REPORT

Thermal Plume Delineation Report

Jackfish Lake

Submitted to:

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Distribution List

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Revision History

Version	Date	Notes/Revisions
V1.0	March 9 2023	Northwest Territories Power Corporation (NTPC) Thermal Plume Delineation Study Report Version 1 submitted to the MVLWB in compliance with the water licence conditions.
V1.1	June 26 2023	Northwest Territories Power Corporation (NTPC) Thermal Plume Delineation Study Report Version 1.1 addresses the revisions required in the Comment and Response Table presented in the MVLWB (2023) letter; a summary of changes is provided in the conformance table that follows 'Revision History'.

Water Licence Compliance Table

Water Licence Schedule 2, Condition 2	Requirement	Applicable Section of the Thermal Plume Delineation Report
a	Maps illustrating the extent of the thermal plume and any seasonal changes documented	Section 3.2.1 and Appendix A, Attachment C
b	Graphical representation of the thermal profile and applicable water quality data	Section 2.5.3; Appendix E
c	Identification of the worse-case thermal plume scenario of the four seasonal conditions identified in Schedule 1, item 1a	Section 3.2.1 and Appendix A
d	Discussion of results and potential impacts to the aquatic ecosystem in Jackfish Lake and recommendations to inform the Aquatic Effects Design Report	Sections 3.2 and 4.0
e	Tabular summaries of all data and information generated under the Thermal Plume Delineation Study, in Excel format	Appendix C, D, E, and F

Conformance Table on Board Requirements for Version V1.1

No.	Topic	Reviewer Recommendation	Proponent Response	Requirement	Location
GNWT-ENR-EAM 2	Habitat classification	ECC recommends that Northwest Territories Power Corporation (NTPC) discuss the transects used for sonar imagery, specifically including rationale for the omission of the area nearest to the discharges.	Figure 2.3-2 was provided to illustrate the approach taken for assessing fish distribution and habitat classification, to aid interpretation. Only the coarse (100-m grid) transect was depicted. Two other transects were surveyed and analyzed with the same methods and are shown in Figure 2.3-1: a perimeter survey (at approx. 4 m depth) and a fine scale transect (10 m grid) in the area most likely to be impacted by a thermal plume, near the discharges.	Board requires NTPC to update the Report to include the explanation.	Section 2.3.4.2
GNWT-ENR-EAM 3	Typo	"For the late fall, late winter, and spring freshet period these increases were less than 1°C for less than 1% of the lake surface." ECC notes that this is likely a typo. ECC recommends that NTPC review the above-noted statement and revise as needed to ensure that it is accurate.	Correct, edit should read: "For the late fall, late winter, and spring freshet period these increases were limited to less than 1°C for approximately 99% of the lake."	Board requires NTPC to update the Report to include the edit.	Section 4.0
ECCC 3	Intake discharges - Section 2.5.2.1 Thermistors, pgs. 37-38/390; Section 2.2 Sampling Stations, pgs. 20-21/930	ECCC recommends that the proponent provide further information and discussion on the depths of the intakes for each plant. This discussion should include the potential for interference by nearby discharges on the intake temperatures at each plant as well as how temperatures may vary between seasons and with changes in current directions, and a comparison of intake temperatures to in-lake reference temperatures at similar depths, if data is available. ECCC also recommends that the proponent provide further information regarding the intermittent temperature increases at the CAT plant discharge, including information on maximum temperatures, temperature differences between intake and discharge, duration, and potential causes.	Stratification effects at K plant: The higher discharge temperatures at K plant recorded by thermistors shown in Figure 2.5-2 are likely due to the configuration of K plant, where water is withdrawn from the lake and held in a pumphouse before it is pumped through the cooling loop and discharged back to the lake. During summer, this may increase the temperature of the water prior to its passage through the cooling loop. Because thermistors are installed at the intakes in the lake, and on the end of the discharge pipe in the lake, additional heat that may be added from holding is not directly measured by thermistors which results in an appearance that is consistent with stratification. The SNP intake temperature data from K plant measures intake temperature of water after it has been pumped from holding and before the generator, which has a very similar temperature profile to the temperatures measured by the K plant discharge thermistor. Intake Locations Refer to ECCC-1 Calculation on differences between intake and discharge temperatures: Intake and discharge temperatures are measured inside the cooling water loop of each plant, with intake temperatures recording inflow temperatures prior to the application of thermal loads from operations and outflow temperatures being recorded after the application of thermal loads. As such, the delta-T calculated	Board requires NTPC to update the Report to include the explanation	Section 2.5.2.1

No.	Topic	Reviewer Recommendation	Proponent Response	Requirement	Location
			using these data reflects the heat load applied by each plant, irrespective of whether the intake temperature is elevated through thermal discharges from other plants or not. Consequently, there is no interference in the calculation of delta-Ts (temperature differences) through each plant used to define the thermal loading from each plant to the lake. Temperature Spikes at CAT Plant: We assume this question is referring to Figure 2.5-2 rather than Figure 2.2-1 and have responded accordingly. The data presented on Figure 2.5-2 are of lake thermistor data, positioned at the discharge locations for each plant. These temperature spikes occur when the plants generate power. As shown on Figures 1 through 3 in Attachment A attached to this comment response document, temperature spikes (measured inside the plants and used for modelling) occurred at EMD plant more frequently than at CAT plant. This could suggest that the EMD discharge thermistor is no longer affixed to the discharge which could only be verified by commercial divers, and the temperature data recorded from inside the plants should be taken as more reliable.		
ECCC 5	Measurement point for fisheries assessment - Section 3.1.3 Assessment of Effects to Fish and Fish Habitat, pgs. 55-56/930	ECCC recommends that the proponent review Comment 3 and the provided ECCC guidance document. ECCC recommends the proponent provide either a rationale for selecting the 100 m measurement point OR update the assessment of effects to fish and fish habitat to include the entirety of the plume.	The 100-m interval was selected to provide an intermediate reference point between the discharge locations and the nearest temperature monitoring locations farther out in the lake. The 100m points are more likely to be directly impacted by a thermal plume than the temperature monitoring station farther out in the lake. Selection of the location was based on the shapes of the predicted thermal plumes (the centroid at 100m) under the hypothetical scenario during the period of interest (early and late summer periods). This provided a reasonable assessment of the impacts experienced by the reference species, Lake Whitefish, during the monitoring period of 2021/2022. This approach was considered the most robust approach for assessing the impacts of modelled thermal plumes on the fish community using the predictions at the 100 m interval as a conservative characterization of the entirety of the plume.	Board requires NTPC to update the Report to include the explanation	Section 3.1.3
ECCC 6	Temperature - Section 3.2.1.2 Effect of Measured Operational Discharges on Jackfish Lake, pgs. 60-63/930	ECCC recommends that the proponent provide more information on the maximum temperature effect and extent. Figure 3.2-4 should be updated to accurately represent the temperature effect.	It should be noted that Figure 3.2-4, which depicts median plume extents at lake surface does not correspond to the 99% value alluded to in Table 3.2- 2, which presents 95th percentile lake bottom temperatures. Instead, Figure 3.2-6 should be used. Nevertheless, a versioning error in the results used to develop some tables was detected upon review of ECCC comments which has resulted in updates to Tables 3.2-2, 3.2-7 and Figure 3.2-5. Though these changes are not material to the results or conclusions, they did require corrections and should now facilitate easier comparisons between Figures and Tables.	Board requires NTPC to update the Report to include the corrected information as explained in the Proponent's response.	Section 3.2.1.2; Tables 3.2-2 and 3.2-7; Figure 3.2-5
ECCC 8	Hypothetical simulations - Section 3.2.1.3 Seasonal Water Temperatures...	ECCC recommends that the proponent provide further information on how hypothetical scenarios have the heat load event applied, and how the duration of the	The hypothetical discharge scenario observed between December 23, 2021, 12:30 through December 25, 2021, 19:00 was applied across a one-year model simulation on five occasions, commencing with the outset of each four-day period used to develop results. The four-day sequence used to represent each	Board requires NTPC to update the Report to include the explanation	Section 3.2.1.3; Appendix A, Section 2.4.8.3

No.	Topic	Reviewer Recommendation	Proponent Response	Requirement	Location
	pgs. 65- 79/930; Appendix A Section 2.4.8.3 Application of Operational Data to Thermal Modelling Assessment pgs. 112-115/930	scenario (4 days) versus the duration of the event (2.5 days) may influence the results of the analysis.	hypothetical seasonal discharges event therefore includes the 2.5-day discharge period, followed by 1.5 days to allow the thermal plume to vertically mix and influence bottom temperatures if conditions are favourable. Because hypothetical discharges are applied to a year-long simulation influenced by atmospheric and hydrologic influences, these four-day sequences also included adequate run time before each discharge event.		
ECCC 9	Figures - Section 3.2.1.3.1 Late Fall pgs. 65-67/390	ECCC recommends that further justification on the temperature ranges selected, and that tables or figures are updated as needed.	The table has now been updated to include 0 values rather than a hyphen (-) characters, but results remain identical. The reason that Figure 3.2-7 shows contours above the 1.5°C threshold and the table does not is because the 1.5 to 1.75°C contour amounts to 0.03 ha, which is applied as a ‘0’ value after rounding to one decimal place.	Board requires NTPC to update the Report to include the edit.	Section 3.2.1.3.1; Table 3.2-3
ECCC 10	Late summer simulations - Section 3.2.1.3.5 pgs. 77-79/390; Section 3.2.1.1 Water Temperatures in Jackfish Lake under Measured Operational Conditions pg. 57/930; Appendix A Section 2.4.8.2 Review and Adjustment of Operational Data, pgs. 111-112/930	ECCC recommends that the proponent discuss the uncertainties and limitations of the model, with reference to how the late summer hypothetical simulation may have been impacted by the lack of operational data available either in this section or an independent section.	Please see response to ECCC Comment 5 for some context. A single simulation including five discrete 2.5-day discharge events was run over a full year with boundary conditions including measured meteorological, hydrological and substrate temperature conditions so that the effects of this largest observed discharge event could be properly evaluated under different seasonal conditions. This was deemed necessary for two reasons. Firstly, as noted in the ECCC comment, no operational data were available after July 2022. Secondly, operational heat loads were so infrequent and low throughout most of the monitoring period that a meaningful understanding of discharge effects under varying seasonal conditions required the application of the maximum observed thermal loading event, measured between December 23 and 25, 2021.	Board requires NTPC to update the Report to include the explanation	Section 3.2.1.3 and Appendix A, Section 2.4.8.3
ECCC 11	Lake surface temperatures - Section 3.2.1.3.5 Late Summer pgs. 77- 79/930	ECCC recommends that the proponent provide more information on the maximum temperature effect and extent.	Acknowledged. This table has now been updated to include areal extents for the full range of modelling results, which was erroneously omitted due to a versioning error in the original submission. It is noted that the results do not materially change the conclusions drawn in the original submission.	Board requires NTPC to update the Report to include the edit.	Section 3.2.1.3.5; Table 3.2-7
ECCC 12	Intake design and modeling inputs - Appendix A Section 2.2.7.2 Cooling Water Flow and Delta Temperature (Delta-T) Operational Inputs, pgs. 101- 102/930; Appendix A Section 2.4.8.1 Intake and Discharge	ECCC recommends that the proponent provide further information on whether there is any plume interference on intake temperatures and whether this has impacted modelling inputs.	Please refer to response under the third header in ECCC Comment 2.	Board noted that reference to ECCC-2 is not correct as that comment refers to the cover letter. Board assumed ECCC and NTPC meant reference to ECCC-3; see Board Decision for that comment.	Section 2.5.2.1

No.	Topic	Reviewer Recommendation	Proponent Response	Requirement	Location
	Configurations, pg. 110/930				
ECCC 13	Calibration station selection - Appendix A Section 2.3.1 Temperature Timeseries pg. 102/930	ECCC recommends that the proponent provide further justification for how stations were selected for either calibration or validation exercises, including any information on characteristics of stations that may make selection of that station more optimal for one use versus the other.	It is agreed that the conventional approach for calibration and validation is to perform these tasks over two separate time periods. That said, the limited temporal availability of operational data, as well as the need to consider varying seasonal conditions in the calibration process, meant that an alternative, however not incorrect, approach was adopted. The locations selected for the calibration process were necessarily geared to maximizing spatial separation between loggers, as well as including the deepest water location available, at the Mid-Lake monitoring station. The far-field calibration location could have included Southwest Bay or Northwest Bay; however, it was decided that including the location most remote from the discharge locations made the most sense as it would be least influenced by thermal discharges and thus provide the best available examination of environmental influences on lake temperature conditions. Lastly, a subset of two of three in-lake discharge monitoring locations was selected, noting that K plant delivered almost no thermal loading throughout the monitoring period (see Figure 2 of Attachment A). As such, two monitoring locations remained, the first coinciding with the EMD discharge which delivered the highest thermal loading over the monitoring period and Northwest Bay, which was suitably remote from the discharge. Ultimately, the division of calibration and validation locations is reasonable and fit for purpose, as borne out by the calibration and validation results presented in Appendix A of the report.	Board requires NTPC to update the Report to include the explanation	Appendix A Section 3.1
ECCC 14	Calibration and validation of models - Appendix A Section 3.2.1.1 Thermal Calibration Results pgs. 123- 129/930; Appendix A Sections 3.2.2 Model Validation Results pgs. 130-134/930	ECCC requests that the proponent provide further information on how trends of over prediction, under prediction, and difficulty capturing variability of temperatures may impact modelling results and the effects assessment to fish and fish habitat.	Model calibration and validation metrics show that model performance is well within industry standards for three-dimensional models and particularly good for shallow lake environments. Like all sophisticated modelling platforms, perfect 3D-model performance is not expected and has not ever been achieved based on our knowledge of the industry. Secondly, model error is expected to remain similar for operational and non-operational conditions, seeing as the thermal dynamics of this lake are primarily driven by meteorological rather than operational effects. Given that the extent of operational effects is determined by subtracting the nonoperational scenario results at each node, and for each time step, from operational scenario results, error in presented modelling results is expected to be relatively consistent between simulation scenarios, and well within the performance metrics presented. It should be noted that RMSE does not represent a simple arithmetic average of model error (which would be much lower than that presented) but is developed using a root mean squared error approach which provides a more conservative representation of model performance.	Board require NTPC to update the Report to include the explanation	Appendix A, Section 3.2.3
MVLWB 1	Section 2.3.2.1 Field Methods - Temperature Loggers	Can NTPC confirm if there is an error in the identified text and clarify the date that temperature monitoring was initiated?	The date of the initiation of temperature monitoring included the incorrect year. The correct date of temperature monitoring under Section 2.3.2.1 is 5 October 2021.	Board requires NTPC to update the Report to include the edit.	Section 2.3.2.1

No.	Topic	Reviewer Recommendation	Proponent Response	Requirement	Location
MVLWB 3	Section 2.5.4 Fish and Fish Habitat - Figures 2.5-5 and 2.5-6	Can NTPC provide clarification on the intake/discharge pipe information provided on Figure 2.5-5 and omitted on Figure 2.5-6?	Refer to ECCC-1 reply.	Board requires NTPC to correct information related to intake/discharge pipes on these two figures.	Section 2.5.4; Figures 2.5-5 and 2.5-6
MVLWB 4	Appendix B QA/QC	Can NTPC confirm there is an error in the identified text and clarify the collection date for the referenced sample?	NTPC confirms there is an error; the collection date should read October 1, 2021 (i.e., not 2022).	Board requires NTPC to update the Report to include the edit.	Appendix B, Section 4.3.1
MVLWB 5	Appendix B QA/QC – Table 4-1	Can NTPC confirm there is an inconsistency in Appendix B between the text provided on p. 13 and the footnote for Table 4- 1 regarding the application of bolded values for chloride, fluoride, xylenes, m,p-xylenes, and o-xylene?	NTPC confirms there is an inconsistency in Appendix B between the text provided on p. 13 and the footnote for Table 4-1 regarding the application of bolded values for chloride, fluoride, xylenes, m, pxylenes, and o-xylene. In Table 4-1, either the bolding for detection limits not above ALS detection limits should be removed or the footnote updated to say: Bolded values are above or below ALS method detection limits.	Board requires NTPC to update the Report to include the edit.	Appendix B, Section 4.3.4 Table 4-1
MVLWB 6	Appendix E	Can NTPC verify whether there are differences in the Appendix E-related information that appears to be included in more than one location and, if so, clarify what those differences include?	The identified sections/information in the report were provided in duplicate and in the future, NTPC will provide the sections/information in only one location.	Board requires NTPC to update the Report to include the edit.	Appendix E

Plain Language Summary

Introduction

The Northwest Territories Power Corporation (NTPC) owns and operates the Jackfish Lake Generating Station (the Facility) located on the northeast shore of Jackfish Lake in Yellowknife, Northwest Territories. The Facility uses lake water to cool the generators in the system; water is withdrawn from Jackfish Lake through intake pipes, flows through a closed-loop cooling system, and then returns to Jackfish Lake via gravity pipes. Studies have shown that thermal discharges to waterbodies have the potential to affect the aquatic environment. Therefore, as per Part E, Condition 5 of Water Licence MV2019L1-0001 (the Water Licence), which was approved for the Facility on 18 October 2019, a thermal plume delineation study was required to evaluate if there are effects from the thermal discharges of the Facility on the aquatic receiving environment in Jackfish Lake. Part E, Condition 5 of the Water Licence required a Thermal Plume Study Report to provide the results of the thermal plume delineation study. In accordance with Schedule 2, Condition 2 of the Water Licence, the Thermal Plume Study Report consists of two main components: results of recent field studies conducted in 2021 to characterize existing conditions and a thermal plume effects assessment, which is focused on the thermal model development and evaluation of model results.

Existing Conditions

Water level, flow and temperature were measured in Jackfish Lake. Water temperature was measured continuously with loggers at multiple locations in Jackfish Lake at a range of depths, with a focus on measuring temperature near the discharges from the Facility. Water temperatures were also measured at discharge pipe locations to measure the temperature of the thermal discharge. The water level, flow, and temperature data were used primarily for inputs into the thermal model and for model validation and calibration.

Water quality monitoring was conducted during five seasonal field programs between September 2021 to August 2022 at eleven locations in total (i.e., stations), nine of which are in Jackfish Lake, one at an inflow location, and one at the outflow from Jackfish Lake. During each field program, profiles of the water column or surface measurements for temperature, dissolved oxygen (DO) concentrations, pH and conductivity were collected, and water samples of conventional parameters, major ions, nutrients, and total and dissolved metals were collected at two depths at five of the lake stations and at the surface at inflow and outflow stations.

The results of the lake water quality monitoring indicated thermal stratification, and gradients in dissolved oxygen and pH, occurred during early and late summer conditions but were absent in fall, winter and freshet conditions. Mid-depth concentrations or values of total suspended solids (TSS) and turbidity in Jackfish Lake were typically higher in summer and fall compared to winter and spring freshet. The seasonally high TSS concentrations and turbidity values in summer and fall may be related to particulate matter from algae blooms, and the low winter TSS concentrations and turbidity values may be related to minimal runoff and wind-driven mixing of sediment during ice-covered conditions. Concentrations of inorganic nitrogen parameters were typically higher in the lake in winter and spring, compared to fall and summer; this seasonal pattern was likely related to biological uptake of nutrients. Consistent spatial gradients in water quality concentrations that would indicate clear or consistent water quality changes across Jackfish Lake were not observed during the field programs. A review of water quality results from the monitored inflow to Jackfish Lake and at stations within Jackfish Lake indicated that the inflow had a negligible influence on the water quality in the lake. Overall, values or concentrations of water quality parameters in Jackfish Lake and its inflow and outflow were within Canadian Water Quality Guidelines (CWQGs) for the protection of aquatic life except for four parameters: pH, DO, total arsenic and total copper; however, results are consistent with historical water quality results and observed exceedances.

A fish and fish habitat assessment was also carried out in October 2021. Previous fisheries surveys of Jackfish Lake described a fish community of Northern Pike (*Esox lucius*), Trout-Perch (*Percopsis omiscomaycus*), and Lake Whitefish (*Coregonus clupeaformis*), of which Lake Whitefish was the dominant species in the lake. In October 2021, a side-scan sonar survey was conducted to provide supplemental data to assist with the assessment of potential effects from the Facility on fish and fish habitat. The survey provided information on lake substrate and bathymetry (i.e., depths), as well as the distribution of large-bodied fish targets across the lake. A bathymetric surface was generated from sonar data, showing a maximum depth of approximately 8.4 m and an average depth of 5.5 m. Habitats for specific life stages of Northern Pike and Lake Whitefish were identified and potential thermal refugia at depth were described. Substrates were classified primarily as organics or mud, with some areas of cobbles and boulders as potential spawning substates for Lake Whitefish. Large-bodied fish targets from the side-scan survey were distributed throughout the lake, including areas surrounding the thermal discharge pipe locations, with higher concentrations of fish in deeper locations of the lake at the time of the survey.

Thermal Plume Effects Assessment

The thermal effects of operational heat loads discharged to Jackfish Lake between October 2021 and July 2022 were simulated using a calibrated and validated using MIKE3 FM, a three-dimensional modelling platform developed for the purposes of the thermal plume study. Jackfish Lake temperature conditions were simulated under non-operational conditions (where heat loads to the lake occur only through atmospheric processes but exclude operational influences) and under a hypothetical maximum measured discharge sequence (measured at the Facility between 23 and 25 December 2021, over a two-and-a-half-day period) across five seasonal conditions (late fall, late winter, spring freshet, early summer and late summer). The non-operational simulation results were used to establish baseline conditions against which measured and hypothetical maximum measured conditions could be compared so that the operational effects of heat discharges could be easily distinguished from those caused by atmospheric processes. It is noted that the heat load discharge from the Facility to the lake used to simulate operations occurred for less than three hours of the two-and-a-half-day simulation window owing to the fact that electricity generation at the Facility is only required intermittently to address demand deficits during peak load periods or under supply shortages at other facilities in the territory.

The modelling results indicate that the effects of measured operational heat loads between October 2021 and July 2022 were negligible in magnitude (within fractions of a degree when considered over time) but relatively large in extent (when considered over the surface area of the lake). The results of hypothetical maximum measured discharge simulations, simulated for the purposes of establishing an understanding of effects under different weather and lake conditions, indicate that temperatures could be elevated in magnitude (resulting in short-term lake temperature increases of up to 4°C) but small in scale (with such large increases affecting less than one percent of the lake’s surface). Hypothetical maximum discharge effects peaked during the summer period and were lowest during the winter period. Overall, the model results indicate that there are negligible potential operational effects on water quality and on the fish community and fish habitat. The negligible effects observed are localized and intermittent. The maximum expected temperatures within 100 m of the discharge point were evaluated and although temperatures can exceed the thermal optima for Lake Whitefish growth at the surface, thermal refuge remains at deeper depths and throughout the rest of the lake, and elevated temperatures at the surface dissipate to non-operational conditions soon after thermal discharge ceases. However, the thermal plume model does indicate that there is a potential for longer term and larger waste heat loads to have a larger influence on temperature if the Facility operates for longer periods than observed during the thermal plume study.

Conclusions

The results of the thermal plume study indicate that the Facility had a negligible impact on temperature in Jackfish Lake, reflecting the highly intermittent nature and low heat of loads discharged to the lake during the thermal plume study. Based on the results of the thermal plume delineation study, it is recommended that the Aquatic Effects Monitoring Program (AEMP) Design Plan include continuous temperature monitoring throughout the open-water period, with emphasis on the summer period when maximum temperatures were observed. An adaptive management approach should be considered, based on temperature values, for the initiation and further monitoring of water quality and biological components, if required.

LIST OF ABBREVIATIONS

Term	Definition
ALS	ALS Canada Ltd.
BCMOE	British Columbia's Ministry of Environment
CALA	Canadian Association for Laboratory Accreditation Inc.
CAT Plant	One of three water-cooled generation plants within the Jackfish Lake Generating Station
CAT Discharge	discharge from the CAT Plant
CCME	Canadian Council of Ministers of the Environment
CWQG	Canadian Water Quality Guidelines
DL	detection limit
DO	dissolved oxygen
EC	Environment Canada
e.g.	for example
EMD Plant	One of three water-cooled generation plants within the Jackfish Lake Generating Station
EMD Discharge	discharge from the EMD Plant
Facility	Jackfish Lake Generating Station
GIS	geographic information system
i.e.,	that is
K-Plant	One of three water-cooled generation plants within the Jackfish Lake Generating Station
K Discharge	discharge for the K-Plant
MVLWB	Mackenzie Valley Land and Water Board
Mid	Middle
MIKE 3 FM	MIKE 3 FM, a three-dimensional (3-D) modelling application developed by the Danish Hydraulic Institute
Minister	Government of Northwest Territories Minister of Environment and Natural Resources
N	north
NW	northwest
NT	Northwest Territories
NTPC	Northwest Territories Power Corporation
pH	potential of hydrogen, provides measure of the acidity or alkalinity of a solution on a scale of 0 to 14
QA/QC	quality assurance and quality control
QA	quality assurance
QC	quality control
S	south
SW	southwest
TDS	total dissolved solids
TSS	total suspended solids

UNITS OF MEASURE AND SYMBOLS

Term	Definition
%	percent
>	greater than
ha	hectares
hrs	hours
°C	degrees Celsius
µg/L	micrograms per litre
µS/cm	microsiemens per centimetre
cm	centimetre
m	metre
m^3	cubic metres
m^3/S	cubic metres per second
mg/L	milligrams per litre
mg-P/L	milligrams as phosphorus per litre
NTU	nephelometric turbidity unit

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Quality Assurance and Quality Control Procedures and Results

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APPENDIX E
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APPENDIX F
Fish and Fish Habitat (Excel)

1.0 INTRODUCTION

The Northwest Territories Power Corporation (NTPC) owns and operates the Jackfish Lake Generating Station (the Facility) located on the northeast shore of Jackfish Lake (previously known as Stock Lake) in Yellowknife, Northwest Territories (NT; Figure 1.1-1). The Facility is located on the northeast shore of Jackfish Lake. The Facility is a critical source of backup power with diesel generators that contribute generation to the North Slave electrical system, including the City of Yellowknife, N'Dilǫ, and Dettah, when required. It is used during periods of peak power demand, during hydroelectric plant maintenance shutdowns, or when hydroelectric power is not available upon loss of the transmission line to the Snare Hydro System. There are three water-cooled generation plants within the Facility: the CAT Plant (built in 1993), the EMD Plant (built in 1974), and the K-Plant (built in 1969). The Facility uses lake water to cool the generators in the system; water is withdrawn from Jackfish Lake through intake pipes, flows through a closed-loop cooling system, and then returns to Jackfish Lake via gravity pipes. Each plant has a cooling system for the generators; the K-Plant has two intakes, and the EMD and CAT Plants each have one intake; each plant also has one discharge pipe.

