

October 29, 2021

Project No. 21471534-R-001-Rev0

Northwest Territories Power Corporation
4 Capital Drive
Hay River, NT, X0E 1G2

2021 JACKFISH GROUNDWATER MONITORING REPORT AS PART OF WATER LICENCE (MV2019L-1001)

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by Northwest Territories Power Corporation (NTPC) to complete groundwater monitoring at two monitoring wells, JF01-06 and MW2 at the Jackfish Power Plant Site (the Site) in Yellowknife, NT. Stipulations in the water license (MV2019L1-001), which was issued in 2019, dictate that sampling be conducted for monitoring wells JF01-06 and MW-2 in both June and September.

This report documents the groundwater sampling events at the Site conducted in 2021. The results of this sampling will need to be submitted for the Jackfish Lake Annual Water License Report which is submitted before March 31 annually.

1.1 Background

On September 22, 2004, a diesel spill occurred at the NTPC Jackfish Power Plant Site in Yellowknife, NT. Remediation activities removed accessible impacted material, but as this is an active site, complete remediation was not possible.

Since 2004, a network of monitoring wells, including JF01-06 and MW-2, have since been installed across the site and along the lake shore to remove hydrocarbon impacted groundwater and assess the migration of impacted groundwater. Groundwater removal was conducted until 2016, and the analysis of BTEX F1-F4 in groundwater samples from JF01-06 and MW-2 continued until 2020. In 2020, a 2021 Groundwater Monitoring Program Plan was developed by NTPC to ensure that the 2021 sampling program is conducted in compliance with the requirements in the Water Licence, which stipulates that a larger sampling set be collected for monitoring wells in JF01-06 and MW-2 in June and September, as outlined in Table 1.

Table 1: Monitoring Locations and Parameters

Monitoring Well	Location	Sampling Frequency	Monitoring Parameters
JF01-06	Located at the Lease Boundary near the lake shore near the warehouse near K Plant	Twice a year during June and September	Field parameters (pH, Electrical Conductivity [EC], Temperature, Dissolved Oxygen [DO]), Major Ions, Total Suspended Solids (TSS), Oil and Grease (Hexane Extractable), pH, Total Petroleum Hydrocarbons (F1, F2, F3, F4 CCME Fractions), Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Dissolved Metals (Metals shall include but not be limited to analysis of the following parameters: Aluminum, Antimony, Arsenic, Barium, Boron, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Thallium, Uranium, and Zinc)
MW-2	Located at the Lease Boundary near the lake shore between the EMD Plant and the Cat Plant	Twice a year during June and September	Field parameters (pH, Electrical Conductivity [EC], Temperature, Dissolved Oxygen [DO]), Major Ions, Total Suspended Solids (TSS), Oil and Grease (Hexane Extractable), pH, Total Petroleum Hydrocarbons (F1, F2, F3, F4 CCME Fractions), Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Dissolved Metals (Metals shall include but not be limited to analysis of the following parameters: Aluminum, Antimony, Arsenic, Barium, Boron, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Thallium, Uranium, and Zinc)

1.2 Objective

The objective of the groundwater monitoring program at Jackfish Power Plant site is to comply with the Water Licence requirements for groundwater sampling by collecting groundwater chemistry samples at the two monitoring wells in June and September 2021.

1.3 Scope of Work

To support the objective outlined in Section 1.2, the following scope of work was completed:

- Groundwater sampling at JF01-06 and MW-2 monitoring well locations completed in July and September 2021;
- Submission of groundwater samples for chemical analysis to ALS Laboratory;
- Chemistry data tabulation and screening; and,
- Preparation of this groundwater monitoring report.

1.3.1 Deviations from Scope of Work

The scope outlined in the Proposal for the Jackfish Power Plant Site in Yellowknife, NT 2021 Annual Groundwater Monitoring was adhered to with the following deviations:

- **June sampling event:** the June sampling event was completed on 16 July 2021 due to the availability of staff in Yellowknife to complete the work.
- **QA/QC program:** A field duplicate sample was not collected during the July and September sampling events. ALS completed lab duplicate samples and method blanks for each sampling event, the results of which can be found in Attachment C.

2.0 FIELD METHODS

The field work was conducted over two events in July and September 2021. The methodology employed during the field investigation is described in the following sub-sections.

2.1 Groundwater Sampling

Groundwater sampling was conducted at monitoring wells JF01-06 and MW-2 on 16 July 2021 and 28 September 2021. Prior to sampling, water levels and depth to bottom were measured in each monitoring well and groundwater was purged from the monitoring wells. Water level measurements are included in Table A, attached.

The samples were collected using a WaTerra™ foot valve and new polyethylene tubing. Three well-volumes were purged from the wells during each sampling event prior to collecting the samples.

During purging, visual observations of water clarity and colour were recorded along with measurements of temperature, pH, conductivity, ORP, dissolved oxygen, total dissolved solids (TDS), salinity, and turbidity using a YSI Pro Plus multimeter. The groundwater sampling sheets are included in Attachment A. Daily calibration sheets for the YSI are included in Attachment B. Field parameters measured prior to sampling are reported in Table A, attached.

Dissolved metals samples were filtered in the field using 0.45 micrometre (µm) disk filters and syringes, and preserved with nitric acid. Samples were labelled, registered on chain-of-custody forms, stored on ice packs or ice in coolers and shipped to ALS for analysis. Samples were submitted for chemical analysis of benzene, toluene, ethylbenzene and xylenes (BTEX) and petroleum hydrocarbons (PHC) (F1 through F4), total suspended solids, routine chemistry, metals, mercury, oil and grease and dissolved oxygen.

Purge water was discharged to the ground surface in an inferred down-gradient direction from the monitoring wells.

2.2 Quality Assurance/Quality Control

To document that the field and analytical data were interpretable, meaningful and reproducible, conformance to a Golder quality assurance/quality control (QA/QC) program was maintained. Standard industry field procedures were used during the investigation to help achieve reproducibility. This involved using QA/QC measures in both the collection (field program component) and analysis (laboratory component) of samples. A field blank and travel blank sample were collected during each sampling event and submitted to ALS for analysis. Additionally, a laboratory duplicate sample and laboratory blank sample were completed by ALS during each sampling round.

3.0 MONITORING RESULTS

The results of the groundwater sampling program indicate that detectable concentrations of F3 (1.29 mg/L) and F4 (2.1 mg/L) hydrocarbons were measured in JF01-06 on 16 July 2021 and were less than the laboratory method detection limit (0.3 mg/L) during the September sampling. Detectable concentrations of F3 (2.92 mg/L) and F4 (4.54 mg/L) hydrocarbons were measured in MW-2 on 28 September 2021 but were less than the laboratory method detection limits (0.30 mg/L) during the July sampling. Tabulated and screened groundwater chemistry data is included in Table A (attached), and the laboratory certificates of analysis (COAs) are provided in Attachment C.

The results of the field component (field blanks and travel blanks) of the QA/QC program are included in Table A. The laboratory component results (laboratory duplicates and laboratory blanks) are included in the certificate of analyses (Attachment C). Based on a review of the QA/QC program, the analytical data are considered reproducible and suitable for the purposes of the groundwater monitoring program.

4.0 CLOSURE

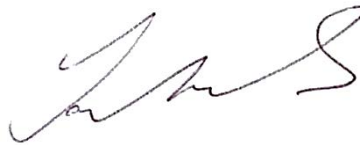
We trust the information contained in this report is sufficient for your present needs. Should you have any additional questions regarding the project, please do not hesitate to contact the undersigned.

Golder Associates Ltd.



Dylan Cook, B.Sc.
Biologist

DC/TR/tt



Tamra Reynolds, M.Sc., P.Geo. (NT/NU)
Associate, Senior Hydrogeologist

Attachments: Table A – Groundwater Data
 Attachment A – Groundwater Sampling Forms
 Attachment B – YSI Calibration Forms
 Attachment C – Laboratory Certificates of Analyses

[https://golderassociates.sharepoint.com/sites/148232/project files/6 deliverables/report/21471534-r-001-rev0-jackfish groundwater monitoring report_mv2019l-001.docx](https://golderassociates.sharepoint.com/sites/148232/project%20files/6%20deliverables/report/21471534-r-001-rev0-jackfish%20groundwater%20monitoring%20report_mv2019l-001.docx)

