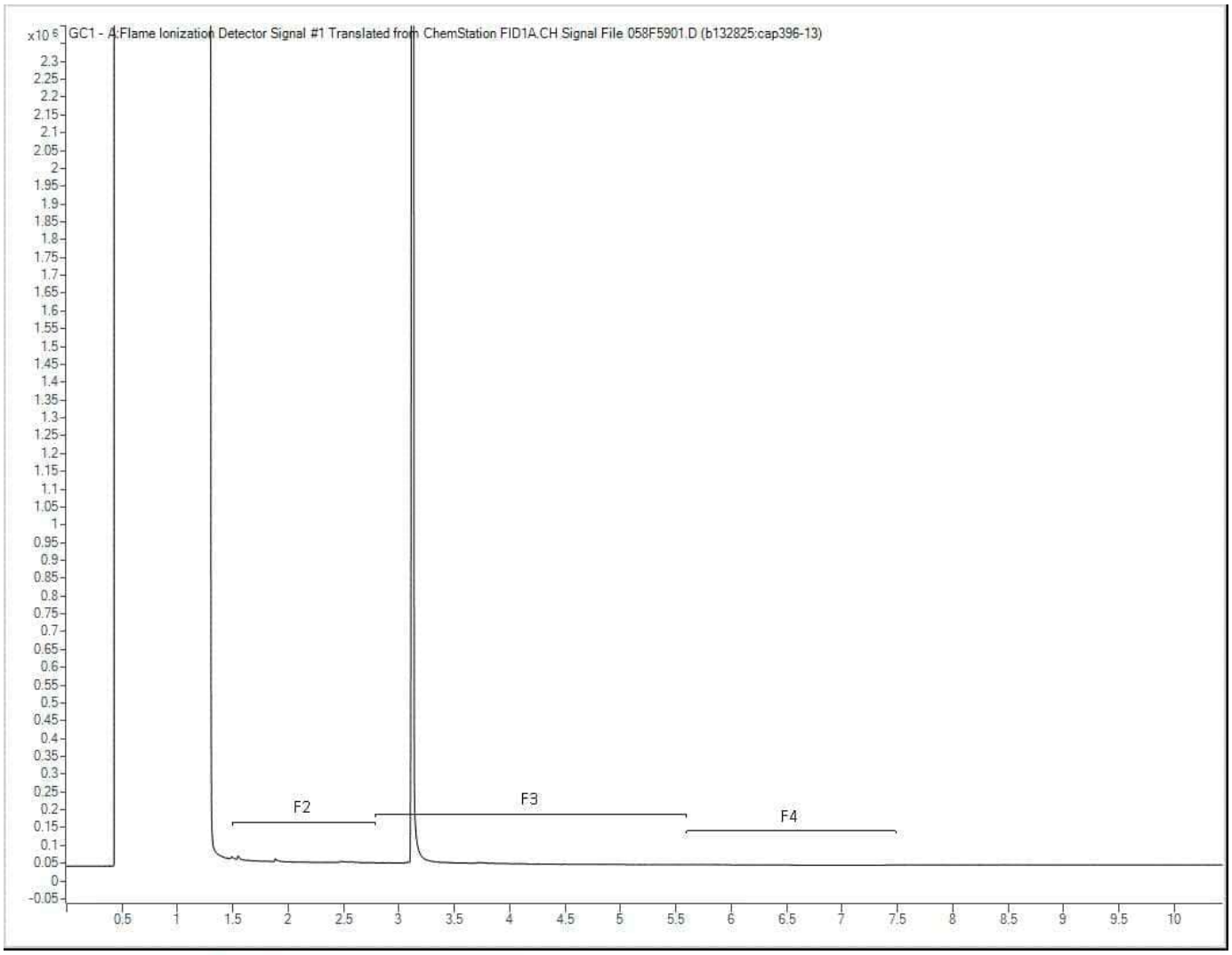
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. 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 Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

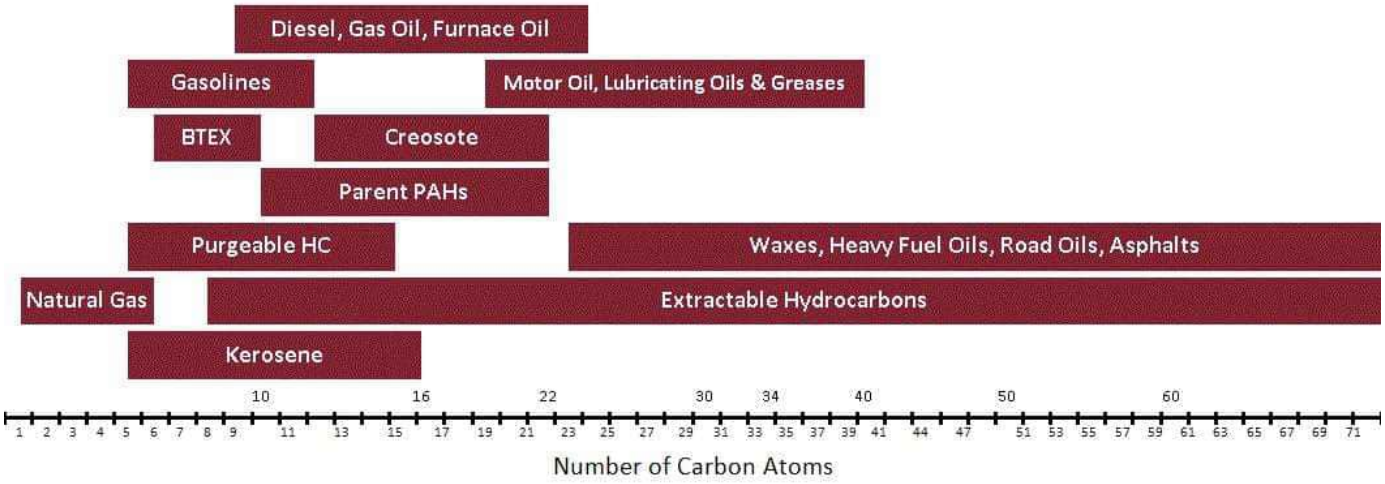
Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C378739
Report Date: 2023/10/12
Bureau Veritas Sample: CAP396

Advisian
Task Order#:417085-49223Line Item:
Site#: N/A
Site Location: Norman Wells, NWT
Client ID: AEMP-DS-05

CCME Hydrocarbons (F2-F4 in water) Chromatogram





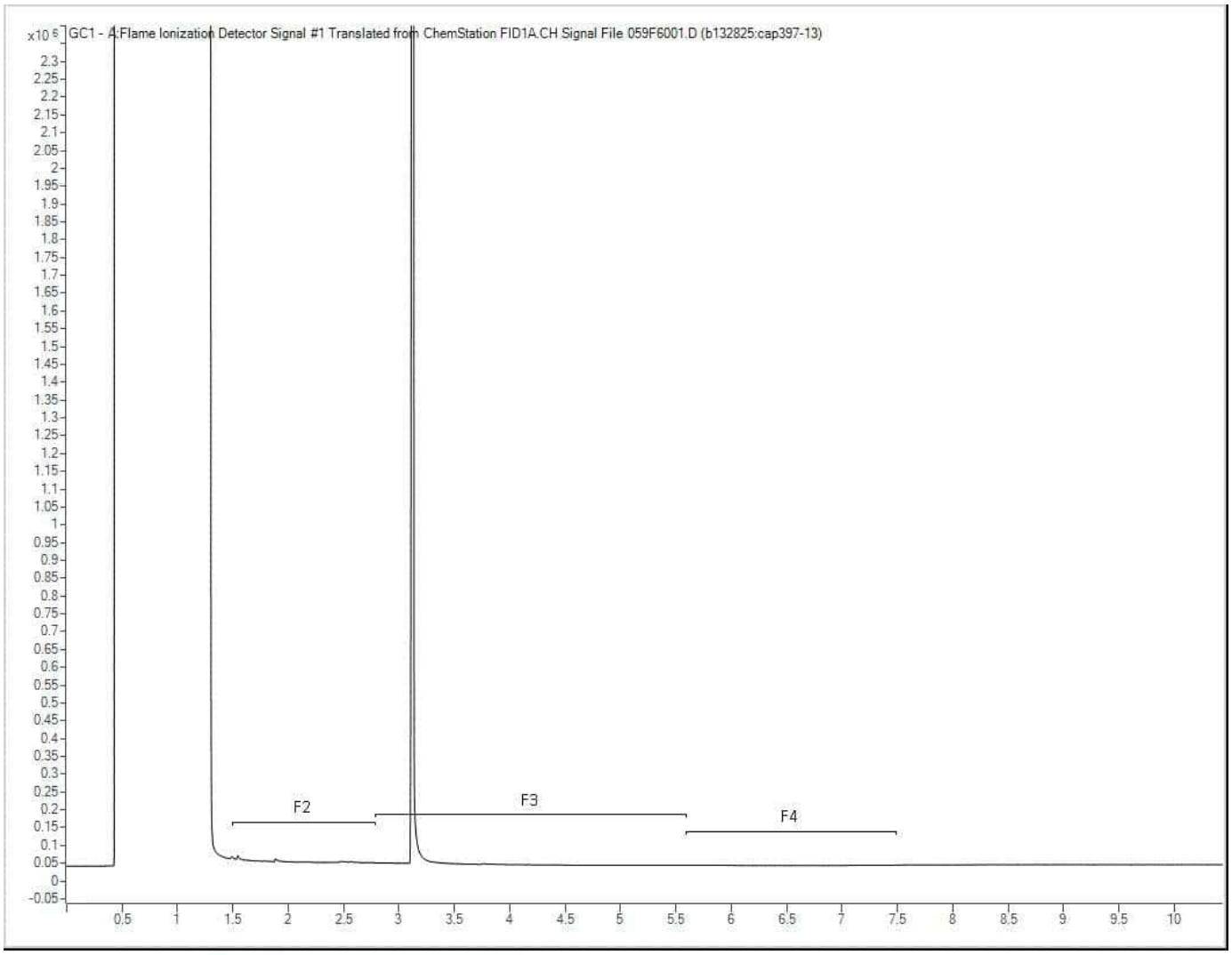
hpchem20\HPchem\1\DATA\2023\10\RUN1002

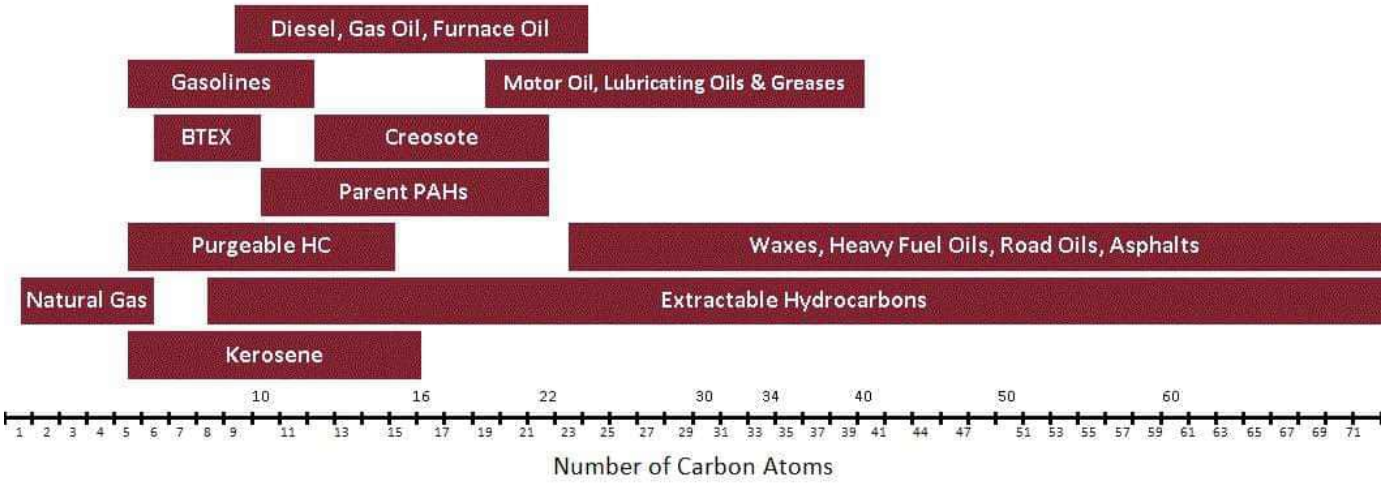
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C378739
Report Date: 2023/10/12
Bureau Veritas Sample: CAP397

