Water Resources Audit Report

Dempster Highway Sewage Pit Facility

Water Resources Branch
[January 07, 2025]

Preface

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

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

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

Executive summary

The Water Resources Branch (WRB) visited the Dempster Highway Sewage Pit Facility in June 2023. Water quality samples were taken from the wastewater pit and two nearby groundwater monitoring wells. Parameters measured included metals, hydrocarbons, fecal coliforms, and other common parameters, along with artificial sweeteners. Previous sampling results were also compiled and where applicable, water quality was compared with Yukon Contaminated Sites Regulation (CSR) standards.

Water quality results indicated the presence of sewage pit water in nearby groundwater. These included elevated levels of nitrogen species and petroleum hydrocarbons that were in some cases above CSR standards.

This report recognizes that there remains a limited amount of water quality available for this location and makes recommendations to further monitor and assess effects of the wastewater facility. These include recommendations related to 1) petroleum hydrocarbons, 2) hydrogeologic characterization and groundwater monitoring, 3) siting new groundwater monitoring wells and 4) site water balance monitoring.

1 Introduction

The Dempster Highway Sewage Pit was originally purposed to be a temporary solution to dispose sewage for residents located on the Klondike Valley (not including Dawson City), Highways and Public Works grader stations, the Dawson airport and campgrounds in the Dawson City area. The facility was designed to accept 8,215 m^3 of wastewater per year (Yukon Territory Water Board - Terms and Conditions of Water Use Licence MS98-114); however, performance challenges of the Dawson City wastewater treatment system has resulted in continued use of the Dempster Pit, including to dispose of sludge from the Dawson City system (Yucan Planning, 2024a).

The facility consists of one sewage pit where the sewage is disposed of via a delivery culvert, located on the north corner of the pit. A gravel borrow pit used for the construction of the Dempster Highway is located adjacent to the west of the sewage pit.

There is no current water use licence in place for this facility. The previous water licence MS98-114 (Type B Miscellaneous undertaking) expired on July 31, 2008 and was not renewed. In January 2024, an application was submitted to YESAB (#2024-0020) to obtain a water licence for a ten-year period. As of January 2025, a water licence application (MN24-022) is undergoing adequacy review with the Yukon Water Board.

Government of Yukon, Department of Environment, Water Resources Branch (WRB) conducted an audit of the Dempster Highway sewage pit facility in June 2023. The purpose of the audit was to learn about the facility, particularly to better understand any potential impacts to the receiving water environment and any implications as it relates to their pending water licence. The objectives of the audit were to:

1. Observe and document site conditions (the sewage pit status; sewage level in the pit in relation to the top of the pit, and where the sewage would flow if sewage were to be released from the pit);
2. Compare concentrations of contaminants of potential concern in the unlicensed sewage pit to relevant standards of the *Contaminated Sites Regulation* (CSR); and
3. Assess whether there are detectable impacts to groundwater quality in the vicinity of the pit based on existing monitoring wells.

2 Field methods and equipment

To understand potential impacts of the wastewater facility on the receiving water environment, WRB wanted to understand the flow paths of groundwater from the facility and whether residual wastewater is present in groundwater monitoring wells and down-gradient area of the sewage pit.

WRB completed a site reconnaissance and water sampling event on June 07, 2023. WRB collected water quality samples at the following locations:

- Monitoring wells 19MW01S and 19MW02D, located west and southwest of the sewage pit; and
- at the northwest area of the sewage pit, in the proximity of the sewage delivery culvert.

Samples were collected by WRB staff following the Water Quality Sampling Protocol for Government of Yukon Monitoring Programs (Government of Yukon 2021) and followed the requirements from the commercial lab conducting the analyses. In-situ water quality field parameters were measured using a YSI ProDSS handheld multimeter, except from the sewage pit, where field parameters were not recorded, due to the risk of contaminating the YSI probe.

The multimeter was calibrated before going in the field by WRB staff as per manufacturer specifications and best practices. Water samples collected by WRB staff during the June 2023 site visit are outlined in Samples collected were analyzed for a suite of analytical parameters; these parameters were selected to support site audit

objectives and to allow for comparison with the effluent quality standards listed in the expired WL MS98-114.

Figure 1: Site plan and sampling locations

Table The sampling locations are presented in Figure 1. Complete results from the sample analysis can be found in Appendix B.

Samples collected were analyzed for a suite of analytical parameters; these parameters were selected to support site audit objectives and to allow for comparison with the effluent quality standards listed in the expired WL MS98-114.

Figure 1: Site plan and sampling locations

Table 1.Water samples collected during the June 2023 site audit.

Station Code	Location	Date & Time	Coordinates		Rationale
			Lat	Long	
19MW01S	MW southwest of sewage pit	07-Jun-2023 15:15	63.990755	-138.672650	Assess potential impact to receiving environment
19MW02D	MW west of sewage pit	07-Jun-2023 14:40	63.990882	-138.672823	Assess potential impact to receiving environment
Pit	North area of sewage pit	07-Jun-2023 15:30	63.991118	-138.672180	Characterize wastewater source

Table 2. Analysis performed for samples collected during the June 2023 site audit.

Parameter
- Field parameters (temperature, pH, specific conductance, dissolved oxygen, oxidation-reduction potential, turbidity) - Major ions (bicarbonate, bromide, calcium, carbonate, chloride, fluoride, hydroxide, magnesium, potassium, sodium, and sulphate) - Nutrients (nitrate, nitrite, nitrate+nitrite, total ammonia, total nitrogen, total phosphorus, dissolved phosphorus, and dissolved phosphorus as phosphate) - Total suspended/dissolved solids - Turbidity, conductivity, pH - Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC) - Artificial sweeteners - Stable water isotopes - Total and dissolved metals including mercury - Fecal coliforms

3 Results & discussion

WRB visited the site on June 7, 2023 and documented the following primary observations:

- The adjacent area to the east and southeast of the sewage pit was observed to be dry at the time of the site visit, as well as the gravel borrow pit located to the southwest. No signs of sewage spillage or infiltration from the sewage lagoon were observed.
- The older monitoring well (MW1), located down-gradient and south of the sewage pit, was observed to be dry.
- The access gate to the site was open and unlocked when the site was visited by WRB.
- The staff gauge marked on the Tetra Tech 2020 site plan was not observed, and accurately assessing the sewage level in the pit in relation to the top of the pit was not possible. Based on visual observation, the sewage level was approximately 1.7 m below the top of the pit walls. The level in the sewage pit was also higher compared to 2021 field photos by Tetra Tech.