Sample Location	Unit	Detection Limit	JF01-06		MW-2		Field Blank		Travel Blank	
			16-Jul-21	28-Sep-21	16-Jul-21	28-Sep-21	16-Jul-21	28-Sep-21	16-Jul-21	28-Sep-21
			YL2100787-001	YL2101418-001	YL2100787-003	YL2101418-003	YL2100787-004	YL2101418-002	YL2100787-002	YL2101418-004
Field Parameters										
Water appearance	-	-	Dark gray	Brown and cloudy	Light gray	Brown and cloudy	-	-	-	-
Temperature	°C	-	17.82	9.7	15.41	11.7	-	-	-	-
pH	-	-	8.34	6.57	6.88	6.77	-	-	-	-
Specific Conductivity	µS/cm	-	408.69	448.4	424.34	443.6	-	-	-	-
Dissolved Oxygen	mg/L	-	8.34	9.24	7.74	6.25	-	-	-	-
ORP	mV	-	256.6	244.9	45.8	111.9	-	-	-	-
Total dissolved solids	g/L	-	280.42	291.85	276.71	287.96	-	-	-	-
Salinity	ppt	-	0.2	0.22	0.21	0.21	-	-	-	-
Turbidity	NTU/AU	-	318.43	3264	200.81	29.3	-	-	-	-
Field Observations										
PVC Pipe Height	m	-	0.9	0.9	0.75	0.75	-	-	-	-
Depth to Water	m	-	1.85	2.05	0.88	2.23	-	-	-	-
Depth to Well Bottom	m	-	3.09	3.09	3.8	3.83	-	-	-	-
Physical Parameters										
Hardness (as CaCO3), dissolved	mg/L	0.6	131	162	135	154	<0.60	<0.60	<0.60	<0.60
pH	-	0.1	7.72	7.89	7.83	8.09	5.11	5.42	5.2	5.34
Total suspended solids	mg/L	3 - 30.0	12300	15600	703	297	<3.0	<3.0	<3.0	<3.0
Major Ions										
Dissolved Calcium	mg/L	0.05	34	43.1	35.7	41.1	<0.050	<0.050	<0.050	<0.050
Chloride	mg/L	0.5	61.2	59.8	61.4	59.9	<0.50	<0.50	<0.50	<0.50
Fluoride	mg/L	0.02	0.14	0.11	0.14	0.1	<0.020	<0.020	<0.020	<0.020
Dissolved Magnesium	mg/L	0.005	11.3	13.3	11.1	12.5	<0.0050	<0.0050	<0.0050	<0.0050
Dissolved Potassium	mg/L	0.05	5.48	3.86	5.36	3.56	<0.050	<0.050	<0.050	<0.050
Dissolved Sodium	mg/L	0.05	31.6	29.6	32.6	28.4	<0.050	<0.050	<0.050	<0.050
Sulfate (as SO4)	mg/L	0.3	22.6	34.4	20.6	29.5	<0.30	<0.30	<0.30	<0.30
Nutrients										
Dissolved Phosphorus	mg-P/L	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Nitrate (as N)	mg-N/L	0.005	0.427	0.313	0.0833	0.0082	<0.0050	<0.0050	<0.0050	<0.0050
Nitrate + nitrite (as N)	mg-N/L	0.0051	0.428	-	0.13	-	<0.0051	-	<0.0051	-
Nitrite (as N)	mg-N/L	0.001	0.001	0.0074	0.0463	0.0039	<0.0010	<0.0010	<0.0010	<0.0010
Dissolved Metals										
Aluminum	mg/L	0.001	0.0585	0.0313	0.0648	0.0129	<0.0010	<0.0010	<0.0010	<0.0010
Antimony	mg/L	0.0001	0.00138	0.0008	0.0008	0.00044	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.0001	0.266	0.165	0.161	0.113	<0.00010	<0.00010	<0.00010	<0.00010
Barium	mg/L	0.0001	0.0573	0.0424	0.0454	0.035	<0.00010	<0.00010	<0.00010	<0.00010
Beryllium	mg/L	0.0001	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.01	0.037	0.023	0.048	0.019	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.000005	0.0000528	<0.0000050	0.0000148	0.0000117	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Cesium	mg/L	0.00001	0.000039	0.000023	0.00002	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Chromium	mg/L	0.0005	<0.00050	<0.00050	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.0001	0.00049	0.0004	0.00101	0.00078	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.0002	0.00337	0.00205	0.00069	0.00106	<0.00020	<0.00020	<0.00020	<0.00020
Iron	mg/L	0.01	0.109	0.052	0.843	0.81	<0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.00005	0.000188	0.000099	0.000157	0.0001	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	mg/L	0.001	0.0047	0.0028	0.0038	0.0027	<0.0010	<0.0010	<0.0010	<0.0010
Manganese	mg/L	0.0001	0.0885	0.0934	0.0798	0.0724	<0.00010	<0.00010	<0.00010	<0.00010
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00005	0.000854	0.000413	0.000576	0.000257	<0.000050	<0.000050	<0.000050	<0.000050
Nickel	mg/L	0.0005	0.00549	0.0025	0.002	0.00133	<0.00050	<0.00050	<0.00050	<0.00050
Rubidium	mg/L	0.0002	0.00709	0.00407	0.00465	0.00216	<0.00020	<0.00020	<0.00020	<0.00020
Selenium	mg/L	0.00005	0.000158	0.000071	0.000091	0.000065	<0.000050	<0.000050	<0.000050	<0.000050
Silicon	mg/L	0.05	7.32	5.06	7.2	5.14	<0.050	<0.050	<0.050	<0.050
Silver	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Strontium	mg/L	0.0002	0.0827	0.0896	0.0898	0.0898	<0.00020	<0.00020	<0.00020	<0.00020
Sulfur	mg/L	0.5	7.76	11.4	6.96	9.73	<0.50	<0.50	<0.50	<0.50
Tellurium	mg/L	0.0002	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	mg/L	0.00001	0.000022	<0.000010	0.000013	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	mg/L	0.0001	0.00018	0.00015	0.00014	0.00011	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.0003	0.00228	0.00109	0.00292	0.00036	<0.00030	<0.00030	<0.00030	<0.00030
Tungsten	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.00001	0.000578	0.00102	0.000434	0.000382	<0.000010	<0.000010	<0.000010	<0.000010
Vanadium	mg/L	0.0005	0.00159	0.00093	0.0017	0.00082	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.001	0.0035	0.0015	0.0015	0.0014	<0.0010	<0.0010	<0.0010	<0.0010
Zirconium	mg/L	0.0002	<0.00020	<0.00020	0.00024	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Aggregate Organics										
Oil & grease (gravimetric)	mg/L	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Volatile Organic Compounds										
Benzene	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Methyl-tert-butyl ether [MTBE]	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Styrene	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
m+p-Xylene	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
o-Xylene	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Total Xylenes	mg/L	0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
Volatile Organic Compounds Surrogates										
4-Bromofluorobenzene	%	1	84.9	83.3	87.2	87.1	85.4	87.1	86.4	83.8
1,4-Difluorobenzene	%	1	99.8	95.6	102	91.3	103	93.1	102	92.2
Hydrocarbons										
F1 (C6-C10)	mg/L	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (C10-C16)	mg/L	0.30 - 0.84	<0.30	<0.30	<0.30	<0.84	<0.30	<0.30	<0.30	<0.30
F3 (C16-C34)	mg/L	0.30 - 1.26	1.29	<0.30	<0.30	2.92	<0.30	<0.30	<0.30	<0.30
F4 (C34-C50)	mg/L	0.30 - 1.26	2.1	<0.30	<0.30	4.54	<0.30	<0.30	<0.30	<0.30
VHw (C6-C10)	mg/L	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F1-BTEX	mg/L	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
VPHw	mg/L	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total Hydrocarbons (C6-C50)	µg/L	0.53	3.39	<0.53	<0.53	7.46	<0.53	<0.53	<0.53	<0.53
Hydrocarbons Surrogates										
2-Bromobenzotrifluoride (F2-F4 surr)	%	1.0 - 8.4	81.6	82.4	64.3	89.1	68.9	77.6	74.4	73.9
3,4-Dichlorotoluene	%	1	114	109	110	89	113	97.5	112	115

ATTACHMENT A

Groundwater Sampling Forms

GROUNDWATER SAMPLE COLLECTION FORM

Well Number:
MW 02

Project Number:	21471534/1000/1010
Project Name:	2021 Sept Jackfish GWM
Location:	NTPC Yellowknife
Contractor / Rig No.:	

Date:	28 Sep 21
Personnel:	DO/KL
Weather:	
Client Contact:	

Purging

Purge Method	Waterra 5/8"	Waterra 1"	Air Lift	BK Pump	S. Steel Bailer	Centrif. Pump	Disp. Bailer	Sub. Pump	Other:
	✓								

Stick-up (m)	0.75	Calculations: $3.83 - 2.23 = 1.6$ $1.6 \times 3 = 4.8$ $4.8 \times 2 = 9.6$
Depth to LNAPL (m)		
Depth to Water (m)	2.23	
Depth to DNAPL (m)		
Total Depth (m)	3.83	
Submerged Depth (m)		
Est. Water Volume (L)	1.6	
Est. 3 x Water Volume (L)	1.0	
Decontamination:		
2" Casing: 2.032 L/m		
1" Casing: 0.508 L/m		
8" Sand pack: 9.271 L/m		
6 5/8" Sand pack: 6.35 L/m		

Purge Start Time:	~ 10:30			Purge End Time:	~ 11:00		
Parameter	1	2	3	4			
Volume (L)	3	6	9	12			
Temperature (°C)	11.5	11.8	11.8	11.7			
Sp. Conductivity (µS/cm ^o)	462.0	460.1	449.1	443.6			
E. Conductivity (µS/cm)	342.2	341.2	335.5	338.7			
TDS (g/L)	300.30	299.00	291.85	287.96			
Salinity (ppt)	0.22	0.22	0.22	0.21			
Dissolved O ₂ (% / mg/L)	4.92	1.77	9.19	6.25			
pH	6.75	6.59	6.73	6.77			
ORP (mV)	214.9	138.6	116.9	111.9			
Appearance and Odour	Brown & cloudy	Brown & cloudy	Brown & cloudy	Brown & cloudy			
Turbidity (NTU)	104	73	78	29.3			
Total Volume Purged (L)							

Sample Collection

Sample Method	Waterra 5/8"	Waterra 1"	Air Lift	BK Pump	S. Steel Bailer	Centrif. Pump	Disp. Bailer	Sub. Pump	Other:
	✓								

Sample ID	Analysis	Time	Container	Preservative	Comments
NTPC 280921-MW2	Routine		250 mL		@ 10:30
	BTEX		2x40, 2x100		
	O+G		2x250		
	D _o Merc		40 mL	FTP	
	D _o Metals		125 mL	FTP	
					TRIP: Blank:
					NTPC 280921-MW2B 11:00

GROUNDWATER SAMPLE COLLECTION FORM

Well Number:
JF01-06

Project Number:	
Project Name:	2021 July Jackfish Groundwater
Location:	NTPC, Yellowknife
Contractor / Rig No.:	

Date:	July 16 / 2021
Personnel:	DD SJ
Weather:	9°C
Client Contact:	Stefan

Purging

Purge Method	Water 5/8"	Water 1"	Air Lift	BK Pump	S. Steel Bailer	Centrif. Pump	Disp. Bailer	Sub. Pump	Other:
	✓								

Stick-up (m)	0.9	Calculations: 2" well 124m = 215 L 2.5L x 3 = 7.5L Purged 7.5 L.
Depth to LNAPL: (m)	/	
Depth to Water: (m)	1.85	
Depth to DNAPL: (m)	/	
Total Depth: (m)	3.09	
Submerged Depth: (m)	1.24	
Est. Water Volume: (L)	2.5	
Est. 3.x Water Volume: (L)	7.5	
Decontamination:	/	
2" Casing: 2:032 L/m	/	
1" Casing: 0.508 L/m	/	
8" Sand pack: 9:271 L/m	/	
6 5/8" Sand pack: 6.35 L/m	/	

Purge Start Time:	0920			Purge End Time:	0935		
Parameter	1	2	3	4			
Volume (L)	0.12L	3.5L	5.0L	7.5L			
Temperature (°C)	15.52	17.60	17.80	17.82			
Sp. Conductivity (µS/cm)	464.24	435.18	438.80	408.69			
E. Conductivity (µS/cm)	393.95	378.49	382.94	311.84			
TDS (g/L)	308.03	285.86	288.06	280.42			
Salinity (ppt)	0.23	0.22	0.21	0.20			
Dissolved O ₂ (% / mg/L)	7.79	8.00	8.37	8.34			
pH	6.74	6.74	6.76	6.87			
ORP (mV)	220.4	232.4	256.6	256.6			
Appearance and Odour	Brown w/ solids		Dark grey sand sediment				
Turbidity (NTU)	15.01	152.01	237.08	318.43			
Total Volume Purged (L)							

Sample Collection

Sample Method	Water 5/8"	Water 1"	Air Lift	BK Pump	S. Steel Bailer	Centrif. Pump	Disp. Bailer	Sub. Pump	Other:
	✓								

Sample ID	Analysis	Time	Container	Preservative	Comments
NTPC160721-JF01-06	Routine	250ml			OLD water was cracked
	2x 40ml BTEX + 2x 100ml Amber				Replaced water, foot valve + block
	2x 250ml O&G				
	40ml Merc. Dis				
	125ml Metals Dis				
					labelled trip blank
					NTPC160721-JF01-06B

GROUNDWATER SAMPLE COLLECTION FORM

Well Number:
MW02

Project Number:	
Project Name:	2021 July Jack Fish GW
Location:	NTPC, YK
Contractor / Rig No.:	

Date:	JULY 16, 2021
Personnel:	D. DIAZ, S. JENSEN
Weather:	90C
Client Contact:	Stefan

Purging

Purge Method	Water 6/8"	Water 1"	Air Lift	BK Pump	S. Steel Baller	Centrif. Pump	Disp. Baller	Sub. Pump	Other:
	✓								