Advisian
Task Order#:417085-49223Line Item:
Site#: N/A
Site Location: Norman Wells, NWT
Client ID: AEMP-DUP 1

CCME Hydrocarbons (F2-F4 in water) Chromatogram





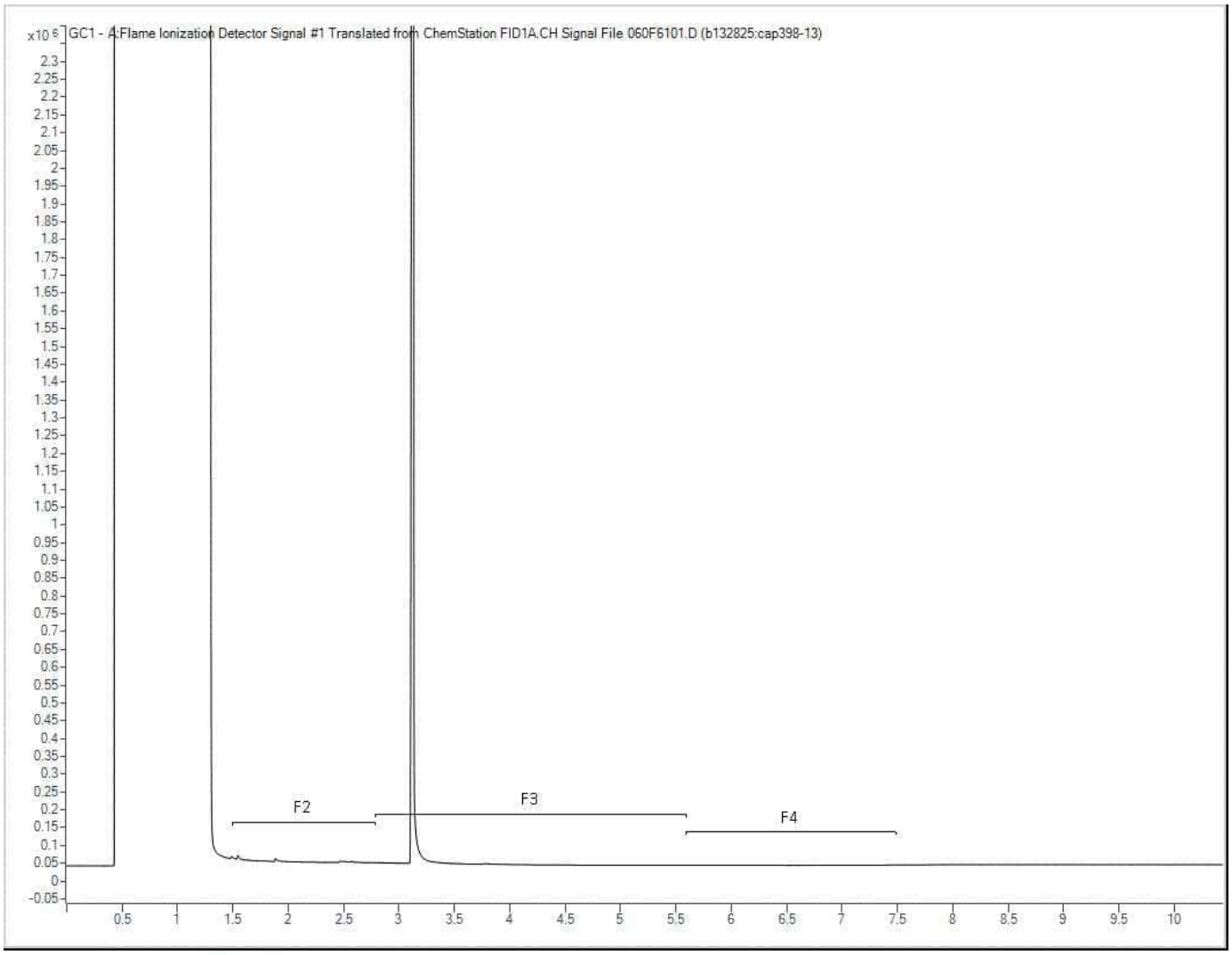
hpchem20\HPchem\1\DATA\2023\10\RUN1002

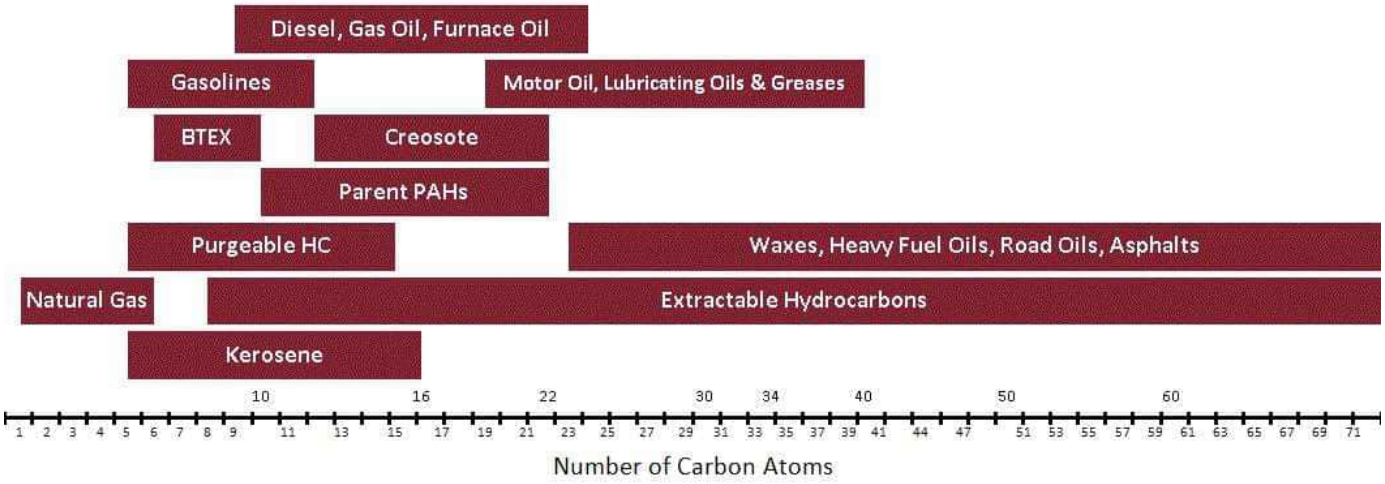
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C378739
Report Date: 2023/10/12
Bureau Veritas Sample: CAP398

Advisian
Task Order#:417085-49223Line Item:
Site#: N/A
Site Location: Norman Wells, NWT
Client ID: AEMP-US-02

CCME Hydrocarbons (F2-F4 in water) Chromatogram





hpchem20\HPchem\1\DATA\2023\10\RUN1002

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam
A Bureau Veritas Group Company

☒ Calgary
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Fax: (403) 735-2240
Toll Free: (800) 386-7247

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9331 - 48 Street, T6B 2R4
Phone: (780) 577-7100
Fax: (780) 450-4187
Toll Free: (800) 386-7247

EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 299609

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Sampler Name (Print): Alex Haigh

REPORT INFORMATION

Company Name: Advisian
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Consultant Project #: 417085-49223.23200

ANALYSIS REQUESTED

	FIELD SAMPLE ID	MATRIX: GROUND WATER	MATRIX: SURFACE WATER	MATRIX: SOIL	MATRIX: OTHER	# CONTAINERS	SAMPLING DATE (YYYY/MM/DD)	SAMPLING TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-2 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☒ DIS ☒	MERCURY TOTAL ☒ DISSOLVED ☒	SALINITY SOIL	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY	pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	True color, TSS, TDS, Turbidity	Oil & Grease	TOC, DOC, Sulphide	Nitrate, Nitrite, Ammonia (Total)	Orthophosphate	COD	Sulphur - total & dissolved	Alkylated PAHs + THM
1	AEMP-DS-05		X			18	2023/10/26	13:45	X			X		X						X	X					X			X	X	X	X	X	X	X	X
2	AEMP-Dup 1		X			18	2023/10/25	9:50	X			X		X						X	X					X			X	X	X	X	X	X	X	X
3	AEMP-US-02		X			18	2023/10/24	11:40	X			X		X						X	X					X			X	X	X	X	X	X	X	X
4																																				
5																																				
6																																				
7																																				
8																																				
9																																				
10																																				

mcal-09-2843

C378739
Y1

IOL SITE LOCATION: Norman Wells, NT

IOL PROJECT # (if applicable): N/A

MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-49223.23200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) FAL ☐ Other

SPECIAL INSTRUCTIONS: email canada.chemistry@worley.com, cakal_IOL data track@worley.com, stacy.gibb@worley.com
IES A2601436

JARS USED & NOT SUBMITTED (Enter N/A for Water): N/A

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

LAB USE ONLY
MAXXAM JOB #

SAMPLES
LABELED BY: VERIFIED BY:

	YES	NO	COOLER ID #			
SEAL PRESENT	✓		TEMP °C	4	5	4
SEAL INTACT	✓			1	2	3
COOLING MEDIA PRESENT	✓					

	YES	NO	COOLER ID #			
SEAL PRESENT			TEMP °C			
SEAL INTACT				1	2	3
COOLING MEDIA PRESENT						

	YES	NO	COOLER ID #			
SEAL PRESENT			TEMP °C			
SEAL INTACT				1	2	3
COOLING MEDIA PRESENT						

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1.	STACY GIBB	2023/09/27	10:00	1.	AJRAUZRCIN	2023/09/29	15:00
2.				2.			
3.				3.			

COC-1010 (06/2016) IOL-AB

White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-10-03
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C381210	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☐ **Yes** ☒ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☐ **Yes** ☒ **No**

If yes, FLAG type and comments:

Date samples submitted 2023-10-06

Due date for lab report on SRC 2023-10-12

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☒ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☒ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☒ **No**	Turbidity, true colour, orthophosphate, nitrite
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☒ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☒ **No** ☐ **N/A**	Antimony – overall QC meets criteria

Data check completed by Alex Haigh **Date** 2024-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	

Data check completed by Alex Haigh **Date** 2024-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes	☐ No	☐ N/A	**Comments**
Trip Blank results acceptable?	☒ Yes	☐ No	☐ N/A	**Comments**
Field Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Equipment Blank results acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes	☐ No	☒ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Field pH vs. Lab pH RPDs acceptable?	☐ Yes	☐ No	☒ N/A	**Comments**
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes	☐ No	☐ N/A	**Comments**

Data check completed by Alex Haigh **Date** 2024-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☒ Yes ☐ No

Explain rationale for yes/no:

Request lab to recheck data? If so give details	☐ Yes	☒ No	☐ N/A	**Comments**

If Yes, Lab request to recheck must be approved by Project Manager Name: **Date**

Data check completed by Alex Haigh **Date** 2024-03-26

Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200
Your C.O.C. #: 299610

Attention: Alex Haigh

Advisian
Suite 500, 151 Canada Olympic
Calgary, AB
Canada T3B 6B7

Report Date: 2023/10/17
Report #: R3411527
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C381210
Received: 2023/10/06, 14:45

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	AB SOP-00005	SM 24 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	2	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	2		Auto Calc
Cadmium - low level CCME - Dissolved	1		Auto Calc
Cadmium - low level CCME (Total)	1		Auto Calc
Chloride/Sulphate by Auto Colourimetry	1	AB SOP-00020	SM24-4500-Cl/SO4-E m
COD by Colorimeter	1	AB SOP-00016	SM 23 5220D m
True Colour	1	CAL SOP-00049	SM 24 2120 C m
Carbon (DOC) (1)	1	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	1	AB SOP-00005	SM 24 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	2	AB SOP-00037	CCME PHC-CWS m
Sulphide (as H2S)	1		Auto Calc
Hardness	1		Auto Calc
Mercury (Dissolved) by CV (3)	1	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	1	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	1	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	1	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (3)	1	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total	1	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance	1		Auto Calc
Ammonia-N (Total)	1	AB SOP-00007	SM 24 4500 NH3 A G m
Nitrate and Nitrite	1		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	1	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N)	1		Auto Calc
Oil and Grease (Gravimetric, n-Hexane)	2	AB SOP-00092	SM 23 5520B/5520F m
Target & Alkylated PAH in Water by GC/MS (4)	2	AB SOP-00037 CAL SOP-00250	EPA 8270e m
Benzo[a]pyrene Equivalency (5)	2		Auto Calc
Orthophosphate by Automated Analyzer (6)	1	AB SOP-00025	SM 24 4500-P A,F m
Total Sulphide	1	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	1	AB SOP-00065	SM 24 2540 C m
Total Kjeldahl Nitrogen (Total)	1	BBY WI-00033	Auto Calc