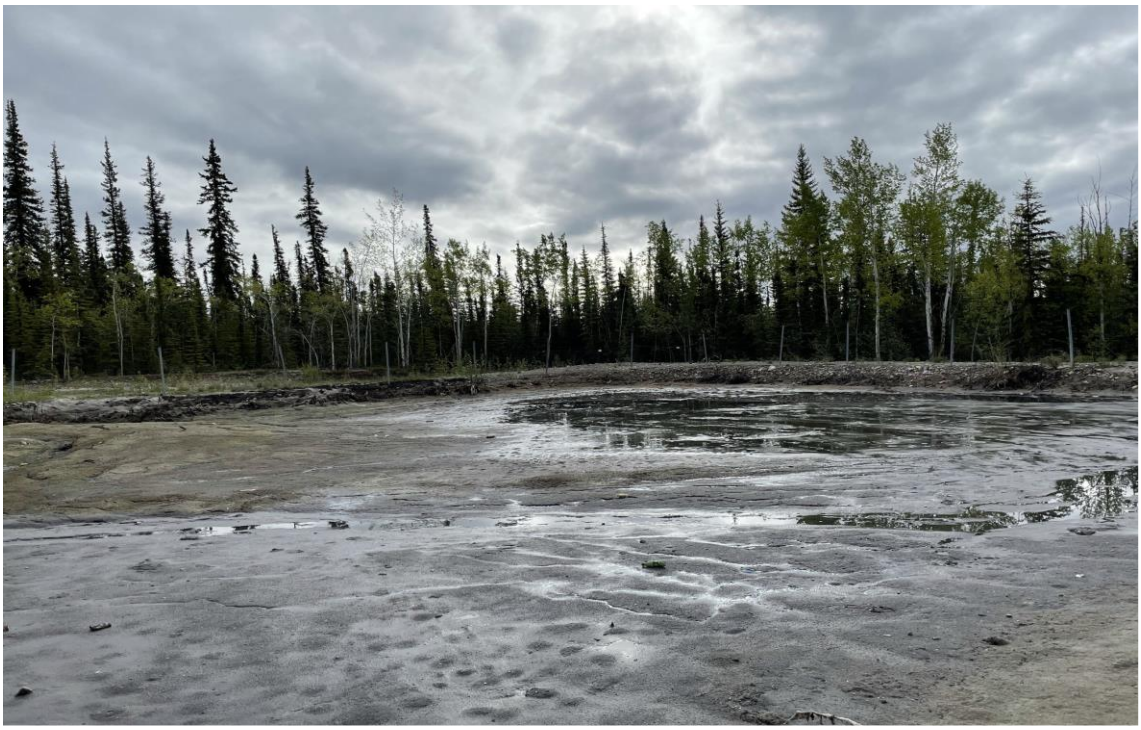
- 

Photo 1: View of the sewage pit looking south-east (TetraTech, June 2021)

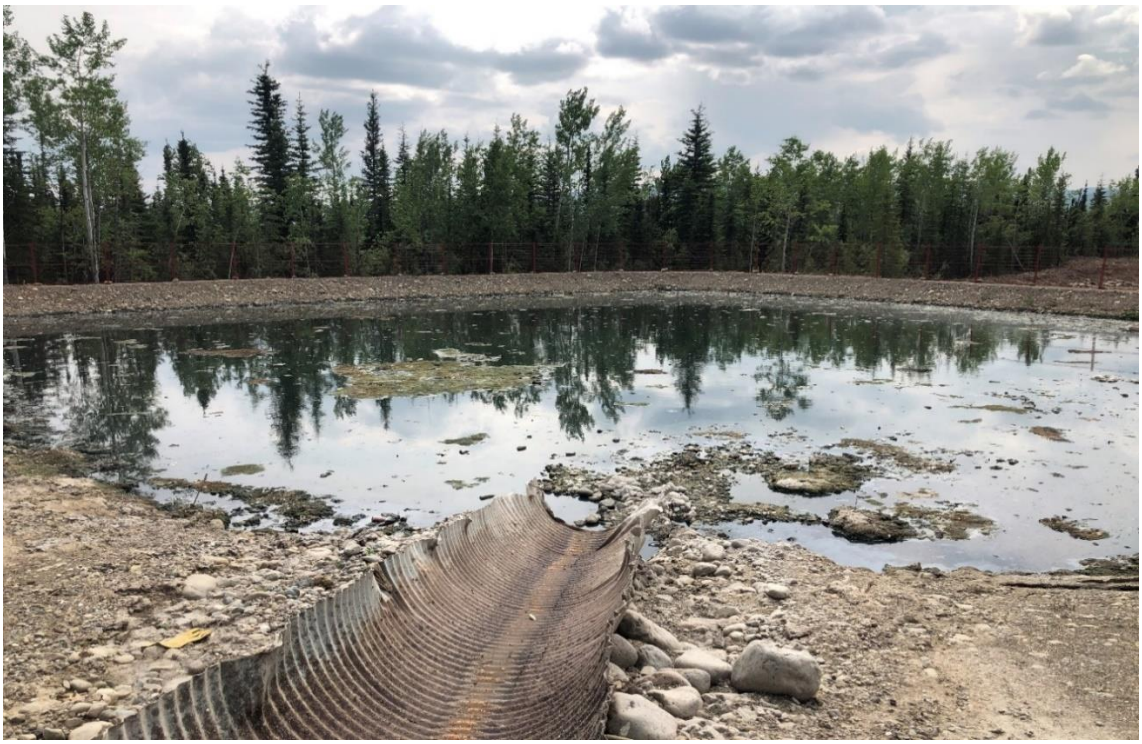


Photo 2: View of the sewage pit looking south (WRB, June 7, 2023)

- A desludging gravel pad on a liner was observed adjacent to the east sewage pit fence during the June 7th site visit. The gravel pad appears to be an outhouse waste drying bed (WSP – Dempster Pit De-Sludging Inspection Report, 2023).

As per Section 4.2.5 of the 2023 “Dempster Pit Operational Plan”, a second drying bed will be built to accept outhouse waste discharge specifically. A six inch-diameter PVC pipe (part of the desludging system installed by Lambourne Environmental on August 20, 2023) was observed to protrude from the west side of the pad, towards the sewage pit, and liquid discharge was observed to seep from the pipe (see photo 3 below).

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Photo 3: Partial view of the drying bed and the protruding PVC pipe on the left of the photo (WRB, June 7, 2023)

- A subsequent site visit by WRB personnel on June 26, 2023 revealed that a drying bed was installed (photo 4, below).