Stick-up (m)	0.75	Calculations:
Depth to LNAPL (m)	/	2" well $1.92 = 3.84L$ $3.84 L \times 3 = 12L$ purged 12L
Depth to Water (m)	1.88	
Depth to DNAPL (m)	/	
Total Depth (m)	3.8	
Submerged Depth (m)	1.92	
Est. Water Volume (L)	3.84	
Est. 3 x Water Volume (L)	11.52	
Decontamination:	/	
2" Casing: 2.032 L/m	/	
1" Casing: 0.508 L/m	/	
8" Sand pack: 9.271 L/m	/	
6 5/8" Sand pack: 6.35 L/m	/	

Purge Start Time:	1020			Purge End Time:	1030		
Parameter	1	2	3	4			
Volume (L)	3.0L	6.0L	9.0L	12.0L			
Temperature (°C)	15.42	15.37	15.56	15.41			
Sp. Conductivity (µS/cm)	449.32	418.9	425.67	424.34			
E. Conductivity (µS/cm)	367.74	353.91	349.33	347.31			
TDS (g/L)	292.58	277.50	276.69	276.71			
Salinity (ppt)	0.22	0.21	0.21	0.21			
Dissolved O ₂ (% / mg/L)	7.25	6.99	7.44	7.74			
pH	6.78	6.92	6.83	6.88			
ORP (mV)	159.7	30.1	40.0	45.8			
Appearance and Odour	brant tint	-	light gray	gray			
Turbidity (NTU)	935.53	285.70	158.72	200.81			
Total Volume Purged (L)							

Sample Collection

Sample Method	Water 5/8"	Water 1"	Air Lift	BK Pump	S. Steel Baller	Centrif. Pump	Disp. Baller	Sub. Pump	Other:
	✓								

Sample ID	Analysis	Time	Container	Preservative	Comments
NTPC 160721- FF106	ROUTINE		250ml		
MW02	BTEX		2x40, 2x100		
	OTC		2x250		
	D. MERC.		40ml	F+P	
	D. METALS		125ml	F+P	
					Filled Field Blank
					NTPC 160721 - MW02 B

ATTACHMENT B

YSI Calibration Forms

TROLL FULL CALIBRATION SHEET

YSI Name and Serial #: _____
 Project Number: _____
 Date of Calibration: _____
 Technician: _____
 DO membrane changed? _____
 Calibration accepted? _____

Record the following Sonde Parameters BEFORE and AFTER calibration and check TROLL reading in reference solutions at end of sampling day:

Parameter	Before	After	End-of-Day Check
Specific Conductivity (µS/cm)			
pH in 7.00 reference solution			*
pH in 4.00 reference solution			*
pH in 10.0 reference solution			*
DO % saturation			
DO mg/L			
ORP (mV)			
Depth (m)			

*record pH and mV.

Record the following diagnostic numbers AFTER calibration:

Diagnostic Number	Value	Target	Acceptable Range
Conductivity cell constant		1.0	0.7 to 1.3
pH mV in 7.00 reference solution		0	-50 to 50
pH mV in 4.00 reference solution		pH 7 value + 177	+165 to +180 from pH 7 mV value
pH mV in 10.0 reference solution		pH 7 value - 177	-165 to -180 from pH 7 mV value
DO offset		0	0
DO slope		1.0	0.7 to 1.4

Notes:

TROLL FULL CALIBRATION SHEET

YSI Name and Serial #: AT500
 Project Number: TBA
 Date of Calibration: JULY 16/2021
 Technician: SJ
 DO membrane changed? /
 Calibration accepted? YES

Record the following Sonde Parameters BEFORE and AFTER calibration and check TROLL reading in reference solutions at end of sampling day:

Parameter	Before	After	End-of-Day Check
Specific Conductivity (µS/cm)	1473.0	1413.0	1324.5
pH in 7.00 reference solution	7.13	7.02	7.09 *
pH in 4.00 reference solution	4.03	4.00	4.01 *
pH in 10.0 reference solution	10.07	10.04	10.03 *
DO % saturation	96.75	100.00	
DO mg/L	8.63	8.63	
ORP (mV)	/		
Depth (m)			

*record pH and mV.

Record the following diagnostic numbers AFTER calibration:

Diagnostic Number	Value	Target	Acceptable Range
Conductivity cell constant	0.889	1.0	0.7 to 1.3
pH mV in 7.00 reference solution	-9.4	0	-50 to 50
pH mV in 4.00 reference solution	152.9	pH 7 value + 177	+165 to +180 from pH 7 mV value
pH mV in 10.0 reference solution	-178.5	pH 7 value - 177	-165 to -180 from pH 7 mV value
DO offset	0.00	0	0
DO slope	1.025118	1.0	0.7 to 1.4

Notes:

TROLL FULL CALIBRATION SHEET

YSI Name and Serial #: YIC YSI PRO Plus
 Project Number: 21471534/1000/1010
 Date of Calibration: 28 Sept 2021
 Technician: DD/KL
 DO membrane changed? no
 Calibration accepted? yes

Record the following Sonde Parameters BEFORE and AFTER calibration and check TROLL reading in reference solutions at end of sampling day:

Parameter	Before	After	End-of-Day Check
Specific Conductivity (µS/cm)	1516	1413	1448
pH in 7.00 reference solution	6.96	7.0	6.905*
pH in 4.00 reference solution	3.88	4.0	4.23*
pH in 10.0 reference solution	10.03	10.00	10.13*
DO % saturation	—	—	
DO mg/L	—	—	
ORP (mV)	1563	200.0	
Depth (m)	—	—	

*record pH and mV.

Record the following diagnostic numbers AFTER calibration:

Diagnostic Number	Value	Target	Acceptable Range
Conductivity cell constant		1.0	0.7 to 1.3
pH mV in 7.00 reference solution		0	-50 to 50
pH mV in 4.00 reference solution		pH 7 value + 177	+165 to +180 from pH 7 mV value
pH mV in 10.0 reference solution		pH 7 value - 177	-165 to -180 from pH 7 mV value
DO offset		0	0
DO slope		1.0	0.7 to 1.4

Notes:

TROLL FULL CALIBRATION SHEET

YSI Name and Serial #: _____
 Project Number: _____
 Date of Calibration: _____
 Technician: _____
 DO membrane changed? _____
 Calibration accepted? _____

Record the following Sonde Parameters BEFORE and AFTER calibration and check TROLL reading in reference solutions at end of sampling day:

Parameter	Before	After	End-of-Day Check
Specific Conductivity (µS/cm)			
pH in 7.00 reference solution			*
pH in 4.00 reference solution			*
pH in 10.0 reference solution			*
DO % saturation			
DO mg/L			
ORP (mV)			
Depth (m)			

*record pH and mV.

Record the following diagnostic numbers AFTER calibration:

Diagnostic Number	Value	Target	Acceptable Range
Conductivity cell constant		1.0	0.7 to 1.3
pH mV in 7.00 reference solution		0	-50 to 50
pH mV in 4.00 reference solution		pH 7 value + 177	+165 to +180 from pH 7 mV value
pH mV in 10.0 reference solution		pH 7 value - 177	-165 to -180 from pH 7 mV value
DO offset		0	0
DO slope		1.0	0.7 to 1.4

Notes:

ATTACHMENT C

Laboratory Certificates of Analyses



CERTIFICATE OF ANALYSIS

Work Order : YL2100787
Amendment : 1
Client : Northwest Territories Power Corporation
Contact : Laurence Bonin
Address : PO Box 2250
Yellowkife NT Canada X1A 2P7
Telephone : ----
Project : ----
PO : ----
C-O-C number : NTPC-JACKFISH-16072021
Sampler : ----
Site : Jackfish
Quote number : YL21-NTPC100-001
No. of samples received : 4
No. of samples analysed : 4

Page : 1 of 5
Laboratory : Yellowknife - Environmental
Account Manager : Oliver Gregg
Address : 314 Old Airport Road, Unit 116
Yellowknife NT Canada X1A 3T3
Telephone : 1 867 446 5593
Date Samples Received : 16-Jul-2021 11:00
Date Analysis Commenced : 21-Jul-2021
Issue Date : 30-Jul-2021 08:39

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
Courtney Cox	Analyst	Inorganics, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Ilnaz Badbezanchi	Team Leader - Metals preparation	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Sristika Chand	Lab Analyst	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).

<i>Unit</i>	<i>Description</i>
-	No Unit
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.



Analytical Results

Sub-Matrix: Water					Client sample ID				
(Matrix: Water)					NTPC160721-JF 01-06	NTPC160721-JF 01-06B	NTPC160721-M W-02	NTPC160721-M W-02B	----
Client sampling date / time					16-Jul-2021 09:40	16-Jul-2021 06:45	16-Jul-2021 10:35	16-Jul-2021 10:45	----
Analyte	CAS Number	Method	LOR	Unit	YL2100787-001	YL2100787-002	YL2100787-003	YL2100787-004	-----
					Result	Result	Result	Result	----
Physical Tests									
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	131	<0.60	135	<0.60	----
pH	----	E108	0.10	pH units	7.72	5.20	7.83	5.11	----
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	12300	<3.0	703	<3.0	----
Anions and Nutrients									
chloride	16887-00-6	E235.Cl	0.50	mg/L	61.2	<0.50	61.4	<0.50	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.140	<0.020	0.140	<0.020	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.427	<0.0050	0.0833	<0.0050	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	0.428	<0.0051	0.130	<0.0051	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0010	<0.0010	0.0463	<0.0010	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	22.6	<0.30	20.6	<0.30	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0585	<0.0010	0.0648	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00138	<0.00010	0.00080	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.266	<0.00010	0.161	<0.00010	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0573	<0.00010	0.0454	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.037	<0.010	0.048	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000528	<0.0000050	0.0000148	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	34.0	<0.050	35.7	<0.050	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000039	<0.000010	0.000020	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0.00050	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00049	<0.00010	0.00101	<0.00010	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00337	<0.00020	0.00069	<0.00020	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.109	<0.010	0.843	<0.010	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000188	<0.000050	0.000157	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0047	<0.0010	0.0038	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	11.3	<0.0050	11.1	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0885	<0.00010	0.0798	<0.00010	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000854	<0.000050	0.000576	<0.000050	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	NTPC160721-JF 01-06	NTPC160721-JF 01-06B	NTPC160721-M W-02	NTPC160721-M W-02B	----
Client sampling date / time					16-Jul-2021 09:40	16-Jul-2021 06:45	16-Jul-2021 10:35	16-Jul-2021 10:45	----	
Analyte	CAS Number	Method	LOR	Unit	YL2100787-001	YL2100787-002	YL2100787-003	YL2100787-004	-----	
					Result	Result	Result	Result	----	
Dissolved Metals										
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00549	<0.00050	0.00200	<0.00050	----	
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	----	
potassium, dissolved	7440-09-7	E421	0.050	mg/L	5.48	<0.050	5.36	<0.050	----	
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00709	<0.00020	0.00465	<0.00020	----	
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000158	<0.000050	0.000091	<0.000050	----	
silicon, dissolved	7440-21-3	E421	0.050	mg/L	7.32	<0.050	7.20	<0.050	----	
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----	
sodium, dissolved	17341-25-2	E421	0.050	mg/L	31.6	<0.050	32.6	<0.050	----	
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0827	<0.00020	0.0898	<0.00020	----	
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	7.76	<0.50	6.96	<0.50	----	
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	----	
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000022	<0.000010	0.000013	<0.000010	----	
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----	
tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00018	<0.00010	0.00014	<0.00010	----	
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00228	<0.00030	0.00292	<0.00030	----	
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----	
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000578	<0.000010	0.000434	<0.000010	----	
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00159	<0.00050	0.00170	<0.00050	----	
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0035	<0.0010	0.0015	<0.0010	----	
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0.00024	<0.00020	----	
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	----	
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	----	
Aggregate Organics										
oil & grease (gravimetric)	----	E567	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	----	
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
ethylbenzene	100-41-4	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
styrene	100-42-5	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
toluene	108-88-3	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
xylene, m+p-	179601-23-1	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
xylene, o-	95-47-6	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	NTPC160721-JF 01-06	NTPC160721-JF 01-06B	NTPC160721-M W-02	NTPC160721-M W-02B	----
Client sampling date / time					16-Jul-2021 09:40	16-Jul-2021 06:45	16-Jul-2021 10:35	16-Jul-2021 10:45	----	
Analyte	CAS Number	Method	LOR	Unit	YL2100787-001	YL2100787-002	YL2100787-003	YL2100787-004	-----	
					Result	Result	Result	Result	----	
Volatile Organic Compounds [Fuels]										
xylene, total	1330-20-7	E611A	0.00075	mg/L	<0.00075	<0.00075	<0.00075	<0.00075	----	
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	84.9	86.4	87.2	85.4	----	
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.8	102	102	103	----	
Hydrocarbons										
F1 (C6-C10)	----	E581.VH+F1	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	----	
F2 (C10-C16)	----	E601	0.30	mg/L	<0.30	<0.30	<0.30	<0.30	----	
F3 (C16-C34)	----	E601	0.30	mg/L	1.29	<0.30	<0.30	<0.30	----	
F4 (C34-C50)	----	E601	0.30	mg/L	2.10	<0.30	<0.30	<0.30	----	
hydrocarbons, total (C6-C50)	----	EC581	370	µg/L	3390	<530	<530	<530	----	
VHw (C6-C10)	----	E581.VH+F1	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	----	
F1-BTEX	----	EC580	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	----	
VPHw	----	EC580A	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	----	
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	81.6	74.4	64.3	68.9	----	
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	114	112	110	113	----	