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CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C381210
Received: 2023/10/06, 14:45

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Laboratory Method	Analytical Method
Nitrogen (Total)	1	AB SOP-00093	SM 24 4500-N C m
Carbon (Total Organic) (7)	1	AB SOP-00087	MMCW 119 1996 m
Total Suspended Solids (NFR)	1	AB SOP-00061	SM 24 2540 D m
Turbidity	1	CAL SOP-00081	SM 24 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) 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.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Alkylated PAH results are semiquantitative
(5) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(6) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

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CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C381210
Received: 2023/10/06, 14:45
(7) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Namita Sahni
Customer Solutions Representative
17 Oct 2023 14:18:00

Please direct all questions regarding this Certificate of Analysis to:
Namita Sahni, Customer Solutions Representative
Email: Namita.Sahni@bureauveritas.com
Phone# (604)639-2614
==========
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 Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

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Bureau Veritas Job #: C381210
Report Date: 2023/10/17

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

AT1 BTEX AND F1-F4 IN WATER (WATER)

Bureau Veritas ID		CBI021	CBI022		
Sampling Date		2023/10/03 11:25	2023/10/03 16:00		
COC Number		299610	299610		
	UNITS	**AEMP-DS-06**	**AEMP-DUP4 (TRIP BLANK)**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	0.10	B141942
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	<0.10	0.10	B141942
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	0.20	B141942
Volatiles					
Benzene	mg/L	<0.00040	<0.00040	0.00040	B145228
Toluene	mg/L	<0.00040	<0.00040	0.00040	B145228
Ethylbenzene	mg/L	<0.00040	<0.00040	0.00040	B145228
m & p-Xylene	mg/L	<0.00080	<0.00080	0.00080	B145228
o-Xylene	mg/L	<0.00040	<0.00040	0.00040	B145228
Xylenes (Total)	mg/L	<0.00089	<0.00089	0.00089	B144062
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	0.10	B144062
F1 (C6-C10)	mg/L	<0.10	<0.10	0.10	B145228
Extraction Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	93	94		B141942
Instrument Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	105	108		B145228
4-Bromofluorobenzene (sur.)	%	98	96		B145228
D4-1,2-Dichloroethane (sur.)	%	95	95		B145228
RDL = Reportable Detection Limit					

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Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TOTAL KJELDAHL NITROGEN (TOTAL)

Bureau Veritas ID		CBI021		
Sampling Date		2023/10/03 11:25		
COC Number		299610		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Calculated Parameters				
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.12	0.020	B144037
Nutrients				
Total Nitrogen (N)	mg/L	0.20	0.020	B150674
RDL = Reportable Detection Limit				

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Project #: 417085-49223-23200

IOL ROUTINE WATER (WATER)

Bureau Veritas ID		CBI021		
Sampling Date		2023/10/03 11:25		
COC Number		299610		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Calculated Parameters				
Hardness (CaCO3)	mg/L	200	0.50	B144004
Ion Balance (% Difference)	%	4.9	N/A	B144007
Nitrate (N)	mg/L	0.081	0.010	B144149
Nitrate (NO3)	mg/L	0.36	0.044	B144016
Nitrite (NO2)	mg/L	<0.033	0.033	B144016
Misc. Inorganics				
Conductivity	uS/cm	430	2.0	B150839
Total Dissolved Solids	mg/L	240	10	B145553
Anions				
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	B150836
Alkalinity (Total as CaCO3)	mg/L	120	1.0	B150836
Bicarbonate (HCO3)	mg/L	150	1.0	B150836
Carbonate (CO3)	mg/L	<1.0	1.0	B150836
Hydroxide (OH)	mg/L	<1.0	1.0	B150836
Chloride (Cl)	mg/L	10	1.0	B145383
Sulphate (SO4)	mg/L	110	1.0	B145383
Nutrients				
Nitrite (N)	mg/L	<0.010	0.010	B144886
Nitrate plus Nitrite (N)	mg/L	0.081	0.010	B144886
Elements				
Dissolved Barium (Ba)	mg/L	0.062	0.010	B145251
Dissolved Boron (B)	mg/L	<0.020	0.020	B145251
Dissolved Calcium (Ca)	mg/L	48	0.30	B145251
Dissolved Iron (Fe)	mg/L	<0.060	0.060	B145251
Dissolved Lithium (Li)	mg/L	<0.020	0.020	B145251
Dissolved Magnesium (Mg)	mg/L	20	0.20	B145251
Dissolved Manganese (Mn)	mg/L	0.0059	0.0040	B145251
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	B145251
Dissolved Potassium (K)	mg/L	0.94	0.30	B145251
Dissolved Silicon (Si)	mg/L	1.5	0.50	B145251

RDL = Reportable Detection Limit
N/A = Not Applicable

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IOL ROUTINE WATER (WATER)

Bureau Veritas ID		CBI021		
Sampling Date		2023/10/03 11:25		
COC Number		299610		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Dissolved Sodium (Na)	mg/L	12	0.50	B145251
Dissolved Strontium (Sr)	mg/L	0.28	0.020	B145251
Dissolved Sulphur (S)	mg/L	35	0.20	B145251
RDL = Reportable Detection Limit				

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REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		CBI021		
Sampling Date		2023/10/03 11:25		
COC Number		299610		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Elements				
Total Cadmium (Cd)	mg/L	0.00014	0.000020	B143970
Total Mercury (Hg)	ug/L	<0.0019	0.0019	B148609
Total Aluminum (Al)	mg/L	0.98	0.0030	B150196
Total Antimony (Sb)	mg/L	<0.00060	0.00060	B150196
Total Arsenic (As)	mg/L	0.00069	0.00020	B150196
Total Barium (Ba)	mg/L	0.068	0.010	B150207
Total Beryllium (Be)	mg/L	<0.0010	0.0010	B150196
Total Boron (B)	mg/L	<0.020	0.020	B150207
Total Calcium (Ca)	mg/L	50	0.30	B150207
Total Chromium (Cr)	mg/L	<0.0010	0.0010	B150196
Total Cobalt (Co)	mg/L	0.0020	0.00030	B150196
Total Copper (Cu)	mg/L	0.0028	0.0010	B150196
Total Iron (Fe)	mg/L	1.3	0.060	B150207
Total Lead (Pb)	mg/L	0.00045	0.00020	B150196
Total Lithium (Li)	mg/L	<0.020	0.020	B150207
Total Magnesium (Mg)	mg/L	20	0.20	B150207
Total Manganese (Mn)	mg/L	0.028	0.0040	B150207
Total Molybdenum (Mo)	mg/L	0.0011	0.00020	B150196
Total Nickel (Ni)	mg/L	0.0063	0.00050	B150196
Total Phosphorus (P)	mg/L	<0.10	0.10	B150207
Total Potassium (K)	mg/L	1.1	0.30	B150207
Total Selenium (Se)	mg/L	0.00050	0.00020	B150196
Total Silicon (Si)	mg/L	3.1	0.50	B150207
Total Silver (Ag)	mg/L	<0.00010	0.00010	B150196
Total Sodium (Na)	mg/L	12	0.50	B150207
Total Strontium (Sr)	mg/L	0.27	0.020	B150207
Total Sulphur (S)	mg/L	34	0.20	B150207
Total Thallium (Tl)	mg/L	<0.00020	0.00020	B150196
Total Tin (Sn)	mg/L	<0.0010	0.0010	B150196
Total Titanium (Ti)	mg/L	0.0081	0.0010	B150196
Total Uranium (U)	mg/L	0.00099	0.00010	B150196
RDL = Reportable Detection Limit				

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REGULATED METALS INCLUDING MERCURY-TOTAL (WATER)

Bureau Veritas ID		CBI021		
Sampling Date		2023/10/03 11:25		
COC Number		299610		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	0.0020	0.0010	B150196
Total Zinc (Zn)	mg/L	0.017	0.0030	B150196
RDL = Reportable Detection Limit				

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RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		CBI021			CBI022		
Sampling Date		2023/10/03 11:25			2023/10/03 16:00		
COC Number		299610			299610		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**	**AEMP-DUP4 (TRIP BLANK)**	**RDL**	**QC Batch**
Calculated Parameters							
Sulphide (as H2S)	mg/L	<0.0020	0.0020	B143975			
Demand Parameters							
Chemical Oxygen Demand	mg/L	16	10	B146400			
Elements							
Dissolved Cadmium (Cd)	mg/L	0.000023	0.000020	B143969			
Misc. Inorganics							
Dissolved Organic Carbon (C)	mg/L	3.9	0.50	B148792			
Total Organic Carbon (C)	mg/L	3.7	0.50	B147956			
Total Suspended Solids	mg/L	13	1.0	B145560			
Anions							
Total Sulphide	mg/L	<0.0018	0.0018	B145191			
Nutrients							
Total Ammonia (N)	mg/L	<0.015	0.015	B145737			
Orthophosphate (P)	mg/L	<0.0030	0.0030	B144935			
Misc. Organics							
Total Oil and grease	mg/L	<2.0	2.0	B145245	<2.0	2.0	B145245
Physical Properties							
True Colour	PtCo units	9.6	2.0	B147043			
Physical Properties							
Turbidity	NTU	19	0.10	B143937			
RDL = Reportable Detection Limit							

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Site Location: Norman Wells, NWT
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SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		CBI021	CBI022		
Sampling Date		2023/10/03 11:25	2023/10/03 16:00		
COC Number		299610	299610		
	UNITS	**AEMP-DS-06**	**AEMP-DUP4 (TRIP BLANK)**	**RDL**	**QC Batch**
Polycyclic Aromatics					
B[a]P TPE Total Potency Equivalents	mg/L	<0.000010	<0.000010	0.000010	B143976
Acenaphthene	ug/L	<0.10	<0.10	0.10	B141941
Acenaphthylene	ug/L	<0.10	<0.10	0.10	B141941
Acridine	ug/L	<0.040	<0.040	0.040	B141941
Anthracene	ug/L	<0.010	<0.010	0.010	B141941
Benzo(a)anthracene	ug/L	<0.0085	<0.0085	0.0085	B141941
Benzo(b&j)fluoranthene	ug/L	<0.0085	<0.0085	0.0085	B141941
Benzo(k)fluoranthene	ug/L	<0.0085	<0.0085	0.0085	B141941
Benzo(g,h,i)perylene	ug/L	<0.0085	<0.0085	0.0085	B141941
Benzo(c)phenanthrene	ug/L	<0.050	<0.050	0.050	B141941
Benzo(a)pyrene	ug/L	<0.0075	<0.0075	0.0075	B141941
Benzo(e)pyrene	ug/L	<0.050	<0.050	0.050	B141941
Chrysene	ug/L	<0.0085	<0.0085	0.0085	B141941
Dibenz(a,h)anthracene	ug/L	<0.0075	<0.0075	0.0075	B141941
Fluoranthene	ug/L	<0.010	<0.010	0.010	B141941
Fluorene	ug/L	<0.050	<0.050	0.050	B141941
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	<0.0085	0.0085	B141941
Indeno(1,2,3-cd)fluoranthene	ug/L	<0.0085	<0.0085	0.0085	B141941
2-Methylnaphthalene	ug/L	<0.10	<0.10	0.10	B141941
Naphthalene	ug/L	<0.10	<0.10	0.10	B141941
Phenanthrene	ug/L	<0.050	<0.050	0.050	B141941
Perylene	ug/L	<0.050	<0.050	0.050	B141941
Pyrene	ug/L	<0.020	<0.020	0.020	B141941
Quinoline	ug/L	<0.20	<0.20	0.20	B141941
Retene	ug/L	<0.050	<0.050	0.050	B141941
C1-Naphthalene	ug/L	<0.10	<0.10	0.10	B141941
C3-Naphthalene	ug/L	<0.10	<0.10	0.10	B141941
C4-Naphthalene	ug/L	<0.10	<0.10	0.10	B141941
C2-Naphthalene	ug/L	<0.10	<0.10	0.10	B141941
Biphenyl	ug/L	<0.020	<0.020	0.020	B141941
RDL = Reportable Detection Limit					