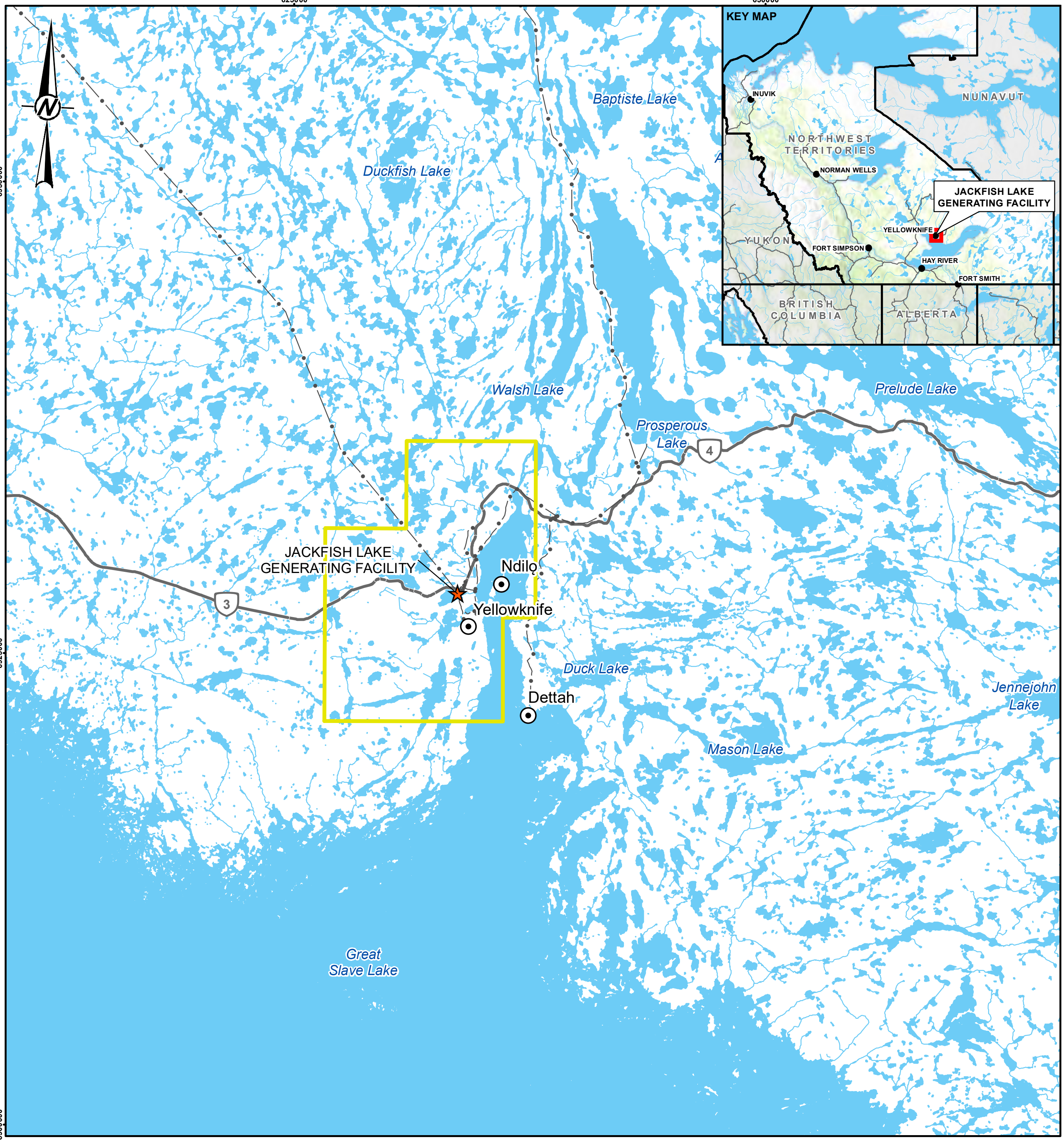
The Facility's cooling systems and water withdrawal from Jackfish Lake were regulated under Water Licence N1L1-1632 (MVLWB 1995). The expiry date of the Water Licence N1L1-1632 was 31 December 2019; therefore, NTPC prepared a Water Licence renewal application for the Facility and submitted it to the Mackenzie Valley Land and Water Board (MVLWB; the Board) on 25 February 2019. On 27 September 2019, the MVLWB recommended that the new Water Licence (MV2019L1-0001; the Water Licence) be approved by the Government of Northwest Territories Minister of Environment and Natural Resources (the Minister). The Water Licence was signed by the Minister and issued on 18 October 2019 (MVLWB 2019a).

The Water Licence included a requirement for NTPC to submit for approval a Thermal Plume Delineation Study Design Plan (Thermal Plume Study Design) within 90 days following issuance of the Water Licence (MVLWB 2019b). The Thermal Plume Study Design version 1.0 was submitted to the MVLWB on 16 January 2020, with the caveat that execution of the study was contingent on installation of the flow monitoring instrumentation.

The Thermal Plume Study Design version 1.0 was deemed adequate by the MVLWB (MVLWB 2020); however, the MVLWB noted that the chosen model required a full year to calibrate the model and to confirm that the model is working and valid. Therefore, a delay in the submission schedule of the Thermal Plume Delineation Study Report (Thermal Plume Study Report) would be needed and MVLWB requested an updated study design with a revised schedule. The Thermal Plume Study Design version 2.0 was submitted on 15 July 2020 with the updated schedule.

Since the submission of the Thermal Plume Study Design version 2.0, NTPC determined that the instrumentation could not be installed until September 2020; therefore, a delay in the sampling program was anticipated, which would also cause a delay in submission of the Thermal Plume Study Report. The MVLWB requested an additional updated version of the study design with the new revised schedule for submission of the Thermal Plume Study Report. The Thermal Plume Study Design version 2.1 (Golder 2021) was submitted on 28 May 2021 with the revised schedule for submission of the Thermal Plume Delineation Report (Thermal Plume Study Report).

The MVLWB approved the study design based on the decision that if the Thermal Plume Study Report identifies deficiencies in the design of the program, then these deficiencies could be addressed through a Board directive for an additional thermal plume assessment or through on-going monitoring as part of the Aquatic Effects Monitoring Program (AEMP; MVLWB 2019b), required under Part F, Condition 1 of the Water Licence (MV2019L1-0001).



LEGEND

- PROJECT LOCATION
- COMMUNITY
- ACTIVE TRANSMISSION LINE
- HIGHWAY
- WATERCOURSE
- WATERBODY
- YELLOWKNIFE MUNICIPAL BOUNDARY

0 5 10

1:300,000 KILOMETRES

REFERENCE(S)

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DATUM: NAD 83 PROJECTION: UTM ZONE 11

CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

REGIONAL LOCATION OF JACKFISH LAKE GENERATING FACILITY

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	LB
PREPARED	AB
REVIEWED	KH
APPROVED	CS

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1.1 Background

Water that discharges to Jackfish Lake from the Facility is warmer than the water that is withdrawn from the lake when one or more of the power generating systems is operating. Studies have shown that thermal discharges to waterbodies have the potential to affect the aquatic environment; however, most studies have demonstrated that effects tend to be localized, depending on the size of the receiving waterbody (EC 2014). Thermal discharge may result in localized alteration of an organism’s physiological and behavioural processes; it may affect primary and secondary production, and cause changes in species composition (EC 2014).

For fish, increased temperatures result in increased rates of metabolism and respiration, as well as increased activity and food consumption (EC 2014). Temperature also affects reproduction, growth, and longevity and can adversely affect species diversity and trophic relationships (Golder 2019a; Spotila et al. 1979).

Thermal discharges from the Facility may result in prolonged and more stable thermal stratification in the lake, which in turn may result in prolonged anoxia at the lake bottom and greater release of the limiting nutrient (phosphorus) and metals from sediments compared to lakes not subject to thermal inputs (Golder 2019a). Additional internal loads of phosphorus from the sediment to the water column could enhance phytoplankton growth and thereby increase the likelihood of summer algal blooms. In addition, increased temperatures can also have an adverse effect when combined synergistically with toxicants (EC 2014). With increasing temperature, toxicity of some contaminants increases (e.g., ammonia; CCME 1999) and the resistance for fish species to disease is lowered.

1.2 Study Area

The study area consists of Jackfish Lake itself, two inflow locations, and the immediate outflow from the lake. Jackfish Lake is located on the northern end of the City of Yellowknife, immediately southwest of the intersection of Highway 3 and the old access to the Ingraham Trail, and approximately 300 metre (m) south of the Yellowknife Solid Waste Facility (Figure 1.1-2). A municipal cemetery is located on the southwest side of the lake.

Inflows to the lake have been observed at two locations in the northwest bay of Jackfish Lake. The lake outlet intermittently drains into a channel that flows into Great Slave Lake, which is approximately 750 m east of Jackfish Lake. The four intake and three discharge pipes for the Facility are located along the northeast shore of Jackfish Lake.

LEGEND

- HIGHWAY
- LOCAL
- MUNICIPAL
- YELLOWKNIFE

0 250 500

1:20,000 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

DEVELOPMENTS SURROUNDING JACKFISH LAKE

CONSULTANT

wsp

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DESIGNED	TL
PREPARED	LB/PS
REVIEWED	KH
APPROVED	CS

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1.3 Purpose and Scope

The purpose of the thermal plume delineation study is to evaluate if there are effects from the thermal discharges of the Facility on the aquatic receiving environment in Jackfish Lake. Part E, Condition 4 of the Water Licence (MV2019L1-0001) required that NTPC submit a thermal plume delineation study design and perform the subsequent study associated with the design. The study was conducted following the Thermal Plume Delineation Study Design version 2.1 (Golder 2021) between 6 October 2021 and 27 September 2022.

The Thermal Plume Study Report provides the results of the thermal plume delineation study. The specific objectives, as per Schedule 2, Condition 2 in the Water Licence (MVLWB 2019b), are listed in Table 1.1-1. Table 1.1-1 also provides the locations of where each condition is addressed in this document. The thermal plume study consists of two main components:

1) a summary of existing conditions (Section 2)

2) a thermal plume effects assessment, which is focused on model development and evaluation of model results (Section 3)

Components of the study included:

- operational temperature flux measurements, using *in-situ* instrumentation (used for inputs to thermal model)
- lake temperature measurements, using *in-situ* temperature loggers (used for inputs to thermal model)
- water flow and water level measurements (used for inputs to thermal model)
- water quality sampling and *in-situ* field measurements
- fish and fish habitat (i.e., aquatic habitat) program, including lake bathymetry and a sonar survey
- thermal modelling

The thermal model provides a seasonal delineation of the thermal plume and an estimate the maximum extent of the thermal plume (Item a in Table 1.1-1). The details of the model calibration, validation, and results are provided in Appendix A.

Table 1.1-1: Compliance Table for the Thermal Plume Study Report

Item	Location
a) Maps illustrating the extent of the thermal plume and any seasonal changes documented;	Section 3.2.1 and Appendix A, Attachment C
b) Graphical representation of the thermal profile and applicable water quality data;	Section 2.5.3; Appendix E
c) Identification of the worse-case thermal plume scenario of the four seasonal conditions identified in Schedule 1, item 1a;	Section 3.2.1 and Appendix A
d) Discussion of results and potential impacts to the aquatic ecosystem in Jackfish Lake and recommendations to inform the Aquatic Effects Design Report; and	Sections 3.2 and 4.0
e) Tabular summaries of all data and information generated under the Thermal Plume Delineation Study, in Excel format.	Appendix C, D, E, and F

1.4 Report Organization

The report is organized as follows:

- Section 1 – Introduction (background, study area, and purpose and organization of the report)
- Section 2 – Existing Environmental Conditions:
  - Sections 2.1 to 2.7 describe the methods used to characterize existing conditions in Jackfish Lake (for model input), including quality assurance and quality control (QA/QC) procedures and results.
  - Section 2.8 describes the results of the recent field studies that were conducted to characterize existing conditions
- Section 3 – Thermal Plume Effects Assessment:
  - Section 3.1 describes the assessment approach for the thermal plume delineation, and the assessment of potential effects on water quality, fish and fish habitat
  - Section 3.2 describers the results of the thermal assessment including a discussion of potential impacts to the aquatic ecosystem
- Section 4 – Conclusions and Recommendations (where recommendations are to inform the Aquatic Effects Design Report)
- Section 5 – References

In addition to the above sections, a description of the data analysis and modelling methods, model calibration and results is provided in Appendix A (Thermal Modelling) and detailed quality assurance and quality control (QA/QC) procedures and results are provided in Appendix B (Quality Assurance and Quality Control). Tabular summaries of all data and information generated under the thermal plume delineation study are provided in Excel format in appendices C through F.

2.0 EXISTING ENVIRONMENTAL CONDITIONS

2.1 Overview of Field Programs

Five sampling programs were completed with the objectives of capturing seasonal differences in temperature and water quality in the lake and to fill data gaps on the existing environment to assess the thermal plume within the lake and to assess effects of inflows to Jackfish Lake:

- Late fall: September/October 2021
- Late winter: March 2022
- Spring freshet: May 2022
- Early Summer: July 2022
- Late Summer: August 2022

During each sampling program, the following were routinely completed:

- Water level measurement
- Inspection of lake inlets and outlet, with measurement of flow, if flowing
- Downloads of water temperature loggers and confirming correct position
- Downloads of thermistor data loggers
- Water quality sampling and field measurements

The fish and fish habitat assessment, including lake bathymetry, was conducted in September 2021. Two non-sampling programs (i.e., visits) took place in December 2021 and September 2022. In December 2021, the position of in-lake temperature loggers was confirmed after ice formation. In September 2022, a final download of in-lake temperature loggers and thermistors was completed, and subsequently, the in-lake temperature loggers were removed from the lake. The thermistors were not removed.

2.2 Sampling Stations

Sampling locations for the thermal plume study (Figure 2.2-1) were selected based on monitoring locations from the 2018 Environmental Monitoring Report (Golder 2019b), feedback from reviewers during the Water Licence application process, and location requirements in the Water Licence (Schedule 2, Condition 1d):

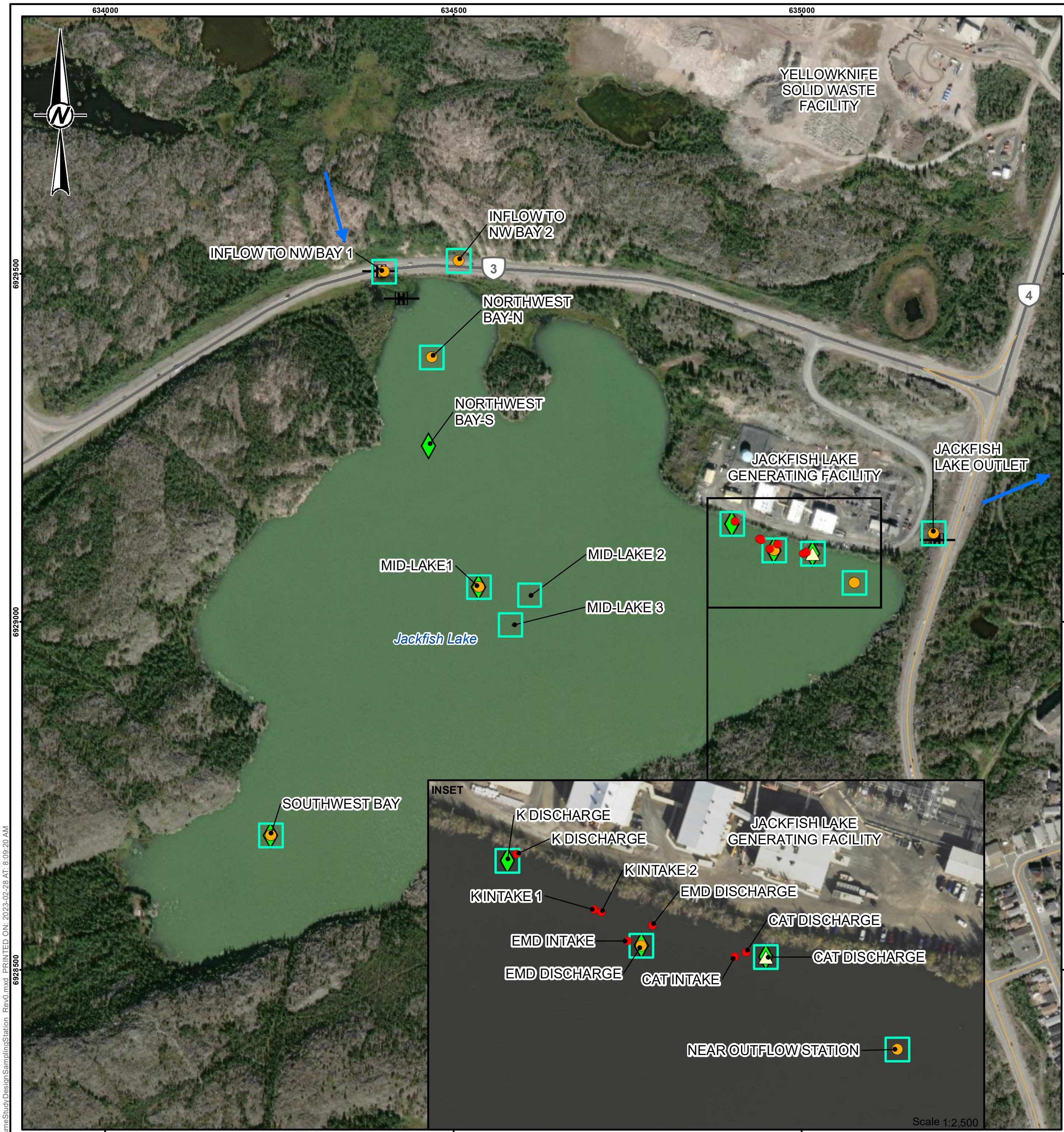
1) a minimum of one station located outside of the potential plume but situated such that potential influence of inflow[s] can be characterized

2) one station located at, or near, the outflow of Jackfish Lake

The location coordinates and applicable study component for each station are provided in Table 2.2-1. Specifics applicable to each of these sampling stations are summarized as follows:

- Thermistors that were installed at the intakes and discharges measured the temperature of the water being circulated through the Facility and back into the lake.
- Temperature loggers that were deployed vertically in the water column measured water temperature at three stations in the immediate vicinity of the discharges from the Facility (i.e., K, EMD, and CAT discharges) and at three in-lake stations.
- Lake water level monitoring occurred at a location near the Facility discharge.
- Flow rates at lake inflows and the outflow were measured to characterize hydrological processes of the lake.
- Water quality samples and field measurements were collected in the immediate vicinity of the discharges from the Facility (i.e., EMD and K, EMD and CAT discharges), at in-lake stations and watercourse stations to characterize quality in Jackfish Lake and its inflows and outflow.
- Fish habitat mapping was conducted throughout Jackfish Lake.

In addition to the in-lake sampling, temperature sensors and in-line flow meters were installed by NTPC to monitor flow rates, intake temperature, and discharge temperature of cooling loops within the Facility.



LEGEND

STATIONS

- TEMPERATURE LOGGER
- THERMISTOR
- WATER QUALITY SAMPLE
- WATER LEVEL
- FIELD WATER QUALITY MEASUREMENTS

- FLOW DIRECTION
- CULVERT
- HIGHWAY
- LOCAL ROAD
- BERM

0 100 200

1:8,000 METRES

NOTE

1. MID LAKE 2 AND 3 WILL BE DETERMINED IN THE FIELD BASED ON DEPTH

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

THERMAL PLUME DELINEATION STUDY SAMPLING STATIONS IN JACKFISH LAKE

CONSULTANT

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Table 2.2-1: Sampling Stations in Jackfish Lake for the Thermal Plume Study

Area	Station	UTM Coordinates (NAD 83, Zone 11)		Thermistors	Water Flow	Water Level	Temperature	Water Quality Field Measurement	Water Quality Sampling
		Easting	Northing						
Watercourse	Inflow to NW Bay 1[(a)]	634506	6929495	-	-	-	-	-	-
	Inflow to NW Bay 2	634400	6929503	-	x[(b)]	-	-	x	x
	Outflow of Jackfish Lake	635189	6929127	-	x[(b)]	-	-	x	x
Intakes In-Lake	K Intake 1	634939	6929119	x	-	-	-	-	-
	K Intake 2	634942	6929118	x	-	-	-	-	-
	EMD Intake	634954	6929105	x	-	-	-	-	-
	CAT Intake	635002	6929098	x	-	-	-	-	-
Discharges In-Lake	K Discharge	634904	6929144	x	-	-	-	-	-
	EMD Discharge	634965	6929112	x	-	-	-	-	-
	CAT Discharge	635007	6929100	x	-	-	-	-	-
In-Lake	Northwest Bay - N	634468	6929380	-	-	-	-	x	x
	Northwest Bay - S	634464	6929253	-	-	-	x	-	-
	Mid Lake 1	634536	6929050	-	-	-	x	x	x
	Mid Lake 2	634608	6929037	-	-	-	-	x	-
	Mid Lake 3	634580	6928995	-	-	-	-	x	-
	EMD Discharge - In lake	634960	6929103	-	-	-	x	x	x
	CAT Discharge - In lake	635016	6929098	-	-	x	x	x	-
	K Discharge - In lake	634900	6929141	-	-	-	x	x	-
	Southwest Bay	634237	6928693	-	-	-	x	x	x
	Near Outflow - In lake	635080	6929055	-	-	-	-	x	x
In-Plant	SNP 00-1a: K Plant Intake 1	n/a	n/a	-	x[(c)]	-	x	-	-
	SNP 00-1b: K Plant Intake 2	n/a	n/a	-	x[(c)]	-	x	-	-
	SNP 00-1c: EMD Plant Intake	n/a	n/a	-	x[(c)]	-	x	-	-
	SNP 00-1d: CAT Plant Intake	n/a	n/a	-	x[(c)]	-	x	-	-
	SNP 00-2a: K Plant Discharge	n/a	n/a	-	-	-	x	-	-
	SNP 00-2b: EMD Plant Discharge	n/a	n/a	-	-	-	x	-	-
	SNP 00-2c: CAT Plant Discharge	n/a	n/a	-	-	-	x	-	-

(a) Station was not sampled because it was dry.

(b) Manual instantaneous measurement.

(c) Automatic continuous measurements.

UTM = Universal Transverse Mercator; NAD = North American Datum of 1983, Zone 11; “-“= not measured or sampled; SNP = Surveillance Network Program; n/a = not applicable, location is inside plant.

2.3 Component Specific Methods

2.3.1 Water Level and Surface Flow

2.3.1.1 Field Methods

Water Level

A hydrometric station with continuous water level measurements was operated near the CAT Discharge. Two Solinst Leveloggers and a Barologger were installed on 30 September 2021 to continuously measure water level and barometric pressure to provide compensated water level data. Manual surveys of water surface elevation were performed relative to geodetic benchmarks adjacent to CAT Plant, which allowed the generation of a time series of water surface elevation. Benchmarks were established during monitoring in 2018 (Golder 2019b) and are provided in Table 2.3-1. Checks and downloads of the Leveloggers and Barologger, and measurement of water level was completed during each of the five sampling programs. The Leveloggers and Barologger were removed from the field at the end of the thermal plume study, on 27 September 2022.

Table 2.3-1: Benchmarks at Jackfish Lake Facility

Benchmark	Location	UTM Coordinates (NAD 83, Zone 11)[a]		Description	Elevation (m; geodetic)
		Easting (m)	Northing (m)		
BM1	West edge of CAT Plant	635015	6929137	Top of fastener in siding of plant, marked with embossed tag	175.733
BM2	West edge of CAT Plant	635015	6929137	Top of bolt securing column to slab, marked with embossed tag	175.527

(a) All coordinates were collected using a handheld GPS and are subject to a horizontal accuracy of 3 to 5 m.
UTM = Universal Transverse Mercator; NAD = North American Datum of 1983, Zone 11; BM = benchmark.

Water Flow

During each sampling program, the identified lake inlets (two culvert crossings at Highway 3 north of Jackfish Lake) and the lake outlet were inspected, and if flow was observed, an instantaneous measurement was collected. Manual water flow measurements were collected following the Water Survey of Canada standard (Terzi et al. 1994). Velocity and depth measurements used for the calculation of flow using the area-velocity method were collected using a SonTek FlowTracker Handheld Acoustic Doppler Velocimeter, or a Hach FH950, with a top-setting wading rod. In addition, a qualitative assessment of fish passage was conducted at the culvert near the outlet of the lake during the field program.

2.3.1.2 Data Analysis

A relationship between paired measurements of lake water surface elevation and lake outflow, referred to as a rating curve, was developed to derive the lake outflow for a given lake water surface elevation. During inspections of the outlet, the stage datum (i.e., the elevation at which there would be no lake outflow) was measured to support the derivation of a lake outflow time series.

Water level and surface flow data were primarily used as hydrological inputs to support the thermal model.

2.3.2 Lake Water Temperature

2.3.2.1 Field Methods

Thermistors

Seven thermistors (3k Ω type) were installed at all plant intakes and discharges (four intakes and three discharges) to measure the temperature of the water being circulated through the Facility and back into the lake (Figure 2.2-1; Tables 2.3-2 and 2.3-3). Thermistors at the intakes and discharges of the plants were installed in an enclosure outdoors on a pole near K-Plant in 2018 (Golder 2019b), and data from the thermistors were available for the thermal plume study from 30 September 2021 to 27 September 2022. The thermistors were located at the intakes and discharges in the lake where thermistor temperatures are subject to environmental and atmospheric influences. The discharge pipes are located near the surface of the water (i.e., 0.6 metres) where water is often warmer, whereas intakes are located on the lakebed, where water is cooler.

A multi-channel data logger (RST DT2055 data logger) collected data automatically, at 15-minute intervals throughout the study period. Data were downloaded during each of the five sampling programs and at the end of the study in September 2022. The thermistors and data logger were left in place and remain operational.

Temperature Loggers

In-lake water temperature monitoring was initiated on 5 October 2021. Lake water depths at each in-lake station were measured during the late fall sampling program, and these data were used to construct the anchor-cable-buoy string and to space the temperature loggers appropriately. A length of chain was included at the anchor to resist loading to the anchor in the case of winds and waves, and any additional length of cable and chain was expected to sit at the lake bottom, until it was mobilized. The measured dimensions and spacing of temperature loggers are summarized in Table 2.3-2.

Temperature loggers (i.e., HOBO Pendant MX2204 Water Temperature Data Loggers) were deployed at six stations: three in the immediate vicinity of the discharges from the Facility (i.e., K, EMD, and CAT discharges) and at three in-lake locations (Tables 2.3-3). At each station, temperature loggers were suspended vertically in the water column by an anchored steel cable and buoy. Target depths included one logger positioned 1 m from the lake bottom, one near the surface and a number of temperature loggers distributed in between, with the number dependent on water depth. The depth of the near surface temperature logger, for the three stations near the Facility, was 0.3 m below surface because the loggers were deployed in areas of year-round open water. For the three stations farther from the Facility, where ice cover formed during the winter, the upper temperature loggers were deployed 1 m below surface. At K Discharge, where depths were shallow, only a near-bottom and near-surface temperature logger were deployed. At Mid Lake 1, where water depths were greatest, a total of four temperature loggers were deployed: near-bottom, near-surface, and two others at one third and two thirds of water depth. All other stations were comprised of three temperature loggers: near-bottom, near-surface, and at mid-depth.

Data were collected at 15-minute intervals, and monitoring was suspended on 27 September 2022, and temperature loggers and associated deployment materials were removed from the field. Temperature loggers at the Southwest Bay station were mistakenly deployed at an incorrect location during the December 2021 program. The location was corrected in March 2022. During the late March program, it was discovered that the temperature logger at the near-bottom position at Mid Lake 1 failed and was replaced; therefore, water temperatures are not available from the start of the thermal plume study until late March. Following retrieval of the temperature loggers for downloading in late March, the data suggests that the near-surface temperature logger froze in ice, reporting sub-zero temperature.

Table 2.3-2: Summary of Configuration and Dimension of In-Lake Water Temperature Logger Deployment

Station	Water Depth at Station[(a)] (m)	Top Logger (m)	Mid 1 Logger (m)	Mid 2 Logger (m)	Bottom Logger (m)	Start of Chain (m)	Anchor (m)
Northwest Bay - S	6.8	1.00	3.33	3.40	5.79	7.46	8.32
Mid Lake 1	7.7	1.00	2.55	5.12	6.69	8.34	9.23
EMD Discharge	5.3	0.30	2.63	n/a	4.28	5.80	6.75
CAT Discharge	2.85	0.30	1.42	n/a	1.85	3.47	4.33
K Discharge	1.6	0.30	n/a	n/a	1.00	2.65	3.52
Southwest Bay	5.3	1.00	2.63	n/a	4.30	5.93	6.80

Note: All lengths are relative to the center of the buoy with the cable and chain fully outstretched.

(a) Water depth measured on 29 September 2021.
S = south; n/a = not applicable

Table 2.3-3: Flow, Temperature, and Water Level Monitoring Stations to Support the Thermal Modelling

Component	Station	Sample Type	Frequency/Duration	Rationale
Flows	Inflow to NW Bay 1	Watercourse - lake inflow; manual flow measurements	Late Fall, Late Winter, Spring Freshet, Early Summer, Late Summer	Measurements collected with intention to capture high and low flow conditions at inflows
	Inflow to NW Bay 2	Watercourse - lake inflow; manual flow measurements	Late Fall, Late Winter, Spring Freshet, Early Summer, Late Summer	Measurements collected with intention to capture high and low flow conditions at inflows
	Outflow of Jackfish Lake	Watercourse - lake outflow; manual flow measurements	Late Fall, Late Winter, Spring Freshet, Early Summer, Late Summer	Measurements collected with intention to capture high and low flow conditions at outflows
	EMD, CAT, and K Intake and Discharge Point	Logger	Automatic level data (15 to 60-minute intervals) recorded throughout entire year	Cooling water intake and discharge flows
Lake level	CAT Discharge - In lake	Level logger	Automatic level data (15 to 60-minute intervals) recorded throughout entire year	Measurements of water level and barometric pressure to provide required lake level data for modelling and other analytical applications
Temperature	Northwest Bay - S	Lake - multi-depth in-lake temperature loggers	Automatic temperature data at 15-minute intervals throughout the year	Identify changing temperature gradient over time
	Mid Lake 1	Lake - multi-depth in-lake temperature loggers	Automatic temperature data at 15-minute intervals throughout the year	Identify changing temperature gradient over time
	EMD Discharge - In lake	Lake - multi-depth in-lake temperature loggers	Automatic temperature data at 15-minute intervals throughout the year	Characterize thermal plume, and identify changing temperature gradient over time during non-operational conditions
	CAT Discharge - In lake	Lake - multi-depth in-lake temperature loggers	Automatic temperature data at 15-minute intervals throughout the year	Characterize thermal plume, and identify changing temperature gradient over time during non-operational conditions
	K Discharge - In lake	Lake - multi-depth in-lake temperature loggers	Automatic temperature data at 15-minute intervals throughout the year	Characterize thermal plume, and identify changing temperature gradient over time during non-operational conditions
	Southwest Bay	Lake - multi-depth in-lake temperature loggers	Automatic temperature data at 15-minute intervals throughout the year	Identify changing temperature gradient over time
	EMD, CAT, and K Intake and Discharge Point	Thermistor temperature logger	Automatic temperature data at 15-minute intervals throughout the year	Characterize hourly cooling water intake and discharge temperatures

Note: Periodic manual measurements are required to verify no issues with logger drift/accuracy.