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: YL2100787	Page	: 1 of 13
Amendment	: 1		
Client	: Northwest Territories Power Corporation	Laboratory	: Yellowknife - Environmental
Contact	: Laurence Bonin	Account Manager	: Oliver Gregg
Address	: PO Box 2250 Yellowknife NT Canada X1A 2P7	Address	: 314 Old Airport Road, Unit 116 Yellowknife, Northwest Territories Canada X1A 3T3
Telephone	: ----	Telephone	: 1 867 446 5593
Project	: ----	Date Samples Received	: 16-Jul-2021 11:00
PO	: ----	Issue Date	: 30-Jul-2021 08:39
C-O-C number	: NTPC-JACKFISH-16072021		
Sampler	: ----		
Site	: Jackfish		
Quote number	: YL21-NTPC100-001		
No. of samples received	: 4		
No. of samples analysed	: 4		

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 Services number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Aggregate Organics : Oil & Grease by Gravimetry											
Amber glass (hydrochloric acid) NTPC160721-JF01-06	E567	16-Jul-2021	22-Jul-2021	28 days	6 days	✓	22-Jul-2021	40 days	0 days	✓	
Aggregate Organics : Oil & Grease by Gravimetry											
Amber glass (hydrochloric acid) NTPC160721-JF01-06B	E567	16-Jul-2021	22-Jul-2021	28 days	6 days	✓	22-Jul-2021	40 days	0 days	✓	
Aggregate Organics : Oil & Grease by Gravimetry											
Amber glass (hydrochloric acid) NTPC160721-MW-02	E567	16-Jul-2021	22-Jul-2021	28 days	6 days	✓	22-Jul-2021	40 days	0 days	✓	
Aggregate Organics : Oil & Grease by Gravimetry											
Amber glass (hydrochloric acid) NTPC160721-MW-02B	E567	16-Jul-2021	22-Jul-2021	28 days	6 days	✓	22-Jul-2021	40 days	0 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE NTPC160721-JF01-06	E235.Cl	16-Jul-2021	----	----	----		21-Jul-2021	28 days	5 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE NTPC160721-MW-02	E235.Cl	16-Jul-2021	----	----	----		21-Jul-2021	28 days	5 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE NTPC160721-MW-02B	E235.Cl	16-Jul-2021	----	----	----		21-Jul-2021	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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Chloride in Water by IC											
HDPE NTPC160721-JF01-06B	E235.Cl	16-Jul-2021	----	----	----		21-Jul-2021	28 days	6 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE NTPC160721-JF01-06	E235.F	16-Jul-2021	----	----	----		21-Jul-2021	28 days	5 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE NTPC160721-MW-02	E235.F	16-Jul-2021	----	----	----		21-Jul-2021	28 days	5 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE NTPC160721-MW-02B	E235.F	16-Jul-2021	----	----	----		21-Jul-2021	28 days	5 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE NTPC160721-JF01-06B	E235.F	16-Jul-2021	----	----	----		21-Jul-2021	28 days	6 days	✓	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE NTPC160721-JF01-06	E235.NO3-L	16-Jul-2021	----	----	----		21-Jul-2021	3 days	5 days	* EHT	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE NTPC160721-MW-02	E235.NO3-L	16-Jul-2021	----	----	----		21-Jul-2021	3 days	5 days	* EHT	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE NTPC160721-MW-02B	E235.NO3-L	16-Jul-2021	----	----	----		21-Jul-2021	3 days	5 days	* EHT	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE NTPC160721-JF01-06B	E235.NO3-L	16-Jul-2021	----	----	----		21-Jul-2021	3 days	6 days	* EHT	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
Container / Client Sample ID(s)				Rec	Actual			Rec	Actual		
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE NTPC160721-JF01-06	E235.NO2-L	16-Jul-2021	----	----	----		21-Jul-2021	3 days	5 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE NTPC160721-MW-02	E235.NO2-L	16-Jul-2021	----	----	----		21-Jul-2021	3 days	5 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE NTPC160721-MW-02B	E235.NO2-L	16-Jul-2021	----	----	----		21-Jul-2021	3 days	5 days	*	EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE NTPC160721-JF01-06B	E235.NO2-L	16-Jul-2021	----	----	----		21-Jul-2021	3 days	6 days	*	EHT
Anions and Nutrients : Sulfate in Water by IC											
HDPE NTPC160721-JF01-06	E235.SO4	16-Jul-2021	----	----	----		21-Jul-2021	28 days	5 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE NTPC160721-MW-02	E235.SO4	16-Jul-2021	----	----	----		21-Jul-2021	28 days	5 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE NTPC160721-MW-02B	E235.SO4	16-Jul-2021	----	----	----		21-Jul-2021	28 days	5 days	✓	
Anions and Nutrients : Sulfate in Water by IC											
HDPE NTPC160721-JF01-06B	E235.SO4	16-Jul-2021	----	----	----		21-Jul-2021	28 days	6 days	✓	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) NTPC160721-JF01-06	E509	16-Jul-2021	22-Jul-2021	----	----		22-Jul-2021	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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) NTPC160721-MW-02	E509	16-Jul-2021	22-Jul-2021	----	----		22-Jul-2021	28 days	6 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) NTPC160721-MW-02B	E509	16-Jul-2021	22-Jul-2021	----	----		22-Jul-2021	28 days	6 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) NTPC160721-JF01-06B	E509	16-Jul-2021	22-Jul-2021	----	----		22-Jul-2021	28 days	7 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) NTPC160721-JF01-06	E421	16-Jul-2021	21-Jul-2021	----	----		21-Jul-2021	180 days	5 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) NTPC160721-JF01-06B	E421	16-Jul-2021	21-Jul-2021	----	----		21-Jul-2021	180 days	5 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) NTPC160721-MW-02	E421	16-Jul-2021	21-Jul-2021	----	----		21-Jul-2021	180 days	5 days	✔	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) NTPC160721-MW-02B	E421	16-Jul-2021	21-Jul-2021	----	----		21-Jul-2021	180 days	5 days	✔	
Hydrocarbons : CCME PHC - F2-F4 by GC-FID											
Amber glass/Teflon lined cap (sodium bisulfate) NTPC160721-JF01-06	E601	16-Jul-2021	21-Jul-2021	14 days	5 days	✔	22-Jul-2021	40 days	1 days	✔	
Hydrocarbons : CCME PHC - F2-F4 by GC-FID											
Amber glass/Teflon lined cap (sodium bisulfate) NTPC160721-JF01-06B	E601	16-Jul-2021	21-Jul-2021	14 days	5 days	✔	22-Jul-2021	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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Hydrocarbons : CCME PHC - F2-F4 by GC-FID											
Amber glass/Teflon lined cap (sodium bisulfate) NTPC160721-MW-02B	E601	16-Jul-2021	21-Jul-2021	14 days	5 days	✓	22-Jul-2021	40 days	1 days	✓	
Hydrocarbons : CCME PHC - F2-F4 by GC-FID											
Amber glass/Teflon lined cap (sodium bisulfate) NTPC160721-MW-02	E601	16-Jul-2021	22-Jul-2021	14 days	6 days	✓	23-Jul-2021	40 days	1 days	✓	
Hydrocarbons : VH and F1 by Headspace GC-FID											
Glass vial (sodium bisulfate) NTPC160721-MW-02	E581.VH+F1	16-Jul-2021	21-Jul-2021	----	----		22-Jul-2021	14 days	6 days	✓	
Hydrocarbons : VH and F1 by Headspace GC-FID											
Glass vial (sodium bisulfate) NTPC160721-MW-02B	E581.VH+F1	16-Jul-2021	21-Jul-2021	----	----		22-Jul-2021	14 days	6 days	✓	
Hydrocarbons : VH and F1 by Headspace GC-FID											
Glass vial (sodium bisulfate) NTPC160721-JF01-06	E581.VH+F1	16-Jul-2021	21-Jul-2021	----	----		22-Jul-2021	14 days	7 days	✓	
Hydrocarbons : VH and F1 by Headspace GC-FID											
Glass vial (sodium bisulfate) NTPC160721-JF01-06B	E581.VH+F1	16-Jul-2021	21-Jul-2021	----	----		22-Jul-2021	14 days	7 days	✓	
Physical Tests : pH by Meter											
HDPE NTPC160721-MW-02	E108	16-Jul-2021	----	----	----		21-Jul-2021	0.25 hrs	120 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE NTPC160721-MW-02B	E108	16-Jul-2021	----	----	----		21-Jul-2021	0.25 hrs	120 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE NTPC160721-JF01-06	E108	16-Jul-2021	----	----	----		21-Jul-2021	0.25 hrs	121 hrs	* EHTR-FM	



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 Actual		Eval	Analysis Date	Holding Times Rec Actual		Eval
Physical Tests : pH by Meter										
HDPE NTPC160721-JF01-06B	E108	16-Jul-2021	----	----	----		21-Jul-2021	0.25 hrs	124 hrs	* EHTR-FM
Physical Tests : TSS by Gravimetry										
HDPE NTPC160721-JF01-06	E160-H	16-Jul-2021	----	----	----		22-Jul-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NTPC160721-JF01-06B	E160-H	16-Jul-2021	----	----	----		22-Jul-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NTPC160721-MW-02	E160-H	16-Jul-2021	----	----	----		22-Jul-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NTPC160721-MW-02B	E160-H	16-Jul-2021	----	----	----		22-Jul-2021	7 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NTPC160721-MW-02	E611A	16-Jul-2021	21-Jul-2021	----	----		22-Jul-2021	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NTPC160721-MW-02B	E611A	16-Jul-2021	21-Jul-2021	----	----		22-Jul-2021	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NTPC160721-JF01-06	E611A	16-Jul-2021	21-Jul-2021	----	----		22-Jul-2021	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NTPC160721-JF01-06B	E611A	16-Jul-2021	21-Jul-2021	----	----		22-Jul-2021	14 days	7 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

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Project : ---



EHT: Exceeded ALS recommended hold time prior to analysis.