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Bureau Veritas Job #: C381210
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Advisian
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Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		CBI021	CBI022		
Sampling Date		2023/10/03 11:25	2023/10/03 16:00		
COC Number		299610	299610		
	UNITS	**AEMP-DS-06**	**AEMP-DUP4 (TRIP BLANK)**	**RDL**	**QC Batch**
C1-biphenyl	ug/L	<0.020	<0.020	0.020	B141941
C2-biphenyl	ug/L	<0.020	<0.020	0.020	B141941
C1-fluorene	ug/L	<0.050	<0.050	0.050	B141941
C2-fluorene	ug/L	<0.050	<0.050	0.050	B141941
C3-fluorene	ug/L	<0.050	<0.050	0.050	B141941
Dibenzothiophene	ug/L	<0.020	<0.020	0.020	B141941
C1-dibenzothiophene	ug/L	<0.020	<0.020	0.020	B141941
C2-dibenzothiophene	ug/L	<0.020	<0.020	0.020	B141941
C3-dibenzothiophene	ug/L	<0.020	<0.020	0.020	B141941
C4-dibenzothiophene	ug/L	<0.020	<0.020	0.020	B141941
C1 phenanthrene/anthracene	ug/L	<0.050	<0.050	0.050	B141941
C2 phenanthrene/anthracene	ug/L	<0.050	<0.050	0.050	B141941
C3 phenanthrene/anthracene	ug/L	<0.050	<0.050	0.050	B141941
C4 phenanthrene/anthracene	ug/L	<0.050	<0.050	0.050	B141941
C1 fluoranthene/pyrene	ug/L	<0.020	<0.020	0.020	B141941
C2 fluoranthene/pyrene	ug/L	<0.020	<0.020	0.020	B141941
C3 fluoranthene/pyrene	ug/L	<0.020	<0.020	0.020	B141941
C4 fluoranthene/pyrene	ug/L	<0.020	<0.020	0.020	B141941
C1 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	0.0085	B141941
C2 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	0.0085	B141941
C3 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	0.0085	B141941
C4 benzo(a)anthracene/chrysene	ug/L	<0.0085	<0.0085	0.0085	B141941
C1benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	0.0075	B141941
C2benzobjkfluoranthene/benzoapyrene	ug/L	<0.0075	<0.0075	0.0075	B141941
C1-Acenaphthene	ug/L	<0.10	<0.10	0.10	B141941
1-Methylnaphthalene	ug/L	<0.10	<0.10	0.10	B141941
Extraction Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	118	113		B141941
D8-ACENAPHTHYLENE (sur.)	%	110	106		B141941
D8-NAPHTHALENE (sur.)	%	91	92		B141941
RDL = Reportable Detection Limit					

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		CBI021	CBI022		
Sampling Date		2023/10/03 11:25	2023/10/03 16:00		
COC Number		299610	299610		
	UNITS	**AEMP-DS-06**	**AEMP-DUP4 (TRIP BLANK)**	**RDL**	**QC Batch**
TERPHENYL-D14 (sur.)	%	123	116		B141941
RDL = Reportable Detection Limit					

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MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		CBI021		
Sampling Date		2023/10/03 11:25		
COC Number		299610		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Elements				
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	B147572
RDL = Reportable Detection Limit				

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Project #: 417085-49223-23200

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		CBI021		
Sampling Date		2023/10/03 11:25		
COC Number		299610		
	UNITS	**AEMP-DS-06**	**RDL**	**QC Batch**
Elements				
Dissolved Aluminum (Al)	mg/L	0.048	0.0030	B145390
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	B145390
Dissolved Arsenic (As)	mg/L	0.00021	0.00020	B145390
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	B145390
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	B145390
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	B145390
Dissolved Copper (Cu)	mg/L	0.0026	0.0010	B145390
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	B145390
Dissolved Molybdenum (Mo)	mg/L	0.00086	0.00020	B145390
Dissolved Nickel (Ni)	mg/L	0.0028	0.00050	B145390
Dissolved Selenium (Se)	mg/L	0.00059	0.00020	B145390
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	B145390
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	B145390
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	B145390
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	B145390
Dissolved Uranium (U)	mg/L	0.00075	0.00010	B145390
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	B145390
Dissolved Zinc (Zn)	mg/L	0.0032	0.0030	B145390
RDL = Reportable Detection Limit				

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Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: CBI021
Sample ID: AEMP-DS-06
Matrix: Water

Collected: 2023/10/03
Relinquished: 2023/10/04
Received: 2023/10/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity @25C (pp, total), CO3,HCO3,OH	AT/ALK	B150836	N/A	2023/10/13	Lesley Quan-Choi
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B145228	N/A	2023/10/16	Ancheol Jeong
F1-BTEX	CALC/MS	B144062	N/A	2023/10/17	Automated Statchk
Cadmium - low level CCME - Dissolved	CALC/MS	B143969	N/A	2023/10/10	Automated Statchk
Cadmium - low level CCME (Total)	CALC/MS	B143970	N/A	2023/10/13	Automated Statchk
Chloride/Sulphate by Auto Colourimetry	KONE	B145383	N/A	2023/10/11	Tyler Orr
COD by Colorimeter	M/PROB	B146400	N/A	2023/10/10	Bailey Morrison
True Colour	SPEC/COL	B147043	N/A	2023/10/10	Shanna McKort
Carbon (DOC)	TECH	B148792	N/A	2023/10/12	Ye Hyun KIM
Conductivity @25C	COND	B150839	N/A	2023/10/13	Lesley Quan-Choi
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B141942	2023/10/10	2023/10/11	Chuhan Huang
Sulphide (as H2S)	CALC	B143975	N/A	2023/10/10	Automated Statchk
Hardness	CALC	B144004	N/A	2023/10/13	Automated Statchk
Mercury (Dissolved) by CV	CV	B147572	2023/10/09	2023/10/12	Kiran Kumari
Mercury (Total) by CV	CV	B148609	2023/10/09	2023/10/12	Kiran Kumari
Elements by ICP - Dissolved	ICPA	B145251	N/A	2023/10/12	Mohammad Pousti
Elements by ICP - Total	ICPA	B150207	2023/10/12	2023/10/13	Hue Quyen Vuong
Elements by ICPMS - Dissolved	ICPM	B145390	N/A	2023/10/09	Kevin Huang
Elements by ICPMS - Total	ICPM	B150196	2023/10/12	2023/10/13	Jason Bao
Ion Balance	CALC	B144007	N/A	2023/10/13	Automated Statchk
Ammonia-N (Total)	KONE	B145737	N/A	2023/10/10	Adam Fishleigh
Nitrate and Nitrite	CALC	B144016	N/A	2023/10/11	Automated Statchk
NO2 (N); NO2 (N) + NO3 (N) in Water	AC/COL	B144886	N/A	2023/10/08	Isabelle White
Nitrate (as N)	CALC	B144149	2023/10/11	2023/10/11	Automated Statchk
Oil and Grease (Gravimetric, n-Hexane)	CALC	B145245	2023/10/12	2023/10/12	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B141941	2023/10/10	2023/10/11	Jiby Uthup
Benzo[a]pyrene Equivalency	GC/MSD	B143976	N/A	2023/10/11	Automated Statchk
Orthophosphate by Automated Analyzer	KONE	B144935	N/A	2023/10/08	Carlo Truong
Total Sulphide	SPEC	B145191	N/A	2023/10/10	Dafne Strozake Maximo
Total Dissolved Solids (Filt. Residue)	BAL	B145553	2023/10/10	2023/10/11	Daryl Viktoria Noval
Total Kjeldahl Nitrogen (Total)	CALC	B144037	N/A	2023/10/13	Automated Statchk
Nitrogen (Total)	AC/COL	B150674	2023/10/12	2023/10/13	Carlo Truong
Carbon (Total Organic)	TECH	B147956	N/A	2023/10/11	Ye Hyun KIM
Total Suspended Solids (NFR)	BAL	B145560	2023/10/10	2023/10/11	Haydee Estilong
Turbidity	TURB	B143937	N/A	2023/10/07	Daryl Viktoria Noval

Bureau Veritas ID: CBI022
Sample ID: AEMP-DUP4 (TRIP BLANK)
Matrix: Water

Collected: 2023/10/03
Relinquished: 2023/10/04
Received: 2023/10/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
BTEX/F1 in Water by HS GC/MS/FID	HSGC/MS	B145228	N/A	2023/10/16	Ancheol Jeong
F1-BTEX	CALC/MS	B144062	N/A	2023/10/17	Automated Statchk
CCME Hydrocarbons (F2-F4 in water)	GC/FID	B141942	2023/10/10	2023/10/11	Chuhan Huang

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Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

TEST SUMMARY

Bureau Veritas ID: CBI022
Sample ID: AEMP-DUP4 (TRIP BLANK)
Matrix: Water

Collected: 2023/10/03
Relinquished: 2023/10/04
Received: 2023/10/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Oil and Grease (Gravimetric, n-Hexane)	CALC	B145245	2023/10/12	2023/10/12	Junyan Ban
Target & Alkylated PAH in Water by GC/MS	GC/MS	B141941	2023/10/10	2023/10/11	Jiby Uthup
Benzo[a]pyrene Equivalency	GC/MSD	B143976	N/A	2023/10/11	Automated Statchk

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GENERAL COMMENTS

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

Package 1	-0.3°C

Sample CBI021 [AEMP-DS-06] : Sample was analyzed past method specified hold time for Turbidity. 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 Orthophosphate by Automated Analyzer. Sample was analyzed past method specified hold time for True Colour. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water.