NW = northwest; S = south.

2.3.2.2 Data Analysis

Thermistor and temperature logger data were primarily used as hydrological inputs to support the thermal model.

2.3.3 Water Quality

Water quality sampling stations were selected to characterize water quality in the inflows to Jackfish Lake (i.e., to characterize the influence of inflows on lake water quality), in Jackfish Lake close to and further from the thermal discharges, and in the outflow from Jackfish Lake (Table 2.3-4, Figure 2.2-1). During the five field programs, water quality samples were collected at the five lake stations and at the watercourse stations, when flow was observed. The following watercourse stations were not sampled between September 2021 and August 2022 due to the absence of observed flow:

- Inflow to NW Bay 1 during all the five field programs
- Inflow to NW Bay 2 in late winter (22 to 25 March 2022) and late summer (24 and 25 August 2022)
- Outflow of Jackfish Lake in late winter (22 to 25 March 2022) and late summer (24 and 25 August 2022)

2.3.3.1 Field Methods

Water quality sampling and field measurements were completed at the inflow to Jackfish Lake and at the outflow of Jackfish Lake, and at five locations in Jackfish Lake. Four additional stations in Jackfish Lake were monitored for field measurements only (Table 2.3-4). Water quality samples and field measurements were collected during late fall (30 September and 1 October 2021), late winter (22 to 25 March 2022), spring freshet (24 to 26 May 2022), early summer (5 and 6 July 2022), and late summer (24 and 25 August 2022). Monitoring was conducted at all water quality stations during each field program, with the exception of the watercourse stations where samples were not collected if flow was not observed.

Water Quality Field Measurements

Field water quality measurements within Jackfish Lake were collected as vertical profile measurements recorded at 1-m depth intervals (or 0.5-m intervals if the total depth was less than 4 m) throughout the water column using a handheld multi-parameter water quality meter (In-Situ AquatTroll 600). Secchi depth and total water depth were also measured at each profile location. At watercourse stations, surface field measurements were collected approximately 0.3 m under the water surface. The profile or surface measurements consisted of:

- water temperature (°C)
- pH
- Dissolved oxygen (DO) in milligrams per litre (mg/L) and percent saturation (%)
- specific conductivity (microsiemens per centimetre [µS/cm])

Additional field information such as station name and location coordinates, total depth, and weather conditions were also recorded.

Table 2.3-4: Water Quality Monitoring Stations in Jackfish Lake and Jackfish Lake Inflows and Outflow

Station	Monitoring Dates	Sample Type and Depth[a]	Rationale
Inflow to NW Bay 1[b]	-	Watercourse - surface sample and surface field measurement	Characterize water quality in inflows to lake
Inflow to NW Bay 2[c]	Late Fall (30 September 2021) Spring Freshet (26 May 2022) Early Summer (6 July 2022)	Watercourse - surface sample and surface field measurement	Characterize water quality in inflows to lake
Northwest Bay - N	Late Fall (30 September and 1 October 2021) Late Winter (22 to 25 March 2022) Spring Freshet (24 to 26 May 2022) Early Summer (5 and 6 July 2022) Late Summer (24 and 25 August 2022)	Lake - bottom and mid-depth sample and field measurement profile	Characterize influence of inflows on in-lake water quality, outside of the potential thermal plume, and identify vertical differences in water quality in the water column
Mid Lake 1	As above	Lake - bottom and mid-depth sample and field measurement profile	Characterize water quality at a deep location in the lake, and identify vertical differences in water quality in the water column
Mid Lake 2	As above	Lake - field measurement profile	Provide additional field profile information for DO and temperature at deep locations
Mid Lake 3	As above	Lake - field measurement profile	Provide additional field profile information for DO and temperature at deep locations
EMD Discharge - In lake	As above	Lake - bottom and mid-depth sample and field measurement profile	Characterize water quality in the potential thermal plume and identify vertical differences in water quality in the water column
CAT Discharge - In lake	As above	Lake - field measurement profile	Provide additional field profile information for DO and temperature in the potential thermal plume
K Discharge - In lake	As above	Lake - field measurement profile	Provide additional field profile information for DO and temperature in the potential thermal plume
Southwest Bay	As above	Lake - bottom and mid-depth sample and field measurement profile	Characterize water quality least influenced by discharges or observed inflows
Near Outflow – In lake	As above	Lake - bottom and mid-depth sample and field measurement profile	Characterize lake water quality near the outflow and identify vertical differences in water quality in the water column
Outflow of Jackfish Lake[c]	Late Fall (30 September 2021) Spring Freshet (24 May 2022) Early Summer (6 July 2022)	Watercourse - surface sample and surface field measurement	Characterize water quality in the outflow from lake

Note: Field measurements included water temperature, dissolved oxygen (concentration and percent saturation), pH, and specific conductivity.

(a) Bottom samples were collected 1 m above lake bottom, surface samples, and surface field measurements were collected approximately 30 cm below the water or ice surface, and water quality field measurement profiles were collected at 1 intervals (or at 0.5 m intervals if the total depth was less than 4 m).

(b) Flow was not observed at Inflow to NW Bay 1 during the Thermal Plume Delineation Study from September 2021 to August 2022; therefore, sampling and field measurements were not completed at this station.

(c) Flow was not observed at Inflow to NW Bay 2 or Outflow of Jackfish Lake during the Thermal Plume Delineation Study in late winter or late summer; therefore, sampling and field measurements were not completed at this station during these months.

DO = dissolved oxygen; NW = northwest; S = south.

Water Quality Samples

During each program, samples were collected at each of the five lake stations at mid-depth and at the bottom (1 m above the lake bottom) of the water column using a Kemmerer sampler and at watercourse stations by directly filling bottles provided by the laboratory. Lake samples were poured from the Kemmerer sampler into sample bottles provided by the laboratory. If more than one full volume of the sampler was required to fill the bottle suite, the bottles would be filled by splitting the sample from each Kemmerer volume equally between the bottles. Water from the Kemmerer sampler (for lake samples) or extra laboratory-grade bottle (for watercourse samples) was also used to measure turbidity in the field using a turbidity meter (LaMotte 2020we); turbidity measurements were based on the average of three readings from the turbidity meter.

Samples with dissolved parameters were filtered and preserved according to laboratory instructions. Prior to transport to the analytical laboratory, samples were stored in coolers and kept cool with ice packs. Analysis request and chain-of-custody forms were used to request the analysis and track samples, respectively.

All water quality samples were sent to ALS Group (ALS) in Vancouver, British Columbia, Canada, an analytical laboratory accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for analysis of routine parameters, major ions, nutrients, and total and dissolved metals:

- Routine parameters (hardness, total alkalinity, specific conductivity, total dissolved solids [TDS], total suspended solids [TSS], turbidity, pH)
- Major ions (fluoride, chloride, sulphate, calcium, potassium, magnesium, sodium)
- Nutrients (total and dissolved phosphorus, nitrate, nitrite, total ammonia, total nitrogen, reactive silica, dissolved organic carbon)
- Total and dissolved metals (aluminum, antimony, arsenic, barium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, thallium, uranium, and zinc)

Bottom samples from the Northwest Bay - N and the Near Outflow - In lake stations were sent to ALS for analysis of:

- Oil and grease (hexane extractable)
- Total petroleum hydrocarbons (F1, F2, F3, F4 Canadian Council of Ministers of the Environment [CCME] fractions)
- Benzene, toluene, ethylbenzene, xylene (BTEX)

Surveillance Network Program

As part of the Water License (MV2019L1-0001), NTPC is required to continuously monitor water temperature and flow at all plant intakes (SNP 00-1a,b,c,d) during periods of discharge to Jackfish Lake. NTPC is also required to measure water temperature at all plant discharge locations (SNP 00-2a,b,c,d) during periods of discharge to Jackfish Lake (Figure 2.2-1).

2.3.3.2 Data Analysis

General Water Quality Characterization and Comparisons to Water Quality Guidelines

Water quality data collected during the thermal plume study were tabulated and compared to Canadian Water Quality Guidelines (CWQGs; CCME 1999). Parameter-dependent CWQGs (e.g., total ammonia, aluminum, cadmium, copper, lead, manganese, nickel, and zinc) were calculated for each sampling event and for each sampling station based on individual sample parameter values. The results of water quality data collected in the inflow to Jackfish Lake, within Jackfish Lake, and at the outflow of Jackfish Lake during the study were also reviewed to provide a general characterization of water quality in these areas.

Spatial and Seasonal Patterns

Water quality data from the inflow to Jackfish Lake, within Jackfish Lake, and at the outflow of Jackfish Lake were plotted to qualitatively review spatial and seasonal patterns in Jackfish Lake and assess differences between inflow, outflow, and lake water quality. Seasonal profiles at either 1-m intervals (for field parameters in the lake) or mid and bottom depths (for routine parameters, nutrients, metals, and hydrocarbons in the lake) were plotted to assess water quality differences within the water column of Jackfish Lake.

Influence of Lake Inflows

The water quality results from the inflow samples were compared to the lake sample results to assess the potential for the inflow to influence lake water quality. The potential for the watercourse inflow to influence water quality in Jackfish Lake was assessed by completing two comparisons:

- concentrations were 20% higher in the inflow relative to the Southwest Bay station (located farthest from the inflow)
- concentrations were 20% higher at the Northwest Bay station (located closest to the inflow) relative to other stations in Jackfish Lake

For the first comparison, both concentrations from the mid-depth and the lake bottom samples at the Southwest Bay station were compared to inflow concentrations. For the second comparison, concentrations in mid-depth samples at the Northwest Bay – N station were compared to concentrations in mid-depth samples at other Jackfish Lake stations; similarly, concentrations in bottom samples at the Northwest Bay – N station were compared to concentrations in bottom samples at other lake stations.

Concentrations below detection limits were assumed to be equal to the detection limit during the comparison. A difference of 20% was selected to identify parameters for further review because concentrations that are within 20% of each other are typically not considered notably different (Appendix B). If both criteria were met during one or more field programs, these parameters were reviewed further to assess the potential of influence from the inflows by evaluating the spatial trends in the lake with increasing distance from the inflows.

2.3.4 Fish and Fish Habitat

2.3.4.1 Field Methods

A fisheries survey was completed for Jackfish Lake in August of 2018 to evaluate the potential effects of the cooling system water discharges on Jackfish Lake (Golder 2019b). In September 2021, a sonar survey using a Helix 5 Chirp SI GPS G2 side-scan sonar unit was conducted in Jackfish Lake to map the fish habitat in the lake with particular focus on areas near the discharges to better understand fish use of the area. The side-scan sonar was used to map depths, benthic habitat (substrates), and large-bodied fish target distributions around the discharge pipes and throughout the lake, providing high-resolution images to map the extent to which vegetation and rocky shoals intersect the thermal plume. All sonar data was logged on the sonar unit, stored on a memory card, then uploaded to the Project SharePoint folder upon return to the office, whereas field notes were recorded on datasheets during the survey, then scanned and uploaded upon return to the office.

The study design included three components: a thermal plume area transect grid, spaced at 10 m intervals; a coarse lake transect grid, spaced at 100-m intervals; and a perimeter transect running parallel to the shoreline, at depths of approximately 2 to 4 m (Figure 2.3-1). The field crew adjusted the survey effort where needed to better map complex habitat features identified while navigating the lake. Detailed notes on observed substrate conditions and habitat features (e.g., submergent and emergent macrophytes) for the entire shoreline and discernible littoral habitats were taken while in the boat during the survey to compare to classified features during post-processing of the sonar data.

Legend

- COARSE LAKE TRANSECT
- PERIMETER TRANSECT
- THERMAL PLUME TRANSECT
- HIGHWAY
- LOCAL ROAD

0 100 200
1:7,000 METRES

NOTE
WATER LEVEL ON SEPTEMBER 29, 2021 WAS MEASURED TO BE 175.53 METRES ABOVE SEA LEVEL (MASL).

REFERENCE(S)
HYDROGRAPHY AND ROAD DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. PUBLIC SECTOR DATASETS MADE AVAILABLE UNDER THE CITY OF YELLOWKNIFE'S OPEN DATA LICENSE V.1. IMAGERY COPYRIGHT © 20170809 ESRI AND ITS LICENSORS. SOURCE: DIGITAL GLOBE. USED UNDER LICENSE, ALL RIGHTS RESERVED.
PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
NORTHWEST TERRITORIES POWER CORPORATION

PROJECT
JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE
SONAR TRANSECTS FOR JACKFISH LAKE BATHYMETRY AND FISH HABITAT MAPPING

CONSULTANT
wsp

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PREPARED	AM
REVIEWED	KH
APPROVED	CS

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2.3.4.2 Data Analysis

As part of the fish and fish habitat assessment, existing conditions in the lake were characterized and the potential for habitat to support fish in the vicinity of thermal plume was delineated. Geo-referenced depth data (i.e., latitudinal, longitudinal, and depth data) collected during the sonar survey of Jackfish Lake were processed and analysed with geographic information system (GIS) software. The spatially explicit sonar imagery was processed using SonarTRX Pro (x64; Leraand Engineering Inc.) to create substrate images from the side-scan sonar (Buscombe 2017). The substrate images consisted of tiles for three directions from the vessel: left, right, and straight down. The depth data, generated from the down direction sonar data were used to generate a bathymetry map for Jackfish Lake and an updated table describing storage (in cubic metres [m^3]) per elevation (or depth; m) for Jackfish Lake. The shoreline, including islands, was assigned a water depth of 0 m.

The distribution of large-bodied fish targets was also analysed using the down direction of the sonar data. In each tile, the water column was identified where the top of the image is the water surface, and the substrate is a cyan line (Figure 2.3-2). The depth was confirmed based on bathymetry data to ensure consistency between the different analyses. The number of fish targets and the depth the fish targets were observed were recorded for each tile. In the example tile shown in Figure 2.3-2, one fish target was counted between 0 and 2 m. The fish distribution data was used to determine where large-bodied fish are in Jackfish Lake and the potential overlap between fish distribution and the potential thermal plume. Inference about fish distribution was limited to the time period of the data collection (i.e., October 2021).

The fish habitat assessment was also informed using the left and right directions from the side-scan sonar data (Figure 2.3-2). Substrate types in each tile were classified according to the Wentworth Scale based on estimated particle size (Wentworth 1922) and any habitat features were noted. Observed substrate and vegetation in the littoral zone (i.e., zone of shallow water with rooted plants along the shoreline) was noted throughout the perimeter sonar transect. Emergent and submergent aquatic vegetation provides Northern Pike (*Esox lucius*) spawning habitat and cover for small-bodied fish. Coarse substrates such as boulders and cobbles similarly provide refuge for small-bodied fish, and large aggregations of boulders and cobbles may provide habitat for spawning Salmonids in the lake such as Lake Whitefish (*Coregonus clupeaformis*).

Of note, only the coarse (100-m grid) transect grid is illustrated in Figure 2.3-2. Two other transects were surveyed and analyzed with the same methods and are shown in Figure 2.3-1: a perimeter survey (at approximately 4-m depth) and a fine scale transect (10-m grid) in the area most likely to be impacted by a thermal plume, near the discharges.

Figure 2.3-2: Example of the Sonar Imagery Evaluated for Habitat Classification (Transect R00037; TileT000) and Fish Distribution (Transect R00039; Tile T475) in Jackfish Lake

2.4 Quality Assurance and Quality Control

A summary of the QA/QC procedures employed during the thermal plume study is provided in Appendix B. A review of the QA/QC data demonstrated:

- Direct measurements of lake water level, lake inflows, and lake outflow were acceptable to address the objectives of the study, and although a data gap in the water level data exists for the winter period (6 December 2021 to 22 March 2022), the gap has no impact to the study because it occurred during a period when there was no lake outflow.
- The temperature logger dataset was largely complete with negligible missing data (i.e., only one data logger out of the 19 resulted in missing data and 6 months of data are still available at that logger) and instances of data gaps or data collected from wrong locations occurred only during the winter when under-ice temperatures were generally stable and predictable resulting in negligible impact to the data collection.
- The water quality data were of acceptable quality. Only one value for dissolved copper was invalidated from further analysis because the concentration (29 µg/L) on 30 September 2021 at the Inflow to NW Bay 2 station was 18 times higher than the total concentration (1.6 µg/L) and outside of the total and dissolved copper ranges from September 2021 to August 2022.
- The bathymetry and fish and fish habitat data met the QA/QC objectives.

Overall, the data collected during the thermal plume study were considered to be of acceptable quality and adequate to address the objectives of the study.

2.5 Results

2.5.1 Water Level and Surface Flow

Flow at the inflow to Northwest (NW) Bay 1 station was not observed during the thermal plume study; flow at the outflow and the inflow to NW Bay 2 station were observed intermittently. A summary of observations and measurements of inflows are provided in Table 2.5-1 and a summary of water level and outflow activities, and measurements taken is provided in Table 2.5-2. The water level and outflow time series, in addition to measurements of water level, outflow and inflow are presented in Figure 2.5-1. Detailed data of water level and surface flow are available in Appendix C.

During the late fall sampling program, outflow from the lake through the culvert crossing 48th Street to the east was not observed. The outflow pathway was inspected, and the height of a high-point above the water surface of Jackfish Lake was measured to be 3 cm, establishing a zero-flow elevation of 174.579 m. The difference between the water level and the zero elevation is referred to as the stage; a negative stage, or a water level below the zero-flow elevation, means there is no outflow.

Atmospheric pressure data from 6 December 2021 to 22 March 2022 are not available due to unreliable readings, assumed to be related to cold air temperatures experienced by the Barologger. As a result, the water level timeseries during that period cannot be presented because atmospheric pressure is required to convert readings of total pressure to water depth. This occurred during the winter when there would not be outflow from the lake due to frozen conditions.

Table 2.5-1: Summary of Inflow Field Activities

Date and Time	Inflow to NW Bay 1 (m^3/s)	Inflow to NW Bay 2 (m^3/s)
30 Sep 2021, 12:45	No flow observed	0.002
Mar 2022	No flow expected (frozen conditions)	No flow expected (frozen conditions)
26 May 2022, 13:00	No flow observed	0.011
6 Jul 2022, 17:10	No flow observed	0.001
24 Aug 2022, 11:00	No flow observed	No flow observed

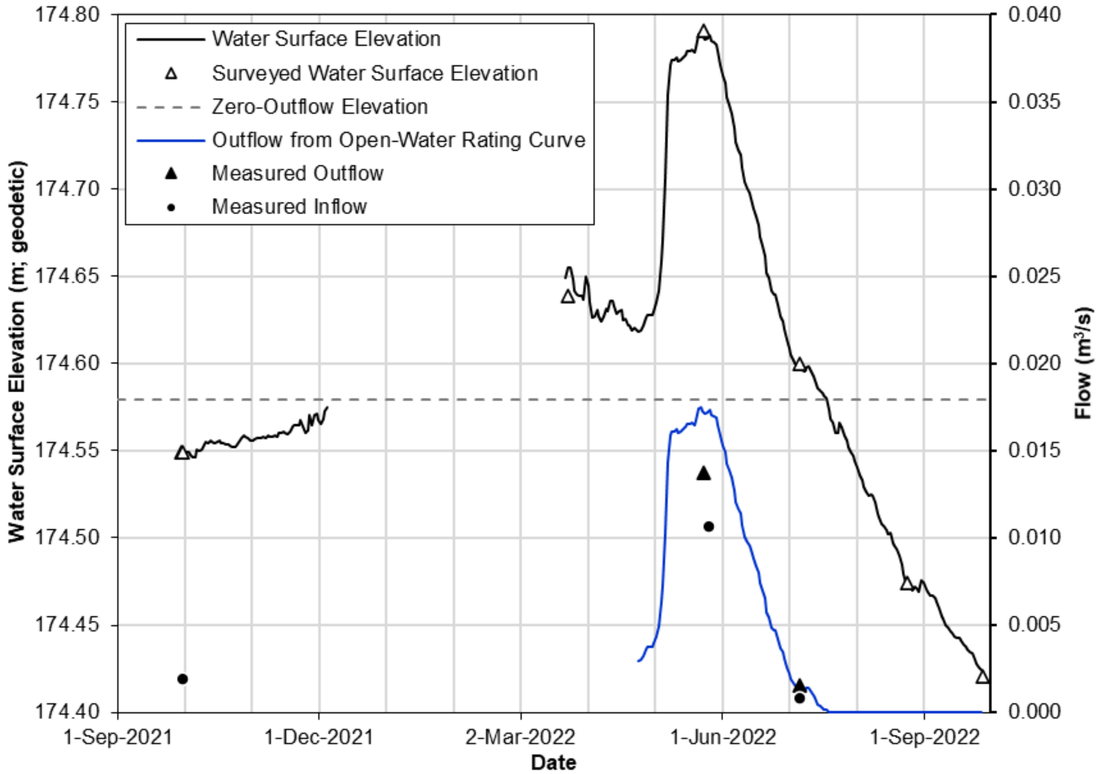
NW = northwest; m^3/s = cubic metres per second.

Table 2.5-2: Summary of Water Level and Outflow Field Activities

Date and Time	Activities	Water Level (m; geodetic)	Outflow (m^3/s)
29 Sep 2021, 17:00	Water level measurement after bathymetry	174.549	No flow observed
30 Sep 2021, 12:45	Pressure transducers deployed, water level measurement, no outflow observed, measurement of zero-flow elevation)	174.549	No flow observed
23 Mar 2022, 16:10	Water level measurement, deployment of redundant Barologger	174.639	No flow expected (frozen conditions)
24 May 2022, 11:45	Water level measurement, outflow measurement, download loggers, removed redundant Barologger from field	174.791	0.014
6 Jul 2022, 14:05	Water level measurement, outflow measurement, download loggers	174.600	0.0015
24 Aug 2022, 11:30	Water level measurement, download loggers	174.475	No flow observed
27 Sep 2022, 10:45	Water level measurement, download loggers, remove loggers from field	174.421	No flow expected (water level is below zero-flow elevation)

m^3/s = cubic metres per second.

Figure 2.5-1: Water Level and Outflow Time Series of Jackfish Lake with Discrete Measurements of Water Level, Outflow, and Inflow



2.5.2 Lake Water Temperature

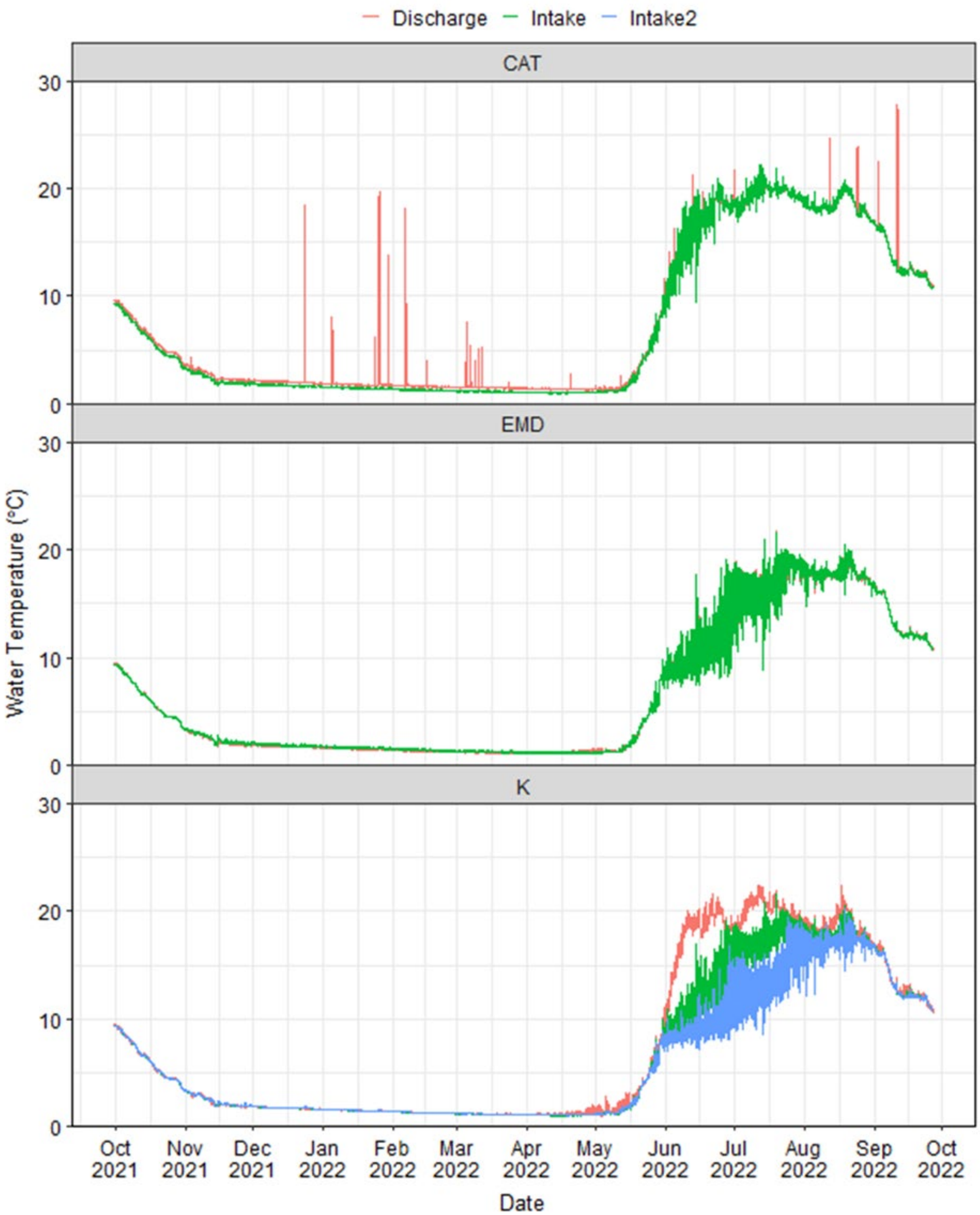
2.5.2.1 Thermistors

Water temperature measured by the thermistors installed in Jackfish Lake (Figure 2.5-2) displayed similar trends to the in-lake temperature loggers (Section 2.5-1). Instances of elevated discharge water temperature compared to the intake are prominent for CAT Plant, which occur at times of power generation when the generators transfer heat to the water discharged to the lake. SNP data from inside EMD Plant (SNP 00-1c, 00-2b) show occurrences of elevated discharge water temperature, which were not measured by the thermistor at the EMD Plant discharge. This could be because the thermistor was no longer properly affixed to the end of the discharge pipe at EMD Plant. This could be confirmed only by commercial divers.

Outside of those occurrences, discharge temperatures are generally close to (i.e., an average of not greater than 0.3°C) temperatures for the CAT Plant and EMD Plant. A larger difference in temperature is apparent for the intakes and discharges of K Plant measured by thermistors beginning in late May. This is expected to be caused by the configuration of K Plant, where water from the intake flows by gravity to a sump at a pumphouse adjacent to K Plant before it is pumped and circulated through the cooling loop. Because the thermistors measure intake temperature at the lake before reaching the pumphouse, heat that may be added to water during holding will appear as an increase in temperature of the discharged water. Temperature data reported by NTPC at the intake to K Plant (SNP 00-1a,b), which are measured immediately after the pumps withdrawing from the pumphouse, are consistent with the temperature of discharge measured by the thermistor, which confirms the addition of heat prior to the withdrawal of water from the sump. K Plant is the only plant of the three plants that employs a holding sump at a pumphouse; the others withdraw water from the lake directly to the respective plant.

It is noted that because thermistors are deployed at the lake, as opposed to inside the plants, they are susceptible to environmental influences (i.e., natural seasonal temperature changes) and are potentially influenced by the discharges of the adjacent plants. The SNP temperature data are most suitable for thermal modelling because the SNP monitoring points are immediately before and immediately after the generators and the increase to temperature are known to be directly contributed by the process of power generation.