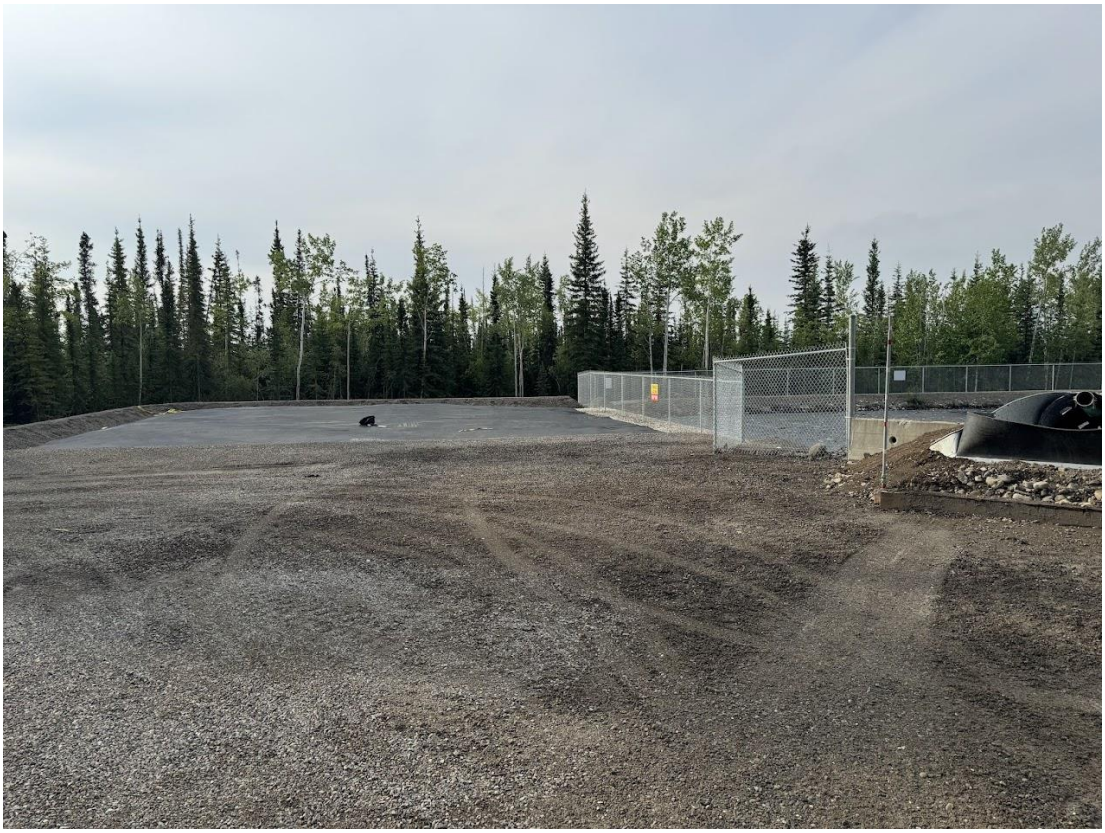
- 

Photo 4: Completed drying bed adjacent to the pit (WRB, June 24, 2023)

- Additional site upgrades noted during the June 24, 2023 site visit included a new fence around the pit, a new culvert and new site gate (photos 5 and 6 below).

Photo 5: New fence and culvert installed at the pit (WRB, June 24, 2023)

Photo 6: New site access gate installed (WRB, June 24, 2023)

3.1 Previous and current analytical results

Water quality results from the WRB 2023 sampling event and the 2021 and 2022 sampling events completed by Tetra Tech were compared with the generic numerical aquatic life standards in Schedule 3 of the Contaminated Sites Regulation (CSR-AW). Parameters that contained an exceedance in the monitoring wells from at least one of the samples are shown in Table 3, along with nitrate and ammonia which provide further context.

Table 3: Summary of analytical results

	Nitrate as N (mg/L)	Nitrite as N (mg/L)	Ammonia (mg/L)	Sulphate (mg/L)	Toluene (µg/L)	LEPH (µg/L)
CSR fAL-SW	40	*	*	100	39	50
CSR fAL	400	*	*	1000	390	500
19MW01S						
June 2021	3.51	0.850 [1]	-	23.7	-	-
June 2021 (Dup)	4.36	1.07 [1]	-	23.6	-	-
Aug 2022	9.98	0.379 [1]	-	12.6	-	-
Aug 2022 (Dup)	10.2	0.389 [1]	-	13.0	-	-
June 2023	4.57	1.42 [1]	0.0341	16.5	-	<250
19MW01D						
Aug 2022	1.51	0.0540	-	1060 [1]	-	-
19MW02D						
June 2021	24.2	25.5 [2]	-	19.4	-	-
Aug 2022	12.0	0.0140	-	10.2	-	-
June 2023	5.49	0.0376	0.0155	13.1	-	<250
19MW03D						
June 2021	0.629	0.0052	-	13.5	-	-
Aug 2022	0.441	<0.0010	-	9.20	-	-
PIT						
June 2021	<0.0250	<0.0050	-	13.5	635 [2]	1090 [2]
Aug 2022	<0.0500	<0.0100	-	<3.00	3110 [2]	3960 [2]
June 2023	<0.0250	0.0183	0.281	<1.50	-	2720 [2]

* - Standard is pH-dependent
[1] – Exceeds Yukon CSR Sched3 for fresh Aquatic Life – Surface Water (fAL-SW)
[2] – Exceeds Yukon CSR Sched3 fAL-SW and Yukon CSR Sched3 fAL

Concentrations of nitrate and nitrite were higher in downgradient wells 19MW01S and 19MW02D compared to the presumed up-gradient well 19MW03D, indicating a potential influence in groundwater quality from the septic lagoon. Sewage contains nitrogen, which can be oxidized by microorganisms to form nitrite and nitrate. An

increase in nitrite or nitrate concentrations in groundwater downgradient of a wastewater facility, such as a sewage pit, is an indication that the facility is impacting local groundwater quality. Elevated nitrogen species in groundwater were observed as a result of oxidation of ammonia from the pit. The nitrite concentration in 19MW01S was 1.42 mg/L (compared to the CSR-AW, which is 2 mg/L when chloride is >10 mg/L).

Wastewater analytical results indicated evidence of hydrocarbon contamination within the material being released into the septic lagoon. The toluene concentration in the August 2022 sample was 3,110 µg/L while the CSR drinking water (DW) and AW standards are 2.4 and 39 µg/L, respectively. Overall, the reported concentrations for hydrocarbon analyte parameters were significantly higher in the August 2022 sampling event than the June 2021 sampling event (Tetra Tech, 2022).

During WRB's June 2023 sampling event, LEPH (Light Extractable Petroleum Hydrocarbons) concentrations in the pit (2,720 ug/L) exceeded the CSR-AW for groundwater (500 ug/L); however, LEPH concentrations in the two wells (19MW01S and 19MW02D) were below the laboratory detection limit (<250 ug/L).

3.2 Artificial sweeteners and wastewater flow paths

Artificial sweeteners are synthetic compounds commonly used as food additives. They are widespread in products consumed by humans but have no natural source, are persistent in the natural environment (particularly acesulfame and sucralose), and can be detected at relatively low concentrations, making them useful tracers of human wastewater (Spoelstra et al. 2017).

Sweeteners were detected at concentrations above the practical quantitation limit in all samples as shown below (Table 4). This confirms that the two monitoring wells sampled are influenced by pit wastewater. The greatest concentration of artificial sweeteners was observed in the raw pit water (as expected), with concentrations in the wells indicating on the order of 5-50x dilution.

Table 4. Complete sweetener analysis results for June 2023 samples.

Sample Name	Acesulfame (ng/L)	Saccharin (ng/L)	Cyclamate (ng/L)	Sucralose (ng/L)
19MW01S	4,917	1,369	3,350	13,252
19MW01S (LR)	4,984	1,357	1,512	13,357

Sample Name	Acesulfame (ng/L)	Saccharin (ng/L)	Cyclamate (ng/L)	Sucralose (ng/L)
19MW02D	1,084	294	469	2,760
19MW02D (LR)	1,550	401	504	3,596
Pit	27,573	12,927	57,739	67,725
Pit (LR)	27,085	9,610	55,953	69,610
MDL	**2**	**2**	**3**	**20**
PQL	**6**	**6**	**8**	**60**

Method: IC/ESI/MS/MS ACS500 suppressor
MDL: minimum detection limit
PQL: practical quantitation limit
LR: Laboratory replicate sample

4 Recommendations

Overall, the site has limited available water data. This audit represents a snapshot in time, and while the results from this audit and the previous Tetra Tech sampling suggest potential for elevated nitrogen and PHCs, further characterization is needed. The following recommendations to improve this characterization are based on WRB's learnings from this audit as well as a review of the aforementioned YESAB project proposal. Each of these recommendations is for consideration to the water licence applicant to implement.

1. **Petroleum hydrocarbons:**

a) Increase characterization of influent sludge to test for petroleum hydrocarbons;
b) Continue and enhance monitoring of petroleum hydrocarbons in the pit and groundwater monitoring wells; and
c) Take reasonable steps to prevent deposit of petroleum hydrocarbons in the influent.