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
B141941	JU2	Method Blank	D10-ANTHRACENE (sur.)	2023/10/10		115	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/10/10		121	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/10/10		103	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/10/10		81	%	50 - 130
			Acenaphthene	2023/10/10	<0.10		ug/L	
			Acenaphthylene	2023/10/10	<0.10		ug/L	
			Acridine	2023/10/10	<0.040		ug/L	
			Anthracene	2023/10/10	<0.010		ug/L	
			Benzo(a)anthracene	2023/10/10	<0.0085		ug/L	
			Benzo(b&j)fluoranthene	2023/10/10	<0.0085		ug/L	
			Benzo(k)fluoranthene	2023/10/10	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2023/10/10	<0.0085		ug/L	
			Benzo(c)phenanthrene	2023/10/10	<0.050		ug/L	
			Benzo(a)pyrene	2023/10/10	<0.0075		ug/L	
			Benzo(e)pyrene	2023/10/10	<0.050		ug/L	
			Chrysene	2023/10/10	<0.0085		ug/L	
			Dibenz(a,h)anthracene	2023/10/10	<0.0075		ug/L	
			Fluoranthene	2023/10/10	<0.010		ug/L	
			Fluorene	2023/10/10	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2023/10/10	<0.0085		ug/L	
			Indeno(1,2,3-cd)fluoranthene	2023/10/10	<0.0085		ug/L	
			2-Methylnaphthalene	2023/10/10	<0.10		ug/L	
			Naphthalene	2023/10/10	<0.10		ug/L	
			Phenanthrene	2023/10/10	<0.050		ug/L	
			Perylene	2023/10/10	<0.050		ug/L	
			Pyrene	2023/10/10	<0.020		ug/L	
			Quinoline	2023/10/10	<0.20		ug/L	
			Retene	2023/10/10	<0.050		ug/L	
			C1-Naphthalene	2023/10/10	<0.10		ug/L	
			C3-Naphthalene	2023/10/10	<0.10		ug/L	
			C4-Naphthalene	2023/10/10	<0.10		ug/L	
			C2-Naphthalene	2023/10/10	<0.10		ug/L	
			Biphenyl	2023/10/10	<0.020		ug/L	
			C1-biphenyl	2023/10/10	<0.020		ug/L	
			C2-biphenyl	2023/10/10	<0.020		ug/L	
			C1-fluorene	2023/10/10	<0.050		ug/L	
			C2-fluorene	2023/10/10	<0.050		ug/L	
			C3-fluorene	2023/10/10	<0.050		ug/L	
			Dibenzothiophene	2023/10/10	<0.020		ug/L	
			C1-dibenzothiophene	2023/10/10	<0.020		ug/L	
			C2-dibenzothiophene	2023/10/10	<0.020		ug/L	
			C3-dibenzothiophene	2023/10/10	<0.020		ug/L	
			C4-dibenzothiophene	2023/10/10	<0.020		ug/L	
			C1 phenanthrene/anthracene	2023/10/10	<0.050		ug/L	
			C2 phenanthrene/anthracene	2023/10/10	<0.050		ug/L	
			C3 phenanthrene/anthracene	2023/10/10	<0.050		ug/L	
			C4 phenanthrene/anthracene	2023/10/10	<0.050		ug/L	
			C1 fluoranthene/pyrene	2023/10/10	<0.020		ug/L	
			C2 fluoranthene/pyrene	2023/10/10	<0.020		ug/L	
			C3 fluoranthene/pyrene	2023/10/10	<0.020		ug/L	
			C4 fluoranthene/pyrene	2023/10/10	<0.020		ug/L	
			C1 benzo(a)anthracene/chrysene	2023/10/10	<0.0085		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
			C2 benzo(a)anthracene/chrysene	2023/10/10	<0.0085		ug/L	
			C3 benzo(a)anthracene/chrysene	2023/10/10	<0.0085		ug/L	
			C4 benzo(a)anthracene/chrysene	2023/10/10	<0.0085		ug/L	
			C1benzobjkfluoranthene/benzoapyrene	2023/10/10	<0.0075		ug/L	
			C2benzobjkfluoranthene/benzoapyrene	2023/10/10	<0.0075		ug/L	
			C1-Acenaphthene	2023/10/10	<0.10		ug/L	
			1-Methylnaphthalene	2023/10/10	<0.10		ug/L	
B141942	CHA	Method Blank	O-TERPHENYL (sur.)	2023/10/10		92	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/10/10	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2023/10/10	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2023/10/10	<0.20		mg/L	
B143937	DVN	Method Blank	Turbidity	2023/10/07	<0.10		NTU	
B144886	ISW	Method Blank	Nitrite (N)	2023/10/08	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2023/10/08	<0.010		mg/L	
B144935	CTU	Method Blank	Orthophosphate (P)	2023/10/08	<0.0030		mg/L	
B145191	DSX	Method Blank	Total Sulphide	2023/10/10	<0.0018		mg/L	
B145228	AJG	Method Blank	1,4-Difluorobenzene (sur.)	2023/10/16		108	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/10/16		97	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/10/16		95	%	50 - 140
			Benzene	2023/10/16	<0.00040		mg/L	
			Toluene	2023/10/16	<0.00040		mg/L	
			Ethylbenzene	2023/10/16	<0.00040		mg/L	
			m & p-Xylene	2023/10/16	<0.00080		mg/L	
			o-Xylene	2023/10/16	<0.00040		mg/L	
			F1 (C6-C10)	2023/10/16	<0.10		mg/L	
B145245	JB9	Method Blank	Total Oil and grease	2023/10/12	<2.0		mg/L	
B145251	MPU	Method Blank	Dissolved Iron (Fe)	2023/10/12	<0.060		mg/L	
			Dissolved Lithium (Li)	2023/10/12	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2023/10/12	<0.20		mg/L	
			Dissolved Manganese (Mn)	2023/10/12	<0.0040		mg/L	
			Dissolved Potassium (K)	2023/10/12	<0.30		mg/L	
			Dissolved Sodium (Na)	2023/10/12	<0.50		mg/L	
			Dissolved Strontium (Sr)	2023/10/12	<0.020		mg/L	
			Dissolved Sulphur (S)	2023/10/12	<0.20		mg/L	
			Dissolved Phosphorus (P)	2023/10/12	<0.10		mg/L	
			Dissolved Barium (Ba)	2023/10/12	<0.010		mg/L	
			Dissolved Silicon (Si)	2023/10/12	<0.50		mg/L	
			Dissolved Boron (B)	2023/10/12	<0.020		mg/L	
			Dissolved Calcium (Ca)	2023/10/12	<0.30		mg/L	
B145383	TOR	Method Blank	Chloride (Cl)	2023/10/11	<1.0		mg/L	
			Sulphate (SO4)	2023/10/11	<1.0		mg/L	
B145390	KH2	Method Blank	Dissolved Aluminum (Al)	2023/10/09	<0.0030		mg/L	
			Dissolved Chromium (Cr)	2023/10/09	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2023/10/09	<0.00030		mg/L	
			Dissolved Copper (Cu)	2023/10/09	<0.0010		mg/L	
			Dissolved Lead (Pb)	2023/10/09	<0.00020		mg/L	
			Dissolved Antimony (Sb)	2023/10/09	<0.00060		mg/L	
			Dissolved Molybdenum (Mo)	2023/10/09	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2023/10/09	<0.00050		mg/L	
			Dissolved Selenium (Se)	2023/10/09	<0.00020		mg/L	
			Dissolved Silver (Ag)	2023/10/09	<0.00010		mg/L	
			Dissolved Arsenic (As)	2023/10/09	<0.00020		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Thallium (Tl)	2023/10/09	<0.00020		mg/L	
			Dissolved Tin (Sn)	2023/10/09	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2023/10/09	<0.0010		mg/L	
			Dissolved Uranium (U)	2023/10/09	<0.00010		mg/L	
			Dissolved Vanadium (V)	2023/10/09	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2023/10/09	<0.0030		mg/L	
			Dissolved Beryllium (Be)	2023/10/09	<0.0010		mg/L	
B145553	DVN	Method Blank	Total Dissolved Solids	2023/10/11	<10		mg/L	
B145560	HE1	Method Blank	Total Suspended Solids	2023/10/11	<1.0		mg/L	
B145737	AFI	Method Blank	Total Ammonia (N)	2023/10/10	<0.015		mg/L	
B146400	BYM	Method Blank	Chemical Oxygen Demand	2023/10/10	<10		mg/L	
B147043	SKM	Method Blank	True Colour	2023/10/10	<2.0		PtCo units	
B147572	KKM	Method Blank	Dissolved Mercury (Hg)	2023/10/12	<0.0019		ug/L	
B147956	YHK	Method Blank	Total Organic Carbon (C)	2023/10/11	<0.50		mg/L	
B148609	KKM	Method Blank	Total Mercury (Hg)	2023/10/12	<0.0019		ug/L	
B148792	YHK	Method Blank	Dissolved Organic Carbon (C)	2023/10/12	<0.50		mg/L	
B150196	JAB	Method Blank	Total Aluminum (Al)	2023/10/13	<0.0030		mg/L	
			Total Chromium (Cr)	2023/10/13	<0.0010		mg/L	
			Total Cobalt (Co)	2023/10/13	<0.00030		mg/L	
			Total Copper (Cu)	2023/10/13	<0.0010		mg/L	
			Total Lead (Pb)	2023/10/13	<0.00020		mg/L	
			Total Antimony (Sb)	2023/10/13	<0.00060		mg/L	
			Total Molybdenum (Mo)	2023/10/13	<0.00020		mg/L	
			Total Nickel (Ni)	2023/10/13	<0.00050		mg/L	
			Total Selenium (Se)	2023/10/13	<0.00020		mg/L	
			Total Silver (Ag)	2023/10/13	<0.00010		mg/L	
			Total Arsenic (As)	2023/10/13	<0.00020		mg/L	
			Total Thallium (Tl)	2023/10/13	<0.00020		mg/L	
			Total Tin (Sn)	2023/10/13	<0.0010		mg/L	
			Total Titanium (Ti)	2023/10/13	<0.0010		mg/L	
			Total Uranium (U)	2023/10/13	<0.00010		mg/L	
			Total Vanadium (V)	2023/10/13	<0.0010		mg/L	
			Total Zinc (Zn)	2023/10/13	<0.0030		mg/L	
			Total Beryllium (Be)	2023/10/13	<0.0010		mg/L	
B150207	HQV	Method Blank	Total Iron (Fe)	2023/10/13	<0.060		mg/L	
			Total Lithium (Li)	2023/10/13	<0.020		mg/L	
			Total Magnesium (Mg)	2023/10/13	<0.20		mg/L	
			Total Manganese (Mn)	2023/10/13	<0.0040		mg/L	
			Total Potassium (K)	2023/10/13	<0.30		mg/L	
			Total Sodium (Na)	2023/10/13	<0.50		mg/L	
			Total Strontium (Sr)	2023/10/13	<0.020		mg/L	
			Total Sulphur (S)	2023/10/13	<0.20		mg/L	
			Total Phosphorus (P)	2023/10/13	<0.10		mg/L	
			Total Barium (Ba)	2023/10/13	<0.010		mg/L	
			Total Silicon (Si)	2023/10/13	<0.50		mg/L	
			Total Boron (B)	2023/10/13	<0.020		mg/L	
			Total Calcium (Ca)	2023/10/13	<0.30		mg/L	
B150674	CTU	Method Blank	Total Nitrogen (N)	2023/10/13	<0.020		mg/L	
B150836	LQ1	Method Blank	Alkalinity (Total as CaCO3)	2023/10/13	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2023/10/13	<1.0		mg/L	
			Bicarbonate (HCO3)	2023/10/13	<1.0		mg/L	
			Carbonate (CO3)	2023/10/13	<1.0		mg/L	

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Bureau Veritas Job #: C381210
Report Date: 2023/10/17

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Hydroxide (OH)	2023/10/13	<1.0		mg/L	
B150839	LQ1	Method Blank	Conductivity	2023/10/13	<2.0		uS/cm	
B141941	JU2	LCS	D10-ANTHRACENE (sur.)	2023/10/10		120	%	50 - 130
			TERPHENYL-D14 (sur.)	2023/10/10		124	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2023/10/10		111	%	50 - 130
			D8-NAPHTHALENE (sur.)	2023/10/10		95	%	50 - 130
			Acenaphthene	2023/10/10		90	%	50 - 130
			Acenaphthylene	2023/10/10		92	%	50 - 130
			Acridine	2023/10/10		74	%	50 - 130
			Anthracene	2023/10/10		83	%	50 - 130
			Benzo(a)anthracene	2023/10/10		103	%	50 - 130
			Benzo(b&j)fluoranthene	2023/10/10		106	%	50 - 130
			Benzo(k)fluoranthene	2023/10/10		116	%	50 - 130
			Benzo(g,h,i)perylene	2023/10/10		112	%	50 - 130
			Benzo(c)phenanthrene	2023/10/10		112	%	50 - 130
			Benzo(a)pyrene	2023/10/10		110	%	50 - 130
			Benzo(e)pyrene	2023/10/10		95	%	50 - 130
			Chrysene	2023/10/10		106	%	50 - 130
			Dibenz(a,h)anthracene	2023/10/10		111	%	50 - 130
			Fluoranthene	2023/10/10		106	%	50 - 130
			Fluorene	2023/10/10		91	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/10/10		108	%	50 - 130
			2-Methylnaphthalene	2023/10/10		76	%	50 - 130
			Naphthalene	2023/10/10		78	%	50 - 130
			Phenanthrene	2023/10/10		111	%	50 - 130
			Perylene	2023/10/10		99	%	50 - 130
			Pyrene	2023/10/10		112	%	50 - 130
			Quinoline	2023/10/10		77	%	50 - 130
			C1-Naphthalene	2023/10/10		64	%	50 - 130
			C3-Naphthalene	2023/10/10		94	%	50 - 130
			C2-Naphthalene	2023/10/10		83	%	50 - 130
			C1-biphenyl	2023/10/10		77	%	50 - 130
			C1 phenanthrene/anthracene	2023/10/10		119	%	50 - 130
			C2 phenanthrene/anthracene	2023/10/10		108	%	50 - 130
			C1 fluoranthene/pyrene	2023/10/10		101	%	50 - 130
			C2 benzo(a)anthracene/chrysene	2023/10/10		96	%	30 - 130
			1-Methylnaphthalene	2023/10/10		64	%	50 - 130
B141942	CHA	LCS	O-TERPHENYL (sur.)	2023/10/10		91	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2023/10/10		92	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2023/10/10		102	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2023/10/10		93	%	60 - 140
B143937	DVN	LCS	Turbidity	2023/10/07		101	%	80 - 120
B144886	ISW	LCS	Nitrite (N)	2023/10/08		101	%	80 - 120
			Nitrate plus Nitrite (N)	2023/10/08		102	%	80 - 120
B144935	CTU	LCS	Orthophosphate (P)	2023/10/08		103	%	80 - 120
B145191	DSX	LCS	Total Sulphide	2023/10/10		102	%	80 - 120
B145228	AJG	LCS	1,4-Difluorobenzene (sur.)	2023/10/16		109	%	50 - 140
			4-Bromofluorobenzene (sur.)	2023/10/16		97	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2023/10/16		96	%	50 - 140
			Benzene	2023/10/16		102	%	60 - 130
			Toluene	2023/10/16		100	%	60 - 130
			Ethylbenzene	2023/10/16		107	%	60 - 130