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	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	248590	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	248157	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	249721	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	248259	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	248160	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	248158	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	248162	1	15	6.6	5.0	✓
pH by Meter	E108	248122	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	248159	1	15	6.6	5.0	✓
TSS by Gravimetry	E160-H	248951	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	248591	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
BTEX by Headspace GC-MS	E611A	248590	1	18	5.5	5.0	✓
CCME PHC - F2-F4 by GC-FID	E601	248059	2	18	11.1	5.0	✓
Chloride in Water by IC	E235.Cl	248157	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	249721	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	248259	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	248160	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	248158	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	248162	1	15	6.6	5.0	✓
Oil & Grease by Gravimetry	E567	249184	1	9	11.1	5.0	✓
pH by Meter	E108	248122	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	248159	1	15	6.6	5.0	✓
TSS by Gravimetry	E160-H	248951	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	248591	1	18	5.5	5.0	✓
Method Blanks (MB)							
BTEX by Headspace GC-MS	E611A	248590	1	18	5.5	5.0	✓
CCME PHC - F2-F4 by GC-FID	E601	248059	2	18	11.1	5.0	✓
Chloride in Water by IC	E235.Cl	248157	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	249721	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	248259	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	248160	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	248158	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	248162	1	15	6.6	5.0	✓
Oil & Grease by Gravimetry	E567	249184	1	9	11.1	5.0	✓
Sulfate in Water by IC	E235.SO4	248159	1	15	6.6	5.0	✓
TSS by Gravimetry	E160-H	248951	1	17	5.8	5.0	✓



Matrix: **Water** Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
<i>Method Blanks (MB) - Continued</i>							
VH and F1 by Headspace GC-FID	E581.VH+F1	248591	1	18	5.5	5.0	✓
<i>Matrix Spikes (MS)</i>							
BTEX by Headspace GC-MS	E611A	248590	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	248157	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	249721	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	248259	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	248160	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	248158	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	248162	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	248159	1	15	6.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	248591	1	18	5.5	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	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160-H Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
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.
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.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
CCME PHC - F2-F4 by GC-FID	E601 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	CCME Fractions 2-4 (F2-F4) are analyzed by GC-FID.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO ₃ 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).
F1-BTEX	EC580 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
Sum F1 to F4 (C6-C50)	EC581 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	Sum F1 to F4 (C6-C50) is calculated as follows: F1 + F2 + F3 + F4 = CCME Fraction 1 (C6-C10) plus CCME Fraction 2 (C10-C16) plus CCME Fraction 3 (C16-C34) plus CCME Fraction 4 (C34-C50).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO ₃ .
Dissolved Mercury Water Filtration	EP509	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
	Vancouver - Environmental			
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.
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
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 : **YL2100787**

Page : 1 of 13

Amendment : **1**

Client : Northwest Territories Power Corporation
Contact : Laurence Bonin
Address : PO Box 2250
 Yellowknife NT Canada X1A 2P7
Telephone : ----
Project : ----
PO : ----
C-O-C number : NTPC-JACKFISH-16072021
Sampler : ----
Site : Jackfish
Quote number : YL21-NTPC100-001
No. of samples received : 4
No. of samples analysed : 4

Laboratory : Yellowknife - Environmental
Account Manager : Oliver Gregg
Address : 314 Old Airport Road, Unit 116
 Yellowknife, Northwest Territories Canada X1A 3T3
Telephone : 1 867 446 5593
Date Samples Received : 16-Jul-2021 11:00
Date Analysis Commenced : 21-Jul-2021
Issue Date : 30-Jul-2021 08:39

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 Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Courtney Cox	Analyst	Inorganics, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Ilnaz Badbezanchi	Team Leader - Metals preparation	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Sristika Chand	Lab Analyst	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 Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

= Indicates a QC result that did not meet the ALS DQO.



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: 248122)											
YL2100787-001	NTPC160721-JF01-06	pH	----	E108	0.10	pH units	7.72	7.68	0.519%	4%	----
Physical Tests (QC Lot: 248951)											
VA21B4679-014	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	445	457	2.70%	20%	----
Anions and Nutrients (QC Lot: 248157)											
VA21B4842-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	0.98	0.97	0.007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 248158)											
VA21B4842-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	3.34	3.32	0.609%	20%	----
Anions and Nutrients (QC Lot: 248159)											
VA21B4842-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	27.2	27.0	0.636%	20%	----
Anions and Nutrients (QC Lot: 248160)											
VA21B4842-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.072	0.071	0.0008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 248162)											
VA21B4842-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0122	0.0122	0.0164%	20%	----
Dissolved Metals (QC Lot: 248259)											
VA21B4797-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0199	0.0197	0.944%	20%	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00063	0.00059	0.00004	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00542	0.00527	2.92%	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	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.052	0.053	0.0006	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	0.463	0.455	0.009	Diff <2x LOR	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00026	0.00027	0.000007	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00031	0.00033	0.00001	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.106	0.105	1.45%	20%	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	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	0.100	mg/L	<0.100	<0.100	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: 248259) - continued											
VA21B4797-001	Anonymous	manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00415	0.00411	0.934%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00068	0.00070	0.00001	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	0.057	0.007	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	0.315	0.306	0.009	Diff <2x LOR	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	0.078	0.080	0.001	Diff <2x LOR	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0167	0.0163	2.10%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	<0.50	0	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	<0.0010	<0.0010	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 249721)											
YL2100787-001	NTPC160721-JF01-06	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 248590)											
YL2100782-002	Anonymous	benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 248591)											
YL2100782-002	Anonymous	F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----
		VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	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
Physical Tests (QCLot: 248951)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 248157)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 248158)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 248159)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 248160)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 248162)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Dissolved Metals (QCLot: 248259)						
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	----
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	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 248259) - continued						
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	17341-25-2	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: 249721)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 249184)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 248590)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 248059)						
F2 (C10-C16)	----	E601	100	µg/L	<100	----
F3 (C16-C34)	----	E601	250	µg/L	<250	----
F4 (C34-C50)	----	E601	250	µg/L	<250	----
Hydrocarbons (QCLot: 248591)						
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----



Sub-Matrix: **Water**

<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Result</i>	<i>Qualifier</i>
Hydrocarbons (QCLot: 248591) - continued						
VHw (C6-C10)	---	E581.VH+F1	100	µg/L	<100	---
Hydrocarbons (QCLot: 249211)						
F2 (C10-C16)	---	E601	100	µg/L	<100	---
F3 (C16-C34)	---	E601	250	µg/L	<250	---
F4 (C34-C50)	---	E601	250	µg/L	<250	---



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				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 248122)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 248951)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 248157)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 248158)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 248159)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 248160)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 248162)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	105	90.0	110	----
Dissolved Metals (QCLot: 248259)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	98.6	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	98.6	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	95.2	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	96.6	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	91.0	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.0	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	96.1	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	96.8	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	97.4	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.3	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.7	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	95.4	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	98.3	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	99.6	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.2	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 248259) - continued									
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	97.3	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	96.0	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	97.0	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	98.7	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	97.2	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	98.0	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	97.6	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	93.5	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	100	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	92.3	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	95.4	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.8	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	92.1	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	97.6	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.7	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.2	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	96.1	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	96.3	80.0	120	----
Aggregate Organics (QCLot: 249184)									
oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	90.6	70.0	130	----
Volatile Organic Compounds (QCLot: 248590)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	119	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	95.5	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	111	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	100	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	102	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	100	70.0	130	----
Hydrocarbons (QCLot: 248059)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	114	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	104	70.0	130	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Hydrocarbons (QCLot: 248059) - continued									
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	112	70.0	130	----
Hydrocarbons (QCLot: 248591)									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	74.5	70.0	130	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	71.0	70.0	130	----
Hydrocarbons (QCLot: 249211)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	106	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	101	70.0	130	----
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	102	70.0	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: 248157)										
VA21B4842-002	Anonymous	chloride	16887-00-6	E235.Cl	106 mg/L	100 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 248158)										
VA21B4842-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 248159)										
VA21B4842-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	106 mg/L	100 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 248160)										
VA21B4842-002	Anonymous	fluoride	16984-48-8	E235.F	1.08 mg/L	1 mg/L	108	75.0	125	----
Anions and Nutrients (QCLot: 248162)										
VA21B4842-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.525 mg/L	0.5 mg/L	105	75.0	125	----
Dissolved Metals (QCLot: 248259)										
VA21B4797-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.194 mg/L	0.2 mg/L	97.2	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0192 mg/L	0.02 mg/L	95.8	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0190 mg/L	0.02 mg/L	95.1	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0399 mg/L	0.04 mg/L	99.6	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00892 mg/L	0.01 mg/L	89.2	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.089 mg/L	0.1 mg/L	89.2	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00392 mg/L	0.004 mg/L	98.1	70.0	130	----
		calcium, dissolved	7440-70-2	E421	3.72 mg/L	4 mg/L	92.9	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.00945 mg/L	0.01 mg/L	94.5	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0386 mg/L	0.04 mg/L	96.5	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.92 mg/L	2 mg/L	95.9	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0185 mg/L	0.02 mg/L	92.3	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0965 mg/L	0.1 mg/L	96.5	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	0.964 mg/L	1 mg/L	96.4	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0190 mg/L	0.02 mg/L	94.8	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0186 mg/L	0.02 mg/L	93.2	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0388 mg/L	0.04 mg/L	96.9	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: 248259) - continued										
VA21B4797-002	Anonymous	phosphorus, dissolved	7723-14-0	E421	9.81 mg/L	10 mg/L	98.1	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.95 mg/L	4 mg/L	98.7	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0199 mg/L	0.02 mg/L	99.6	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0414 mg/L	0.04 mg/L	104	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.04 mg/L	10 mg/L	90.4	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00633 mg/L	0.008 mg/L	79.2	70.0	130	----
		sodium, dissolved	17341-25-2	E421	1.94 mg/L	2 mg/L	96.9	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	19.3 mg/L	20 mg/L	96.6	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00374 mg/L	0.004 mg/L	93.6	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0378 mg/L	0.04 mg/L	94.6	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0184 mg/L	0.02 mg/L	92.0	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00384 mg/L	0.004 mg/L	95.9	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0967 mg/L	0.1 mg/L	96.7	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.414 mg/L	0.4 mg/L	104	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
Dissolved Metals (QCLot: 249721)										
YL2100787-002	NTPC160721-JF01-06B	mercury, dissolved	7439-97-6	E509	0.000103 mg/L	0.0001 mg/L	103	70.0	130	----
Volatile Organic Compounds (QCLot: 248590)										
YL2100782-002	Anonymous	benzene	71-43-2	E611A	130 µg/L	100 µg/L	130	60.0	140	----
		ethylbenzene	100-41-4	E611A	108 µg/L	100 µg/L	108	60.0	140	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	122 µg/L	100 µg/L	122	60.0	140	----
		styrene	100-42-5	E611A	114 µg/L	100 µg/L	114	60.0	140	----
		toluene	108-88-3	E611A	114 µg/L	100 µg/L	114	60.0	140	----
		xylene, m+p-	179601-23-1	E611A	225 µg/L	200 µg/L	112	60.0	140	----
		xylene, o-	95-47-6	E611A	113 µg/L	100 µg/L	113	60.0	140	----
Hydrocarbons (QCLot: 248591)										
YL2100782-003	Anonymous	F1 (C6-C10)	----	E581.VH+F1	6440 µg/L	6310 µg/L	102	60.0	140	----
		VHw (C6-C10)	----	E581.VH+F1	6140 µg/L	6310 µg/L	97.4	60.0	140	----