Rationale: The Dempster Pit is not designed as a facility to treat petroleum hydrocarbons. As such, the only reasonable response to elevated PHCs is to attempt to reduce the source. The project proposal currently under assessment includes such plans for enhanced monitoring and characterization in the Operational Plan (Yucan Planning, 2024b). WRB supports implementation of such measures.

2. **Hydrogeologic characterization and groundwater monitoring:**

Drill an additional borehole south-southeast of the facility and install nested groundwater monitoring wells in this new borehole to:

a) Improve the interpretation of the groundwater flow direction;

b) Enable groundwater quality monitoring in this area, which may be impacted by the pit; and

c) Site the proposed "far-field" downgradient groundwater monitoring wells proposed in the Operational Plan.

Rationale: The Operational Plan (Yucan Planning, 2024b, section 6.3.3) includes a plan to advance two new boreholes and install nested groundwater monitoring wells in each. Proposed locations of these boreholes are not shown in the Operational Plan; however, the Plan states that the "boreholes will be drilled approximately 60m and 110m southwest of the lagoon."

The current network of active monitoring wells does not allow for accurate interpretation of the groundwater flow direction and likely fails to monitor the breadth of the plume of groundwater that is impacted from the pit and flowing off-site. The active downgradient monitoring wells, 19MW01 and 19MW02 essentially form a line with the active upgradient monitoring well, 19MW03. Ideally, networks of three groundwater monitoring wells form a triangular array, which enables triangulation of the hydraulic heads measured in each well and interpolation of the equipotential surface between the wells (ideally spanning the area in which the groundwater flow direction is to be determined).

An additional borehole should be advanced south-southeast of the sewage pit and nested groundwater monitoring wells should be installed in this borehole to improve the interpretation of the groundwater flow direction and enable groundwater quality monitoring in this area, which may be impacted by the pit. A map of groundwater elevation contours should be prepared using groundwater elevations measured in these new wells and the existing active wells and the groundwater flow direction should be re-interpreted in light of these new data.

3. **Siting new groundwater monitoring wells:**

Revise the locations of the "far-field" downgradient groundwater monitoring wells proposed in the Operational Plan on the basis of data from additional new monitoring wells recommended above.

Rationale: It is not currently possible to optimally site new groundwater monitoring wells in order to delineate the plume of groundwater impacted by the pit. This is because the current network of active monitoring wells does not allow for accurate interpretation of the groundwater flow direction (see Rationale for previous recommendation). Locations for the additional "far-field" downgradient monitoring wells proposed in the Operational Plan should be re-considered in light of the re-interpreted groundwater flow direction

WRB assumes that the intention is to locate the proposed new monitoring wells along an existing area of disturbance; however, these locations may not be optimal in terms of delineating the plume of groundwater impacted by the pit, which is the objective of the new wells, according to the Operational Plan. WRB recognizes that optimally locating the new wells may lead to new land disturbances. The potential impacts of these disturbances must be considered and mitigated appropriately.

4. Water Balance:

Monitor influent volumes and water levels in the sewage pit.

Rationale: The staff gauge was observed to be missing during WRB site visit. Tracking of water levels and influent volumes is needed to provide a reasonable understanding of the water balance for the facility. This is needed to ensure there is sufficient storage in the pit that can avoid any overtopping events.

5 Authors & contact information

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References

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Tetra Tech (2020), Hydrogeological Assessment, Dempster Highway KM 3.9 Sewage Pit, Yukon

Tetra Tech (2022), 2021 Groundwater Monitoring of the Dempster Highway KM 3.9 Sewage Pit, Yukon

Tetra Tech (2023), 2022 Groundwater Monitoring of the Dempster Highway KM 3.9 Sewage Pit, Yukon

Tetra Tech (2023), Groundwater Monitoring Plan Sewage Pit, Dempster Highway KM 3.9, Yukon

WSP Canada Inc. (2023), Dempster Pit De-Sludging Inspection Report

Yucan Planning. 2024a. Municipal Water License Application: Dempster Sewage Lagoon, YESAB document #2024-0020-0002.

Yucan Planning. 2024b. OPERARTIONAL PLAN -Dempster Lagoon Sewage Treatment Facility, YESAB document #2024-0020-0003.

Yukon Territory Water Board (2000), Water Use Licence MS98-114

Appendix A – Field notes and site conditions

Table 5. Field notes.

Station Code	Station Description	Field Notes
19MW01S	Southwest monitoring well	Well in good standing; water clear during well purging
19MW02D	West monitoring well	Well in good standing; water clear during well purging
Pit	Sewage pit	Water turbid; scum on the surface

Table 6. Site visit dates and conditions.

Date	Weather	Site Conditions
June 07, 2023	Partly cloudy, 21°C at the time of the site visit	Accessed the site by vehicle. Sampled two monitoring wells and collected one water sample from the sewage pit; samples for full suite analysis.

In-situ field data was compared against lab data as a check of quality assurance. pH of samples is known to vary any time after 15 minutes and therefore likely the reason for an RPD over 10%. The specific chemistry of a single water sample will cause changes to the pH, but this change is not always linear or predictable.

Table 7. Results of in-situ and lab data comparison from June 2023 water samples.

Sample Location	Field pH (pH Units)	Lab pH (pH Units)	RPD Should be below 10%	Field Conductivity (µS/cm)	Lab Conductivity (µS/cm)	RDP Should be below 20%
19MW01S	6.65	7.50	12.01	640	Not reported	n/a
19MW02D	6.61	7.45	11.94	559	Not reported	n/a
Pit	Not measured	7.30	n/a	Not measured	Not reported	n/a

Appendix B – ALS water quality sample result

CERTIFICATE OF ANALYSIS

Work Order	: **WR2300506**	Page	: 1 of 10
Client	: **Government of Yukon**	Laboratory	: Whitehorse - Environmental
Contact	: Water Resources Branch	Account Manager	: Tasnia Tarannum
Address	: Department of Environment, Environmental Protection and Assessment Branch 419 Range Road Whitehorse YT Canada Y1A 3V1	Address	: #12 151 Industrial Road Whitehorse YT Canada Y1A 2V3
Telephone	: ----	Telephone	: +1 867 668 6689
Project	: Dempster Sewage Lagoon	Date Samples Received	: 09-Jun-2023 23:43
PO	: ----	Date Analysis Commenced	: 12-Jun-2023
C-O-C number	: ----	Issue Date	: 19-Jun-2023 09:17
Sampler	: ----		
Site	: YOWN - Yukon Observation Well Network		
Quote number	: WR22-GYPT100-002		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Anshim Anshim	Lab Assistant	Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Inorganics, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Organics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*
SFP	*Sample was filtered and preserved at the laboratory.*
SMI	*Surrogate recovery could not be measured due to sample matrix interference.*