Figure 2.5-2: Thermistor Water Temperature Time Series by Plant



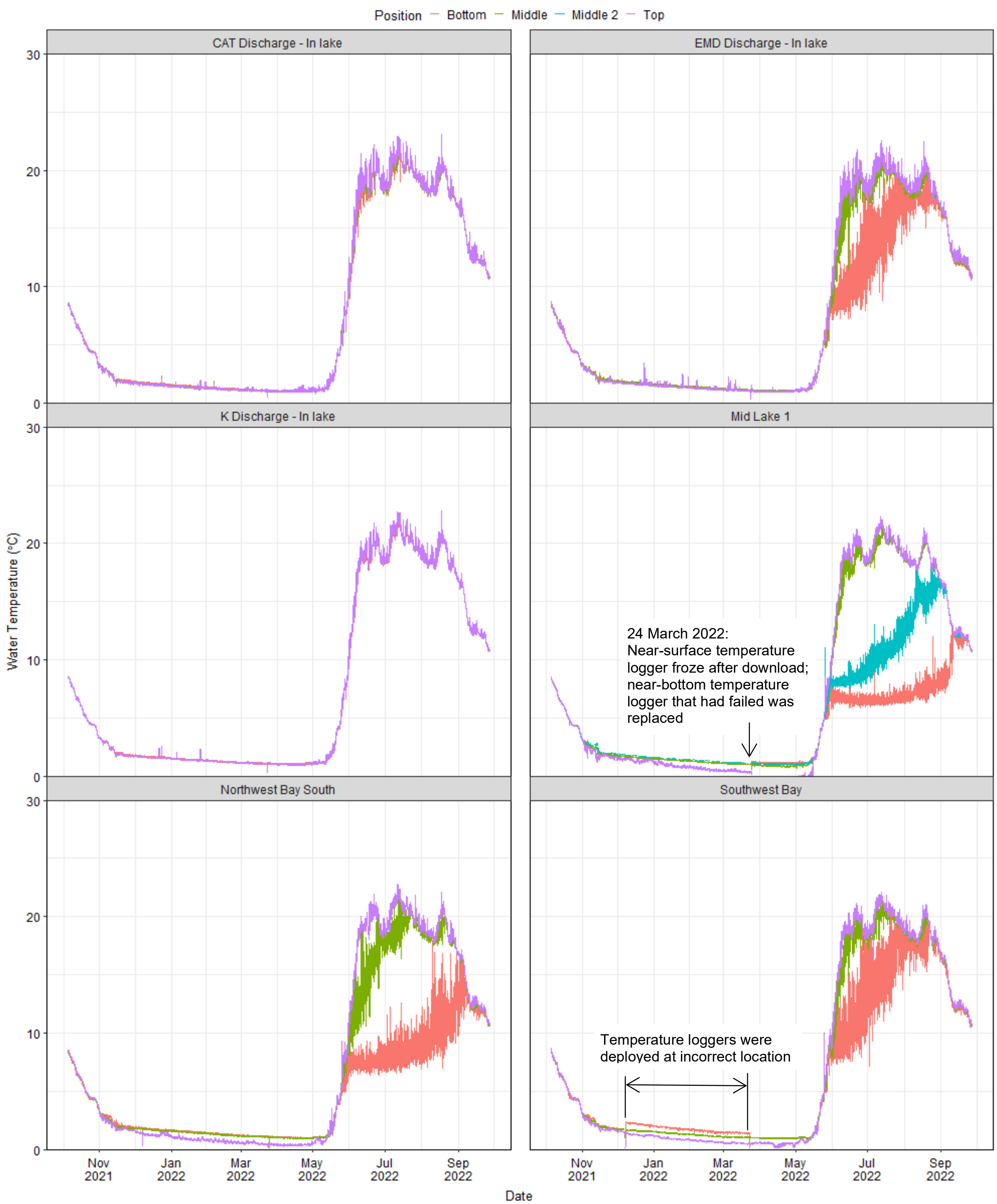
2.5.2.2 Temperature Loggers

Water temperatures consistently decreased from September until mid-November, after which the decrease was more gradual (Figure 2.5-3; Appendix D). During the winter period, until early May, temperatures decreased from an average of approximately 2.2°C to 0.8°C. At the stations close to the Facility, where open-water occurs year-round; the difference between the near-surface and near-bottom temperatures did not vary greatly and were within a range of 0.5°C.

During winter, a temperature gradient through the water column was not consistently observed based on the temperature logger data near the Facility (Figure 2.5-3). The stations away from the Facility exhibited thermal stratification, where temperatures were generally colder near surface (i.e., near under-side of ice) and warmer near bottom. Temperatures at mid-depth were generally consistent within a range of 0.5°C. Temperatures near surface were approximately 1°C colder than temperatures at mid-depth and near-bottom.

During spring, temperatures across the lake increased sharply in mid-May and began to exhibit thermal stratification (Figure 2.5-3). At the deep stations (i.e., Northwest Bay – S and Mid Lake 1), temperature measured from the deeper temperature loggers remained relatively stable (i.e., 6 to 8°C) until fall. At the moderately deep stations (i.e., EMD Discharge and Southwest Bay), stratification was weakly observed, as near-bottom temperatures were consistently lower than surface temperatures, but steadily increased during summer. At shallow stations (i.e., CAT Discharge and K Discharge), very little stratification was observed, though a temperature gradient was observed with temperature decreasing with depth. During late summer and fall, cooling of the lake led to convergence of temperatures in the water column, promoting mixing.

Figure 2.5-3: In-Lake Water Temperature Time Series by Location and Position



2.5.3 Water Quality

Water quality results are presented in Appendix E as tables (Appendices E.1 to 3) and as figures (Appendices E.4 to 6). ALS certificates of analysis are presented in Appendix E.7.

2.5.3.1 General Water Quality Characterization and Comparisons to Water Quality Guidelines

Routine Parameters

The depth of stations in Jackfish Lake ranged from 1.1 to 7.9 m. EMD Discharge — In lake, Mid Lake 1, Mid Lake 2, and Mid Lake 3 were the deep stations, with depths up to 6 to 7 m during most of the sampling events from September 2021 to August 2022. Jackfish Lake was generally well-mixed during late fall, late winter, and spring freshet based on the temperature and conductivity field profiles (Appendices E.1 and E.4); thermal stratification was evident during the sampling events in early and late summer (July and August) when water temperatures were lower at the bottom of the lake, particularly at deeper locations in the lake, compared to the surface (Appendices E.1 and E.4). Field turbidity measurements were low (less than 2 NTU) in the inflow (Inflow to NW Bay 2), and in the winter for the Jackfish Lake stations. Water in Jackfish Lake was generally turbid from early summer to fall, as indicated by turbidity results (4.2 to 22 NTU). Water at the Outflow of Jackfish Lake station was generally turbid, with turbidity measurements from 6.6 to 53 NTU.

Measured field pH values ranged from 7.0 to 8.2 during late fall, late winter, and spring freshet. In the upper portion of the water column (upper 3 m) in Jackfish Lake, water was more alkaline during summer (July and August) compared to other seasons, with typical field pH values between 9.1 and 9.5 (Appendices E.1 and E.4); summer field pH values near the bottom of the lake (i.e., 4 m or deeper) ranged from slightly acidic to alkaline (6.8 to 9.1). Field pH values in the mid-depth samples were typically above the CWQG during the summer (Appendix E.2). Values of field pH at Inflow to NW Bay 2 and Outflow of Jackfish Lake were within the CWQG range. Alkaline waters during the summer were previously observed in 2018 (Golder 2019b).

The concentration of dissolved oxygen (DO) in lake water is a function of the balance of the processes that introduce oxygen into (e.g., wind mixing and photosynthesis by algae) and remove oxygen from the water column (e.g., respiration by algae and aquatic organisms, microbial decomposition, and chemical oxidation). Based on the measurements of DO concentrations during the thermal plume study, Jackfish Lake was well-oxygenated with the exception of bottom concentrations during July and August. During these two months, low DO concentrations (less than 4 mg/L) or anoxic conditions (approaching or at 0 mg/L) were observed at the lake bottom (depths greater than 4 m) (Appendices E.1 and E.4). Thermal stratification of the lake during warmer months limited mixing of DO between surface waters and bottom waters. Lower DO concentrations measured near the bottom of Jackfish Lake may be due to natural processes in or near the sediment boundary that consume oxygen (e.g., microbial decomposition of organic matter in the sediments). Concentrations of DO were typically above the minimum CWQG of 6.5 mg/L for all other life stages (CCME 1999), except for bottom samples at most lake stations in July and August (Appendix E.2). Plots of DO concentration profiles from the summer of 1980 indicate that DO concentrations near the bottom of Jackfish Lake have historically been below the CWQG of 6.5 mg/L (Baker 1987). Concentrations of DO at the Inflow to NW Bay 2 station and the Outflow of Jackfish Lake station were typically above the minimum CWQG (6.5 mg/L), except for the Outflow of Jackfish Lake station (5.2 mg/L) on 30 September 2021.

Total alkalinity (as $CaCO_3$) at the Inflow to NW Bay 2 station, at stations in Jackfish Lake, and at the Outflow of Jackfish Lake station ranged from 56 to 136 mg/L during the thermal plume study (Appendix E.2); total alkalinity indicated an overall low sensitivity to acid input (BC ENV 2021). Measured TSS concentrations in Jackfish Lake and its inflow (Inflow to NW Bay 2) ranged from less than 3 mg/L to 18 mg/L; TSS concentrations at the Outflow of Jackfish Lake station were typically higher (6.0 to 55 mg/L) than concentrations in the lake.

Concentrations of dissolved organic carbon varied from 11 to 21 mg/L during the thermal plume study (Appendix E.2). High concentrations of dissolved organic carbon have been shown to have a protective effect against metal toxicity in aquatic organisms and has been incorporated into the calculation of some guidelines (e.g., CWQG for dissolved manganese and dissolved zinc; CCME 1999).

Major Ions

Major ions in surface water may be expressed in terms of hardness, TDS (measured directly or calculated), specific conductivity, major cations, and major anions (Appendix E.2). The toxicity of many metals decreases with increasing hardness. Hardness (as $CaCO_3$) in waters from the Inflow to NW Bay 2 station, the Jackfish Lake stations, and the Outflow of Jackfish Lake station ranged from 99 to 178 mg/L during the thermal plume study (Appendix E.2); water hardness values were classified as moderately hard (i.e., within the range of 76 to 180 mg/L; CCME 1999). Measured and calculated TDS ranges (232 to 319 mg/L and 233 to 280 mg/L, respectively), together with field and laboratory specific conductivity (407 to 499 and 439 to 544 µS/cm, respectively; Appendix E.2) indicated a moderate level of total ion concentrations in Jackfish Lake during the thermal plume study (Hart et al. 1990; Mitchell and Prepas 1990). Overall, Concentrations of TDS and values of specific conductivity at the Inflow to NW Bay 2 station and the Outflow of Jackfish Lake station were similar to those in Jackfish Lake (Appendix E.2).

Two major anions, chloride and fluoride, have CWQGs; concentrations of chloride and fluoride at the Inflow to NW Bay 2 station, the Jackfish Lake stations, and the Outflow of Jackfish Lake station were below their respective CWQGs during the thermal plume study (Appendix E.2).

Nutrients

The main nutrients of concern in most freshwaters are phosphorus and nitrogen, as both are required for aquatic plant growth in small amounts. Phosphorus is often the limiting nutrient, which means that small additions of phosphorus can result in increased productivity (Schindler 1974). Increased nutrient concentrations may result in excessive algal growth in water or on rock substrates, which can decrease oxygen concentration in water at night and under ice when photosynthesis and wind driven mixing do not occur, respectively. Both dissolved phosphorus and total phosphorus (TP) were measured during the thermal plume study.

Trophic status classification of lakes and watercourses can be based on TP concentrations (CCME 2004). Based on the concentrations of TP, the trophic status of Jackfish Lake ranged from meso-eutrophic to hyper-eutrophic (i.e., 0.027 to 0.12 milligrams phosphorus per litre [mg-P/L]; Appendix E.2). The trophic status at the Inflow to NW Bay 2 station ranged from oligotrophic to mesotrophic (TP concentrations 0.0082 to 0.011 mg-P/L), whereas the trophic status at the Outflow of Jackfish Lake station ranged from eutrophic to hyper-eutrophic (TP concentrations 0.092 to 0.41 mg-P/L; Appendix E.2). Elevated concentrations of TP in Jackfish Lake and at outflow of Jackfish Lake could be related to internal loading of TP from lake sediments or loading from runoff.

Nitrogen can be present in both dissolved and particulate forms in surface waters. Dissolved inorganic forms include nitrate, nitrite and ammonia; total nitrogen includes both total and dissolved inorganic and organic nitrogen. Three CWQGs exist for the dissolved inorganic forms of nitrogen: total ammonia, nitrate, and nitrite.

During the thermal plume study, concentrations of total ammonia, nitrate and nitrite were below CWQGs in Jackfish Lake and at the Inflow to NW Bay 2 station and the Outflow of Jackfish Lake station (Appendix E.2).

Metals

Metals naturally occur in surface waters in small quantities. Aquatic organisms can be adversely affected by high metal concentrations; however, the level at which metals are toxic to aquatic organisms varies and several environmental factors (e.g., organic matter, hardness, pH) can modify the toxicity of metals (CCME 1999).

Total metal concentrations were below CWQGs in Jackfish Lake except for arsenic and copper. Total arsenic concentrations were consistently above the CWQG at the Inflow to NW Bay 2 station, the Jackfish Lake stations, and at the Outflow of Jackfish Lake station during the thermal plume study (Appendix E.2), as well as in historical samples collected from Jackfish Lake in 2018 (Golder 2019b). Concentrations of total arsenic are routinely above the CWQG in lakes in, and around, Yellowknife due to the historical contamination from former gold mines in the area (Palmer et. al 2015). Total copper concentrations were above the CWQG in three lake samples (Near Outflow – In lake [mid-depth] at 9.7 µg/L on 1 October 2021, EMD Discharge – In lake [bottom] at 4.6 µg/L on 24 August 2022, and Northwest Bay – N [mid-depth] at 4.5 µg/L on 6 July 2022; Appendix E.2). Total copper concentrations above the CWQG have also been observed historically in Jackfish Lake (Golder 2019b). Dissolved metal concentrations were below relevant CWQGs in Jackfish Lake during the thermal plume study (Appendix E.2).

Organics

Elevated levels of organic compounds may be harmful to aquatic organisms; however, toxicity varies widely by chemical (CCME 1999). Concentrations in lake samples analyzed for total oil and grease, total petroleum hydrocarbons (F1, F2, F3, F4 fractions), and BTEX were below detection limits (DLs) and CWQGs (Appendix E.2).

2.5.3.2 Spatial and Seasonal Patterns

The assessment of spatial patterns in water quality at the Jackfish Lake stations focussed on field parameters, routine parameters, major ions, nutrients, and metals that were typically above the DLs. Spatial patterns for metals typically below DLs (i.e., beryllium, bismuth, cadmium, chromium, cesium, lead, mercury, silver, tellurium, thallium, thorium, tin, titanium, tungsten, vanadium, and zirconium) and organics, which were consistently below DLs, were not assessed for seasonal or spatial patterns.

Vertical Patterns in Jackfish Lake

No clear vertical patterns were observed in water column profiles for field parameters at the five lake stations during the September 2021, October 2021, March 2022, or May 2022 sampling events (Appendix E.4). During the July and August sampling events in 2022, vertical gradients in Jackfish Lake were observed for temperature, dissolved oxygen, and pH, which were consistent with historical observations in 2018 (Appendix E.4; Golder 2019b).

Seasonal and spatial patterns of water temperatures at the bottom, middle and top of the water column are discussed in the following subsection. A discussion of the detailed profile measurements (i.e., at 1- or 0.5-m depth intervals) of temperature collected during the five sampling events is provided here.

Vertical gradients in temperatures were typically observed in Jackfish Lake during July and August 2022 when the lake was thermally stratified. In July 2022, temperatures at most stations in Jackfish Lake gradually decreased with depth from 20°C at depths of 3 m to 4 m below the water surface to as low as 6°C near the lake bottom. In

August 2022, small vertical gradients from 0 to 5 m were observed at the four lake stations where depths exceed 5 m (at EMD Discharge – In lake, Mid Lake 1, Mid Lake 2, and Mid Lake 3): a sharp decrease in temperature was observed from 5 m to the bottom at the four stations (Appendix E.4). Strong vertical gradients in temperatures were not observed in other seasons (i.e., in September/October 2021, May 2022, March 2022); slight increases in temperature (0.1 to 1.1°C) with increasing depth were observed at all the lake stations in March 2022 (Appendix E.4).

Vertical gradients in DO concentrations, where DO concentrations decreased with increasing depth, were observed during the July and August 2022 programs. In July 2022, DO concentrations decreased by approximately 12 mg/L between depths of 2 or 3 m and the bottom at all stations (Appendix E.4). During the August field program, DO concentrations declined slightly from the surface to depths of 4 or 5 m at all nine stations, from where strong vertical gradients were observed to the lake bottom at four of the stations (i.e., EMD Discharge – In lake, Mid Lake 1, Mid Lake 2, and Mid Lake 3); vertical trends at depth were not observed for stations with a total depth of 5 m or less (i.e., K Discharge – In lake, CAT Discharge – In lake, Near Outflow – In lake, Northwest Bay – N, and Southwest Bay; Appendix E.4). Vertical gradients in DO saturation demonstrated similar spatial, temporal, and vertical patterns to those of DO concentrations (Appendix E.4). During open-water conditions, the density difference of water layers between the cooler, denser layer of the water at the bottom of the lake (i.e., the hypolimnion) versus the warmer layer above inhibited mixing of the water column, thereby reducing the potential for aeration in the deeper portion of the water. The lowest DO concentrations in Jackfish Lake typically occurred near the bottom of the lake, where oxygen consumption can increase due to biological activity in the sediment.

Similar to temperature and DO, vertical patterns in pH in Jackfish Lake were observed during the July and August 2022 programs. During the July program, field pH decreased with depth by approximately 2 pH units between 3 m and the bottom at all stations (Appendix E.4). During the August program, little to no gradients were observed for pH between the surface and a depth 4 or 5 m; pH decreased approximately 2 units between 5 m and the lake bottom at EMD Discharge – In lake, Mid Lake 1, Mid Lake 2, and Mid Lake 3 (Appendix E.4). In the lower layers, decomposition processes generate carbon dioxide, and photosynthesis is limited due to a lack of light; therefore, resulting in an overall increase in carbon dioxide (carbonic acid in the water) that can result in lower pH values at the bottom coinciding with lower DO.

The majority of concentrations or values from laboratory analyzed parameters were comparable between the mid-depth and bottom samples (Appendix E.5). However, differences between mid-depth and bottom depths were observed in one or more seasons for 11 parameters:

- Turbidity values and TSS concentrations at most lake stations in July were higher at the mid-depth compared to the bottom (Appendix E.5); this pattern in turbidity values and TSS concentrations was also observed in August but to a lesser extent (Appendix E.5). Higher mid-depth turbidity values and TSS concentrations may be related to observed algae blooms in the euphotic zone (i.e., upper layer of the water column which receives sunlight) during the summer.
- The vertical patterns of lab pH were typically consistent with those observed for field pH in July and August (i.e., lower at the two locations deeper than 5 m compared to the mid-depth samples; Appendix E.5).

- Total and dissolved manganese concentrations were higher (i.e., up to 594 and 547 µg/L, respectively) at the bottom compared to mid-depth samples in July and August 2022. At the deepest sampling station in the lake (Mid Lake 1) in August, total manganese concentrations were approximately 10-times higher, and dissolved manganese concentrations were approximately 500-times higher at the bottom compared to the mid-depth (Appendix E.5). The higher concentrations at the bottom relative to the mid-depth are likely related to the reductive dissolution of manganese from sediments under low dissolved oxygen or anoxic conditions near the lake bottom.
- Total iron demonstrated similar trends as total and dissolved manganese in July and August 2022: concentrations were typically higher at the bottom compared to mid-depth; total iron concentration at the Mid Lake 1 station in August was six-times higher at the bottom compared to the mid-depth in August (Appendix E.5). Dissolved iron concentrations were less than the detection limits in July and August 2022, except for the bottom sample at the Mid Lake 1 station in August (60 µg/L; Appendix E.5). Similar to manganese, the vertical trends of iron may also be related to reductive dissolution of sediments related to low dissolved oxygen concentrations at the bottom of the lake.
- Total ammonia, dissolved selenium, and dissolved sulphur concentrations were higher at the bottom compared to the mid-depth at the Mid Lake 1 station in August 2022, which may also be related to low DO concentrations at the lake bottom (Appendix E.5).
- Dissolved lithium concentrations were higher at the lake bottom at the Southwest Bay station in March and August 2022; the cause for the occasional elevated concentrations of dissolved lithium at the bottom of this station is unclear (Appendix E.5).

Horizontal Patterns in Jackfish Lake

Water quality concentrations at mid-depth across Jackfish Lake were typically similar during each field program. Consistent gradients in water quality concentrations that would indicate clear or consistent water quality changes across Jackfish Lake were not observed during the field programs. However, higher, or lower, concentrations of some parameters were observed in the inflow relative to lake concentrations. Higher concentrations of dissolved organic carbon and some total and dissolved metals (i.e., aluminum, sodium, nickel, and iron) were observed in the inflow compared to those in Jackfish Lake and at the outflow of Jackfish Lake while, concentrations of silica, total and dissolved arsenic, barium, and silicon were lower in the inflow compared to concentrations in Jackfish Lake and at the outflow of Jackfish Lake (Appendix E.5). Higher concentrations of dissolved lithium at the bottom of the lake were observed at the Southwest Bay station in March and August 2022 (Appendix E.5).

Water quality concentrations at the outflow of Jackfish Lake were generally similar to those in Jackfish Lake, with the exception of total aluminum. Total aluminum concentrations at the outflow of Jackfish Lake were approximately 2 to 3 times higher than those in Jackfish Lake (Appendix E.5). Overall, consistent within-lake horizontal patterns were not observed in Jackfish Lake during the thermal plume study (Appendix E.5).

Seasonal Patterns

Seasonal patterns in the September 2021 to August 2022 monitoring period were observed in multiple field and routine parameters (pH, DO, TSS, turbidity, nitrogen parameters [nitrate, nitrite, nitrate + nitrite, and total ammonia]), and one metal (zinc).

DO concentrations and percent saturations were seasonally stratified in summer. Concentrations and percent saturation values of DO in the upper portions of the water column in Jackfish Lake were typically highest in summer and lowest in winter. DO concentrations and saturations in the lower portions of the water column were highest in late fall, and lowest in summer (Appendix E.4). Lower values of DO in winter and in the lower portions of the water column in summer were likely a result of lower mixing and interaction with the ambient air, i.e., an algal bloom during the summer likely contributed to the higher DO values in the upper portions of the water column (Appendix E.4).

Field pH was also seasonally stratified. Field pH values in Jackfish Lake were consistently higher in the upper portions of the water column in early and late summer (July and August 2022), and lower at the lower portions of the water column in early and late summer, and in the whole water column during late winter (March 2022) and spring freshet (May 2022) (Appendix E.4). The elevated pH values during the summer months are likely related to the higher DO concentrations and the algae blooms observed during this period.

Mid-depth concentrations or values of TSS and turbidity were typically higher in summer, and fall (September/October 2021, July and August 2022) compared to winter and spring freshet (March and May 2022); TSS concentrations at all depths were lowest during the winter (Appendix E.5). The seasonally high turbidity values and TSS concentrations in summer and fall may be related to particulate matter from algae blooms, and the low winter turbidity values and TSS concentrations may be related to limited runoff and wind-driven mixing of sediment during ice-covered conditions.

Concentrations of nitrogen parameters (nitrate, nitrite, nitrate + nitrite, and total ammonia) were typically higher at Jackfish Lake stations in March and May, compared to September/October 2021, and July and August 2022 (Appendix E.5). This seasonal pattern was likely related to biological uptake of nutrients.

Total and dissolved zinc concentrations were slightly higher in Jackfish Lake in late fall (September/October 2021) and late winter (March 2022) compared to May to August 2022. Potential contamination in the blanks may have caused the seasonal pattern of total and dissolved zinc. The equipment blank for the two programs and the field blank on 24 March 2022 had total and dissolved zinc concentrations detected at similar levels to concentrations in Jackfish Lake (Appendix B).

2.5.3.3 Influence of Lake Inflows

The assessment of influence from the inflow was conducted for three sampling events based on when the inflow (Inflow to NW Bay 2) was sampled: late fall (30 September and 1 October 2021), spring freshet (24 to 26 May 2022), and early summer (5 and 6 July 2022).

Concentrations that were notably higher (20% higher) at the Inflow to NW Bay 2 station relative to the Southwest Bay station (located farthest from the inflows) were summarized in Appendix E.3, Table E.3-1. Concentrations that were notably higher at the Northwest Bay – N station (located closest to the inflows) relative to other stations in Jackfish Lake were summarized in Appendix E.3, Table E.3-2. Parameter concentrations meeting both criteria included:

- Field measurements (percent saturation and concentrations of DO)
- Nutrients (total ammonia)
- Total metals (aluminum, iron, lead, molybdenum, nickel, selenium, and zinc)

- Dissolved metals (aluminum, copper, manganese, and zinc)

For most parameters, both criteria were only met in one sampling event and total and dissolved aluminum, total iron, and dissolved manganese were the only parameters for which both criteria were met in more than one sampling event (Appendix E.3, Tables E.3-1 and E.3-2).

Percent saturation and concentrations of DO did meet both criteria; however, elevated DO levels in the inflow are not expected to have negative impacts on water quality or aquatic life in Jackfish Lake. Concentrations of all other parameters that met both criteria were below relevant CWQGs. Therefore, if concentrations in Jackfish Lake were influenced by this monitored inflow (Inflow to NW Bay 2), these changes were unlikely to have effects on aquatic life. Additionally, none of these parameters demonstrated a decreasing trend in concentrations in Jackfish Lake with distance from the inflow.

Based on the inconsistency in meeting both criteria for most parameters and the absence of concentrations above CWQGs and lake-wide horizontal patterns for all the parameters that met both criteria, the influence of the monitored inflow to Jackfish Lake on water quality in Jackfish Lake is expected to be negligible.

2.5.4 Fish and Fish Habitat

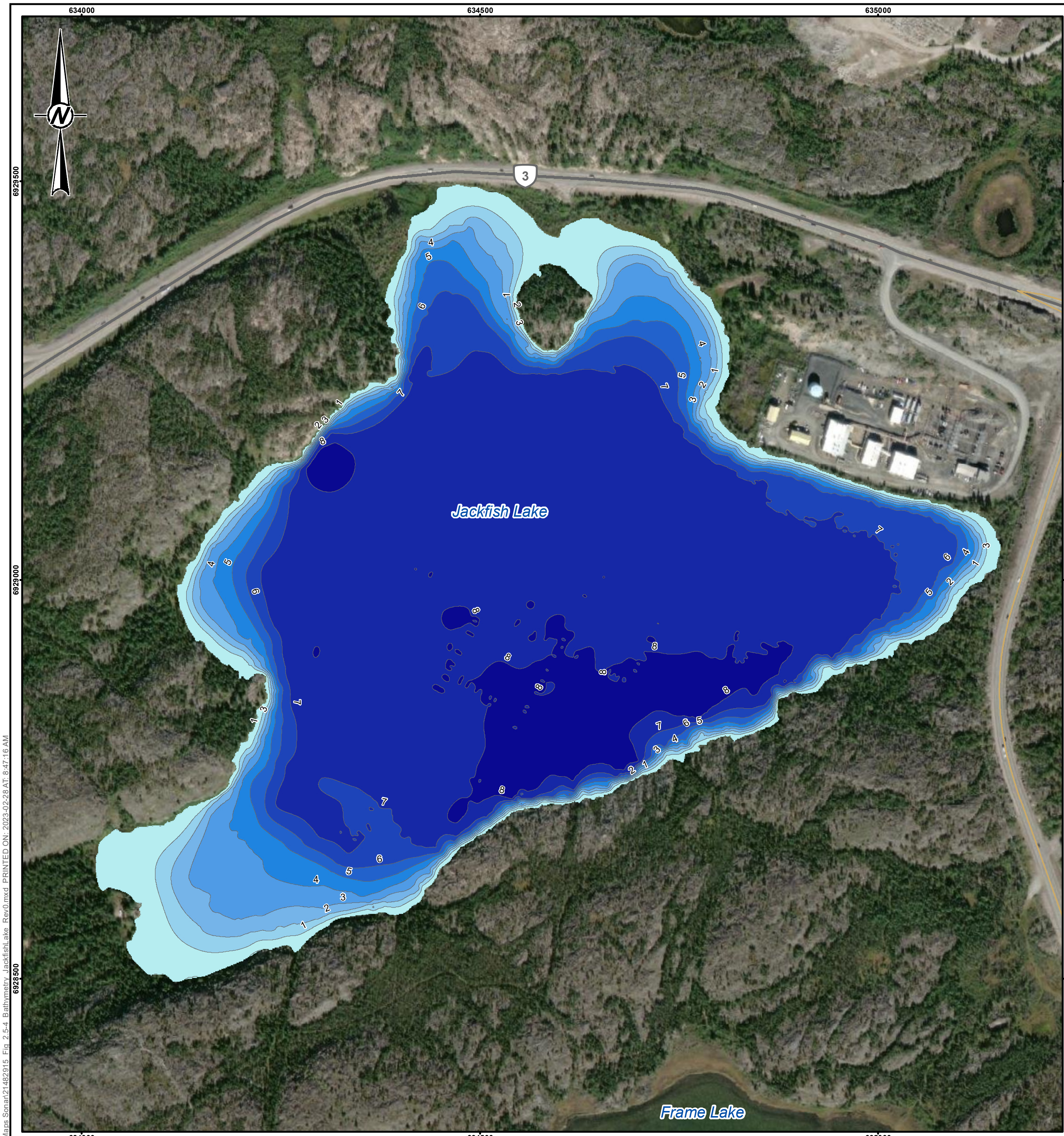
The bathymetry data shows a maximum depth of approximately 8.4 m and an average depth of 5.5 m. The bathymetric surface generated from the side-scan sonar data is shown in Figure 2.5-4. Based on the side-scan sonar data and visual observation of the shoreline and littoral areas, most of the substrate in Jackfish Lake was characterized as mud (i.e., organics with silt and some sand). Cobbles and boulders were recorded around the perimeter of Jackfish Lake and at some of the mid-lake locations. Submergent or emergent vegetation (i.e., macrophytes) were not observed from the sonar imagery; however, submergent and emergent macrophytes were observed in littoral areas of the lake by the field crew during the survey. Emergent and submergent vegetation appear to be co-localized with mud around the perimeter of Jackfish Lake and account for up to 20% cover over the soft substrate. The habitat within the thermal plume is consistent with the habitat in the rest of Jackfish Lake. The substrate analysis from sonar data is shown in Figure 2.5-5.