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Bureau Veritas Job #: C381210
Report Date: 2023/10/17

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			m & p-Xylene	2023/10/16		106	%	60 - 130
			o-Xylene	2023/10/16		101	%	60 - 130
			F1 (C6-C10)	2023/10/16		95	%	60 - 140
B145245	JB9	LCS	Total Oil and grease	2023/10/12		105	%	70 - 130
B145251	MPU	LCS	Dissolved Iron (Fe)	2023/10/12		105	%	80 - 120
			Dissolved Lithium (Li)	2023/10/12		94	%	80 - 120
			Dissolved Magnesium (Mg)	2023/10/12		103	%	80 - 120
			Dissolved Manganese (Mn)	2023/10/12		105	%	80 - 120
			Dissolved Potassium (K)	2023/10/12		98	%	80 - 120
			Dissolved Sodium (Na)	2023/10/12		100	%	80 - 120
			Dissolved Strontium (Sr)	2023/10/12		99	%	80 - 120
			Dissolved Sulphur (S)	2023/10/12		98	%	80 - 120
			Dissolved Phosphorus (P)	2023/10/12		102	%	80 - 120
			Dissolved Barium (Ba)	2023/10/12		101	%	80 - 120
			Dissolved Silicon (Si)	2023/10/12		99	%	80 - 120
			Dissolved Boron (B)	2023/10/12		104	%	80 - 120
			Dissolved Calcium (Ca)	2023/10/12		96	%	80 - 120
B145383	TOR	LCS	Chloride (Cl)	2023/10/11		96	%	80 - 120
			Sulphate (SO4)	2023/10/11		99	%	80 - 120
B145390	KH2	LCS	Dissolved Aluminum (Al)	2023/10/09		103	%	80 - 120
			Dissolved Chromium (Cr)	2023/10/09		102	%	80 - 120
			Dissolved Cobalt (Co)	2023/10/09		103	%	80 - 120
			Dissolved Copper (Cu)	2023/10/09		103	%	80 - 120
			Dissolved Lead (Pb)	2023/10/09		102	%	80 - 120
			Dissolved Antimony (Sb)	2023/10/09		117	%	80 - 120
			Dissolved Molybdenum (Mo)	2023/10/09		105	%	80 - 120
			Dissolved Nickel (Ni)	2023/10/09		102	%	80 - 120
			Dissolved Selenium (Se)	2023/10/09		112	%	80 - 120
			Dissolved Silver (Ag)	2023/10/09		102	%	80 - 120
			Dissolved Arsenic (As)	2023/10/09		108	%	80 - 120
			Dissolved Thallium (Tl)	2023/10/09		101	%	80 - 120
			Dissolved Tin (Sn)	2023/10/09		101	%	80 - 120
			Dissolved Titanium (Ti)	2023/10/09		103	%	80 - 120
			Dissolved Uranium (U)	2023/10/09		102	%	80 - 120
			Dissolved Vanadium (V)	2023/10/09		103	%	80 - 120
			Dissolved Zinc (Zn)	2023/10/09		106	%	80 - 120
			Dissolved Beryllium (Be)	2023/10/09		102	%	80 - 120
B145553	DVN	LCS	Total Dissolved Solids	2023/10/11		96	%	80 - 120
B145560	HE1	LCS	Total Suspended Solids	2023/10/11		102	%	80 - 120
B145737	AFI	LCS	Total Ammonia (N)	2023/10/10		101	%	80 - 120
B146400	BYM	LCS	Chemical Oxygen Demand	2023/10/10		103	%	80 - 120
B147043	SKM	LCS	True Colour	2023/10/10		99	%	80 - 120
B147572	KKM	LCS	Dissolved Mercury (Hg)	2023/10/12		101	%	80 - 120
B147956	YHK	LCS	Total Organic Carbon (C)	2023/10/11		100	%	80 - 120
B148609	KKM	LCS	Total Mercury (Hg)	2023/10/12		105	%	80 - 120
B148792	YHK	LCS	Dissolved Organic Carbon (C)	2023/10/12		104	%	80 - 120
B150196	JAB	LCS	Total Aluminum (Al)	2023/10/13		110	%	80 - 120
			Total Chromium (Cr)	2023/10/13		108	%	80 - 120
			Total Cobalt (Co)	2023/10/13		108	%	80 - 120
			Total Copper (Cu)	2023/10/13		106	%	80 - 120
			Total Lead (Pb)	2023/10/13		109	%	80 - 120
			Total Antimony (Sb)	2023/10/13		125 (1)	%	80 - 120

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Bureau Veritas Job #: C381210
Report Date: 2023/10/17

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Molybdenum (Mo)	2023/10/13		112	%	80 - 120
			Total Nickel (Ni)	2023/10/13		105	%	80 - 120
			Total Selenium (Se)	2023/10/13		106	%	80 - 120
			Total Silver (Ag)	2023/10/13		107	%	80 - 120
			Total Arsenic (As)	2023/10/13		108	%	80 - 120
			Total Thallium (Tl)	2023/10/13		109	%	80 - 120
			Total Tin (Sn)	2023/10/13		111	%	80 - 120
			Total Titanium (Ti)	2023/10/13		108	%	80 - 120
			Total Uranium (U)	2023/10/13		108	%	80 - 120
			Total Vanadium (V)	2023/10/13		108	%	80 - 120
			Total Zinc (Zn)	2023/10/13		107	%	80 - 120
			Total Beryllium (Be)	2023/10/13		105	%	80 - 120
B150207	HQV	LCS	Total Iron (Fe)	2023/10/13		94	%	80 - 120
			Total Lithium (Li)	2023/10/13		94	%	80 - 120
			Total Magnesium (Mg)	2023/10/13		93	%	80 - 120
			Total Manganese (Mn)	2023/10/13		97	%	80 - 120
			Total Potassium (K)	2023/10/13		93	%	80 - 120
			Total Sodium (Na)	2023/10/13		96	%	80 - 120
			Total Strontium (Sr)	2023/10/13		91	%	80 - 120
			Total Sulphur (S)	2023/10/13		92	%	80 - 120
			Total Phosphorus (P)	2023/10/13		92	%	80 - 120
			Total Barium (Ba)	2023/10/13		94	%	80 - 120
			Total Silicon (Si)	2023/10/13		92	%	80 - 120
			Total Boron (B)	2023/10/13		92	%	80 - 120
			Total Calcium (Ca)	2023/10/13		95	%	80 - 120
B150674	CTU	LCS	Total Nitrogen (N)	2023/10/13		109	%	80 - 120
B150836	LQ1	LCS	Alkalinity (Total as CaCO3)	2023/10/13		99	%	80 - 120
B150839	LQ1	LCS	Conductivity	2023/10/13		100	%	90 - 110
B150674	CTU	SRM	Total Nitrogen (N)	2023/10/13		109	%	80 - 120

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

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

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

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

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

Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Bureau Veritas Job #: C381210
Report Date: 2023/10/17

Advisian
Task Order#: 417085-49223
Site#: N/A
Site Location: Norman Wells, NWT
Project #: 417085-49223-23200

VALIDATION SIGNATURE PAGE

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

Gita Pokhrel, Laboratory Supervisor

Janet Gao, B.Sc., QP, Supervisor, Organics

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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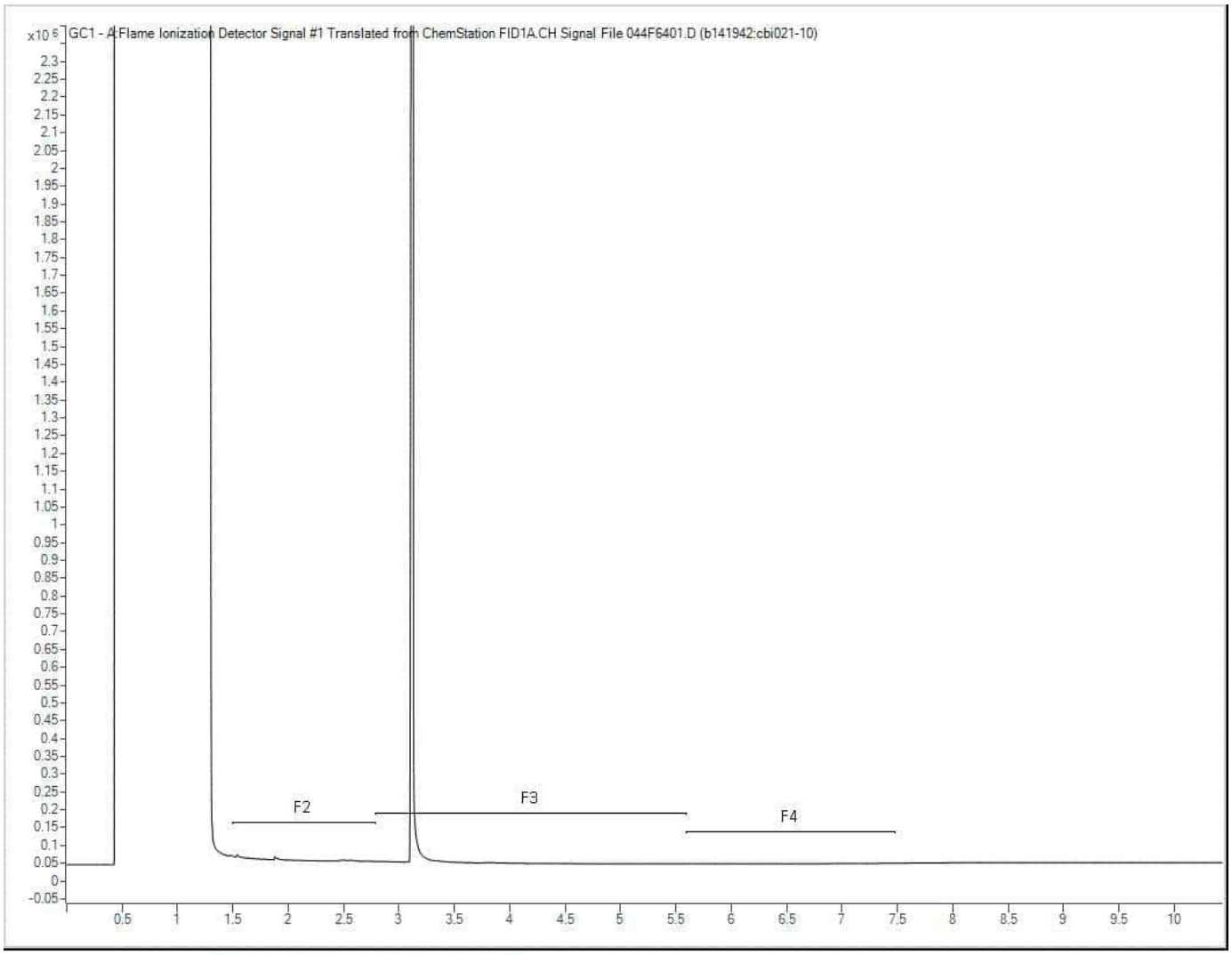
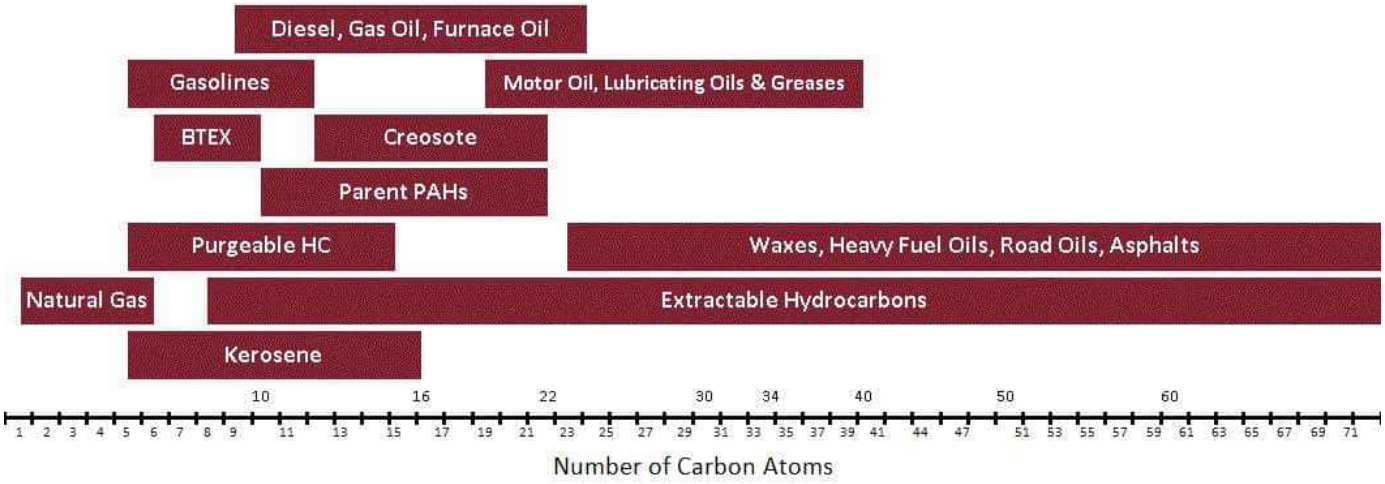
Bureau Veritas Job #: C381210
Report Date: 2023/10/17
Bureau Veritas Sample: CBI021