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: 19MW01S	19MW02D	----	----	----
					Client sampling date / time: 07-Jun-2023 15:15	07-Jun-2023 14:30	----	----	----
					WR2300506-001	WR2300506-002	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
Hardness (as CaCO3), dissolved	----	EC100/VA	0.60	mg/L	264	250	----	----	----
pH @ 15°C (WSER)	----	E108A/VA	0.10	pH units	7.50	7.45	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	3.99	2.03	----	----	----
Ammonia, un-ionized (as N), 15°C (WSER)	7664-41-7	EC298/VA	0.0010	mg/L	0.0341	0.0155	----	----	----
Bromide	24959-67-9	E235.Br-L/VA	0.050	mg/L	<0.050	<0.050	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L	26.8	23.0	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L	0.079	0.089	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L	4.57	5.49	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L	5.99	5.53	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L	1.42	0.0376	----	----	----
Nitrogen, total	7727-37-9	E366/VA	0.030	mg/L	10.7	8.10	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	<0.0020	0.0032	----	----	----
Phosphorus, total dissolved	7723-14-0	E375-T/VA	0.0020	mg/L	<0.0020 SFP	0.0032 SFP	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L	16.5	13.1	----	----	----
Dissolved Metals									
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L	<0.0010	0.0015	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L	0.00012	0.00014	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L	0.00029	0.00023	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L	0.395	0.253	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L	<0.000100	<0.000100	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L	<0.000050	<0.000050	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L	0.024	0.016	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L	0.000213	0.0000978	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L	81.3	78.5	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L	<0.000010	<0.000010	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L	<0.00050	<0.00050	----	----	----

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	19MW01S	19MW02D	----	----	----
					Client sampling date / time	07-Jun-2023 15:15	07-Jun-2023 14:30	----	----	----
						WR2300506-001	WR2300506-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		0.00787	0.00035	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		0.00173	0.00358	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		0.183	<0.010	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0045	0.0048	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		14.7	13.1	----	----	----
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		4.20	0.123	----	----	----
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	0.0000119	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.000786	0.000275	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		0.0105	0.00409	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.050	<0.050	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		2.93	4.21	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00060	0.00054	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		0.000454	0.000812	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		5.95	5.98	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		9.10	6.16	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.439	0.370	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		5.68	4.39	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00020	<0.00020	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		0.000030	0.000012	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00030	<0.00030	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		0.00021	<0.00010	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.00117	0.00129	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00050	<0.00050	----	----	----
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0035	0.0030	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00020	mg/L		<0.00020	<0.00020	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	Field	----	----	----

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	19MW01S	19MW02D	----	----	----
					Client sampling date / time	07-Jun-2023 15:15	07-Jun-2023 14:30	----	----	----
						WR2300506-001	WR2300506-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	----	----	----
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L		<2.0	<2.0	----	----	----
Oil & grease (gravimetric)	----	E567/VA	5.0	mg/L		<5.0	<5.0	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	<250	----	----	----
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	----	----	----
HEPHw	----	EC600A/VA	250	µg/L		<250	<250	----	----	----
LEPHw	----	EC600A/VA	250	µg/L		<250	<250	----	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		82.7	81.9	----	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Acridine	260-94-6	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	----	----	----
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		<0.015	<0.015	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	----	----	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	19MW01S	19MW02D	----	----	----
					Client sampling date / time	07-Jun-2023 15:15	07-Jun-2023 14:30	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		WR2300506-001	WR2300506-002	--------	--------	--------
						Result	Result	----	----	----
Polycyclic Aromatic Hydrocarbons										
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		<0.050	<0.050	----	----	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		<0.020	<0.020	----	----	----
Pyrene	129-00-0	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L		<0.050	<0.050	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		86.4	79.8	----	----	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		106	100	----	----	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		107	102	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Surface Water (Matrix: Water)					Client sample ID	Pit	----	----	----	----
					Client sampling date / time	07-Jun-2023 15:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		WR2300506-003	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA	0.60	mg/L		184	----	----	----	----
pH @ 15°C (WSER)	----	E108A/VA	0.10	pH units		7.30	----	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		51.9	----	----	----	----
Ammonia, un-ionized (as N), 15°C (WSER)	7664-41-7	EC298/VA	0.0010	mg/L		0.281	----	----	----	----
Bromide	24959-67-9	E235.Br-L/VA	0.050	mg/L		<0.250 DLDS	----	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		43.9	----	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		0.109	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.0250 DLDS	----	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		<0.0255	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		0.0183	----	----	----	----
Nitrogen, total	7727-37-9	E366/VA	0.030	mg/L		108	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L		14.5	----	----	----	----
Phosphorus, total dissolved	7723-14-0	E375-T/VA	0.0020	mg/L		10.2	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		<1.50 DLDS	----	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		0.0279	----	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		0.00023	----	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00206	----	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.108	----	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L		<0.000100	----	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	----	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.187	----	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000050	----	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		48.2	----	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		0.000069	----	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		0.00074	----	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		0.00194	----	----	----	----

Analytical Results

Sub-Matrix: Surface Water (Matrix: Water)					Client sample ID	Pit	----	----	----	----
					Client sampling date / time	07-Jun-2023 15:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		WR2300506-003	--------	--------	--------	--------
						Result	----	----	----	----
Dissolved Metals										
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		0.00101	----	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		1.27	----	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	----	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0035	----	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		15.6	----	----	----	----
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.319	----	----	----	----
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	----	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.000121	----	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		0.00960	----	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		16.1	----	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		19.7	----	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.0183	----	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		0.00108	----	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		3.82	----	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	----	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		33.9	----	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.216	----	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		23.7	----	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00020	----	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000010	----	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00010	----	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		0.00034	----	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		0.00091	----	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		<0.00010	----	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.000076	----	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00050	----	----	----	----
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0020	----	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00020	mg/L		0.00032	----	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	----	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Laboratory	----	----	----	----

Analytical Results

Sub-Matrix: Surface Water (Matrix: Water)					Client sample ID	Pit	----	----	----	----
					Client sampling date / time	07-Jun-2023 15:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		WR2300506-003	--------	--------	--------	--------
						Result	----	----	----	----
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L		208	----	----	----	----
Oil & grease (gravimetric)	----	E567/VA	5.0	mg/L		34.7	----	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		2720	----	----	----	----
EPH (C19-C32)	----	E601A/VA	250	µg/L		8150	----	----	----	----
HEPHw	----	EC600A/VA	250	µg/L		8150	----	----	----	----
LEPHw	----	EC600A/VA	250	µg/L		2720	----	----	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		100	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		<0.039 DLQ	----	----	----	----
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		<0.010	----	----	----	----
Acridine	260-94-6	E641A/VA	0.010	µg/L		<0.010	----	----	----	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L		<0.010	----	----	----	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		<0.042 DLCI	----	----	----	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		<0.0123 DLQ	----	----	----	----
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		<0.010	----	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		<0.015	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		<0.010	----	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		<0.010	----	----	----	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L		<0.042 DLCI	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		<0.0050	----	----	----	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		<0.042 DLCI	----	----	----	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L		<0.871 DLQ	----	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		<0.010	----	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		0.105	----	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		0.138	----	----	----	----
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		0.150	----	----	----	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		<0.045 DLQ	----	----	----	----