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CERTIFICATE OF ANALYSIS

Work Order : YL2101418
Client : Golder Associates Ltd.
Contact : Laurence Bonin
Address : 9 - 4905 48th Street
Yellowknife NT Canada X1A 3S3
Telephone : ---
Project : CX21471534-JACKFISH SEPTEMBER 2021 NTPC JACKFISH
GW SAMPLING
PO : ---
C-O-C number : NTPC JACKFISH-280921
Sampler : DOMI DIAZ
Site : ---
Quote number : NTPC Jackfish Lake
No. of samples received : 4
No. of samples analysed : 4

Page : 1 of 5
Laboratory : Yellowknife - Environmental
Account Manager : Oliver Gregg
Address : 314 Old Airport Road, Unit 116
Yellowknife NT Canada X1A 3T3
Telephone : 1 867 446 5593
Date Samples Received : 28-Sep-2021 11:00
Date Analysis Commenced : 01-Oct-2021
Issue Date : 07-Oct-2021 08:30

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.

Table with 3 columns: Signatories, Position, Laboratory Department. Lists names like Inaz Badbezanchi, Janice Leung, Kim Jensen, Lindsay Gung, Owen Cheng and their respective roles and departments.



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).

<i>Unit</i>	<i>Description</i>
-	No Unit
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

<i>Qualifier</i>	<i>Description</i>
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).



Analytical Results

Sub-Matrix: Water					Client sample ID	NTPC280921-JF 01-06	NTPC280921-JF 01-06B	NTPC280921-M W-02	NTPC280921-M W-02B	----
(Matrix: Water)					Client sampling date / time	28-Sep-2021 09:30	28-Sep-2021 10:00	28-Sep-2021 10:30	28-Sep-2021 11:00	----
Analyte	CAS Number	Method	LOR	Unit	YL2101418-001	YL2101418-002	YL2101418-003	YL2101418-004	-----	
					Result	Result	Result	Result	----	
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	162	<0.60	154	<0.60	----	
pH	----	E108	0.10	pH units	7.89	5.42	8.09	5.34	----	
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	15600	<3.0	297	<3.0	----	
Anions and Nutrients										
chloride	16887-00-6	E235.Cl	0.50	mg/L	59.8	<0.50	59.9	<0.50	----	
fluoride	16984-48-8	E235.F	0.020	mg/L	0.110	<0.020	0.100	<0.020	----	
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.313	<0.0050	0.0082	<0.0050	----	
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0074	<0.0010	0.0039	<0.0010	----	
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	34.4	<0.30	29.5	<0.30	----	
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0313	<0.0010	0.0129	<0.0010	----	
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00080	<0.00010	0.00044	<0.00010	----	
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.165	<0.00010	0.113	<0.00010	----	
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0424	<0.00010	0.0350	<0.00010	----	
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	----	
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----	
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.023	<0.010	0.019	<0.010	----	
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0.0000117	<0.0000050	----	
calcium, dissolved	7440-70-2	E421	0.050	mg/L	43.1	<0.050	41.1	<0.050	----	
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000023	<0.000010	<0.000010	<0.000010	----	
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00040	<0.00010	0.00078	<0.00010	----	
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00205	<0.00020	0.00106	<0.00020	----	
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.052	<0.010	0.810	<0.010	----	
lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000099	<0.000050	0.000100	<0.000050	----	
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0028	<0.0010	0.0027	<0.0010	----	
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	13.3	<0.0050	12.5	<0.0050	----	
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0934	<0.00010	0.0724	<0.00010	----	
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----	
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000413	<0.000050	0.000257	<0.000050	----	



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	NTPC280921-JF 01-06	NTPC280921-JF 01-06B	NTPC280921-M W-02	NTPC280921-M W-02B	----
Client sampling date / time					28-Sep-2021 09:30	28-Sep-2021 10:00	28-Sep-2021 10:30	28-Sep-2021 11:00	----	
Analyte	CAS Number	Method	LOR	Unit	YL2101418-001	YL2101418-002	YL2101418-003	YL2101418-004	-----	
					Result	Result	Result	Result	---	
Dissolved Metals										
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00250	<0.00050	0.00133	<0.00050	----	
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	----	
potassium, dissolved	7440-09-7	E421	0.050	mg/L	3.86	<0.050	3.56	<0.050	----	
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00407	<0.00020	0.00216	<0.00020	----	
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000071	<0.000050	0.000065	<0.000050	----	
silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.06	<0.050	5.14	<0.050	----	
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----	
sodium, dissolved	17341-25-2	E421	0.050	mg/L	29.6	<0.050	28.4	<0.050	----	
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0896	<0.00020	0.0898	<0.00020	----	
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	11.4	<0.50	9.73	<0.50	----	
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	----	
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----	
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----	
tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00015	<0.00010	0.00011	<0.00010	----	
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00109	<0.00030	0.00036	<0.00030	----	
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----	
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00102	<0.000010	0.000382	<0.000010	----	
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00093	<0.00050	0.00082	<0.00050	----	
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0015	<0.0010	0.0014	<0.0010	----	
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	----	
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	----	
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	----	
Aggregate Organics										
oil & grease (gravimetric)	----	E567	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	----	
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
ethylbenzene	100-41-4	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
styrene	100-42-5	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
toluene	108-88-3	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
xylene, m+p-	179601-23-1	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	NTPC280921-JF 01-06	NTPC280921-JF 01-06B	NTPC280921-M W-02	NTPC280921-M W-02B	----
Client sampling date / time					28-Sep-2021 09:30	28-Sep-2021 10:00	28-Sep-2021 10:30	28-Sep-2021 11:00	----	
Analyte	CAS Number	Method	LOR	Unit	YL2101418-001	YL2101418-002	YL2101418-003	YL2101418-004	-----	
					Result	Result	Result	Result	---	
Volatile Organic Compounds [Fuels]										
xylene, o-	95-47-6	E611A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
xylenes, total	1330-20-7	E611A	0.00075	mg/L	<0.00075	<0.00075	<0.00075	<0.00075	----	
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	83.3	87.1	87.1	83.8	----	
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	95.6	93.1	91.3	92.2	----	
Hydrocarbons										
F1 (C6-C10)	----	E581.VH+F1	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	----	
F2 (C10-C16)	----	E601	0.30	mg/L	<0.30	<0.30	<0.84 ^{DLM}	<0.30	----	
F3 (C16-C34)	----	E601	0.30	mg/L	<0.30	<0.30	2.92	<0.30	----	
F4 (C34-C50)	----	E601	0.30	mg/L	<0.30	<0.30	4.54	<0.30	----	
hydrocarbons, total (C6-C50)	----	EC581	370	µg/L	<530	<530	7460	<530	----	
VHw (C6-C10)	----	E581.VH+F1	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	----	
F1-BTEX	----	EC580	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	----	
VPHw	----	EC580A	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	----	
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	82.4	77.6	89.1	73.9	----	
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	109	97.5	89.0	115	----	

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: YL2101418	Page	: 1 of 13
Client	: Golder Associates Ltd.	Laboratory	: Yellowknife - Environmental
Contact	: Laurence Bonin	Account Manager	: Oliver Gregg
Address	: 9 - 4905 48th Street Yellowknife NT Canada X1A 3S3	Address	: 314 Old Airport Road, Unit 116 Yellowknife, Northwest Territories Canada X1A 3T3
Telephone	: ----	Telephone	: 1 867 446 5593
Project	: CX21471534-JACKFISH SEPTEMBER 2021 NTPC JACKFISH GW SAMPLING	Date Samples Received	: 28-Sep-2021 11:00
PO	: ----	Issue Date	: 07-Oct-2021 08:30
C-O-C number	: NTPC JACKFISH-280921		
Sampler	: DOMI DIAZ		
Site	: ----		
Quote number	: NTPC Jackfish Lake		
No. of samples received	: 4		
No. of samples analysed	: 4		