Advisian
Task Order#:417085-49223Line Item:
Site#: N/A
Site Location: Norman Wells, NWT
Client ID: AEMP-DS-06

CCME Hydrocarbons (F2-F4 in water) Chromatogram





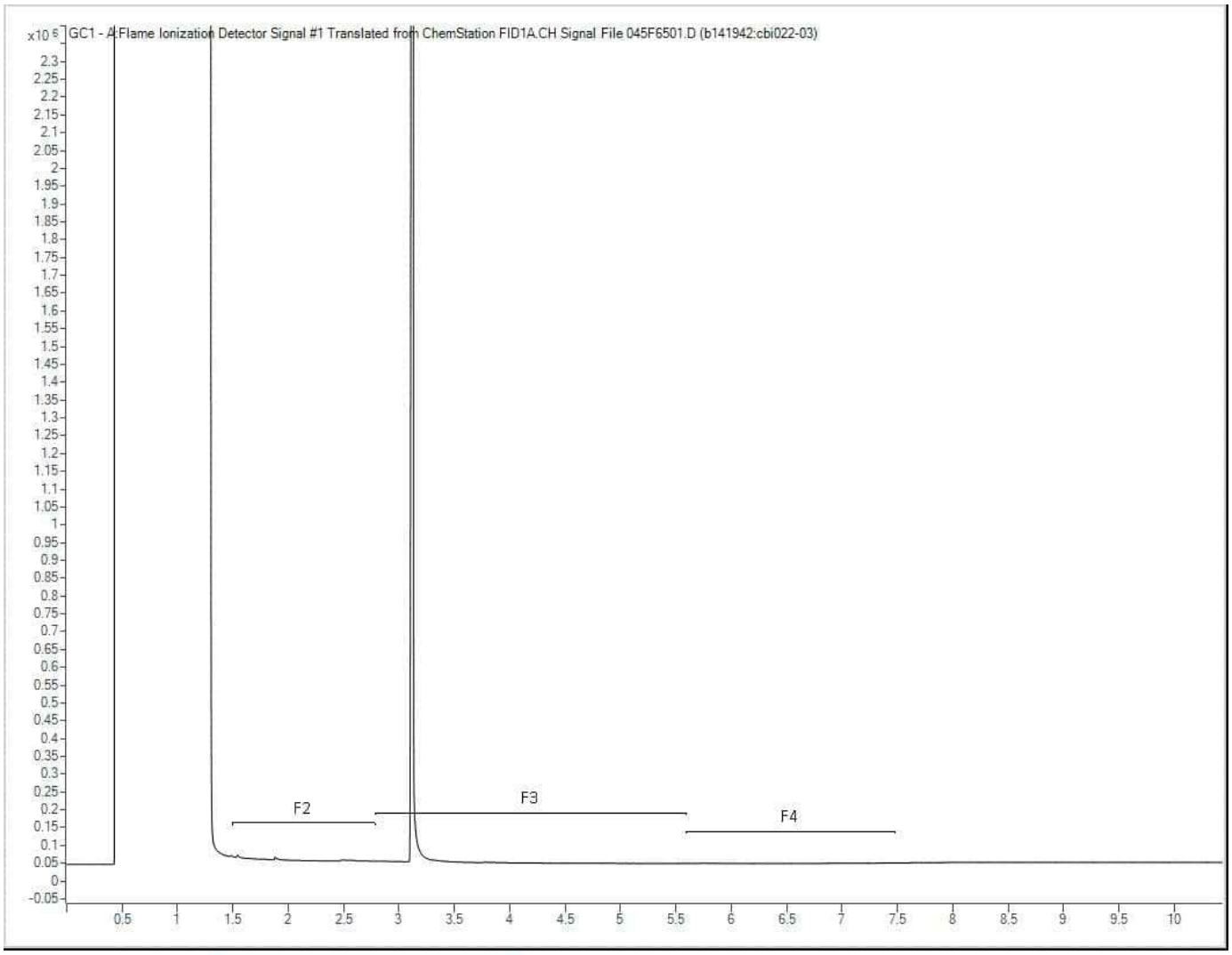
hpchem20\HPchem\1\DATA\2023\10\RUN1010

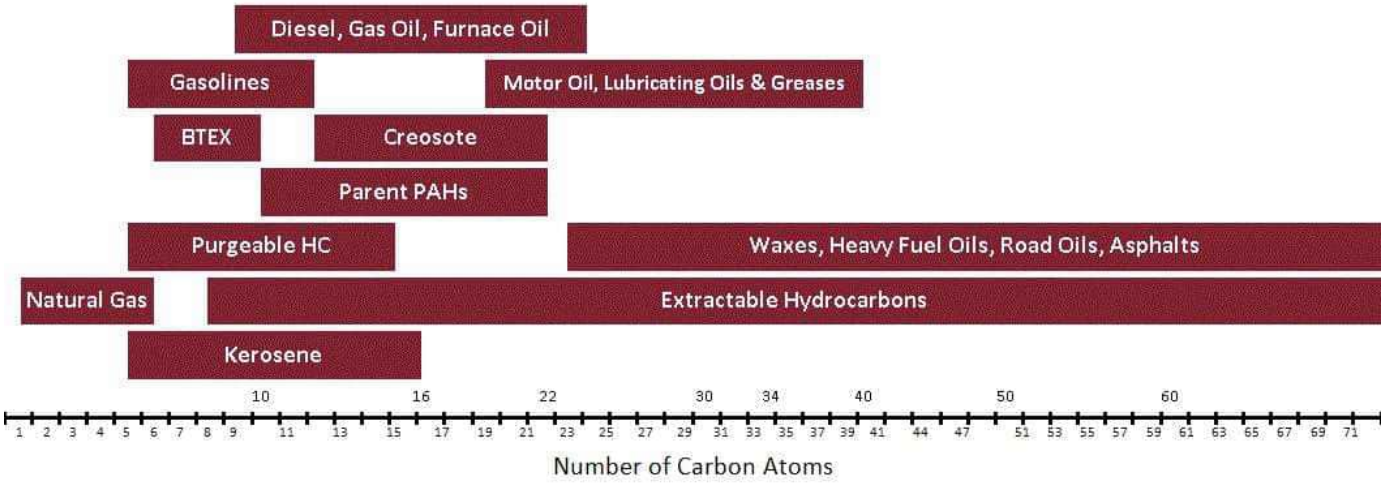
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C381210
Report Date: 2023/10/17
Bureau Veritas Sample: CBI022

Advisian
Task Order#:417085-49223Line Item:
Site#: N/A
Site Location: Norman Wells, NWT
Client ID: AEMP-DUP4 (TRIP BLANK)

CCME Hydrocarbons (F2-F4 in water) Chromatogram





hpchem20\HPchem\1\DATA\2023\10\RUN1010

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam
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EXXON MOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

Page 1 of 1

C of C # 299610

INVOICE INFORMATION

Company Name: ☒ Imperial Oil ☐ ExxonMobil
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE, Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Sampler Name (Print): Alex Haigh | Stacy Gibb

REPORT INFORMATION

Company Name: Advisian
Contact Name: Alex Haigh
Address: 49 Quarry Park Blvd SE, Calgary, AB T2C 3E7
Email: alex.haigh@advisian.com
Ph: 587-897-6249
Consultant Project #: 417085-49223.23200

ANALYSIS REQUESTED

	FIELD SAMPLE ID	MATRIX: GROUND WATER	MATRIX: SURFACE WATER	MATRIX: SOIL	MATRIX: OTHER	# CONTAINERS	SAMPLING DATE (YYYY/MM/DD)	SAMPLING TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	VOC	PAH	PHCs (FRACTIONS 1-2 PLUS BTEX)	PHCs (FRACTIONS 1-4 PLUS BTEX)	PHCs (FRACTIONS 2-4)	PHCs (FRACTION 1 PLUS BTEX)	GRAIN SIZE (75 MICRON)	TEXTURE (% SAND, SILT, CLAY)	PARTICLE SIZE DISTRIBUTION WITH GRAPH	REGULATED METALS TOT ☒ DIS ☒	MERCURY TOTAL ☒ DISSOLVED ☒	SALINITY SOIL	FERTILIZER SOIL	FERTILIZER WATER	NUTRIENTS SOIL	ROUTINE POTABILITY	pH ☐ EC ☐ ALKALINITY ☐	BASIC CLASS II LANDFILL PKG	True color, TSS, TDS, Turbidity	Oil & Grease	Tox, DOC, Sulphide	Nitrate, Nitrite, Ammonia (total), TKN	Orthophosphate	COD	Sulphur - total & dissolved	Alkylated PAHs, TPH
1	AEMP - DS - 06		X			18	2023/10/03	11:25	X			X		X						X	X					X			X	X	X	X	X	X	X	X
2	AEMP - Dup 4 (TRIP BLANK)				X	8	2023/10/03	16:00				X		X																X						X
3																																				
4																																				
5																																				
6																																				
7																																				
8																																				
9																																				
10																																				

mcal-10-572

IOL SITE LOCATION: Norman Wells, NT
IOL PROJECT # (if applicable): N/A
MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 417085-49223.23200

REGULATORY CRITERIA / DETECTION LIMITS:
☐ Alberta Tier 1 ☐ CDWG
☐ SEQG (SK) ☐ NoSC (SK)
☒ CCME (incl. level) FWAL ☐ Other

SPECIAL INSTRUCTIONS email Canada.chemistry@worley.com, cacal-IOR datatrack@worley.com, Stacy.Gibb@worley.com
IES A2601436

JARS USED & NOT SUBMITTED Enter N/A for Water: N/A

TURNAROUND TIME
Standard (5 days) ☒
Rush (3 days) ☐
(2 days) ☐
(1 day) ☐
(same day) ☐
Date Required

	YES	NO	COOLER ID # MCAL				YES	NO	COOLER ID #				YES	NO	COOLER ID #			
SEAL PRESENT	✓		TEMP °C	-1	0	0			TEMP °C	1	2	3			TEMP °C	1	2	3
SEAL INTACT	✓			1	2	3												
COOLING MEDIA PRESENT	✓																	

LAB USE ONLY
MAXXAM JOB #

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1.	STACY Gibb	2023/10/04	10:30	1.	Sun Ete	2023/10/06	14:45
2.				2.			
3.				3.			