Analytical Results

Sub-Matrix: Surface Water (Matrix: Water)					Client sample ID	Pit	----	----	----	----
					Client sampling date / time	07-Jun-2023 15:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		WR2300506-003	--------	--------	--------	--------
						Result	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
Pyrene	129-00-0	E641A/VA	0.010	µg/L		<0.042 DLCI	----	----	----	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L		0.222	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		72.0	----	----	----	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		Not Determined SMI	----	----	----	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		97.3	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WR2300506**	Page	: 1 of 13
Client	: **Government of Yukon**	Laboratory	: Whitehorse - Environmental
Contact	: Water Resources Branch	Account Manager	: Tasnia Tarannum
Address	: Department of Environment, Environmental Protection and Assessment Branch 419 Range Road Whitehorse YT Canada Y1A 3V1	Address	: #12 151 Industrial Road Whitehorse, Yukon Canada Y1A 2V3
Telephone	: ----	Telephone	: +1 867 668 6689
Project	: Dempster Sewage Lagoon	Date Samples Received	: 09-Jun-2023 23:43
PO	: ----	Issue Date	: 19-Jun-2023 09:14
C-O-C number	: ----		
Sampler	: ----		
Site	: YOWN - Yukon Observation Well Network		
Quote number	: WR22-GYPT100-002		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] 19MW01S	E555	07-Jun-2023	----	----	----		12-Jun-2023	3 days	5 days	× EHTL
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] 19MW02D	E555	07-Jun-2023	----	----	----		12-Jun-2023	3 days	5 days	× EHTL
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Pit	E555	07-Jun-2023	----	----	----		12-Jun-2023	3 days	5 days	× EHTL
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) 19MW01S	E567	07-Jun-2023	15-Jun-2023	28 days	8 days	✓	16-Jun-2023	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) 19MW02D	E567	07-Jun-2023	15-Jun-2023	28 days	8 days	✓	16-Jun-2023	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) Pit	E567	07-Jun-2023	15-Jun-2023	28 days	8 days	✓	16-Jun-2023	40 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) 19MW01S	E298	07-Jun-2023	12-Jun-2023	----	----		12-Jun-2023	28 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
19MW02D	E298	07-Jun-2023	12-Jun-2023	----	----		12-Jun-2023	28 days	5 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (lab preserved)										
Pit	E298	07-Jun-2023	12-Jun-2023	3 days	5 days	× EHTL	12-Jun-2023	28 days	0 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
19MW01S	E235.Br-L	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
19MW02D	E235.Br-L	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
Pit	E235.Br-L	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
19MW01S	E235.Cl	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
19MW02D	E235.Cl	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Pit	E235.Cl	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
19MW01S	E235.F	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE 19MW02D	E235.F	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Pit	E235.F	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE 19MW01S	E235.NO3-L	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	3 days	6 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE 19MW02D	E235.NO3-L	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	3 days	6 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Pit	E235.NO3-L	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE 19MW01S	E235.NO2-L	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE 19MW02D	E235.NO2-L	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Pit	E235.NO2-L	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	3 days	6 days	× EHTL
Anions and Nutrients : Sulfate in Water by IC										
HDPE 19MW01S	E235.SO4	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
19MW02D	E235.SO4	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Pit	E235.SO4	07-Jun-2023	13-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (lab preserved)										
19MW01S	E375-T	07-Jun-2023	12-Jun-2023	3 days	5 days	× EHTL	13-Jun-2023	28 days	1 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (lab preserved)										
19MW02D	E375-T	07-Jun-2023	12-Jun-2023	3 days	5 days	× EHTL	13-Jun-2023	28 days	1 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (lab preserved)										
Pit	E375-T	07-Jun-2023	12-Jun-2023	3 days	5 days	× EHTL	13-Jun-2023	28 days	1 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
19MW01S	E366	07-Jun-2023	12-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
19MW02D	E366	07-Jun-2023	12-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (lab preserved)										
Pit	E366	07-Jun-2023	12-Jun-2023	3 days	5 days	× EHTL	13-Jun-2023	28 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
19MW01S	E372-U	07-Jun-2023	12-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
19MW02D	E372-U	07-Jun-2023	12-Jun-2023	----	----		13-Jun-2023	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (lab preserved)										
Pit	E372-U	07-Jun-2023	12-Jun-2023	3 days	5 days	× EHTL	13-Jun-2023	28 days	1 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
19MW01S	E509	07-Jun-2023	12-Jun-2023	----	----		12-Jun-2023	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
19MW02D	E509	07-Jun-2023	12-Jun-2023	----	----		12-Jun-2023	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
Pit	E509	07-Jun-2023	14-Jun-2023	----	----		14-Jun-2023	28 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
Pit	E421	07-Jun-2023	12-Jun-2023	----	----		14-Jun-2023	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
19MW01S	E421	07-Jun-2023	12-Jun-2023	----	----		14-Jun-2023	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
19MW02D	E421	07-Jun-2023	12-Jun-2023	----	----		14-Jun-2023	180 days	7 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
19MW01S	E601A	07-Jun-2023	13-Jun-2023	14 days	6 days	✓	14-Jun-2023	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
19MW02D	E601A	07-Jun-2023	13-Jun-2023	14 days	6 days	✓	14-Jun-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
Pit	E601A	07-Jun-2023	13-Jun-2023	14 days	6 days	✓	14-Jun-2023	40 days	1 days	✓
Physical Tests : pH by Meter at 15C (WSER)										
HDPE										
19MW01S	E108A	07-Jun-2023	----	----	----		12-Jun-2023	5 days	5 days	✓
Physical Tests : pH by Meter at 15C (WSER)										
HDPE										
19MW02D	E108A	07-Jun-2023	----	----	----		12-Jun-2023	5 days	5 days	✓
Physical Tests : pH by Meter at 15C (WSER)										
HDPE										
Pit	E108A	07-Jun-2023	----	----	----		12-Jun-2023	5 days	5 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
19MW01S	E641A	07-Jun-2023	13-Jun-2023	14 days	6 days	✓	14-Jun-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
19MW02D	E641A	07-Jun-2023	13-Jun-2023	14 days	6 days	✓	14-Jun-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
Pit	E641A	07-Jun-2023	13-Jun-2023	14 days	6 days	✓	14-Jun-2023	40 days	0 days	✓

Legend & Qualifier Definitions

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Ammonia by Fluorescence	E298	984421	1	15	6.6	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	984968	1	5	20.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	985351	1	17	5.8	5.0	✓
Chloride in Water by IC	E235.Cl	985350	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	983804	2	14	14.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	984088	2	33	6.0	5.0	✓
Fluoride in Water by IC	E235.F	985349	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	985352	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	985353	1	20	5.0	5.0	✓
pH by Meter at 15C (WSER)	E108A	984890	1	5	20.0	5.0	✓
Sulfate in Water by IC	E235.SO4	985354	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	984424	1	12	8.3	5.0	✓
Total Nitrogen by Colourimetry	E366	984422	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	984423	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Ammonia by Fluorescence	E298	984421	1	15	6.6	5.0	✓
BC PHCs - EPH by GC-FID	E601A	986826	1	15	6.6	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	984968	1	5	20.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	985351	1	17	5.8	5.0	✓
Chloride in Water by IC	E235.Cl	985350	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	983804	2	14	14.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	984088	2	33	6.0	5.0	✓
Fluoride in Water by IC	E235.F	985349	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	985352	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	985353	1	20	5.0	5.0	✓
Oil & Grease by Gravimetry	E567	991606	1	8	12.5	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	986825	1	16	6.2	5.0	✓
pH by Meter at 15C (WSER)	E108A	984890	1	5	20.0	5.0	✓
Sulfate in Water by IC	E235.SO4	985354	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	984424	1	12	8.3	5.0	✓
Total Nitrogen by Colourimetry	E366	984422	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	984423	1	13	7.6	5.0	✓
Method Blanks (MB)							
Ammonia by Fluorescence	E298	984421	1	15	6.6	5.0	✓
BC PHCs - EPH by GC-FID	E601A	986826	1	15	6.6	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	984968	1	5	20.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	985351	1	17	5.8	5.0	✓
Chloride in Water by IC	E235.Cl	985350	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	983804	2	14	14.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	984088	2	33	6.0	5.0	✓
Fluoride in Water by IC	E235.F	985349	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	985352	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	985353	1	20	5.0	5.0	✓
Oil & Grease by Gravimetry	E567	991606	1	8	12.5	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	986825	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	985354	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	984424	1	12	8.3	5.0	✓
Total Nitrogen by Colourimetry	E366	984422	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	984423	1	13	7.6	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	984421	1	15	6.6	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	985351	1	17	5.8	5.0	✓
Chloride in Water by IC	E235.Cl	985350	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	983804	2	14	14.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	984088	2	33	6.0	5.0	✓
Fluoride in Water by IC	E235.F	985349	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	985352	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	985353	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	985354	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	984424	1	12	8.3	5.0	✓
Total Nitrogen by Colourimetry	E366	984422	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	984423	1	13	7.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter at 15C (WSER)	E108A Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at 15 ± 1°C, and is used to calculate Un-Ionized Ammonia for the federal Wastewater Systems Effluent Regulation.
Bromide in Water by IC (Low Level)	E235.Br-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Oil & Grease by Gravimetry	E567 Vancouver - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Un-ionized Ammonia at 15°C, WSER	EC298 Vancouver - Environmental	Water	WSER 29June2012	Un-ionized Ammonia at 15C is calculated from test results for Total Ammonia and for pH at 15C, as per the federal Wastewater Systems Effluent Regulation, and is expressed in units of mg/L "as N".