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 Services number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Aggregate Organics : Oil & Grease by Gravimetry											
Amber glass (hydrochloric acid) NTPC280921-JF01-06	E567	28-Sep-2021	04-Oct-2021	28 days	7 days	✓	05-Oct-2021	40 days	0 days	✓	
Aggregate Organics : Oil & Grease by Gravimetry											
Amber glass (hydrochloric acid) NTPC280921-JF01-06B	E567	28-Sep-2021	04-Oct-2021	28 days	7 days	✓	05-Oct-2021	40 days	0 days	✓	
Aggregate Organics : Oil & Grease by Gravimetry											
Amber glass (hydrochloric acid) NTPC280921-MW-02	E567	28-Sep-2021	04-Oct-2021	28 days	7 days	✓	05-Oct-2021	40 days	0 days	✓	
Aggregate Organics : Oil & Grease by Gravimetry											
Amber glass (hydrochloric acid) NTPC280921-MW-02B	E567	28-Sep-2021	04-Oct-2021	28 days	7 days	✓	05-Oct-2021	40 days	0 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE NTPC280921-JF01-06	E235.Cl	28-Sep-2021	----	----	----		01-Oct-2021	28 days	3 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE NTPC280921-JF01-06B	E235.Cl	28-Sep-2021	----	----	----		01-Oct-2021	28 days	3 days	✓	
Anions and Nutrients : Chloride in Water by IC											
HDPE NTPC280921-MW-02	E235.Cl	28-Sep-2021	----	----	----		01-Oct-2021	28 days	3 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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Chloride in Water by IC											
HDPE NTPC280921-MW-02B	E235.Cl	28-Sep-2021	----	----	----		01-Oct-2021	28 days	3 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE NTPC280921-JF01-06	E235.F	28-Sep-2021	----	----	----		01-Oct-2021	28 days	3 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE NTPC280921-JF01-06B	E235.F	28-Sep-2021	----	----	----		01-Oct-2021	28 days	3 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE NTPC280921-MW-02	E235.F	28-Sep-2021	----	----	----		01-Oct-2021	28 days	3 days	✓	
Anions and Nutrients : Fluoride in Water by IC											
HDPE NTPC280921-MW-02B	E235.F	28-Sep-2021	----	----	----		01-Oct-2021	28 days	3 days	✓	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE NTPC280921-JF01-06	E235.NO3-L	28-Sep-2021	----	----	----		01-Oct-2021	3 days	3 days	✓	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE NTPC280921-JF01-06B	E235.NO3-L	28-Sep-2021	----	----	----		01-Oct-2021	3 days	3 days	✓	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE NTPC280921-MW-02	E235.NO3-L	28-Sep-2021	----	----	----		01-Oct-2021	3 days	3 days	✓	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE NTPC280921-MW-02B	E235.NO3-L	28-Sep-2021	----	----	----		01-Oct-2021	3 days	3 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		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NTPC280921-JF01-06	E235.NO2-L	28-Sep-2021	----	----	----		01-Oct-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NTPC280921-JF01-06B	E235.NO2-L	28-Sep-2021	----	----	----		01-Oct-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NTPC280921-MW-02	E235.NO2-L	28-Sep-2021	----	----	----		01-Oct-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NTPC280921-MW-02B	E235.NO2-L	28-Sep-2021	----	----	----		01-Oct-2021	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NTPC280921-JF01-06	E235.SO4	28-Sep-2021	----	----	----		01-Oct-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NTPC280921-JF01-06B	E235.SO4	28-Sep-2021	----	----	----		01-Oct-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NTPC280921-MW-02	E235.SO4	28-Sep-2021	----	----	----		01-Oct-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NTPC280921-MW-02B	E235.SO4	28-Sep-2021	----	----	----		01-Oct-2021	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NTPC280921-JF01-06	E509	28-Sep-2021	05-Oct-2021	----	----		05-Oct-2021	28 days	7 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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) NTPC280921-JF01-06B	E509	28-Sep-2021	05-Oct-2021	----	----		05-Oct-2021	28 days	7 days	✓	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) NTPC280921-MW-02	E509	28-Sep-2021	05-Oct-2021	----	----		05-Oct-2021	28 days	7 days	✓	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial dissolved (hydrochloric acid) NTPC280921-MW-02B	E509	28-Sep-2021	05-Oct-2021	----	----		05-Oct-2021	28 days	7 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) NTPC280921-JF01-06	E421	28-Sep-2021	05-Oct-2021	----	----		05-Oct-2021	180 days	7 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) NTPC280921-JF01-06B	E421	28-Sep-2021	05-Oct-2021	----	----		05-Oct-2021	180 days	7 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) NTPC280921-MW-02	E421	28-Sep-2021	05-Oct-2021	----	----		05-Oct-2021	180 days	7 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE dissolved (nitric acid) NTPC280921-MW-02B	E421	28-Sep-2021	05-Oct-2021	----	----		05-Oct-2021	180 days	7 days	✓	
Hydrocarbons : CCME PHC - F2-F4 by GC-FID											
Amber glass/Teflon lined cap (sodium bisulfate) NTPC280921-JF01-06	E601	28-Sep-2021	03-Oct-2021	14 days	5 days	✓	04-Oct-2021	40 days	1 days	✓	
Hydrocarbons : CCME PHC - F2-F4 by GC-FID											
Amber glass/Teflon lined cap (sodium bisulfate) NTPC280921-JF01-06B	E601	28-Sep-2021	03-Oct-2021	14 days	5 days	✓	04-Oct-2021	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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Hydrocarbons : CCME PHC - F2-F4 by GC-FID											
Amber glass/Teflon lined cap (sodium bisulfate) NTPC280921-MW-02	E601	28-Sep-2021	03-Oct-2021	14 days	5 days	✓	04-Oct-2021	40 days	1 days	✓	
Hydrocarbons : CCME PHC - F2-F4 by GC-FID											
Amber glass/Teflon lined cap (sodium bisulfate) NTPC280921-MW-02B	E601	28-Sep-2021	03-Oct-2021	14 days	5 days	✓	04-Oct-2021	40 days	1 days	✓	
Hydrocarbons : VH and F1 by Headspace GC-FID											
Glass vial (sodium bisulfate) NTPC280921-JF01-06	E581.VH+F1	28-Sep-2021	03-Oct-2021	----	----		04-Oct-2021	14 days	6 days	✓	
Hydrocarbons : VH and F1 by Headspace GC-FID											
Glass vial (sodium bisulfate) NTPC280921-JF01-06B	E581.VH+F1	28-Sep-2021	03-Oct-2021	----	----		04-Oct-2021	14 days	6 days	✓	
Hydrocarbons : VH and F1 by Headspace GC-FID											
Glass vial (sodium bisulfate) NTPC280921-MW-02	E581.VH+F1	28-Sep-2021	03-Oct-2021	----	----		04-Oct-2021	14 days	6 days	✓	
Hydrocarbons : VH and F1 by Headspace GC-FID											
Glass vial (sodium bisulfate) NTPC280921-MW-02B	E581.VH+F1	28-Sep-2021	03-Oct-2021	----	----		04-Oct-2021	14 days	6 days	✓	
Physical Tests : pH by Meter											
HDPE NTPC280921-MW-02B	E108	28-Sep-2021	----	----	----		01-Oct-2021	0.25 hrs	78 hrs	* EHTL	
Physical Tests : pH by Meter											
HDPE NTPC280921-MW-02	E108	28-Sep-2021	----	----	----		01-Oct-2021	0.25 hrs	78 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE NTPC280921-JF01-06	E108	28-Sep-2021	----	----	----		01-Oct-2021	0.25 hrs	79 hrs	* EHTR-FM	



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		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : pH by Meter										
HDPE NTPC280921-JF01-06B	E108	28-Sep-2021	----	----	----		01-Oct-2021	0.25 hrs	79 hrs	* EHTR-FM
Physical Tests : TSS by Gravimetry										
HDPE NTPC280921-JF01-06	E160-H	28-Sep-2021	----	----	----		05-Oct-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NTPC280921-JF01-06B	E160-H	28-Sep-2021	----	----	----		05-Oct-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NTPC280921-MW-02	E160-H	28-Sep-2021	----	----	----		05-Oct-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NTPC280921-MW-02B	E160-H	28-Sep-2021	----	----	----		05-Oct-2021	7 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NTPC280921-JF01-06	E611A	28-Sep-2021	03-Oct-2021	----	----		04-Oct-2021	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NTPC280921-JF01-06B	E611A	28-Sep-2021	03-Oct-2021	----	----		04-Oct-2021	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NTPC280921-MW-02	E611A	28-Sep-2021	03-Oct-2021	----	----		04-Oct-2021	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NTPC280921-MW-02B	E611A	28-Sep-2021	03-Oct-2021	----	----		04-Oct-2021	14 days	6 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

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

Page : 8 of 13
Work Order : YL2101418
Client : Golder Associates Ltd.
Project : CX21471534-JACKFISH SEPTEMBER 2021 NTPC JACKFISH GW SAMPLING



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	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	309648	1	15	6.6	5.0	✓
Chloride in Water by IC	E235.Cl	307820	1	19	5.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	310824	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	311371	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	307819	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	307822	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	307823	1	19	5.2	5.0	✓
pH by Meter	E108	307816	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	307824	1	19	5.2	5.0	✓
TSS by Gravimetry	E160-H	310821	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	309647	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
BTEX by Headspace GC-MS	E611A	309648	1	15	6.6	5.0	✓
CCME PHC - F2-F4 by GC-FID	E601	309553	1	8	12.5	5.0	✓
Chloride in Water by IC	E235.Cl	307820	1	19	5.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	310824	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	311371	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	307819	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	307822	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	307823	1	19	5.2	5.0	✓
Oil & Grease by Gravimetry	E567	310795	1	7	14.2	5.0	✓
pH by Meter	E108	307816	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	307824	1	19	5.2	5.0	✓
TSS by Gravimetry	E160-H	310821	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	309647	1	13	7.6	5.0	✓
Method Blanks (MB)							
BTEX by Headspace GC-MS	E611A	309648	1	15	6.6	5.0	✓
CCME PHC - F2-F4 by GC-FID	E601	309553	1	8	12.5	5.0	✓
Chloride in Water by IC	E235.Cl	307820	1	19	5.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	310824	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	311371	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	307819	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	307822	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	307823	1	19	5.2	5.0	✓
Oil & Grease by Gravimetry	E567	310795	1	7	14.2	5.0	✓
Sulfate in Water by IC	E235.SO4	307824	1	19	5.2	5.0	✓
TSS by Gravimetry	E160-H	310821	1	11	9.0	5.0	✓



Matrix: **Water** Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
<i>Method Blanks (MB) - Continued</i>							
VH and F1 by Headspace GC-FID	E581.VH+F1	309647	1	13	7.6	5.0	✓
<i>Matrix Spikes (MS)</i>							
BTEX by Headspace GC-MS	E611A	309648	1	15	6.6	5.0	✓
Chloride in Water by IC	E235.Cl	307820	1	19	5.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	310824	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	311371	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	307819	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	307822	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	307823	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	307824	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	309647	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	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160-H Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
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.
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.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
CCME PHC - F2-F4 by GC-FID	E601 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	CCME Fractions 2-4 (F2-F4) are analyzed by GC-FID.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃ , dissolved)" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO ₃ 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.
F1-BTEX	EC580 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
Sum F1 to F4 (C6-C50)	EC581 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	Hydrocarbons, total (C6-C50) is the sum of CCME Fractions F1(C6-C10), F2(C10-C16), F3(C16-C34), and F4(C34-C50). F4G-sg is not used within this calculation due to overlap with other fractions.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO ₃ .
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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.
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
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	: YL2101418	Page	: 1 of 14
Client	: Golder Associates Ltd.	Laboratory	: Yellowknife - Environmental
Contact	: Laurence Bonin	Account Manager	: Oliver Gregg
Address	: 9 - 4905 48th Street Yellowknife NT Canada X1A 3S3	Address	: 314 Old Airport Road, Unit 116 Yellowknife, Northwest Territories Canada X1A 3T3
Telephone	: ----	Telephone	: 1 867 446 5593
Project	: CX21471534-JACKFISH SEPTEMBER 2021 NTPC JACKFISH GW SAMPLING	Date Samples Received	: 28-Sep-2021 11:00
PO	: ----	Date Analysis Commenced	: 01-Oct-2021
C-O-C number	: NTPC JACKFISH-280921	Issue Date	: 07-Oct-2021 08:30
Sampler	: DOMI DIAZ		
Site	: ----		
Quote number	: NTPC Jackfish Lake		
No. of samples received	: 4		
No. of samples analysed	: 4		

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 Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Ilmaz Badbezanchi	Team Leader - Metals preparation	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia

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Work Order : YL2101418
Client : Golder Associates Ltd.
Project : CX21471534-JACKFISH SEPTEMBER 2021 NTPC JACKFISH GW SAMPLING



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 Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

= Indicates a QC result that did not meet the ALS DQO.