Shallow areas on the shores could provide spawning habitat for Northern Pike and are suitable for all life stages of small-bodied fish (e.g., Trout-perch). The fish community in the lake has access to deeper, cooler water within Jackfish Lake and areas that are not impacted by the thermal plume. The shoreline bordering the plant and in proximity to the discharge locations is primarily mud bottom out in the lake with cobbles along the shoreline (Figure 2.5-5). Vegetation was assessed as sparse along the shoreline closest to the discharge location (10% submergent vegetation by area; Photo 2.5-1) and more abundant closer to the outlet in the Northwest corner of the lake (20% combined submergent and emergent vegetation by area; Photo 2.5-2). Generally, vegetation coverage in the immediate vicinity of the discharge locations is less abundant than other areas of the lake, however abundant vegetation coverage is available in the bay and throughout the lake.

Three species of fish were documented in Jackfish Lake: Lake Whitefish, Northern Pike, and Trout-perch. The captured fish were primarily adult Lake Whitefish as the dominant species in the lake, all of which were in good body condition with full stomachs. Northern Pike adults were also captured but were potentially in poor body condition (e.g., underweight). Also, one juvenile or young-of-year Northern Pike was captured suggesting reproduction is occurring in the lake. Mercury tissue concentrations in Lake Whitefish and Northern Pike were below CFIA (2018) guidelines. Mean total dissolved gas concentrations were lower than the threshold of 110% and no evidence of gas bubble trauma was documented.

Water from Jackfish Lake flows to Great Slave Lake through a culvert. This culvert is likely a barrier to fish moving in or out of the lake when water levels are low and there is no water flowing through the culvert. Upstream movement of fish through the culvert would depend on the species, the gradient and water velocities of the culvert, and the drop between the culvert and water level of receiving waters. In recent years, water levels have been high enough to allow for water to flow consistently through the culvert to Great Slave Lake.

The large-bodied fish target distribution data from the side-scan survey on 29 September 2021 is presented in Figure 2.5-6. At the time of the survey, fish targets were concentrated in the deeper areas in Jackfish Lake. Some large-bodied fish targets were noted in the southeast shore, but overall, shallow areas typically had less fish targets than deeper areas. Although this analysis provides information regarding fish distribution, the analysis is biased towards large-bodied fish that were within the water column (i.e., not in, or on, the benthic sediments) and represents a snapshot of large-bodied fish distribution throughout the monitoring period on the lake. Of note, the survey does suggest that all areas of the lake are used by large-bodied fish such as Lake Whitefish and Northern Pike).



LEGEND

HIGHWAY
LOCAL ROAD
BATHYMETRY CONTOUR

WATER DEPTH m

0-1
1-2
2-3
3-4
4-5
5-6
6-7
7-8
8-9

0 100 200
1:7,000 METRES

NOTE

WATER LEVEL ON SEPTEMBER 29, 2021 WAS MEASURED TO BE 175.53 METRES ABOVE SEA LEVEL (MASL).

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

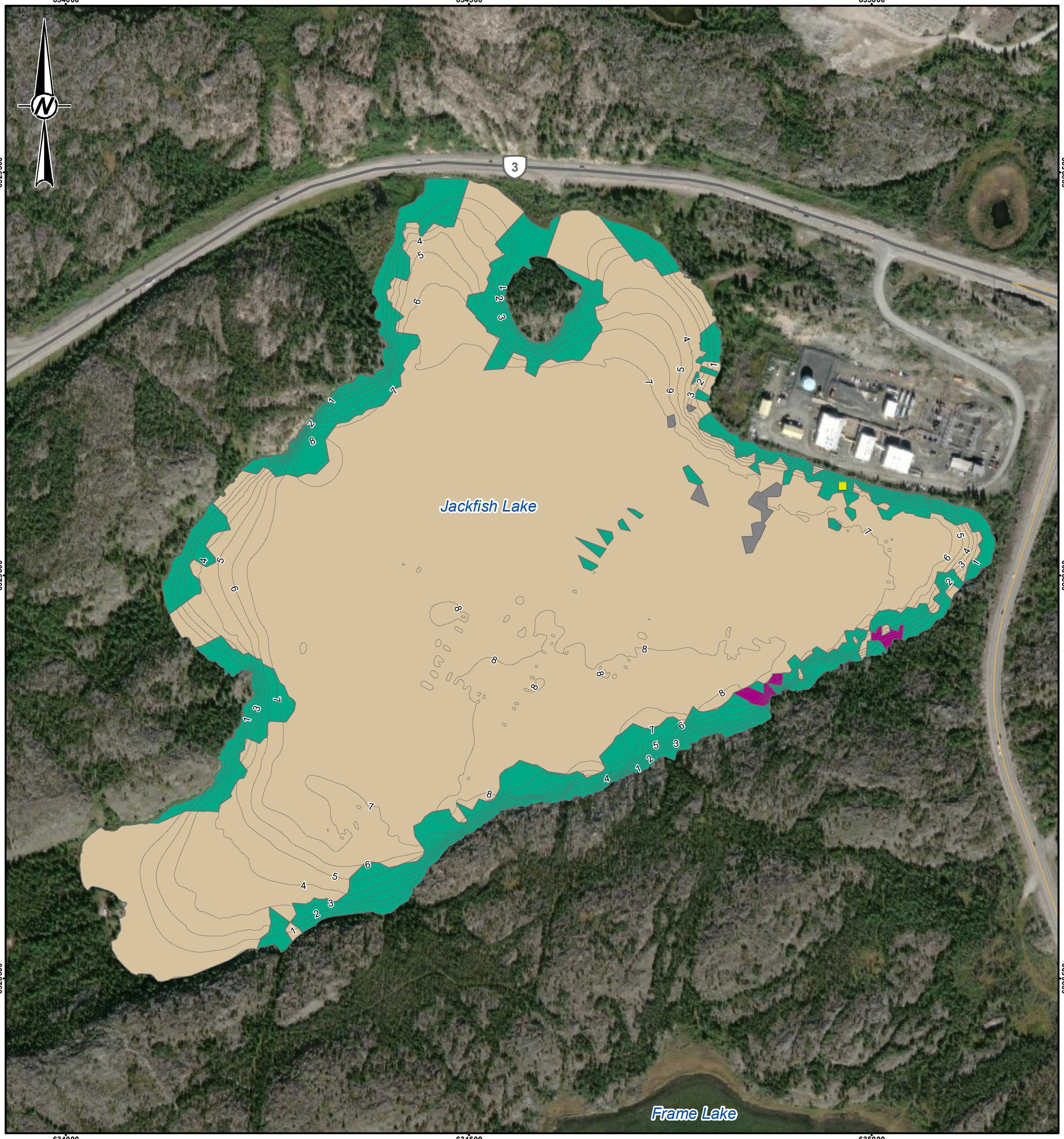
JACKFISH LAKE BATHYMETRY

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	AM
PREPARED	AM
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
21482915		0	2.5-4



LEGEND

- DIFFUSER
- BATHYMETRY CONTOUR
- HIGHWAY
- LOCAL ROAD
- PRIMARY SUBSTRATE: MUD

SECONDARY SUBSTRATE

- BOULDER
- BOULDER/COBBLE
- COBBLE

0 100 200
1:7,000 METRES

NOTE

WATER LEVEL ON SEPTEMBER 29, 2021 WAS MEASURED TO BE 175.53 METRES ABOVE SEA LEVEL (MASL).

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
NORTHWEST TERRITORIES POWER CORPORATION

PROJECT
JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE
JACKFISH LAKE SUBSTRATE TYPES

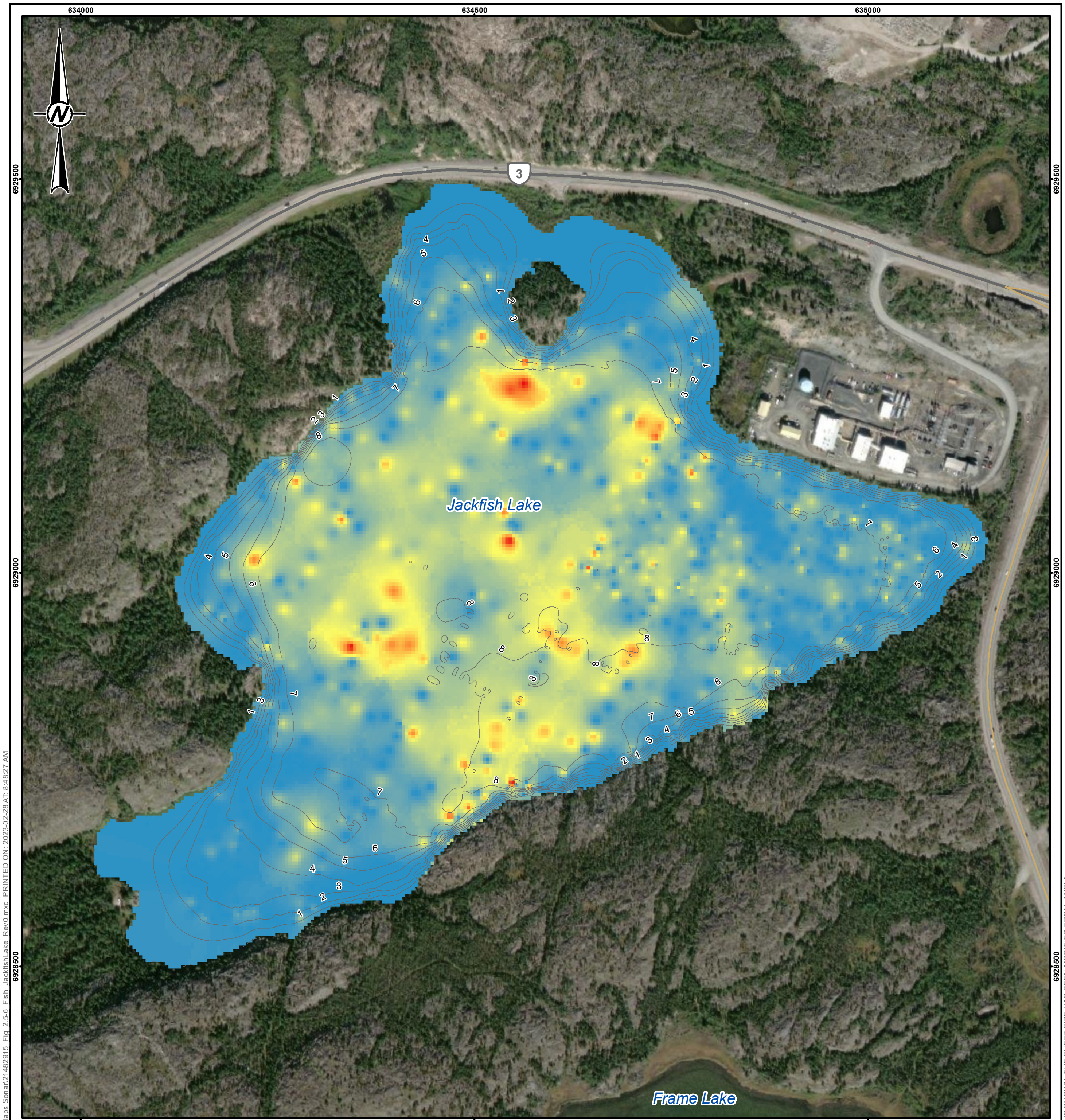
CONSULTANT
wsp

YYYY-MM-DD	2023-02-28
DESIGNED	AM
PREPARED	AM
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
21482915		0	2.5-5

Photo 2.5-1: Shoreline in close proximity to the discharge pipe locations.

Photo 2.5-2: Shoreline with submergent and emergent vegetation apparent at the boat launch in the Northwest corner of the lake close to the outlet.



LEGEND

- HIGHWAY
- LOCAL ROAD
- BATHYMETRY CONTOUR

FISH OBSERVATIONS

High : 12

Low : 0

0 100 200

1:7,000 METRES

NOTE

WATER LEVEL ON SEPTEMBER 29, 2021 WAS MEASURED TO BE 175.53 METRES ABOVE SEA LEVEL (MASL).

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

LARGE-BODIED FISH TARGET DISTRIBUTION IN JACKFISH LAKE

CONSULTANT

YYYY-MM-DD	2023-02-28
DESIGNED	AM
PREPARED	AM
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
21482915		0	2.5-6

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25mm

3.0 THERMAL PLUME EFFECTS ASSESSMENT

The purpose of the thermal plume delineation study was to evaluate if there are effects from the thermal discharges of the Facility on the aquatic receiving environment in Jackfish Lake. Thermal discharges from the Facility may result in prolonged and more stable thermal stratification in the lake, which in turn may result in prolonged anoxia at the lake bottom and greater release of the limiting nutrient (phosphorus) and metals from sediments. Increased temperatures can also have an adverse effect when combined synergistically with toxicants (EC 2014). With increasing temperature, toxicity of some contaminants increases (e.g., ammonia; CCME 1999) and the resistance for fish species to disease is lowered. Increased temperatures may also result in increased rates of metabolism and respiration, and increased activity and food consumption (EC 2014). Temperature can affect reproduction, growth, and longevity and can adversely affect species diversity and trophic relationships (Golder 2019a; Spotila et al. 1979).

A thermal model was used to delineate the thermal plume (Section 3.1.1) and provide simulated non-operational (baseline), measured operational, and hypothetical operational discharge conditions (Section 3.2.1) that were then used by the water quality and fish and fish habitat components to evaluate if operational effects to the aquatic environment are occurring under existing conditions or have the potential to cause effects under the hypothetical discharge scenario (i.e., peak measured worst-case scenario; Sections 3.2.2 and 3.2.3, respectively).

3.1 Assessment Approach

The following sections detail the data analysis and modelling method, and assessment approach to meet the requirements of the Thermal Plume Study Design as set out in by the Water Licence and presented in Section 1.3. Specific details on the modelling approach for the Jackfish Lake thermal model can be found in Appendix A.

3.1.1 Thermal Plume Delineation - Thermal Modelling

Thermal modelling was conducted using MIKE3 FM, a three-dimensional (3-D) modelling application developed by the Danish Hydraulic Institute. MIKE3 FM is fundamentally a hydrodynamic modelling platform that combines a number of computational components in either two-dimensional (2-D) or 3-D environments including, hydrodynamics, thermodynamics, advective transport, water quality, sediment and mud transport, and spectral wave attenuation (e.g., Ma et al. 2009; Dewey 2011).

The modelling approach used measured environmental inputs (physiographic, meteorological, hydrological) and measured operational inputs (flows, and corresponding temperature increase, through each station at the Facility) to simulate the lake's processes during the 6 October 2021 through 27 September 2022 monitoring period. Input data were used for the purposes of calibrating the model, validating model performance, and for simulating lake conditions under operational (effect) and non-operational (baseline) conditions. By carrying out these simulations and extracting modelled results at each model node throughout the model domain for each time step of operational and non-operational simulations, the temperature differences resulting from operational influences alone could be calculated to understand the magnitude of change and spatial extent of changes related to discharged heat loads on the lake across the year. Because operational heat loads during the monitoring period were highly infrequent, and plume delineations corresponding to operational effects under five seasonal scenarios (late fall, late winter, spring freshet, early summer and late summer) were required, a subsequent hypothetical modelling scenario was developed using the peak quasi-continuous heat load from operations (measured between 23 and 25 December 2021) to Jackfish Lake for informational purposes.

The median and maximum extent of operational effects were subsequently plotted using the 50th percentile and the 95th percentile operational effect statistics to illustrate the extents and magnitudes of operational effects within Jackfish Lake. A separate series of 95th percentile temperatures simulated at lake surface and lake bottom over the monitoring period were developed to illustrate annual temperature conditions in the lake. Isopleths (i.e., temperatures at different depths), providing temperature time series over depth and time were also developed to establish whether modelled discharges were having a meaningful effect on the thermal structure of the lake. Several model result extractions were completed at specific points of interest (i.e., at water quality sampling stations and areas of interest for fish and fish habitat) to assist other components with their interpretation of temperature conditions at the time site visits were conducted, to illustrate temperature effects during each seasonal condition, and to provide a characterisation of temperature conditions throughout the year.

All input data were screened and, where justified, adjusted to fill data gaps or provide more representative information with which to simulate lake conditions. Key stages of model development, calibration, simulation, and interpretation of results were reviewed following QA/QC procedures outlined in Golder's Global Numerical Modelling QA/QC Process provided in Attachment B of Appendix A.

3.1.2 Assessment of Effects to Water Quality

A qualitative assessment of the potential effect of cooling water discharge on lake stratification was completed using temperature modelling results from the 2022 summer period (1 June 2022 to 1 August 2022[1]). Modelled time series of surface, mid-depth and bottom temperature differences (i.e., differences between modelled operational and non-heat waste load scenarios) during the 2022 summer period were reviewed to assess changes in temperatures at different depths due to waste heat discharges that occurred in the summer of 2022. Modelled time series of temperature isopleths (i.e., temperatures at different depths) for the 2022 summer period and two hypothetical scenarios in early and late summer were reviewed. The hypothetical scenarios were based on the largest waste heat discharged during the thermal plume study (i.e., 23 to 25 December 2021), which were used to simulate the potential change in lake temperatures if this discharge occurred during the early and late summer periods.

3.1.3 Assessment of Effects to Fish and Fish Habitat

The bathymetry data was used to characterize the oxythermal habitat for Lake Whitefish for ice-covered (winter) and open-water (summer) seasons using updated results from the thermal modelling. These results supplement information generated from previously collected bathymetry data in 2018 (Golder 2019b).

To assess the operational effects on the aquatic ecosystem of Jackfish Lake, fish habitat (based on depth and substrate) and fish distribution maps were compared to the results from the thermal modelling. For the fisheries assessment, predicted model temperatures under the non-operational scenario and the hypothetical operational discharge (i.e., peak measured worst-case scenario), relative to published maximum optimal thermal ranges for Lake Whitefish. Lake Whitefish, which is a cold water adapted species, were chosen over Northern Pike, as the sentinel species due to their sensitivity to warmer thermal regimes. An optimal thermal niche of 15.5°C to 19.5°C for juvenile Lake Whitefish growth (Edsall 1999) was used as a generalised reference range for evaluating operational effects on fish community long-term growth. Alternate guidelines are available for specific Lake Whitefish life history stages (e.g., egg incubation, rearing, and spawning; BCMOE 1981); however, this information was not available to assess the dynamics of these life stages and a generalised approach was

[1] 1 August 2022 was the end of the 2022 operations scenario (Appendix A).

required to assess impacts on the fish community in Jackfish Lake as a whole. The assessment was also bound to the early and late summer model periods when the impacts of thermal discharge from the plant were likely to be most apparent.

An intermediate point located 100 m from the discharge points was used as the measurement point for the fisheries assessment, with the objective of evaluating thermal conditions in the centre of the thermal plume predicted by the hypothetical scenario, but away from the discharge locations, which were measured directly with temperature loggers. The 100-m interval was selected to provide an intermediate reference point between the discharge locations and the nearest temperature monitoring locations farther out in the lake. The 100-m points are more likely to be directly impacted by a thermal plume than the temperature monitoring station farther out in the lake. Furthermore, selection of the location was based on the shapes of the predicted thermal plumes (the centroid at 100 m) under the hypothetical scenario during the period of interest (early and late summer periods). This provided a reasonable assessment of the impacts experienced by the reference species, Lake Whitefish, during the monitoring period of 2021/2022. This approach was considered the most robust approach for assessing the impacts of modelled thermal plumes on the fish community using the predictions at the 100-m interval as a conservative characterization of the entirety of the plume. For each time period, a point was selected 100 m out in the lake located in the centre of the predicted thermal plume (Table 3.1-1).

Table 3.1-1: Measurement Locations in the Thermal Plumes 100 m from the Discharge Point

Location	Total Depth (m)	UTM Coordinates (NAD 83, Zone 11)	
		Easting (m)	Easting (m)
Baseline Discharge Point	-	634930	6929122
Early Summer Thermal Plume (1 to 5 July 2022)	7.2	634994	6929045
Late Summer Thermal Plume (1 to 5 August 2022)	5.3	635025	6929091

UTM = Universal Transverse Mercator; NAD = North American Datum of 1983, Zone 11; “-“= not depicted.

3.2 Assessment Results

3.2.1 Thermal Plume Delineation

The following subsections present the results of the thermal modelling study for Jackfish Lake. Supporting details for the Jackfish Lake thermal model can be found in Appendix A. The thermal model simulated three modelling scenarios: (i) a non-operational (baseline) scenario, (ii) a measured operational conditions scenario, both for the purposes of delineating thermal plumes, and (iii) a hypothetical operational discharge scenario (the peak measured heat load applied to Jackfish Lake) for the purposes of characterising thermal plumes during the five seasonal conditions identified in Schedule 1, item 1a (i.e., spring freshet, early summer, late summer, late fall and late under ice). Maps illustrating the extent of the thermal plume and any seasonal changes documented are also provided, including a calculation of maximum thermal plume extents as a percentage of the lake area.

3.2.1.1 Water Temperatures in Jackfish Lake under Measured Operational Conditions

The 95th percentile plots of measured operational conditions at lake surface and lake bottom between 6 October 2021 and 27 September 2022 (noting that no operational conditions were simulated from 1 August 2022 onwards) are provided in Figures 3.2-1 and 3.2-2, respectively. Given that operational discharges over a delta-T (temperature difference) of 1°C occur less than five percent of the simulation period, both figures largely reflect a natural thermal state for Jackfish Lake, with some minor exceptions. Surface temperatures reflect warmer surface temperatures within the deeper portions of the lake resulting from atmospheric heating throughout the ice-free period, while cooler surface temperatures in the shallows along the southwestern, western, and northern shorelines reflect the influence of cooler substrate temperatures. The surface area around the discharges reflects the influence of continuous circulation of cooler bottom waters being drawn in via the intakes and discharged to surface through the system when heat loads are rarely applied. Bottom temperatures within the deeper portion of the lake remain less warm due to the influence of cooler substrate temperatures and reduced light penetration with depth, while 95th percentile bottom temperatures in the shallows remain warmer and close to, though slightly below 95th percentile surface temperatures at those locations.

In brief, very little operational influence, other than the circulation of cooler bottom waters through the plant cooling systems, is visually detectable under measured conditions, largely because operational discharges equal to or greater than 1°C occur for less than five percent of the simulation period.

LEGEND

HIGHWAY

LOCAL ROAD

ABSOLUTE TEMPERATURE (SURFACE) - 95TH PERCENTILE

High : 20.78

Low : 6.21

0 100 200

1:7,000 METRES

REFERENCE(S)

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CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

ANNUAL 95TH PERCENTILE LAKE TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE DURING MEASURED OPERATIONS

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	MLE
PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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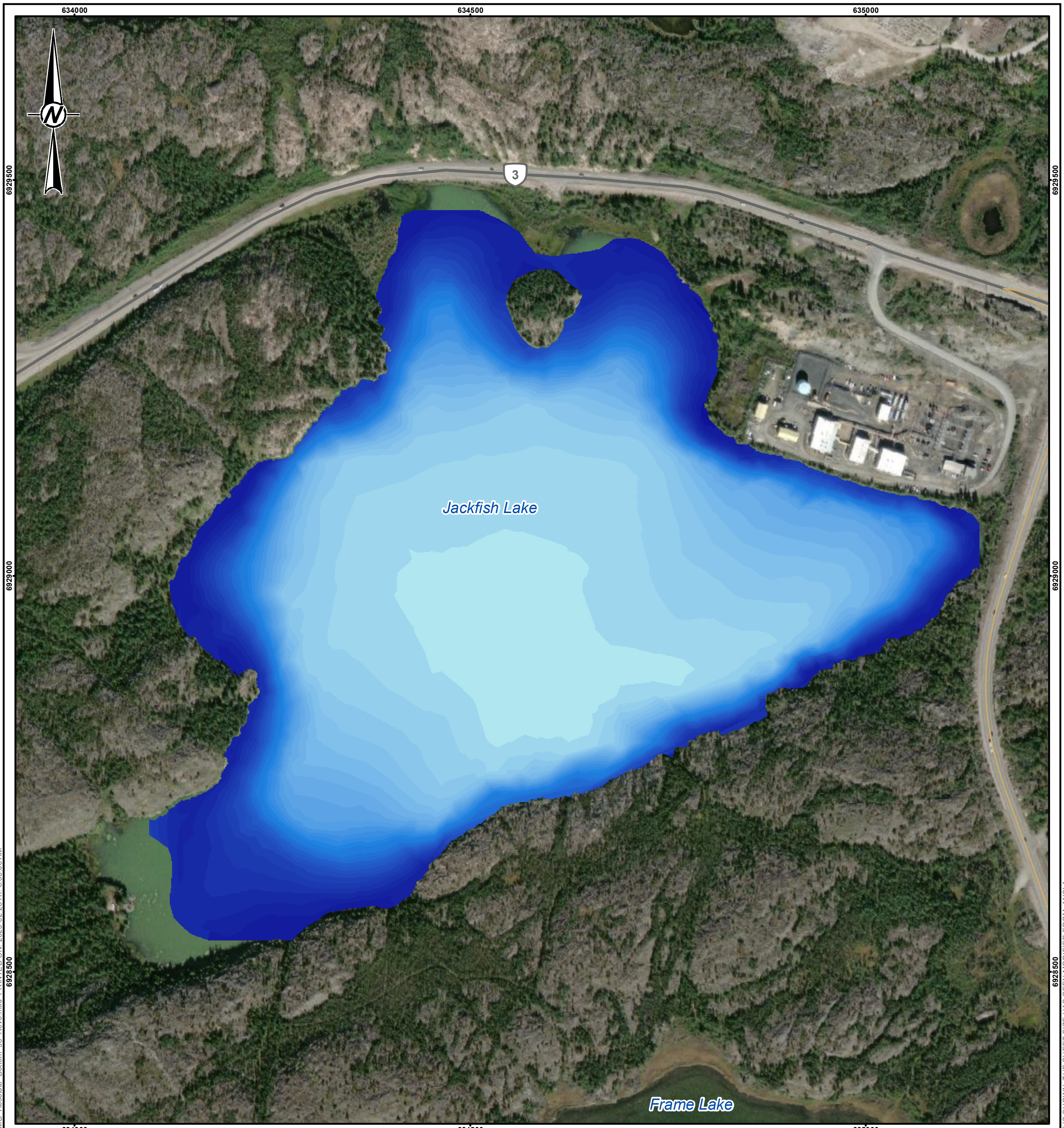

LEGEND

HIGHWAY

LOCAL ROAD

ABSOLUTE TEMPERATURE (BOTTOM) - 95TH PERCENTILE

High : 20.78

Low : 6.21

0 100 200

1:7,000 METRES

REFERENCE(S)

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PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

ANNUAL 95TH PERCENTILE LAKE TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM DURING MEASURED OPERATIONS

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
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REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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3.2.1.2 Effect of Measured Operational Discharges on Jackfish Lake

The notable absence of visually detectable thermal impacts on Jackfish Lake are illustrated in Figures 3.2-3 through 3.2-6. These figures provide a visualization of the 95th percentile temperature differences between measured and operational conditions (Figures 3.2-3 and 3.2-5), as well as 50th percentile (median) temperature differences between measured and operational conditions (Figures 3.2-4 and 4-6).

The 95th percentile (Figure 3.2-3) and median temperature (Figure 3.2-4) differences at the lake surface resulting from operational effects indicate that the thermal effects of measured operations over the simulation window were extremely small, i.e., generally between 0.2°C and 0.4°C and between 0°C and 0.2°C, respectively. Similar increases in temperature were observed at lake bottom, with the 95th percentile temperature increase generally amounting to 0.4°C (Figure 3.2-5) or less, and the median temperature increase amounting to between 0°C and 0.2°C (Figure 3.2-6). These changes largely reflect the residual effects of assimilated temperature increases after discharges have occurred, which collectively occur less than five percent of the time at an increase of 1°C or higher. The 95th percentile and median aerial extent of operational effects on Jackfish Lake are presented in Tables 3.2-1 and 3.2-2.