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
Oil & Grease Extraction for Gravimetry	EP567 Vancouver - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **WR2300506**	Page	: 1 of 18
Client	: Government of Yukon	Laboratory	: Whitehorse - Environmental
Contact	: Water Resources Branch	Account Manager	: Tasnia Tarannum
Address	: Department of Environment, Environmental Protection and Assessment Branch 419 Range Road Whitehorse YT Canada Y1A 3V1	Address	: #12 151 Industrial Road Whitehorse, Yukon Canada Y1A 2V3
Telephone	:	Telephone	: +1 867 668 6689
Project	: Dempster Sewage Lagoon	Date Samples Received	: 09-Jun-2023 23:43
PO	: ----	Date Analysis Commenced	: 12-Jun-2023
C-O-C number	: ----	Issue Date	: 19-Jun-2023 10:16
Sampler	: ---- ----		
Site	: YOWN - Yukon Observation Well Network		
Quote number	: WR22-GYPT100-002		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Anshim Anshim	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Vancouver Inorganics, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Vancouver Organics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 984890)											
WR2300482-002	Anonymous	pH @ 15°C (WSER)	----	E108A	0.10	pH units	8.86	8.88	0.225%	4%	----
Anions and Nutrients (QC Lot: 984421)											
FJ2301336-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0250	mg/L	0.141	0.136	0.0053	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 984422)											
KS2301921-001	Anonymous	Nitrogen, total	7727-37-9	E366	0.030	mg/L	0.414	0.424	2.32%	20%	----
Anions and Nutrients (QC Lot: 984423)											
FJ2301336-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0025	0.0023	0.0003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 984424)											
FJ2301336-001	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 985349)											
FJ2301374-002	Anonymous	Fluoride	16984-48-8	E235.F	0.100	mg/L	0.727	0.715	0.012	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 985350)											
FJ2301374-002	Anonymous	Chloride	16887-00-6	E235.Cl	2.50	mg/L	2.66	2.60	0.07	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 985351)											
FJ2301374-002	Anonymous	Bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 985352)											
FJ2301374-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	<0.0250	<0.0250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 985353)											
FJ2301374-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 985354)											
FJ2301374-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	10.6	10.5	0.15	Diff <2x LOR	----
Dissolved Metals (QC Lot: 983804)											
VA23B3103-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	0.0000127	0.0000147	0.0000020	Diff <2x LOR	----
Dissolved Metals (QC Lot: 984088)											
VA23B3076-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0226	0.0225	0.302%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00121	0.00122	0.237%	20%	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00026	0.00026	0.000001	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0193	0.0200	3.81%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 984088) - continued											
VA23B3076-001	Anonymous	Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.010	0.010	0.0003	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000059	<0.0000050	0.0000009	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	15.2	15.6	2.56%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00207	0.00219	5.30%	20%	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.068	0.069	0.001	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000419	0.000417	0.000002	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	1.36	1.38	1.56%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0438	0.0452	3.09%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00118	0.00121	2.45%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.466	0.471	0.005	Diff <2x LOR	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00115	0.00115	0.000002	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	0.000054	0.000004	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.44	2.44	0.00993%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	20.3	20.2	0.156%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.148	0.146	1.31%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	2.00	2.03	0.03	Diff <2x LOR	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0014	0.0017	0.0002	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 985073)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 985073) - continued											
VA23B3169-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	5.0 µg/L	0.0040	0.0011	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	1.75 µg/L	0.00176	0.432%	20%	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	3.14 µg/L	0.00317	0.825%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	41.5 µg/L	0.0421	1.32%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.050 µg/L	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	28 µg/L	0.028	0.0010	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000450	mg/L	<0.0450 µg/L	<0.0000450	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	54600 µg/L	54.3	0.528%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.010 µg/L	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.50 µg/L	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.11 µg/L	0.00012	0.00001	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	2.89 µg/L	0.00293	1.36%	20%	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	<10 µg/L	<0.010	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.050 µg/L	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	1.9 µg/L	0.0019	0.00004	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	16200 µg/L	16.4	1.37%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	56.2 µg/L	0.0574	1.97%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	86.8 µg/L	0.0895	3.09%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	1.05 µg/L	0.00107	0.00002	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	65 µg/L	0.087	0.022	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	3790 µg/L	3.88	2.49%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.71 µg/L	0.00082	0.00010	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	14.3 µg/L	0.0152	6.18%	20%	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	6800 µg/L	7.01	3.15%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.010 µg/L	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	51800 µg/L	53.4	3.00%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	360 µg/L	0.363	1.01%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	48700 µg/L	48.6	0.122%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.20 µg/L	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.010 µg/L	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.30 µg/L	<0.00030	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 985073) - continued											
VA23B3169-001	Anonymous	Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.21 µg/L	0.00022	0.000006	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	8.68 µg/L	0.00894	2.98%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	12.4 µg/L	0.0125	0.457%	20%	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	1.1 µg/L	0.0011	0.00001	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.30 µg/L	<0.00030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 988962)											
WR2300499-006	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 984968)											
VA23B2969-002	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 984421)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 984422)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 984423)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 984424)						
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 985349)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 985350)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 985351)						
Bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 985352)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 985353)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 985354)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Dissolved Metals (QCLot: 983804)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 984088)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 984088) - continued						
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 985073)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 985073) - continued						
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 988962)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 988962) - continued						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 984968)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 991606)						
Oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Hydrocarbons (QCLot: 986826)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 986825)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 984890)									
pH @ 15°C (WSER)	----	E108A	----	pH units	7 pH units	101	98.0	102	----
Anions and Nutrients (QCLot: 984421)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	110	85.0	115	----
Anions and Nutrients (QCLot: 984422)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 984423)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.4	80.0	120	----
Anions and Nutrients (QCLot: 984424)									
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	94.0	80.0	120	----
Anions and Nutrients (QCLot: 985349)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.5	90.0	110	----
Anions and Nutrients (QCLot: 985350)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.9	90.0	110	----
Anions and Nutrients (QCLot: 985351)									
Bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	92.8	85.0	115	----
Anions and Nutrients (QCLot: 985352)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 985353)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.1	90.0	110	----
Anions and Nutrients (QCLot: 985354)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
Dissolved Metals (QCLot: 984088)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	98.8	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	107	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	91.6	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	87.2	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 984088) - continued									
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	96.9	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	107	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.2	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	99.7	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	98.6	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	107	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	91.0	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.1	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.6	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	110	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	96.6	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	98.3	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	103	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	109	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	91.3	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	104	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	100	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	99.4	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	90.6	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.5	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	106	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
Dissolved Metals (QCLot: 985073)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	105	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	95.1	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	107	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 985073) - continued									
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	107	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	97.9	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.1	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	96.7	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.4	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	100.0	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	99.8	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.6	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	106	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	99.1	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	99.2	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	104	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	97.4	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	104	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	100	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	105	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	92.5	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	110	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	98.9	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	110	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	98.7	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.9	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	103	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	93.9	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	93.4	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	92.2	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	102	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	93.1	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 988962) - continued									
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	101	80.0	120	----
Aggregate Organics (QCLot: 984968)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	90.2	85.0	115	----
Aggregate Organics (QCLot: 991606)									
Oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	97.0	70.0	130	----
Hydrocarbons (QCLot: 986826)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	108	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	101	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 986825)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	82.1	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	112	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	95.0	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	127	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	90.1	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	123	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	109	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	112	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	116	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 984421)										
KS2301921-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.107 mg/L	0.1 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 984422)										
WR2300506-001	19MW01S	Nitrogen, total	7727-37-9	E366	20.7 mg/L	20 mg/L	104	70.0	130	----
Anions and Nutrients (QCLot: 984423)										
KS2301921-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0466 mg/L	0.05 mg/L	93.1	70.0	130	----
Anions and Nutrients (QCLot: 984424)										
KS2301921-001	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0473 mg/L	0.05 mg/L	94.5	70.0	130	----
Anions and Nutrients (QCLot: 985349)										
FJ2301375-001	Anonymous	Fluoride	16984-48-8	E235.F	1.07 mg/L	1 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 985350)										
FJ2301375-001	Anonymous	Chloride	16887-00-6	E235.Cl	105 mg/L	100 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 985351)										
FJ2301375-001	Anonymous	Bromide	24959-67-9	E235.Br-L	0.484 mg/L	0.5 mg/L	96.8	75.0	125	----
Anions and Nutrients (QCLot: 985352)										
FJ2301375-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.63 mg/L	2.5 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 985353)										
FJ2301375-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.518 mg/L	0.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 985354)										
FJ2301375-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	106 mg/L	100 mg/L	106	75.0	125	----
Dissolved Metals (QCLot: 983804)										
WR2300504-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.000104 mg/L	0.0001 mg/L	104	70.0	130	----
Dissolved Metals (QCLot: 984088)										
VA23B3076-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.176 mg/L	0.2 mg/L	87.8	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0383 mg/L	0.04 mg/L	95.8	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 984088) - continued										
VA23B3076-002	Anonymous	Bismuth, dissolved	7440-69-9	E421	0.00931 mg/L	0.01 mg/L	93.1	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.090 mg/L	0.1 mg/L	90.2	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00408 mg/L	0.004 mg/L	102	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0107 mg/L	0.01 mg/L	107	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0380 mg/L	0.04 mg/L	95.1	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.93 mg/L	2 mg/L	96.6	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0938 mg/L	0.1 mg/L	93.8	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	0.952 mg/L	1 mg/L	95.2	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0388 mg/L	0.04 mg/L	97.1	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	10.4 mg/L	10 mg/L	104	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.93 mg/L	4 mg/L	98.2	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0383 mg/L	0.04 mg/L	95.9	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.12 mg/L	10 mg/L	91.2	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00424 mg/L	0.004 mg/L	106	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	19.8 mg/L	20 mg/L	98.8	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0429 mg/L	0.04 mg/L	107	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00403 mg/L	0.004 mg/L	101	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0216 mg/L	0.02 mg/L	108	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0364 mg/L	0.04 mg/L	91.1	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00394 mg/L	0.004 mg/L	98.6	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0970 mg/L	0.1 mg/L	97.0	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.438 mg/L	0.4 mg/L	110	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 985073)										