SAMPLES
LABELED BY:
VERIFIED BY:

COC-1010 (06/2016) IOL-AB
White: Maxxam Yellow: Client

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2024-03-17
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C419662	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☒ **Yes** ☐ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☐ **Yes** ☒ **No**

If yes, FLAG type and comments*:*

Date samples submitted 2024-03-20

Due date for lab report on SRC 2024-04-04

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature? ☐ **Yes** ☐ **No** **Comments**

(Imperial Oil only) Data Quality Waver (DQW) issued? ☐ **Yes** ☐ **No** **If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.**

Date returned to lab:

Extractions and analysis conducted within acceptable hold times? ☐ **Yes** ☐ **No**

Lab has warranted all tests were in statistical control? (look for trend rule failure notes) ☐ **Yes** ☐ **No**

Lab QA/QC samples are within Acceptance Criteria?

Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Extraction Surrogate Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☐ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☐ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☐ **No** ☐ **N/A**	

Data check completed by **Date**

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☐ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☐ Yes ☐ No	
Data check completed by		**Date**

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes ☐ No ☐ N/A	**Comments**	
Trip Blank results acceptable?	☐ Yes ☐ No ☐ N/A	**Comments**	
Field Blank results acceptable?	☐ Yes ☐ No ☐ N/A	**Comments**	
Equipment Blank results acceptable?	☐ Yes ☐ No ☐ N/A	**Comments**	
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes ☐ No ☐ N/A	**Comments**	
Data check completed by		**Date**	

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes ☐ No ☐ N/A	**Comments**	
Field pH vs. Lab pH RPDs acceptable?	☐ Yes ☐ No ☐ N/A	**Comments**	
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☐ Yes ☐ No ☐ N/A	**Comments**	
Data check completed by		**Date**	

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose?	☐ Yes ☐ No		
Explain rationale for yes/no:			
Request lab to recheck data? If so give details	☐ Yes ☐ No ☐ N/A	**Comments**	
If Yes, Lab request to recheck must be approved by Project Manager Name:		**Date**	
Data check completed by		**Date**	

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2024-03-17
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C419865	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☒ **Yes** ☐ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☐ **Yes** ☒ **No**

If yes, FLAG type and comments*:*

Date samples submitted 2024-03-20

Due date for lab report on SRC 2024-04-04

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☐ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☐ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☐ **No**	
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☐ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Extraction Surrogate Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☐ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☐ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☐ **No** ☐ **N/A**	

Data check completed by **Date**

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☐ **Yes** ☐ **No**	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☐ **Yes** ☐ **No**	
Data check completed by		**Date**

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Trip Blank results acceptable?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Field Blank results acceptable?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Equipment Blank results acceptable?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Data check completed by		**Date**	

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Field pH vs. Lab pH RPDs acceptable?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Data check completed by		**Date**	

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose?	☐ **Yes** ☐ **No**		
Explain rationale for yes/no:			
Request lab to recheck data? If so give details	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
If Yes, Lab request to recheck must be approved by Project Manager Name:		**Date**	
Data check completed by		**Date**	

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2024-03-15/16
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C419882	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☒ **Yes** ☐ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☒ **Yes** ☐ **No**

If yes, FLAG type and comments: Labelling issue – filtered bottles not checked as such

Date samples submitted 2024-03-20

Due date for lab report on SRC 2024-04-05

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☐ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☐ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☐ **No**	
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☐ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Extraction Surrogate Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☐ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☐ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☐ **No** ☐ **N/A**	

Data check completed by **Date**

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☐ **Yes** ☐ **No**	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☐ **Yes** ☐ **No**	
Data check completed by		**Date**

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Trip Blank results acceptable?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Field Blank results acceptable?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Equipment Blank results acceptable?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Data check completed by		**Date**	

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Field pH vs. Lab pH RPDs acceptable?	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
Data check completed by		**Date**	

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose?	☐ **Yes** ☐ **No**		
Explain rationale for yes/no:			
Request lab to recheck data? If so give details	☐ **Yes** ☐ **No** ☐ **N/A**	**Comments**	
If Yes, Lab request to recheck must be approved by Project Manager Name:		**Date**	
Data check completed by		**Date**	

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2024-03-15/16
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C419882	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☒ **Yes** ☐ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☒ **Yes** ☐ **No**

If yes, FLAG type and comments: Labelling issue – filtered bottles not checked as such

Date samples submitted 2024-03-20

Due date for lab report on SRC 2024-04-05

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☐ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☐ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☐ **No**	
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☐ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Extraction Surrogate Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☐ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☐ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☐ **No** ☐ **N/A**	

Data check completed by **Date**

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples? ☐ **Yes** ☐ **No** _____

Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?) ☐ **Yes** ☐ **No** _____

Data check completed by _____ **Date** _____

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable? ☐ **Yes** ☐ **No** ☐ **N/A** **Comments** _____

Trip Blank results acceptable? ☐ **Yes** ☐ **No** ☐ **N/A** **Comments** _____

Field Blank results acceptable? ☐ **Yes** ☐ **No** ☐ **N/A** **Comments** _____

Equipment Blank results acceptable? ☐ **Yes** ☐ **No** ☐ **N/A** **Comments** _____

Correspondence re: lab QA/QC issues attached (and saved under correct job #)? ☐ **Yes** ☐ **No** ☐ **N/A** **Comments** _____

Data check completed by _____ **Date** _____

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable? ☐ **Yes** ☐ **No** ☐ **N/A** **Comments** _____

Field pH vs. Lab pH RPDs acceptable? ☐ **Yes** ☐ **No** ☐ **N/A** **Comments** _____

Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist. ☐ **Yes** ☐ **No** ☐ **N/A** **Comments** _____

Data check completed by _____ **Date** _____

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose? ☐ **Yes** ☐ **No** _____

Explain rationale for yes/no: _____

Request lab to recheck data? If so give details ☐ **Yes** ☐ **No** ☐ **N/A** **Comments** _____

If Yes, Lab request to recheck must be approved by Project Manager Name: _____ **Date** _____

Data check completed by _____ **Date** _____

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2024-03-18
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C420367	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☒ **Yes** ☐ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☐ **Yes** ☒ **No**

If yes, FLAG type and comments*:*

Date samples submitted 2024-03-22

Due date for lab report on SRC 2024-04-08

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature?	☐ **Yes** ☐ **No**	**Comments**
(Imperial Oil only) Data Quality Waver (DQW) issued?	☐ **Yes** ☐ **No**	**If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.** **Date returned to lab:**
Extractions and analysis conducted within acceptable hold times?	☐ **Yes** ☐ **No**	
Lab has warranted all tests were in statistical control? (look for trend rule failure notes)	☐ **Yes** ☐ **No**	
Lab QA/QC samples are within Acceptance Criteria?		
Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Extraction Surrogate Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☐ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☐ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☐ **N/A**	
Lab Control Sample (LCS) recovery	☐ **Yes** ☐ **No** ☐ **N/A**	

Data check completed by **Date**

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☐ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☐ Yes ☐ No	
Data check completed by		**Date**

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes ☐ No ☐ N/A	**Comments**	
Trip Blank results acceptable?	☐ Yes ☐ No ☐ N/A	**Comments**	
Field Blank results acceptable?	☐ Yes ☐ No ☐ N/A	**Comments**	
Equipment Blank results acceptable?	☐ Yes ☐ No ☐ N/A	**Comments**	
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes ☐ No ☐ N/A	**Comments**	
Data check completed by		**Date**	

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes ☐ No ☐ N/A	**Comments**	
Field pH vs. Lab pH RPDs acceptable?	☐ Yes ☐ No ☐ N/A	**Comments**	
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☐ Yes ☐ No ☐ N/A	**Comments**	
Data check completed by		**Date**	

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose?	☐ Yes ☐ No		
Explain rationale for yes/no:			
Request lab to recheck data? If so give details	☐ Yes ☐ No ☐ N/A	**Comments**	
If Yes, Lab request to recheck must be approved by Project Manager Name:		**Date**	
Data check completed by		**Date**	

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

1. BACKGROUND

Client	Imperial	**Date(s) sampled**	2023-08-21
Laboratory	BV	**Project No.**	417085-49223
Lab Submission No.	C366008	**Site name**	Norman Wells - AEMP

2. SAMPLE RECEIPT CONFIRMATION (SRC)

SRC cross-checked against the chain of custody (COC; sample names, analytical packages)? ☐ **Yes** ☒ **No** **Comments** good

(Fundamental Laboratory Acceptance Guideline (FLAG) received? ☐ **Yes** ☒ **No**

If yes, FLAG type and comments*:*

Date samples submitted 2023-08-24

Due date for lab report on SRC 2023-09-08

SRC cross-checked with program planning / analytical schedule (sample names, analytical packages correct as per schedule)? ☒ Yes ☐ No **Comments** good

Data check completed by Alex Haigh **Date** 2024-03-26

3. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab data received (pdf/dbf) with signature? ☒ **Yes** ☐ **No** **Comments**

(Imperial Oil only) Data Quality Waver (DQW) issued? ☐ **Yes** ☒ **No** **If yes, contact PM. DQW *MUST BE* signed and returned to lab in 5 working days.**

Date returned to lab:

Extractions and analysis conducted within acceptable hold times? ☐ **Yes** ☒ **No** Turbidity, true colour, orthophosphate, nitrite

Lab has warranted all tests were in statistical control? (look for trend rule failure notes) ☒ **Yes** ☐ **No**

Lab QA/QC samples are within Acceptance Criteria?

Instrument Surrogate Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Extraction Surrogate Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Method Blank Concentration	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Duplicate RPD	☒ **Yes** ☐ **No** ☐ **N/A**	
Matrix Spike Recovery	☒ **Yes** ☐ **No** ☐ **N/A**	
Spiked Blank Recovery	☐ **Yes** ☐ **No** ☒ **N/A**	
Lab Control Sample (LCS) recovery	☒ **Yes** ☐ **No** ☐ **N/A**	

Data check completed by Alex Haigh **Date** 2024-03-26

Laboratory Report Data Checklist

Both Database and Project Staff sections to be completed within 5 calendar days of receipt of Lab Confirmation Package and Certificate Of Analysis

4. CERTIFICATE OF ANALYSIS (COA) LAB QA/QC REPORT

Lab reports have all the requested packages, on the correct samples?	☒ Yes ☐ No	
Detection limits are suitable for the project purpose? (What was requested on the COC and is that correct? Have any been raised?)	☒ Yes ☐ No	
Data check completed by	Alex Haigh	**Date** 2024-03-26

5. CERTIFICATE OF ANALYSIS (COA) FIELD DUPLICATES, BLANKS

Field duplicates decoded and RPDs acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Trip Blank results acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Field Blank results acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Equipment Blank results acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Correspondence re: lab QA/QC issues attached (and saved under correct job #)?	☐ Yes ☐ No ☒ N/A	**Comments**	
Data check completed by	Alex Haigh	**Date**	2024-03-26

6. LAB DATA/FIELD DATA/HISTORICAL DATA CHECKS

Field EC vs. Lab EC RPDs acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Field pH vs. Lab pH RPDs acceptable?	☐ Yes ☐ No ☒ N/A	**Comments**	
Is lab collected data within acceptable/expected historical ranges (if applicable)? Check against historical data tables if they exist.	☒ Yes ☐ No ☐ N/A	**Comments**	
Data check completed by	Alex Haigh	**Date**	2024-03-26

7. CERTIFICATE OF ANALYSIS (COA) RESULTS INTERPRETATION

Are data in this report considered to be Fit for Purpose?	☒ Yes ☐ No		
Explain rationale for yes/no:			
Request lab to recheck data? If so give details	☐ Yes ☒ No ☐ N/A	**Comments**	
If Yes, Lab request to recheck must be approved by Project Manager Name:		**Date**	
Data check completed by	Alex Haigh	**Date**	2024-03-26