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: 307816)											
VA21C1461-001	Anonymous	pH	----	E108	0.10	pH units	7.76	7.75	0.0387%	4%	----
Physical Tests (QC Lot: 310821)											
VA21C1335-001	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 307819)											
VA21C1461-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 307820)											
VA21C1461-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	2.83	2.81	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 307822)											
VA21C1461-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.286	0.284	0.586%	20%	----
Anions and Nutrients (QC Lot: 307823)											
VA21C1461-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 307824)											
VA21C1461-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	7.58	7.56	0.320%	20%	----
Dissolved Metals (QC Lot: 310824)											
YL2101411-003	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 311371)											
YL2101422-005	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0055	0.0057	0.0002	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00011	0.00011	0.000005	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0263	0.0264	0.553%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	0.000026	0.000032	0.000006	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.768	0.781	1.74%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000249	0.0000260	0.0000011	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	147	149	1.35%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000106	0.000114	6.98%	20%	----
		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	0.00099	0.00093	0.00006	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00171	0.00172	0.00001	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.011	0.011	0.0002	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000058	0.000059	0.0000001	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: 311371) - continued											
YL2101422-005	Anonymous	lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0098	0.0099	0.00010	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	85.6	83.7	2.20%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.109	0.107	1.52%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.0190	0.0191	0.714%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.0338	0.0330	2.47%	20%	----
		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	15.6	15.6	0.136%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0157	0.0158	0.396%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000686	0.000713	3.84%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	4.04	4.02	0.389%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	72.2	71.4	1.11%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	1.46	1.49	1.86%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	179	178	0.685%	20%	----
		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	0.000018	0.000020	0.000001	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	0.00629	0.00633	0.666%	20%	----
		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	0.0080	0.0082	0.0001	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 309648)											
VA21C1163-001	Anonymous	benzene	71-43-2	E611A	0.00050	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		ethylbenzene	100-41-4	E611A	0.00050	µg/L	0.00134 mg/L	1.38	0.03	Diff <2x LOR	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.00050	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		styrene	100-42-5	E611A	0.00050	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		toluene	108-88-3	E611A	0.00050	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611A	0.00050	µg/L	0.00192 mg/L	1.78	0.14	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.00050	µg/L	0.00235 mg/L	2.23	0.12	Diff <2x LOR	----
Hydrocarbons (QC Lot: 309647)											
VA21C1163-001	Anonymous	F1 (C6-C10)	----	E581.VH+F1	100	µg/L	120	120	0.0%	30%	----

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 Work Order : YL2101418
 Client : Golder Associates Ltd.
 Project : CX21471534-JACKFISH SEPTEMBER 2021 NTPC JACKFISH GW SAMPLING



Sub-Matrix: **Water**

Laboratory Duplicate (DUP) Report

<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD(%) or Difference</i>	<i>Duplicate Limits</i>	<i>Qualifier</i>
Hydrocarbons (QC Lot: 309647) - continued											
VA21C1163-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	110	110	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
Physical Tests (QCLot: 310821)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 307819)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 307820)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 307822)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 307823)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 307824)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Dissolved Metals (QCLot: 310824)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 311371)						
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	----
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	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 311371) - continued						
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	17341-25-2	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	----
Aggregate Organics (QCLot: 310795)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 309648)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 309553)						
F2 (C10-C16)	----	E601	100	µg/L	<100	----
F3 (C16-C34)	----	E601	250	µg/L	<250	----
F4 (C34-C50)	----	E601	250	µg/L	<250	----
Hydrocarbons (QCLot: 309647)						
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----

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Work Order : YL2101418
Client : Golder Associates Ltd.
Project : CX21471534-JACKFISH SEPTEMBER 2021 NTPC JACKFISH GW SAMPLING



Sub-Matrix: **Water**

<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Result</i>	<i>Qualifier</i>
Hydrocarbons (QCLot: 309647) - continued						
VHw (C6-C10)	---	E581.VH+F1	100	µg/L	<100	---



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 Concentration	Recovery (%) LCS	Recovery Limits (%)		Qualifier
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 307816)									
pH	----	E108	----	pH units	7 pH units	99.8	98.0	102	----
Physical Tests (QCLot: 310821)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	91.8	85.0	115	----
Anions and Nutrients (QCLot: 307819)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	94.4	90.0	110	----
Anions and Nutrients (QCLot: 307820)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 307822)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 307823)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	94.9	90.0	110	----
Anions and Nutrients (QCLot: 307824)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	99.1	80.0	120	----
Dissolved Metals (QCLot: 311371)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	98.2	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	98.9	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.2	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.2	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	114	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	99.2	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	96.8	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.5	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.0	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	94.7	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	97.8	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	99.3	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	98.3	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	97.7	80.0	120	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Dissolved Metals (QCLot: 311371) - continued									
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	95.3	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.5	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	103	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	99.4	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	97.1	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	103	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	98.5	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	85.1	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.2	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	88.7	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.3	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	97.9	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	94.0	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	98.7	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.6	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.9	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	96.2	80.0	120	----
Aggregate Organics (QCLot: 310795)									
oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	97.0	70.0	130	----
Volatile Organic Compounds (QCLot: 309648)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	85.9	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	72.7	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	91.3	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	74.4	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	77.2	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	101	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	76.1	70.0	130	----
Hydrocarbons (QCLot: 309553)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	102	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	95.6	70.0	130	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Hydrocarbons (QCLot: 309553) - continued									
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	99.2	70.0	130	----
Hydrocarbons (QCLot: 309647)									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	95.5	70.0	130	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	98.2	70.0	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**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	Target	MS	Low	High	
Anions and Nutrients (QCLot: 307819)										
VA21C1461-002	Anonymous	fluoride	16984-48-8	E235.F	0.960 mg/L	1 mg/L	96.0	75.0	125	----
Anions and Nutrients (QCLot: 307820)										
VA21C1461-002	Anonymous	chloride	16887-00-6	E235.Cl	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 307822)										
VA21C1461-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.51 mg/L	2.5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 307823)										
VA21C1461-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.468 mg/L	0.5 mg/L	93.7	75.0	125	----
Anions and Nutrients (QCLot: 307824)										
VA21C1461-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	104 mg/L	100 mg/L	104	75.0	125	----
Dissolved Metals (QCLot: 310824)										
YL2101412-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000967 mg/L	0.0001 mg/L	96.7	70.0	130	----
Dissolved Metals (QCLot: 311371)										
VA21B8560-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0189 mg/L	0.02 mg/L	94.7	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0396 mg/L	0.04 mg/L	98.9	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00904 mg/L	0.01 mg/L	90.4	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.094 mg/L	0.1 mg/L	94.5	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00395 mg/L	0.004 mg/L	98.7	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	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0390 mg/L	0.04 mg/L	97.4	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0194 mg/L	0.02 mg/L	97.3	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0189 mg/L	0.02 mg/L	94.5	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.95 mg/L	2 mg/L	97.3	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0981 mg/L	0.1 mg/L	98.1	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	0.0195 mg/L	0.02 mg/L	97.5	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: 311371) - continued										
VA21B8560-002	Anonymous	molybdenum, dissolved	7439-98-7	E421	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.1 mg/L	10 mg/L	101	70.0	130	----
		potassium, dissolved	7440-09-7	E421	4.02 mg/L	4 mg/L	100	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0398 mg/L	0.04 mg/L	99.6	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.24 mg/L	10 mg/L	92.4	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00394 mg/L	0.004 mg/L	98.5	70.0	130	----
		sodium, dissolved	17341-25-2	E421	1.81 mg/L	2 mg/L	90.6	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	20.1 mg/L	20 mg/L	100	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	0.00376 mg/L	0.004 mg/L	94.0	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0200 mg/L	0.02 mg/L	99.8	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0391 mg/L	0.04 mg/L	97.8	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0189 mg/L	0.02 mg/L	94.7	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00383 mg/L	0.004 mg/L	95.7	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0990 mg/L	0.1 mg/L	99.0	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.399 mg/L	0.4 mg/L	99.8	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0415 mg/L	0.04 mg/L	104	70.0	130	----
Volatile Organic Compounds (QCLot: 309648)										
VA21C1164-001	Anonymous	benzene	71-43-2	E611A	78.8 µg/L	100 µg/L	78.8	60.0	140	----
		ethylbenzene	100-41-4	E611A	67.8 µg/L	100 µg/L	67.8	60.0	140	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	87.4 µg/L	100 µg/L	87.4	60.0	140	----
		styrene	100-42-5	E611A	67.3 µg/L	100 µg/L	67.3	60.0	140	----
		toluene	108-88-3	E611A	73.6 µg/L	100 µg/L	73.6	60.0	140	----
		xylene, m+p-	179601-23-1	E611A	194 µg/L	200 µg/L	97.2	60.0	140	----
		xylene, o-	95-47-6	E611A	70.9 µg/L	100 µg/L	70.9	60.0	140	----
Hydrocarbons (QCLot: 309647)										
YL2101339-002	Anonymous	F1 (C6-C10)	----	E581.VH+F1	5600 µg/L	6310 µg/L	88.8	60.0	140	----
		VHw (C6-C10)	----	E581.VH+F1	5760 µg/L	6310 µg/L	91.3	60.0	140	----

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Work Order : YL2101418
Client : Golder Associates Ltd.
Project : CX21471534-JACKFISH SEPTEMBER 2021 NTPC JACKFISH GW SAMPLING



Lab Copy

Northwest Territories Power Corp.(NTPC) Jackfish Power Plant GW Monitoring Chain-of-Custody Record - Analytical Request Form

CoC#: NTPC-Jackfish-280921-16072021 Created: July 16,

From: Golder Associates - NTPC Address: 9, 4905 - 48 Street Yellowknife, Northwest Territories X1A 3S3 Phone: (867) 873 6319 Contact: Laurence Bonin laurence_bonin@golder.com

Send Samples For Analysis To: ALS Group, Yellowknife Address: 314 Old Airport Rd, Unit 116 Yellowknife, NT X1A 3T3 Phone: (867) 873-5593 Fax: (867) 920-4238 Contact: Oliver Gregg Email: Oliver.Gregg@alsglobal.com

eMail Confirmation and Results To: Please use full distribution list from quote laurence_bonin@golder.com jclark@ntpc.com tamra_reynolds@golder.com

Send Original Signed Lab Reports To: Golder Associates Ltd. Address: 9, 4905 - 48 Street Yellowknife, Northwest Territories X1A 3S3 Phone: (867) 873 6319 Contact: Laurence Bonin laurence_bonin@golder.com

Send Invoice To: Golder Associates Ltd. Address: 9, 4905 - 48 Street Yellowknife, Northwest Territories X1A 3S3 Phone: (867) 873 6319 Attn: Laurence Bonin laurence_bonin@golder.com

FIELD SAMPLE INFORMATION

REQUESTED LAB SUITES (see reverse side for details)

Fields Notes:

Samples have been field filtered and preserved

Please ensure that there is only one COC per report. Use email confirmation and results list on this COC. Requires a 5-day TAT.

Facility Code:

Project # 21471534-Jackfish Quote # Sept. July 2021 NTPC Jackfish GW Sampling CX21471534-YK

YL2101418

Table with columns: Sample ID #, Sample Location, Sample Date (dd-mmm-yy), Sample Time (hh:mm), Matrix, Environmental Division Yellowknife Work Order Reference YL2101418, Sampler Comments, and requested lab suites (G = Grab or C = Composite, Number of Containers, Routine (pH, major ions), Total Suspended Solids (TSS), Dissolved metals, Dissolved mercury, Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Total Petroleum Hydrocarbons (F1-F4 CCME Fractie), Oil and Grease (Hexane Extractable)).

Relinquished by (Sampler Signature): Domi DIAZ Date/Time: Sept.28, 2021 Company: Golder Associates Ltd Received by (Signature): [Signature] Company: ACS Relinquished by (Signature): [Signature] Date/Time: 28-Sep-21 11:00 Company: [Signature] Sampler (Printed Name): Domi Diaz/Shakita MacLennan-Jensen Sample Storage Temperature prior to Shipping (deg. C): Sample Receipt Temperature (deg. C): 9.4 Samples Received in Good Condition? (Yes) No (If no, provide details.)