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 985073) - continued										
VA23B3169-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.214 mg/L	0.2 mg/L	107	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0220 mg/L	0.02 mg/L	110	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0421 mg/L	0.04 mg/L	105	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00840 mg/L	0.01 mg/L	84.0	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00399 mg/L	0.004 mg/L	99.7	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0104 mg/L	0.01 mg/L	104	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0424 mg/L	0.04 mg/L	106	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0199 mg/L	0.02 mg/L	99.6	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0185 mg/L	0.02 mg/L	92.5	70.0	130	----
		Iron, dissolved	7439-89-6	E421	2.04 mg/L	2 mg/L	102	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0182 mg/L	0.02 mg/L	90.8	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0385 mg/L	0.04 mg/L	96.4	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	11.9 mg/L	10 mg/L	119	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0205 mg/L	0.02 mg/L	103	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0433 mg/L	0.04 mg/L	108	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00386 mg/L	0.004 mg/L	96.6	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	22.4 mg/L	20 mg/L	112	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00365 mg/L	0.004 mg/L	91.4	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0405 mg/L	0.04 mg/L	101	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0186 mg/L	0.02 mg/L	92.9	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 985073) - continued										
VA23B3169-002	Anonymous	Uranium, dissolved	7440-61-1	E421	0.00405 mg/L	0.004 mg/L	101	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.107 mg/L	0.1 mg/L	107	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.384 mg/L	0.4 mg/L	96.1	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0419 mg/L	0.04 mg/L	105	70.0	130	----
Dissolved Metals (QCLot: 988962)										
WR2300499-007	Anonymous	Mercury, dissolved	7439-97-6	E509	0.000101 mg/L	0.0001 mg/L	101	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page of

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Environmental Division Whitehorse

Work Order Reference

WR2300506

Telephone : +1 867 668 6689

Report To	Contact and company name below will appear on the final report
Company:	Government of Yukon - Dept of ENV / WRB
Contact:	Water Resources Branch (V-310)
Phone:	867 332 3120
	Company address below will appear on the final report
Street:	419 Range Road
City/Province:	Whithorse, Y.T.
Postal Code:	Y1A 3V1
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax norbert.botca@yukon.ca

Email 2 nicole.novodvorsky@yukon.ca

Email 3 cole.fischer@yukon.ca

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax norbert.botca@yukon.ca

Email 2 nicole.novodvorsky@yukon.ca

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, s

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please conta

Project Information

ALS Account # / Quote #:	GYPT100 / WR22-GYPT100-002
Job #:	Dempster Sewage Lagoon
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (ALS use only):

ALS Contact:

Sampler: CF; NB

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	F/P	Routine	Diss. Metals	Major Ions	Nutrients	CBOD5	O&G	Hydrocarbons	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	19MW01S	7-Jun-23	15:15	GW	7			R	R	R	R	R	R			
	19MW02D	7-Jun-23	14:30	GW	7			R	R	R	R	R	R			
	Pit	7-Jun-23	15:00	SW	7			R	R	R	R	R	R			x

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?

☐ YES ☑ NO

Are samples for human consumption/ use?

☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

The "pit" sample is raw, unfiltered water from the sewage lagoon

SAMPLE RECEIPT DE

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PAC

Submission Comments identified on Sample Receip

Cooler Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C

7

1

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
EP	09-Jun-23	1200

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
ED	JUNE 9	11:43

FINAL SHIPMENT

Received by:	Date

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

FEB 2022 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**