These findings indicate that the magnitude of thermal effects from operational heat loads applied to the lake was relatively small from October 2021 through July 2022 (after which operational data were screened out).

Table 3.2-1: Aerial Extent of 95th Percentile and Median Measured Operational Effects on Jackfish Lake at Lake Surface (6 October 2021 to 27 September 2022 Simulation Period)

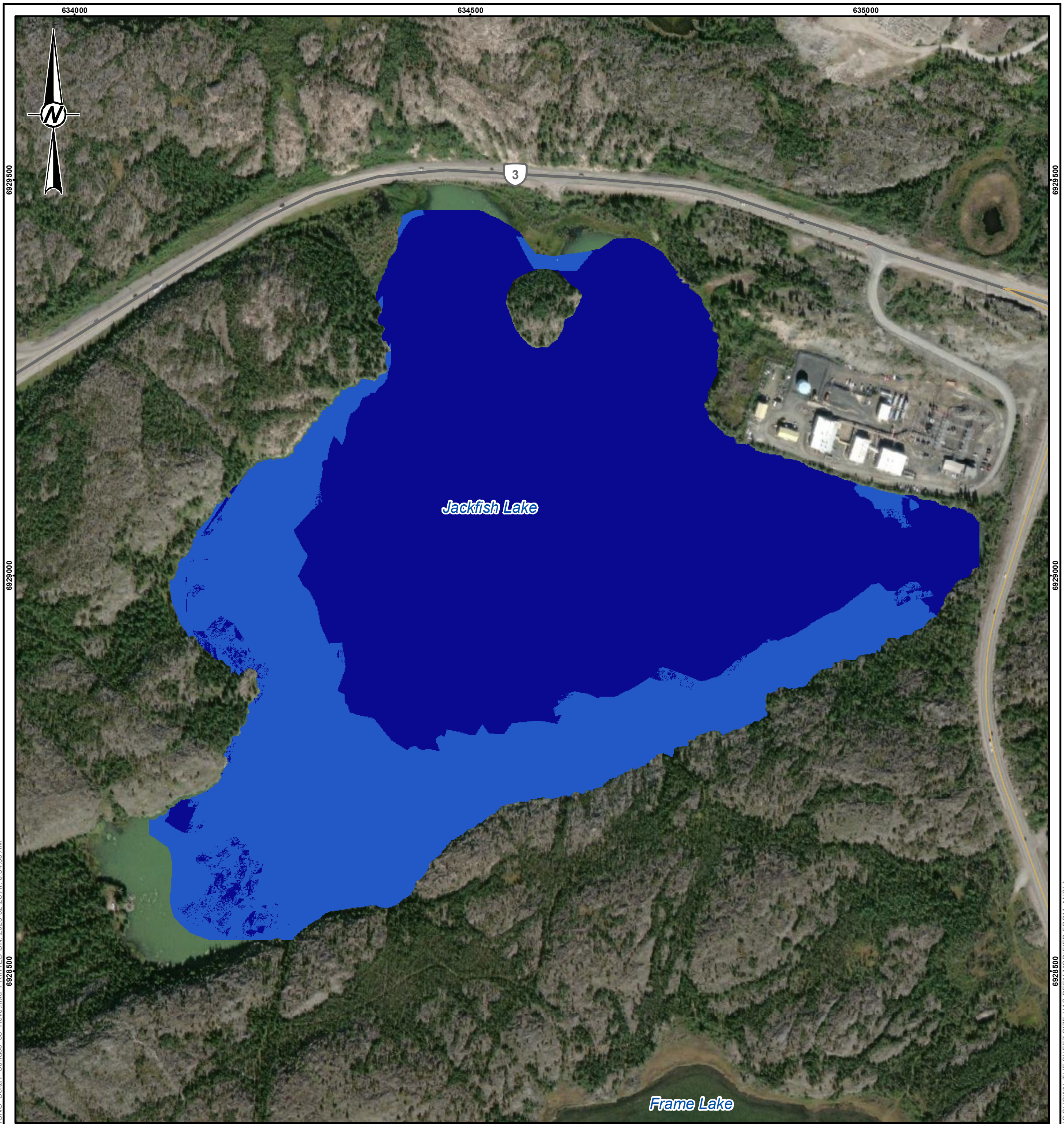
Temperature Effect	95th Percentile Extents (ha)	95th Percentile Extents (% of Extracted Area)	50th Percentile Extents (ha)	50th Percentile Extents (% of Extracted Area)
0°C to 0.1°C	-	-	35.9	70
0.1°C to 0.2°C	-	-	15.4	30
0.2°C to 0.3°C	18.7	36	-	-
0.3°C to 0.4°C	32.6	62	-	-
0.4°C to 0.5°C	0.9	2	-	-

ha = hectares; "-" = not applicable.

Table 3.2-2: Aerial Extent of 95th Percentile and Median Measured Operational Effects on Jackfish Lake at Lake Bottom (6 October 2021 to 27 September 2022 Simulation Period)

Temperature Effect	95th Percentile Extents (ha)	95th Percentile Extents (% of Extracted Area)	50th Percentile Extents (ha)	50th Percentile Extents (% of Extracted Area)
0°C to 0.1°C	-	-	33.8	66
0.1°C to 0.2°C	0.1	0	17.5	34
0.2°C to 0.3°C	0.2	0	-	-
0.3°C to 0.4°C	49.4	96	-	-
0.4°C to 0.5°C	1.1	2	-	-
0.5°C to 0.6°C	0.4	1	-	-
0.6°C to 0.7°C	0.1	0	-	-
0.7°C to 0.8°C	0.0	0	-	-
0.8°C to 0.9°C	0.0	0	-	-
0.9°C to 1.0°C	0.0	0	-	-

ha = hectares; "-" = not applicable.



LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0.3 - 0.4

0 100 200

1:7,000 METRES

REFERENCE(S)

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CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

ANNUAL 95TH PERCENTILE MEASURED OPERATIONAL EFFECT TEMPERATURES IN JACKFISH LAKE AT SURFACE

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
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PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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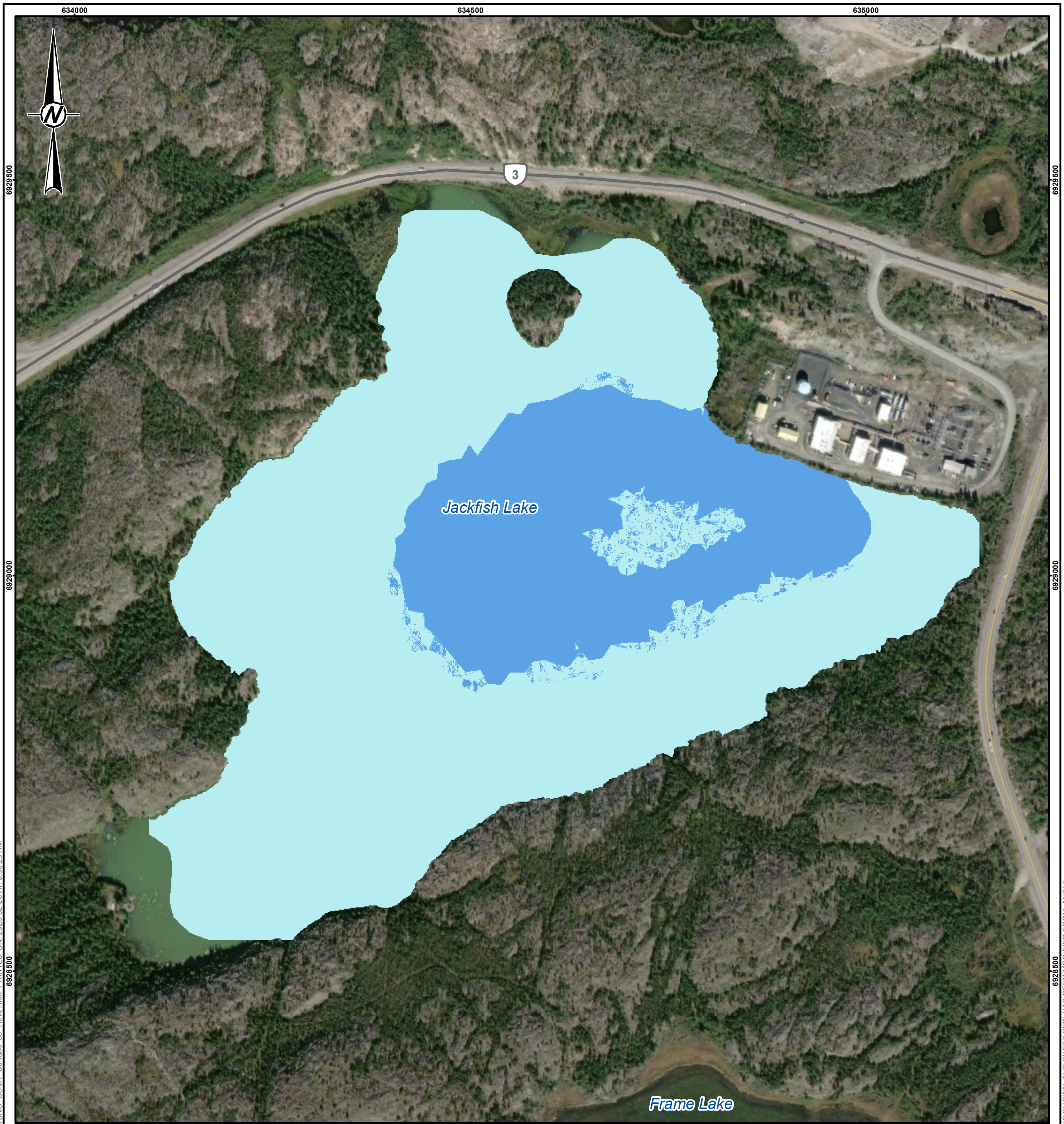

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 50TH PERCENTILE

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0.3 - 0.4

0 100 200

1:7,000 METRES

REFERENCE(S)

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PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

ANNUAL MEDIAN MEASURED OPERATIONAL EFFECT TEMPERATURES IN JACKFISH LAKE AT SURFACE

CONSULTANT

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PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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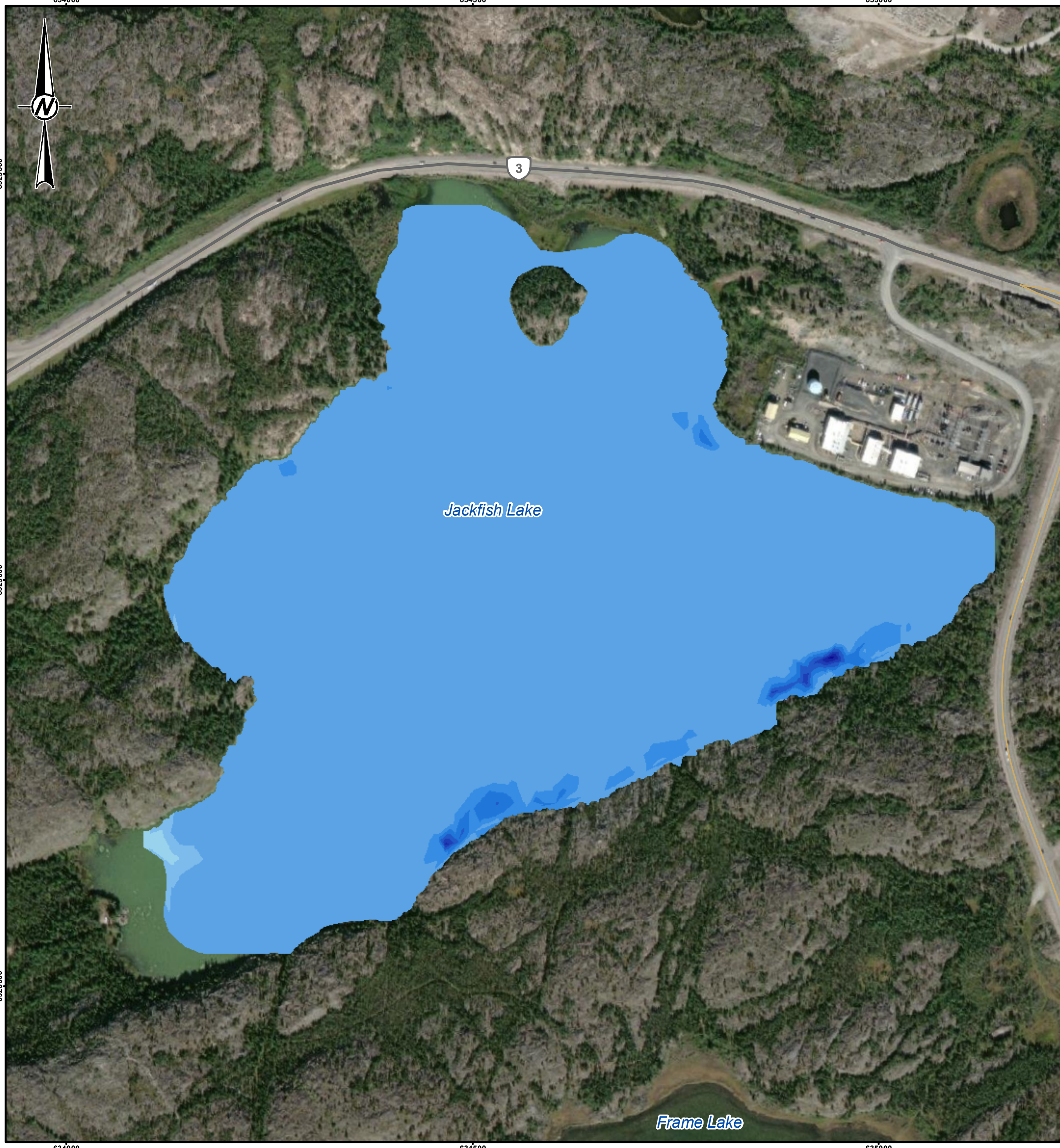

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM - 95TH PERCENTILE

- 0 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0

0 100 200

1:7,000 METRES

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PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

ANNUAL 95TH PERCENTILE MEASURED OPERATIONAL EFFECT TEMPERATURES IN JACKFISH LAKE AT BOTTOM

CONSULTANT

wsp

YYYY-MM-DD	2023-04-19
DESIGNED	MLE
PREPARED	AB
REVIEWED	KH
APPROVED	CS

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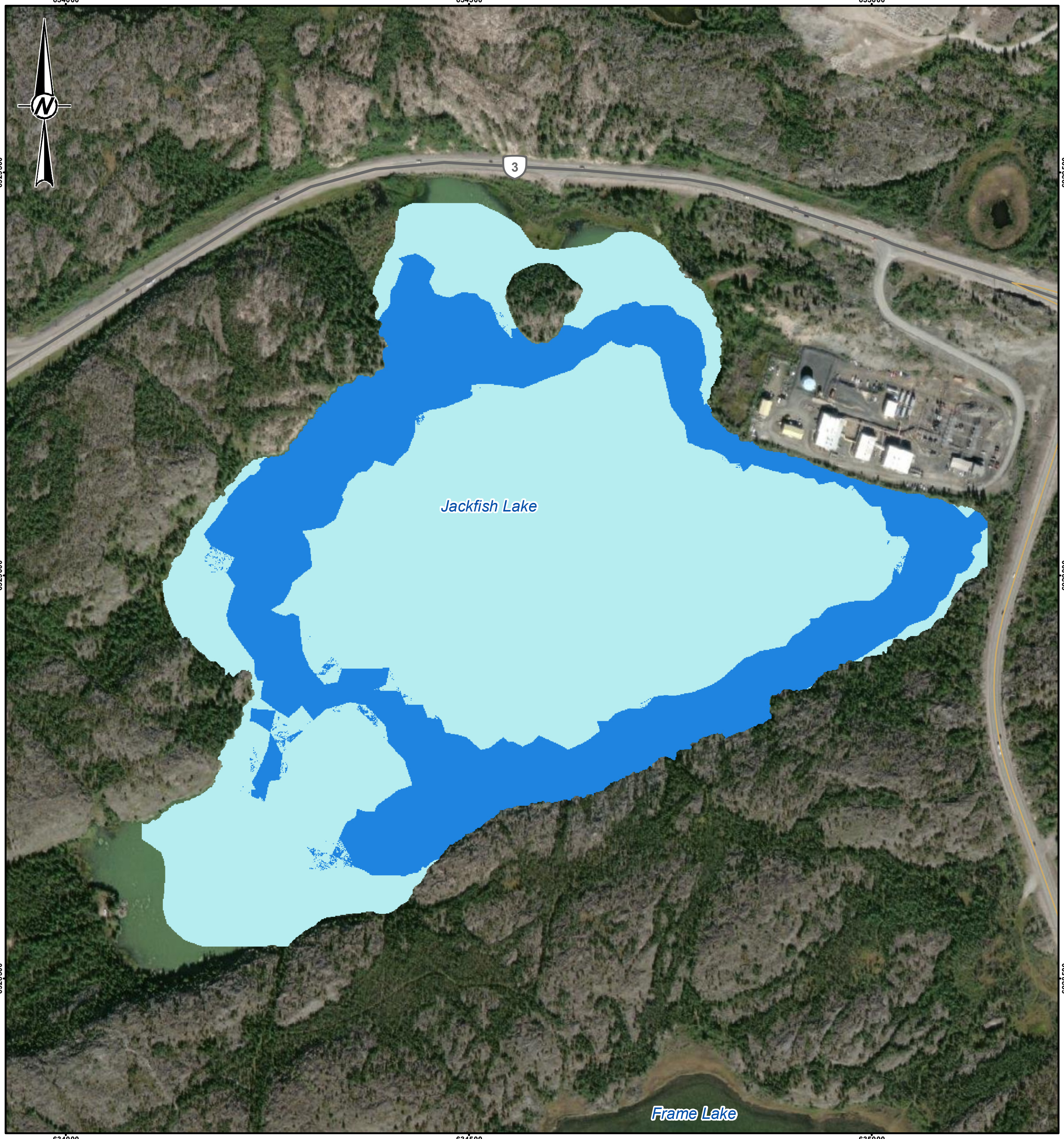

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 50TH PERCENTILE

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0 100 200

1:7,000 METRES

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TITLE

ANNUAL MEDIAN MEASURED OPERATIONAL EFFECT TEMPERATURES IN JACKFISH LAKE AT BOTTOM

CONSULTANT

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PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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PATH: I:\CLIENTS\NTPC\21482915\Mapping\Products\Hydrology\21482915 Fig 3.2-6 Annual MONO DeltaT Bottom 50 Rev0.mxd PRINTED ON: 2023-02-28 AT: 8:36:13 AM

3.2.1.3 Seasonal Water Temperatures in Jackfish Lake resulting from Hypothetical Maximum Operational Discharges

The following hypothetical simulation results reflect identical operational heat loads being applied to Jackfish Lake for each of the five seasonal conditions. In interpreting these results it should be noted that all differences observed are related to environmental differences including different wind directions and speeds, different thermal structures, and atmospheric forcings associated with each simulation window.

The hypothetical discharge scenario observed between December 23, 2021, 12:30 and December 25, 2021, 19:00 was applied across a one-year model simulation on five occasions, commencing with the outset of each 4-day period used to develop results. The 4-day sequence used to represent each hypothetical seasonal discharge event includes the 2.5-day discharge period, followed by 1.5 days to allow the thermal plume to vertically mix and influence bottom temperatures if conditions are favourable. Because hypothetical discharges are applied to a year-long simulation influenced by atmospheric and hydrologic influences, these 4-day sequences also included adequate model run time before each discharge event.

3.2.1.3.1 Late Fall

The late fall condition reflects the 95th percentile temperature differences between the two-and-a-half-day hypothetical discharge scenario and non-operational scenario, calculated over a four-day period commencing at the start of discharge. Figures 3.2-7 and 3.2-8 illustrate the 95th percentile temperature difference between hypothetical operational lake conditions and non-operational lake conditions between 21 and 25 October 2021 at lake surface and lake bottom, respectively.

The fall discharge event coincided with wind conditions that directed currents to the northwest. Given the lake's cooling temperatures at this time, the figures illustrate that the resulting thermal plume generally remained positively buoyant for most of this period. Vertical mixing was also relatively limited until it reached the shallows surrounding the lakes northern island, where sufficient vertical mixing and/or thermal diffusion resulted in a slight elevation (less than 0.5°C) of lake bottom temperatures. Table 3.2-3 presents the sizes of the surface and bottom plumes associated with this discharge event demonstrating that the magnitude of operational effects during fall is negligible even under maximum heat output conditions recorded between 6 October 2021 and 31 July 2022. Overall, these results indicate that the magnitude of temperature increases in the late fall period was relatively small.

Table 3.2-3: Aerial Extent of 95th Percentile and Median Hypothetical Operational Effects on Jackfish Lake during Late Fall (21 and 25 October 2021 Simulation Period)

Temperature Effect	95th Percentile Extents (ha) at Surface	95th Percentile Extents (% of Extracted Area) at Surface	95th Percentile Extents (ha) at Bottom	95th Percentile Extents (% of Extracted Area) at Bottom
0°C to 0.25°C	46.5	91	49.8	97
0.25°C to 0.5°C	1.8	3	1.5	3
0.5°C to 0.75°C	2.2	4	-	-
0.75°C to 1°C	0.4	1	-	-
1°C to 1.25°C	0.2	0	-	-
1.25°C to 1.5°C	0.3	1	-	-
1.5°C to 1.75°C	0.0	0	-	-
1.75°C to 2°C	0.0	0	-	-

Note: Tabulated values may not sum to 100% in all instances due to a function of rounding.
ha = hectares; "-" = not applicable.

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 0.25

0.25 - 0.5

0.5 - 0.75

0.75 - 1

1 - 1.25

1.25 - 1.5

1.5 - 1.75

0 100 200

1:7,000 METRES

REFERENCE(S)

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PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE - LATE FALL

CONSULTANT

wsp

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REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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25mm

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

0 - 0.25

0.25 - 0.5

0.5 - 0.75

0.75 - 1

1 - 1.25

1.25 - 1.5

1.5 - 1.75

0 100 200

1:7,000 METRES

REFERENCE(S)

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PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM - LATE FALL

CONSULTANT

wsp

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PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
21482915		0	3.2-8

3.2.1.3.2 Late Winter

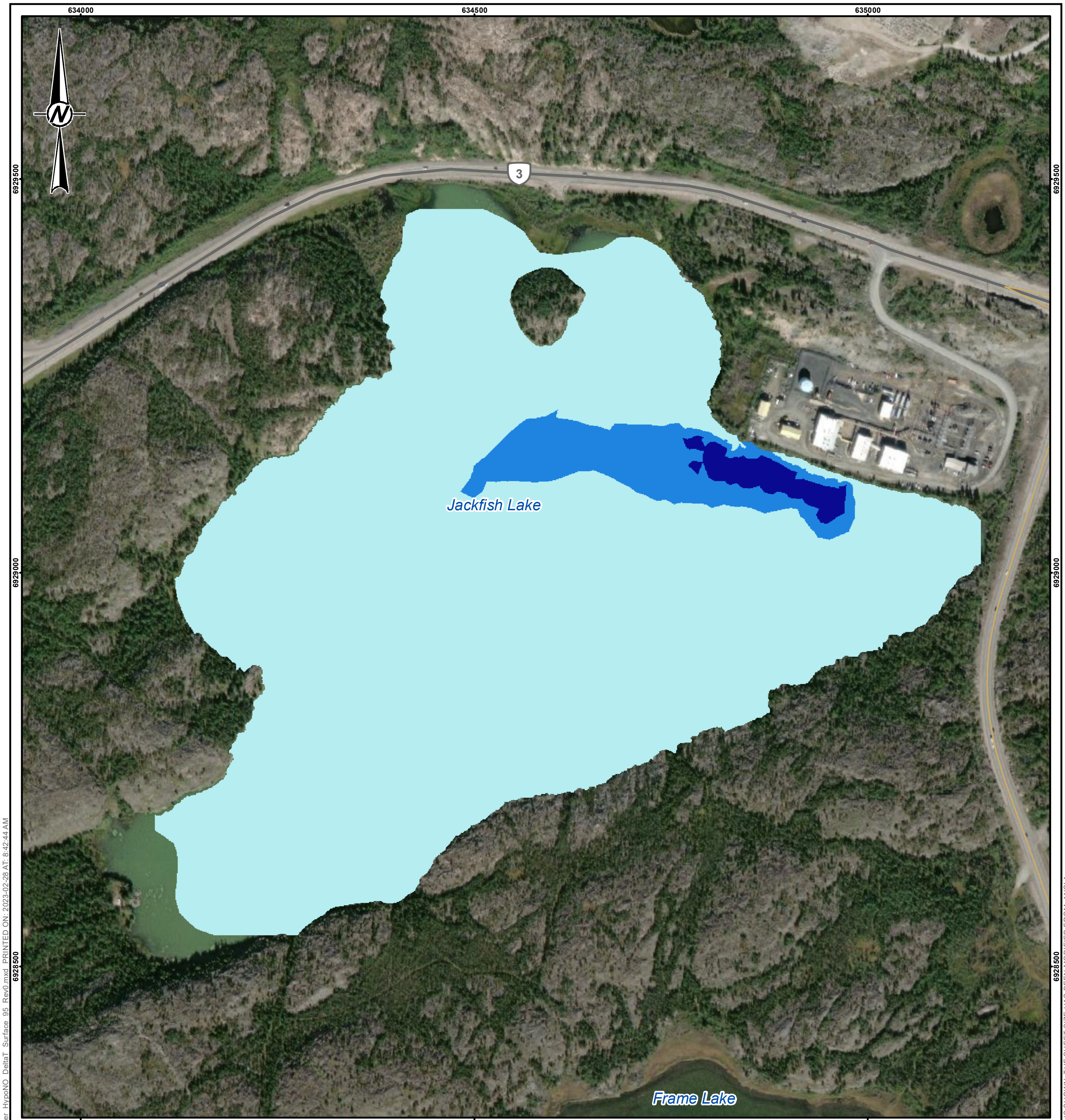
The late winter condition reflects the 95th percentile temperature differences between the two-and-a-half-day hypothetical discharge scenario and non-operational scenario, calculated over a four-day period commencing at the start of discharge a few weeks prior to ice break-up. Figures 3.2-9 and 3.2-10 illustrate the 95th percentile temperature difference between hypothetical operational lake conditions and non-operational lake conditions between 10 and 14 April 2022 at lake surface and lake bottom, respectively. Table 3.2-4 presents the aerial extent of the 95th percentile surface and bottom temperature increases resulting from this discharge event.

As illustrated on Figures 3.2-9 and 3.2-10, the thermal plume remained largely confined to surface, with very little heating of bottom waters in the discharge area, and only negligible bottom contact identified in the area to the northwest of the discharge. A relatively small area of localized temperature increases is illustrated at lake bottom in the deep portions of the lake towards the south (Figure 3.2-10), which may suggest that the plume had cooled sufficiently to begin sinking as it cooled to within 0.1°C to 0.2°C of ambient lake temperatures. Overall, these results indicate that the magnitude of temperature increases in the late winter period was extremely small.

Table 3.2-4: Aerial Extent of 95th Percentile and Median Hypothetical Operational Effects on Jackfish Lake during Late Winter (10 and 14 April 2022 Simulation Period)

Temperature Effect	95th Percentile Extents (ha) at Surface	95th Percentile Extents (% of Extracted Area) at Surface	95th Percentile Extents (ha) at Bottom	95th Percentile Extents (% of Extracted Area) at Bottom
0°C to 0.1°C	47.7	93	51	100
0.1°C to 0.2°C	2.9	6	0.3	0
0.2°C to 0.3°C	0.7	1	-	-
0.3°C to 0.4°C	0.1	0	-	-

Note: Tabulated values may not sum to 100% in all instances due to a function of rounding.
ha = hectares; "-" = not applicable.



LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0 100 200

1:7,000 METRES

REFERENCE(S)

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CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE - LATE WINTER

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	MLE
PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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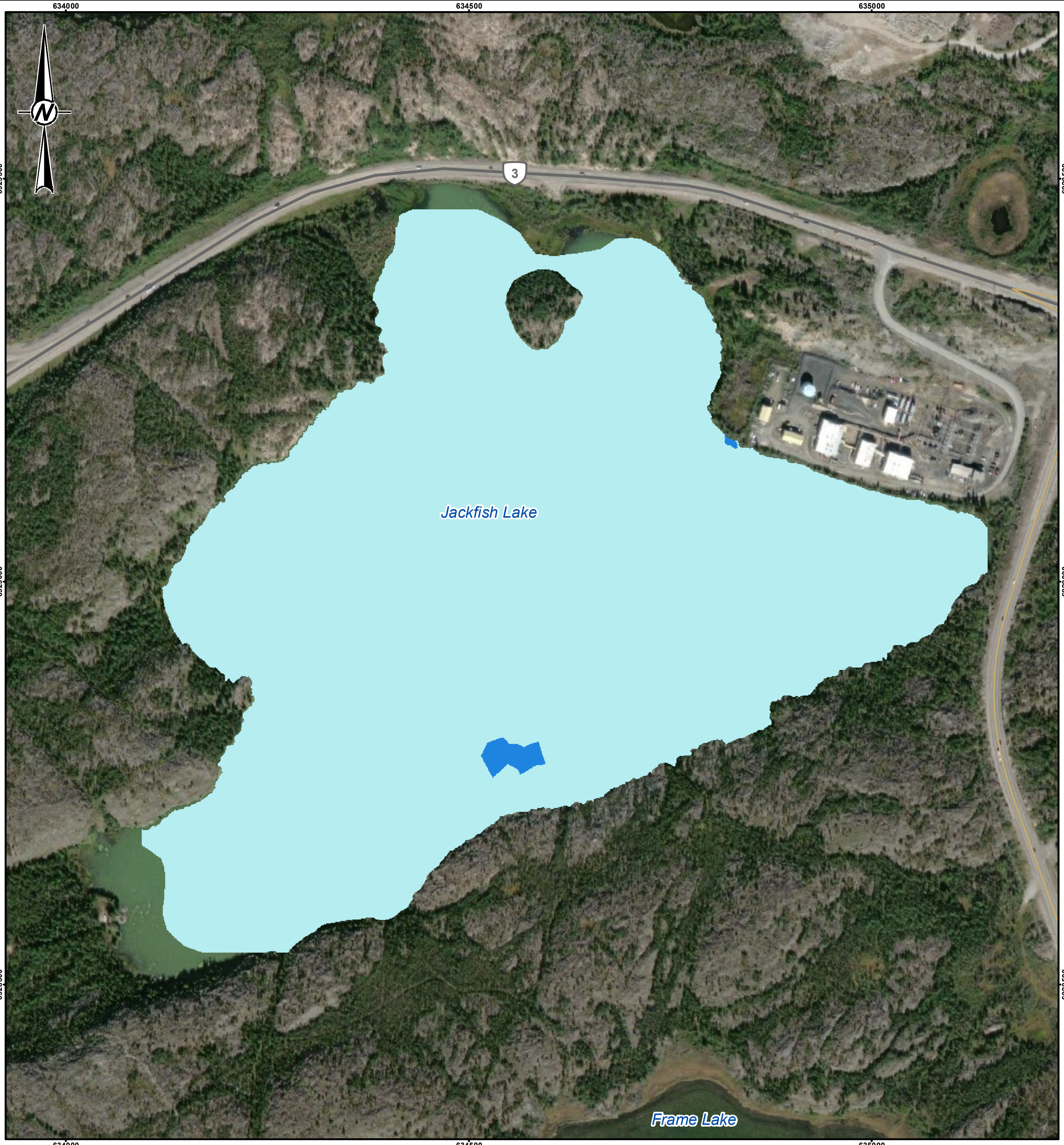

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0 100 200

1:7,000 METRES

REFERENCE(S)

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NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM - LATE WINTER

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	MLE
PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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25mm

3.2.1.3.3 Spring Freshet

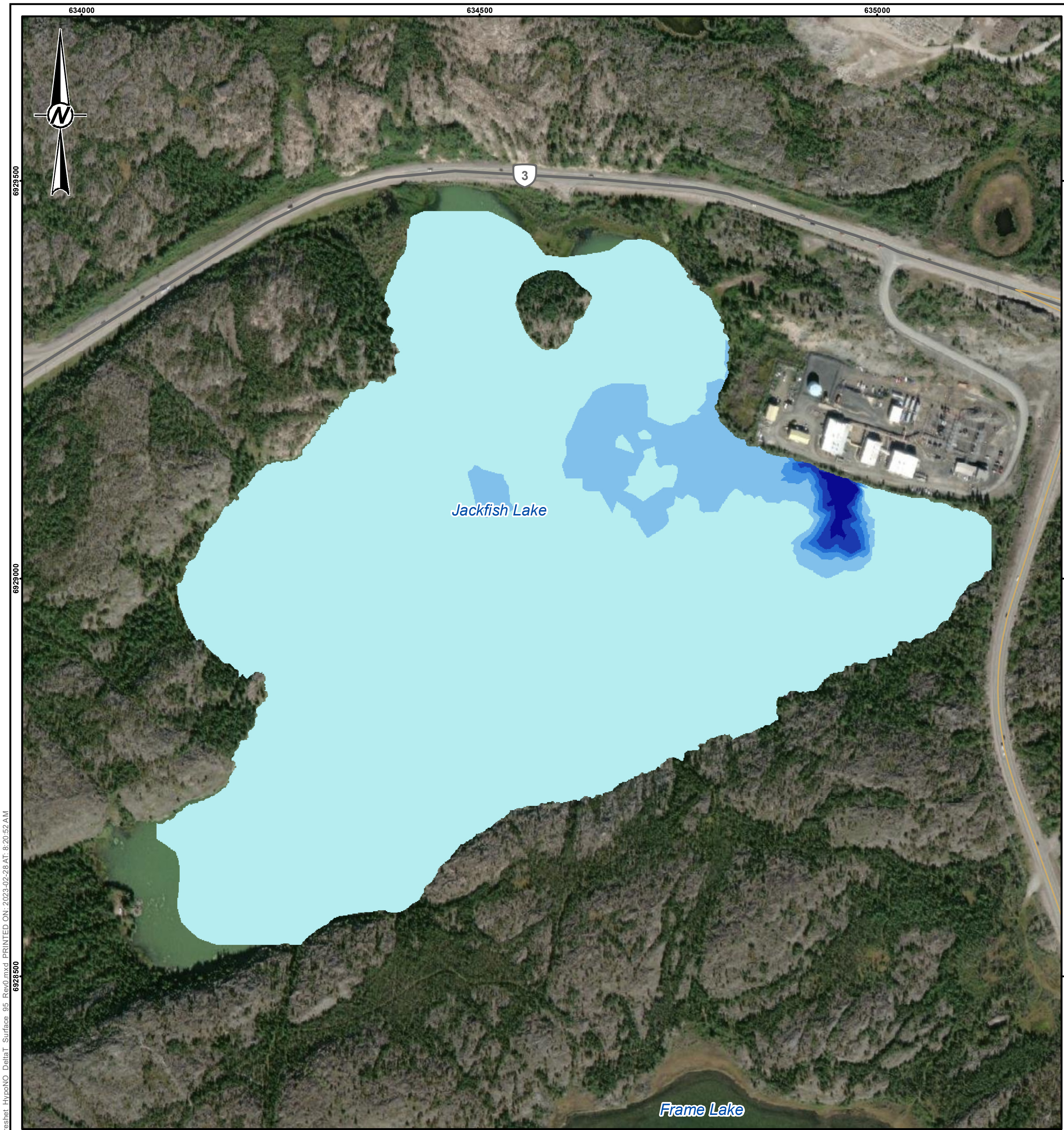
The spring freshet condition reflects the 95th percentile temperature differences between the two-and-a-half-day hypothetical discharge scenario and non-operational scenario, calculated over a four-day period commencing at the start of discharge during spring freshet. Figures 3.2-11 and 3.2-12 illustrate the 95th percentile temperature difference between hypothetical operational lake conditions and non-operational lake conditions between 25 and 29 May 2022 at lake surface and lake bottom, respectively. Table 3.2-5 presents the aerial extent of the 95th percentile surface and bottom increases resulting during this discharge event, noting that some of the temperature increases along the lake's south-eastern shoreline are not necessarily directly related to operational heating.

The surface plume illustrated on Figure 3.2-11 suggests that a current reversal may have occurred during active discharge with minor temperature increases located to the north and west of the discharge array and slightly larger temperature increases to the south. Figure 3.2-12 illustrates minor increases of bottom temperatures along both trajectories; a small, localized area of 0.5°C increase is located to the northwest of the discharge array. Several similar temperature increases are also shown along the lakes south-eastern shoreline that could be the direct result of the thermal plume or simply an artifact of moderately altered thermal structures at this location that would manifest themselves in phasal shifts of diurnal temperature fluctuations and thus not reflect direct heating of the plume. Overall, these results indicate that the magnitude of temperature increases during the spring freshet period was relatively small.

Table 3.2-5: Aerial Extent of 95th Percentile and Median Hypothetical Operational Effects on Jackfish Lake during Spring Freshet (25 and 29 May 2022 Simulation Period)

Temperature Effect	95th Percentile Extents (ha) at Surface	95th Percentile Extents (% of Extracted Area) at Surface	95th Percentile Extents (ha) at Bottom	95th Percentile Extents (% of Extracted Area) at Bottom
0°C to 0.5°C	47.1	92	50.5	98
0.5°C to 1°C	3.4	7	0.8	2
1°C to 1.5°C	0.2	0	0	0
1.5°C to 2°C	0.2	0	-	-
2°C to 2.5°C	0.2	0	-	-
2.5°C to 3°C	0.2	0	-	-
3°C to 3.5°C	0.0	0	-	-

Note: Tabulated values may not sum to 100% in all instances due to a function of rounding.
ha = hectares; "-" = not applicable.



LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 0.5

0.5 - 1

1 - 1.5

1.5 - 2

2 - 2.5

2.5 - 3

0 100 200

1:7,000 METRES

REFERENCE(S)

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CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE - SPRING FRESHET

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	MLE
PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
21482915		0	3.2-11

LEGEND

- HIGHWAY
- LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3

0 100 200

1:7,000 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM - SPRING FRESHET

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
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PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
21482915		0	3.2-12

3.2.1.3.4 Early Summer

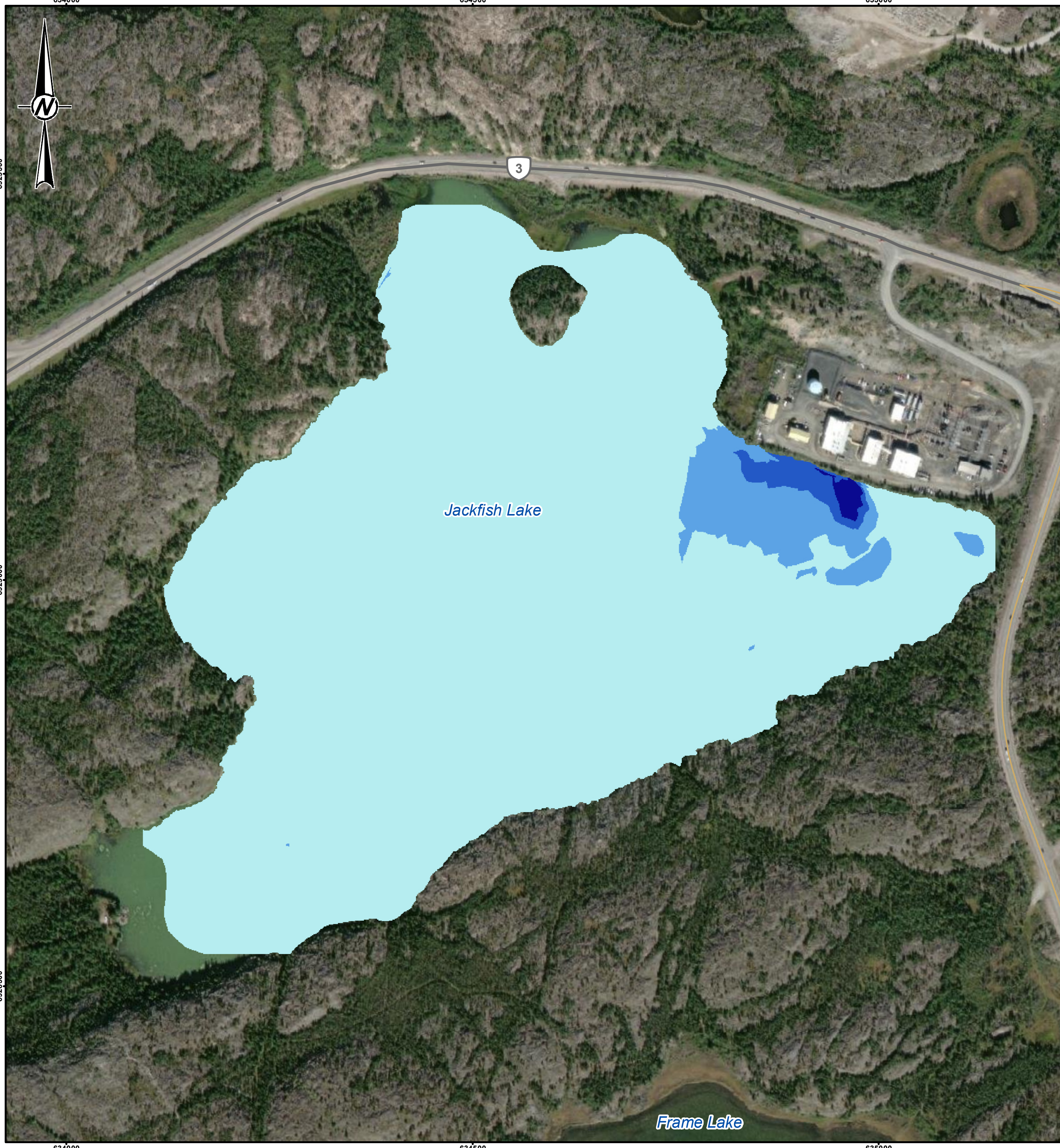
The early summer condition reflects the 95th percentile temperature differences between the two-and-a-half-day hypothetical discharge scenario and non-operational scenario, calculated over a four-day period commencing at the start of discharge during the early summer. Figures 3.2-13 and 3.2-14 illustrate the 95th percentile temperature difference between hypothetical operational lake conditions and non-operational lake conditions between 1 and 5 July 2022 at lake surface and lake bottom, respectively. Table 3.2-6 presents the aerial extent of the 95th percentile surface and bottom increases resulting during this discharge event.

Figure 3.2-13 depicts the surface plume resulting from the hypothetical discharge event at a time when current conditions were reasonably calm, and only slightly directed to the east. Small, localized, temperature differences are depicted to the southwest and north of the lake and are the product of small alterations in thermal structure that result in minor phasal shifts in temperature fluctuation and thus not illustrative of thermal impacts. Figure 3.2-14 indicates that some changes to bottom temperatures in the vicinity of the discharges resulted from the hypothetical discharge event. However, it is considered unlikely that operational effects contributed directly to temperature differences observed towards the southern extent of Jackfish Lake; a phasal shift resulting from slightly modified thermal structure is likely the cause. Overall, these results indicate that the aerial extent of temperature increases greater than 1°C were relatively small during the early summer period.

Table 3.2-6: Aerial Extent of 95th Percentile and Median Hypothetical Operational Effects on Jackfish Lake during Early Summer (1 and 5 July 2022 Simulation Period)

Temperature Effect	95th Percentile Extents (ha) at Surface	95th Percentile Extents (% of Extracted Area) at Surface	95th Percentile Extents (ha) at Bottom	95th Percentile Extents (% of Extracted Area) at Bottom
0°C to 1°C	48.3	94	50.2	98
1°C to 2°C	2.3	5	1.0	2
2°C to 3°C	0.5	1	0.1	0
3°C to 4°C	0.1	0	0	0
4°C to 5°C	0.0	0	-	-

Note: Tabulated values may not sum to 100% in all instances due to a function of rounding.
ha = hectares; "-" = not applicable.



LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4

0 100 200

1:7,000 METRES

REFERENCE(S)

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CLIENT

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PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE - EARLY SUMMER

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
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PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

0 - 1

1 - 2

2 - 3

3 - 4

0 100 200

1:7,000 METRES

REFERENCE(S)

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CONSULTANT

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0

3.2.1.3.5 Late Summer

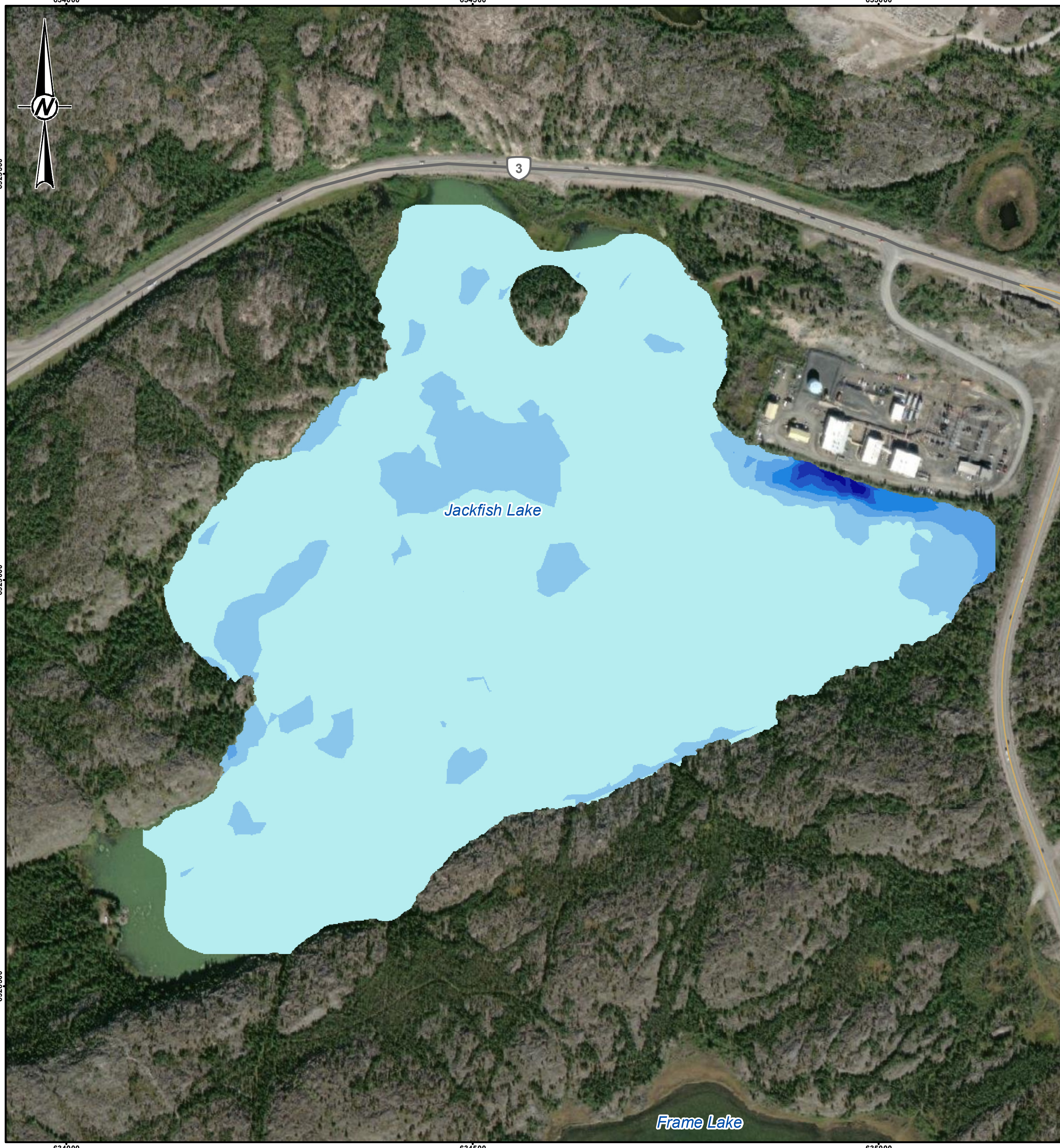
The late summer condition reflects the 95th percentile temperature differences between the two-and-a-half-day hypothetical discharge scenario and non-operational scenario, calculated over a four-day period commencing at the start of discharge during the late summer. Figures 3.2-15 and 3.2-16 illustrate the 95th percentile temperature difference between hypothetical operational lake conditions and non-operational lake conditions between 1 and 5 August 2022 at lake surface and lake bottom, respectively. Table 3.2-7 presents the aerial extent of the 95th percentile surface and bottom increases resulting during this discharge event.

Figure 3.2-15 illustrates surface temperature differences between the hypothetical operational and non-operational simulations over the four-day period. While some localized changes in the vicinity of the discharges are indicative of operational heat loads introduced to the lake, most of the temperature differences shown on the lake are illustrative of modified thermal structures in the lake that result in slightly modified timings of peak surface temperatures and manifest themselves as statistically notable temperatures at lake surface. In terms of lake bottom temperature differences, these are mostly unrelated to the direct thermal effects of the thermal plume (Figure 3.2-16) but are likely the result of indirect effects that slightly modify the thermal structure of the lake and cause temporal differences in temperature responses to diurnal atmospheric effects. Overall, these results indicate that the aerial extent of temperature increases greater than 1°C were relatively small during the late summer period.

Table 3.2-7: Aerial Extent of 95th Percentile and Median Hypothetical Operational Effects on Jackfish Lake during Late Summer (1 and 5 August 2022 Simulation Period)

Temperature Effect	95th Percentile Extents (ha) at Surface	95th Percentile Extents (% of Extracted Area) at Surface	95th Percentile Extents (ha) at Bottom	95th Percentile Extents (% of Extracted Area) at Bottom
0°C to 1°C	44.0	86	50.5	98
1°C to 2°C	6.2	12	0.8	1
2°C to 3°C	0.6	1	0	0
3°C to 4°C	0.3	1	-	-
4°C to 5°C	0.1	0	-	-
5°C to 6°C	0.1	0	-	-
6°C to 7°C	0.0	0	-	-
7°C to 8°C	0.0	0	-	-

Note: Tabulated values may not sum to 100% in all instances due to a function of rounding.
ha = hectares; “-“ = not applicable.



LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 1

1 - 2

2 - 3

3 - 4

4 - 5

5 - 6

6 - 7

0 100 200

1:7,000 METRES

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NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE - LATE SUMMER

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
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PROJECT NO.	CONTROL	REV.	FIGURE
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25mm

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

0 - 1

1 - 2

2 - 3

3 - 4

4 - 5

5 - 6

6 - 7

0 100 200

1:7,000 METRES

REFERENCE(S)

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JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

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SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM - LATE SUMMER

CONSULTANT

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YYYY-MM-DD	2023-02-28
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PREPARED	AB
REVIEWED	KH
APPROVED	CS

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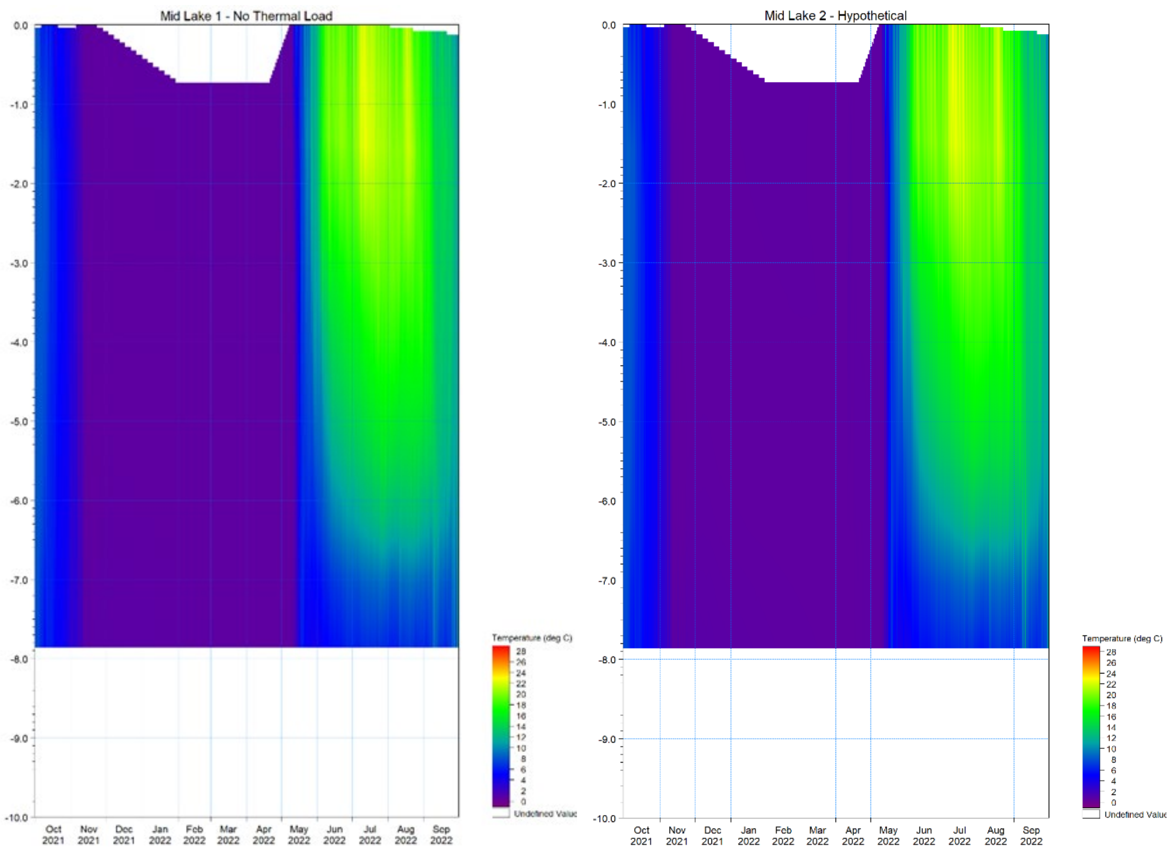
3.2.1.4 Thermal Structure of Jackfish Lake

Figure 3.2-17 provides an overview of the thermal structure of Jackfish Lake over time at the Mid-Lake monitoring location for non-operational (baseline) and hypothetical discharge conditions. Despite minor temporal differences at this location observed in the form of time series data, the illustrated isopleths demonstrate that no substantial changes to the thermal structure of Jackfish Lake have occurred as a result of the hypothetical discharges.

Figure 3.2-17: Thermal Structure of Jackfish Lake (Mid-Lake Location) under Hypothetical and Non-Operational Conditions (6 October 2021 through 27 September 2022)



3.2.1 Influence of Cooling Water Discharge on Water Quality

The timing of field programs did not align when both stratification occurred (i.e., summer programs) and cooling water discharges from the Facility or immediately after (i.e., one or two days following) cooling water discharges. Therefore, a qualitative assessment of the potential effect of cooling water discharge on lake stratification was completed using temperature modelling results from the 2022 summer period (1 June 2022 to 1 August 2022).

Modelled timeseries data of surface, mid-depth and bottom temperature differences (i.e., differences between the measured operational and non-operational scenarios) at locations throughout Jackfish Lake showed small to negligible difference in temperatures due to the waste heat loadings during the summer. At the three depths (surface, mid-depth, and bottom) and ten locations in the lake (locations identified in Table 2.2-1 and Figure 2.2-1), modelled temperature differences due to the waste heat load discharge were typically within 1°C (Appendix E, E 6-1 to E.6-10). Modelled temperature differences greater than 1.1°C were observed at K Discharge – In Lake at the bottom and surface (Figure E.6-1), EMD Discharge – In Lake at the surface only (Figure E.6-2), and Near the Outflow – In Lake at the surface only (Figure E.6-10). The largest modelled temperature increase was observed at the surface of EMD Discharge – In Lake (Figure E.6-2), where the modelled surface temperature increased by up to 2.7˚C after a waste heat load discharge event on 29 July 2022; the increase in temperature at the surface was limited to within 24 hours of the end of this waste heat load discharge event. The second largest modelled temperature increases were observed at the bottom of K Discharge – In Lake, where temperature increases of up to 2.5˚C were observed after a waste heat load discharge event that occurred on 12 July 2022 (Figure E.6-1); the increase in temperature at the bottom was limited to within 24 hours of the end of the waste heat load discharge event. During this same waste heat load discharge event, the surface temperatures at K Discharge – In Lake also increased by up to 1.6°C; this increase in temperature also continued for less than 24 hours. Overall, the modelled differences in temperature at the different depths during the summer did not indicate a potential for influencing thermal stratification on a lake-wide or extended temporal (e.g., more than 24 hrs from the end of the waste heat discharge) basis. The pattern in the modelled temperatures are consistent with the observation of similar patterns in thermal stratification, based on measured temperature profiles, between locations closest to the discharge (i.e., EMD Discharge – In Lake, K Discharge – In Lake and CAT Discharge – In Lake) and locations farther from the discharge (e.g., Mid Lake 1, 2 and 3, Near Outflow – In Lake and Southwest Bay) during the summer field programs (Appendix E, Figure E.4-1; July and August).

A qualitative review of the isopleth temperature plots, which showed temperatures with depth over the summer modelling period, indicated negligible differences (i.e., negligible visual differences in plots) in stratification during the summer in 2022 and during the two hypothetical waste heat load scenarios during the summer (Appendix E, Figures E.6-11 to E.6-20). The modelled temperatures in the isopleth plots at different depths are similar between the operational and non-operational (i.e., no thermal load) scenarios for locations closest to the discharges (i.e., EMD Discharge – In Lake, K Discharge – In Lake and CAT Discharge – In Lake) during the summer 2022 period (Appendix E, Figures E.6-11 to E.6-13). Temperature differences between the non-operational and hypothetical scenarios (i.e., maximum observed waste heat load during the thermal plume study was modelled during early and late summer conditions) at all monitored locations in the lake (Table 2.2-1 and Figure 2.2-1) were negligible when the isopleths were visually reviewed (Appendix E, Figures E.6-11 to E.6-20). This is consistent with the modelled time series of temperatures differences which indicated that the influence of waste heat discharges on temperatures in Jackfish Lake was negligible (typically within 1°C) and limited in time (i.e., negligible influence after 24 hrs from the end of the waste heat load discharge event).

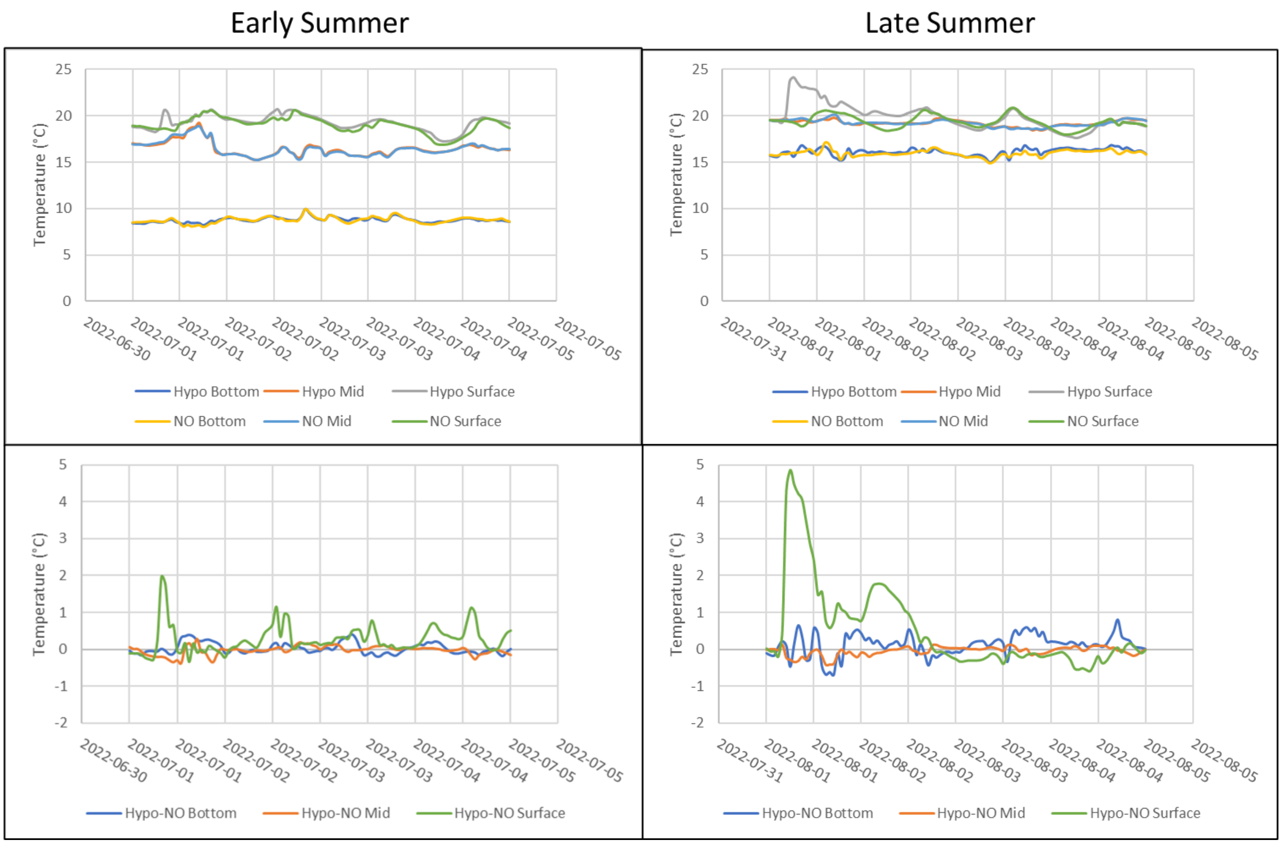
3.2.2 Influence of Operational Discharge on Fish and Fish Habitat

Model predictions for the two operational scenarios demonstrated similar trends (Figure 3.2-18). In the absence of thermal input from the Facility, temperature stratification in the lake was apparent and surface water temperatures were stable under non-operational conditions at 19.0°C and 19.3°C during the early summer and late summer, respectively. The non-operational model scenario also predicted gradual heating of the bottom strata from an average of 8.8°C in early summer to 16.0°C in late summer, as the lake naturally heated, and stratification depth increased. Under non-operational conditions, these results suggest that average temperatures at the surface were approaching the maximum thermal optimum for Lake Whitefish in both periods, and that temperatures at the surface were occasionally above the maximum thermal range for periods of time, although suitable temperatures were available deeper in the lake during both periods.

Under the hypothetical operational discharge scenario, temperatures were similar to the non-operational model scenario at the bottom and mid-depth in the water column; however, the surface water temperatures were generally elevated above the non-operational model scenario temperatures. This represents the attenuation of the discharge water at the surface as it dissipates through the plume. Temperatures at the surface were on average 0.27°C and 0.53°C higher than non-operational conditions in the early and late summer; however, the distribution of temperatures was largely skewed towards the modelled period of discharge for the hypothetical operational discharge scenario (i.e., the first two-and-a-half days), with temperatures reaching maximum values of 1.96°C and 4.86°C above non-operational conditions (Figure 3.2-18), 100 m away from the discharge point. During both periods, temperatures return to stable conditions quickly and remain within approximately 1°C of the non-operational model scenario for the remainder of the model period. These results indicate that under the maximum discharge conditions of the hypothetical operational discharge scenario, the operation of the Facility is capable of boosting water temperatures at the surface well above the thermal optimum for Lake Whitefish growth, particularly in late summer (maximum = 24.1°C), the effect is limited to the surface and to periods when the Facility is operating; the plume dissipates quickly thereafter.

The thermal model results demonstrated that the thermal discharges from the Facility did not result in prolonged thermal stratification in the lake and did not result in prolonged anoxia at the lake bottom. Internal loads of phosphorus from the sediment to the water column may still be occurring in Jackfish Lake as a result of historical phosphorus loads. However, the thermal model results do not suggest that the Facility is affecting thermal stratification or furthering prolonged anoxia that could enhance phytoplankton growth and thereby increase the likelihood of spring or summer algal blooms.

Figure 3.2-18: Model Predictions for Thermal Plume Temperatures, 100 metres from the Discharge Point During Early and Late Summer Periods



Notes: Top panels show predicted temperatures by date and scenario. The bottom panels show the relative difference in predicted temperature between the NO and Hypo model scenarios.

NO = non-operational conditions scenario; Hypo = predicted hypothetical operational discharge scenario; Hypo-NO = difference in model predictions at each time step.

4.0 CONCLUSIONS AND RECOMENDATIONS

The results of the thermal plume study indicate that the Facility had a negligible impact on temperature in Jackfish Lake. The small changes that were observed were likely the result of the highly intermittent nature and low heat loads discharged to the lake during the thermal plume study.

The assessment of the hypothetical operational discharge scenario (i.e., peak measured worst-case scenario) carried out for late fall, late winter, spring freshet, early summer, and late summer demonstrated that the thermal extent of the temperature increases were generally negligible or relatively small. For the late fall, late winter, and spring freshet period these increases were more than 1°C for less than 1% of the lake surface. In the early and late summer, the effect on lake surface temperatures was generally within 1°C, with small portions of the lake surface (1%) increasing by more than 2°C, while the effect on lake bottom temperatures was generally within 1°C of non-operational (baseline) lake temperatures, with only a small portion of the lake bottom (2% or less) increasing by more than 1°C. Although the thermal structure of the lake experienced minor modifications outside the turbulent mixing zone of the discharges, they are not visually detectable at the mid-lake location meaning discharges of the nature observed in September 2021 through July 2022 are not altering the thermal structure or behaviour of the lake.

The results indicate that there are negligible effects of operations on water quality, and as such, the potential operational effects on the fish community, including Lake Whitefish, would also be negligible. Potential effects were localised and intermittent in nature. The maximum expected temperatures within 100 m of the discharge point were evaluated and although temperatures above the thermal optima for Lake Whitefish growth are present at the surface, thermal refuge remains at deeper depths and throughout the rest of the lake, and elevated temperatures at the surface dissipate to non-operational conditions soon after discharge of warm waters cease. However, the thermal plume model does indicate that there is a potential for longer term and larger waste heat loads to have a larger influence on temperature if operational discharge of warm water continues for longer periods than observed during the thermal plume study.

Based on the results of the thermal plume delineation study, it is recommended that the Aquatic Effects Monitoring Program (AEMP) Design Plan include continuous temperature monitoring throughout the open-water period, with emphasis on the summer period when maximum temperatures were observed. An adaptive management approach should be considered, based on temperature values, for the initiation and further monitoring of water quality and biological components, if required.

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Thermal Modelling Report

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APPENDICES

ATTACHMENT A

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1.0 INTRODUCTION

This model calibration/validation report has been prepared for Northwest Territories Power Corporation (NTPC) by WSP Canada Inc. (WSP) and provides the technical support for the model calibration and validation of the Thermal Plume Delineation Study (Thermal Plume Study) for Jackfish Lake.

1.1 Background

The Jackfish diesel generating facility, which is located on the northeast shore of Jackfish Lake in Yellowknife, Northwest Territories (NT), contributes power to the North Slave electrical system, when required, and is comprised of three separate plants: the CAT plant, EMD plant, and K plant. Each plant has an engine cooling system that uses water from Jackfish Lake. These cooling systems and their use of water from Jackfish Lake are regulated under Water Licence MV2019L1-0001 (the Water Licence) issued by the Mackenzie Valley Land and Water Board (MVLWB) on 18 October 2019 (MVLWB 2019).

The K and EMD plant each have one intake through which cooling water is drawn from the lake and one discharge each, through which cooling water and excess heat load are discharged back into the lake for thermodynamic assimilation. CAT plant comprises two intakes and one discharge through which excess heat loads are delivered to Jackfish Lake. Flow and temperature measurements for each plant were recorded from October 2021 through September 2022 and used in model calibration and validation.

1.1.1 Technical Background

Several lake processes are relevant to the fate and behaviour of thermal discharges in Jackfish Lake. The most relevant of these processes include:

- **Circulation and hydrodynamics:** Lake circulation and wind-driven currents can dictate the rate at which temperature plumes are advected and dispersed and, ultimately, influence thermocline development and the timing of turnover events.
- **Ice formation:** ice cover can substantially reduce advection and mixing within reservoir waters for a large period of the year, allowing mild inverse thermoclines to develop during winter stratification periods. Ice formation also limits heat exchange between the lake and atmosphere ultimately affecting the water temperature under ice.
- **Temperature stratification:** the establishment of thermoclines occurs in response to seasonal variations in temperature. The more pronounced a temperature gradient becomes, the greater the potential for it to impede vertical mixing by wind-driven sheer. It has been assumed that chemical inputs are insignificant, and therefore, stratification driven by chemistry gradients is not considered to be a relevant lake process that could affect the fate of thermal plumes.
- **Water and heat balance:** the balance of inputs, including direct precipitation, and potentially, watercourse inflows, as well as losses through surface evaporation and outflows, drive the lake water balance and determine lake-wide residence time. Atmospheric and, given Jackfish Lake's location within the discontinuous permafrost zone, substrate heating/cooling effects ultimately drive the heat balance within a body of water and dictate the rate at which cooling, or heating of a waterbody occurs. Heat exchange between the lake and atmosphere as well as between the lake and underlying substrate directs both the long-term (e.g., seasonal) and short-term (e.g., diurnal) thermal characteristics of the lake.

1.2 Purpose

The purpose of this report is to document the technical inputs and approach, relevant assumptions and limitations, model construction, calibration, and validation as well as results of the Jackfish Thermal Plume Study.

1.3 Objectives

The principal objectives of the Jackfish Lake thermal modelling report are to provide tabular and graphical information to document lake temperatures during the 2021 through 2022 period of interest and establish an understanding of operational effects on lake temperatures during this time frame. Specific objectives include:

- Documentation of data review, inputs, adjustments, and assumptions
- Documentation of model calibration and validation and commentary on model performance
- Visualisation and quantification of annual spatial extents of thermal plumes resulting from operational influences at the lake surface and lakebed by comparing the lake's thermal regime in the presence and absence of operational influences to derive environmental delta-T plots and calculations that characterize temperature increases resulting from measured operations
- Establishment of seasonal characterisations of thermal plumes resulting from operational influences by simulating the lake's thermal regime in the presence and absence of operational influences[1] during:
  - late fall (October 2021 or September 2022),
  - late winter immediately before ice break up (March/April 2022),
  - spring freshet (May/June 2022),
  - early summer (July 2022) and
  - late summer (August 2022).

Additional outputs from these model simulations are provided separately for the purposes of the fish and fish habitat and water quality study components and contour plots are provided in Attachment A.

2.0 MODEL INPUTS AND MODEL SETUP

The following subsections detail the sources, evaluation and preparation of model inputs developed for the purposes of driving model simulations. It should be noted that all aspects of model development, the preparation of model inputs, model calibration and validation, and analysis of modelling results were completed in conformance with our internal Global Numerical Modelling Quality Assurance and Quality Control Process provided in Appendix B.

2.1 Selected Model Software

MIKE 3 FM, a three-dimensional (3-D) modelling application developed by the Danish Hydraulic Institute, was used to simulate the effects of thermal discharges to Jackfish Lake relative to baseline (non-operational conditions). MIKE3 FM is fundamentally a hydrodynamic modelling platform that combines a number of

[1] *It is noted that because operational influences are only intermittent, synthesised hypothetical operational simulations of thermal effects are used to define operational effects for each of these times.*

computational components in either two-dimensional (2-D) or 3-D environments including, but not limited to, hydrodynamics, thermodynamics, advective transport, water quality, sediment and mud transport, and spectral wave attenuation (e.g., Ma et al. 2009; Dewey 2011). Only two of these components are necessary for the purposes of simulating the hydrodynamics and thermodynamics of Jackfish Lake, but the flexibility of this platform can easily be extended to other components for other future investigations, if ever required.

MIKE3 FM is recognized as one of the leading, if not the premiere, computational platforms for replicating and investigating lake hydrodynamic and thermodynamic behaviour and is capable of providing highly accurate information to address current, as well as potential future, questions regarding operational effects on the lake. It combines all the relevant physical process underlying thermal plume fate within one platform, avoiding the need to produce overly conservative outcomes associated with more simplistic computational approaches.

2.2 Model Inputs

Bathymetric, water level, hydrological and inflow temperature data used to develop inputs to the model were collected by WSP's technical field specialists over the period between October 2021 and September 2022. Descriptions of the sampling methods, data management, reporting, and modelling required for the Thermal Plume Study are provided in the Thermal Plume Delineation Study Design Plan (Golder 2021).

Additional input data used to characterize operational inputs, including discharge flows and temperature increases between each intake and discharge were collected and provided to WSP by NTPC following third-party installation of in-plant instrumentation.

2.2.1 Bathymetric and Topographical Inputs

Bathymetric data was collected by WSP on 29 September 2021. The average water elevation was 174.55 meters above sea level (masl) on the day the survey was conducted, and measured depths ranged from 8.36 m to 0.06 m. The land water boundary was defined based on digital imagery from the date the survey was conducted. A review of both inputs, as well as topographic contours along the perimeter of Jackfish Lake and historical digital imagery of Jackfish Lake, suggest little material variability in the wetted area as a result of seasonal changes in water levels. Figure 1 shows the topographic contour at 180 masl, the estimated land water boundary and locates of the bathymetric survey, demonstrating that the perimeter of the Lake is bound by topographic highs, except for localized areas on the northwest and southwest bay shorelines.

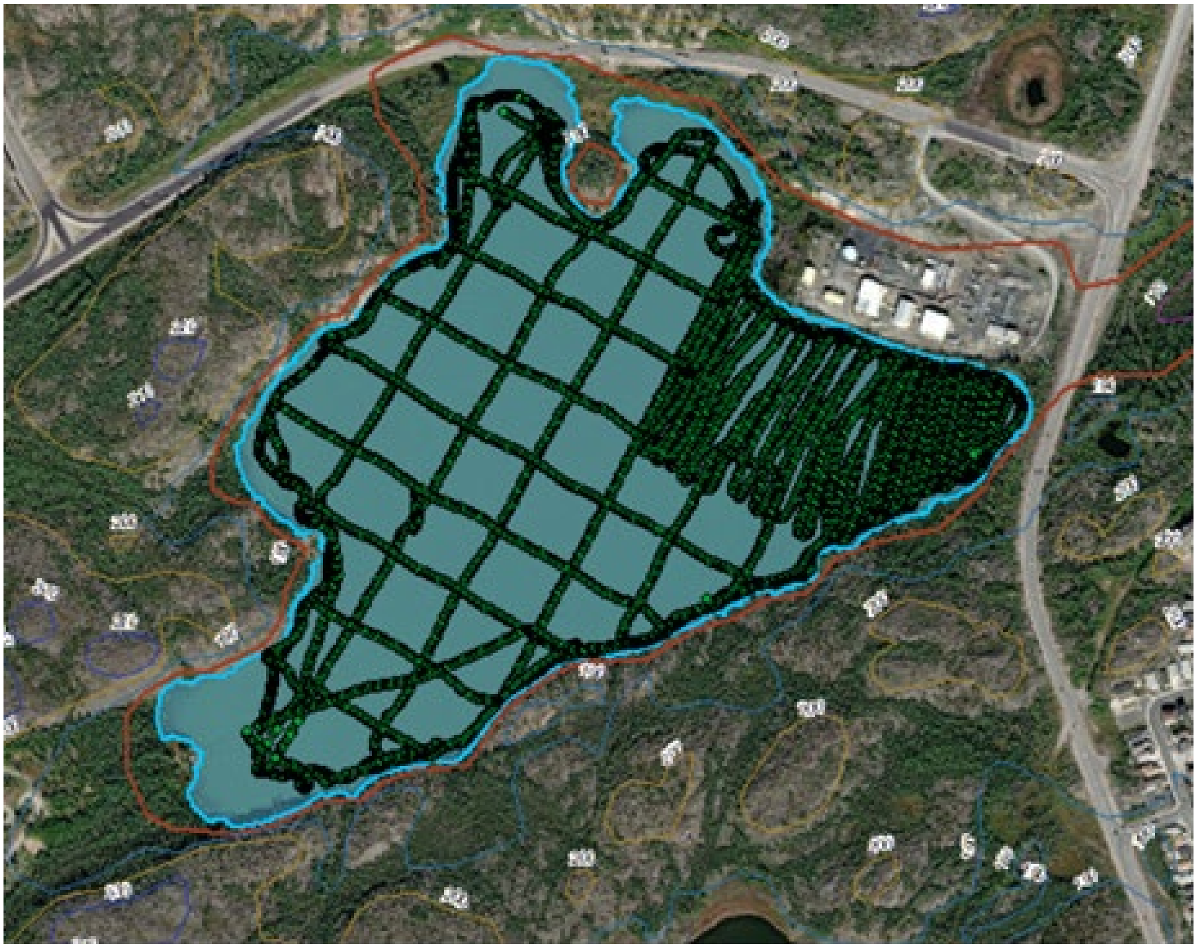


Figure 1: Bathymetric, Topographic, and Land-water Boundary Data Obtained for the Purposes of Mesh Generation

2.2.2 Meteorological Inputs

Meteorological inputs are the key drivers of lake circulation and thermal dynamics. The meteorological input data required for the Jackfish Lake model were hourly air temperature, wind speed and direction, air pressure, relative humidity, short and long-wave radiation, clearness coefficient (i.e., cloud cover), and precipitation. Most variable inputs were obtained from measurements recorded at Yellowknife A climate station (Station 2204101; ECCC 2022). It is noted that precipitation data for the modelling period yielded a total of 170 mm, compared to 288 mm for an average year.

Meanwhile, evaporation was calculated internally by the model during each computational timestep based on the difference between air and water temperature, as well as a combination of inputted meteorological variables and short and long wave radiation. These were calculated in the model using information on latitude, longitude, and inherent empirical functions, including formulations for short and long wave radiation provided within the modelling environment.

2.2.3 Ice Cover

Measurements of ice thickness during the 2021 through 2022 ice cover period were collected by WSP's technical field specialists on two occasions (7 December 2021 and 24 March 2022), recording a maximum ice thickness of 0.8 m at the centre of the lake towards the end of March, to provide an indication of ice thickness to be applied to the model. Ice thickness measurements collected during the winter period are presented in Table 1. Periods of ice cover were separately obtained from SentinelHub (2022) and NDWI (2022).

Table 1: Ice Thickness Measurements Collected during Ice Cover Period

Date	Location/Comment	Thickness
7 Dec 2021	Ice was only recorded for safety verification	>0.30 m near shore, approximately 0.40 m at SW Bay station
22 Mar 2022	SW Bay	0.70 m
24 Mar 2022	NW Bay N	0.65 m
24 Mar 2022	Mid Lake 1	0.80 m
24 Mar 2022	Mid Lake 2	0.75 m
24 Mar 2022	Mid Lake 3	0.80 m
25 Mar 2022	“Near Outflow” station	0.44 m

SW = southwest; NW = northwest; N = north.

2.2.4 Lake Substrate Temperature Inputs

Jackfish Lake is situated in the discontinuous permafrost zone (Heginbottom et al. 1995) and is therefore influenced by an underlying thermal regime not typical of lakes further to the south. Limited data exists to characterize permafrost temperatures in the Yellowknife area (Karunaratne 2008) and understanding of permafrost conditions in Yellowknife generally dates back to a period before the effects of warming climates were documented (Brown 1973, Wolfe 1998).

Karunaratne (2008) measured ground, and subsurface temperatures at depths of 50 cm and 100 cm below surface at four sites in the vicinity of Yellowknife between 2004 and 2006. All four sites were located in peatlands; conditions within this substrate type were described as commonly saturated.

Given substrates within Jackfish Lake are inundated and influenced be seasonal heating throughout much of the year, the influence of frozen ground temperatures on lake thermal regimes are smaller than land--based measurements would suggest. Nevertheless, lower strata temperatures do exercise an influence on lake temperatures throughout the year, particularly in waters within proximity to the lakebed.

In his study, Karunaratne (2008) illustrates the difference between mean daily air and ground surface temperatures measured across a two-year study at one site, that was used to synthesize lake substrate temperatures for the Jackfish Lake model.

2.2.5 Hydrological Inflows and Outflow

2.2.5.1 Lake Inflows

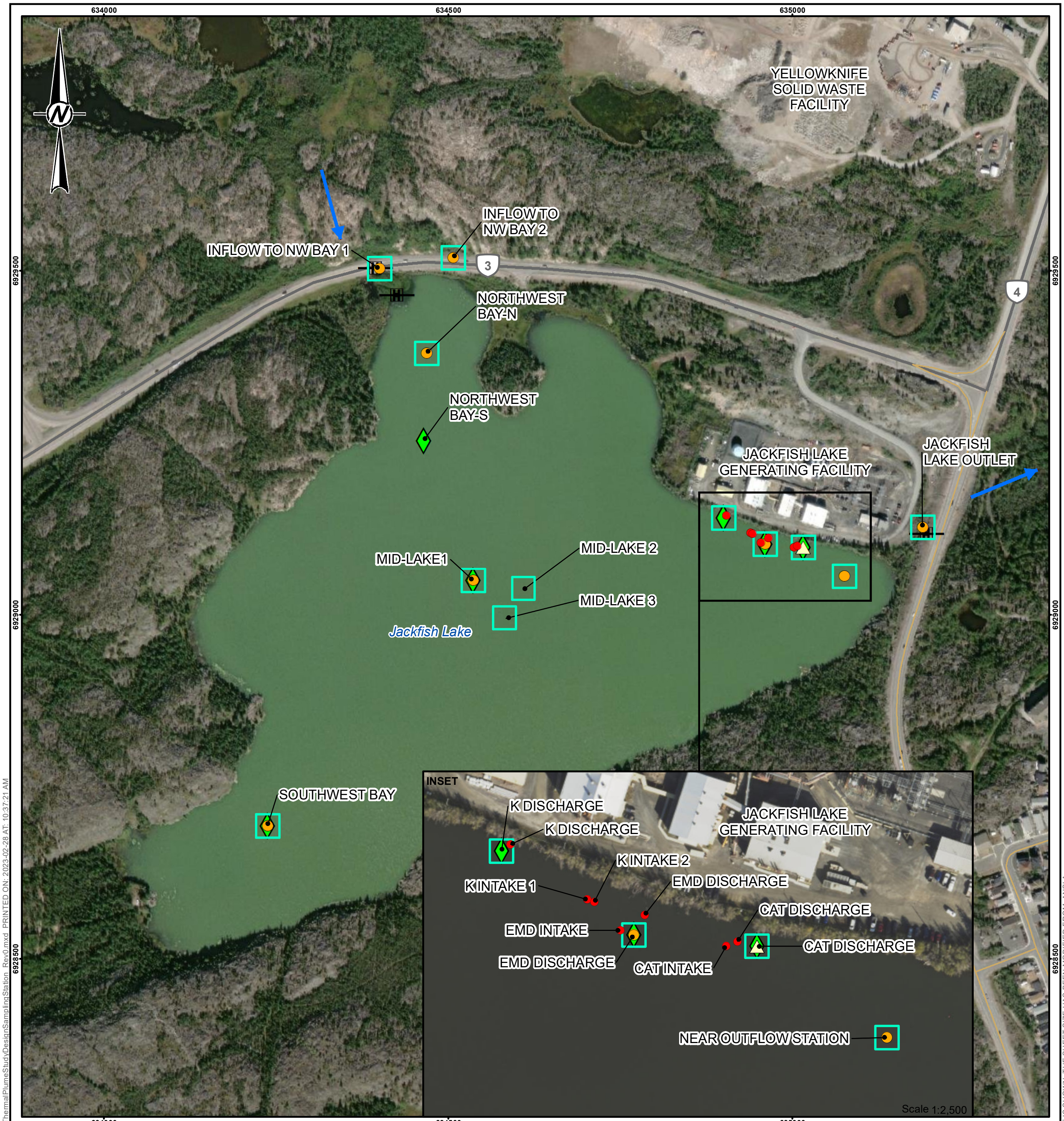
According to field observations, hydrological inflows to the lake only occur periodically, mainly during freshet and occasionally following heavy overland precipitation during spring, summer, and fall. Two main inflow locations (Figure 2), located on the northern shore of the lake along the MacKenzie Highway, were identified as conveying intermittent flows to Jackfish Lake, however, one of which dry during the study period and non-point inputs are likely from land runoff from smaller adjoining catchments along the lake.

Measurements of instream flows were collected within the two identified watercourses (NW Bay 1 and NW Bay 2) on five occasions; dates and observed inflows are summarized on Table 2. The available inflow data at NW Bay 1 and NW Bay 2 were insufficient to develop a rating curve with which to abstract a flow timeseries but indicate that inflows to the lake, even during freshet, are extremely limited.

Table 2: Observation of Inflow Conditions to Jackfish Lake on Five Occasions during Study Period

Date (MDT; UTC-06)	Inflow to NW Bay 1 (m^3/s)	Inflow to NW Bay 2 (m^3/s)
30 Sep 2021 12:45	No flow observed	0.002
22 Mar 2022 16:00	No flow observed	No flow observed
26 May 2022 13:00	No flow observed	0.01
06 Jul 2022 17:10	No flow observed	0.00085
24 Aug 2022 11:00	No flow observed	No flow observed

MDT = Mountain Daylight Time; UTC = Universal Coordinated Time; NW = northwest; m^3/S = cubic metres per second.



LEGEND

STATIONS

- TEMPERATURE LOGGER
- THERMISTOR
- WATER QUALITY SAMPLE
- WATER LEVEL
- FIELD WATER QUALITY MEASUREMENTS

- FLOW DIRECTION
- CULVERT
- HIGHWAY
- LOCAL ROAD
- BERM

0 100 200

1:8,000 METRES

NOTE

1. MID LAKE 2 AND 3 WILL BE DETERMINED IN THE FIELD BASED ON DEPTH

REFERENCE(S)

HYDROGRAPHY AND ROAD DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. PUBLIC SECTOR DATASETS MADE AVAILABLE UNDER THE CITY OF YELLOWKNIFE'S OPEN DATA LICENSE V.1. IMAGERY COPYRIGHT © 20170809 ESRI AND ITS LICENSORS. SOURCE: DIGITAL GLOBE. USED UNDER LICENSE, ALL RIGHTS RESERVED.

PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

LAKE MONITORING LOCATIONS

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	LB
PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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2.2.5.2 *Lake Outflows*

Manually measured lake levels and instream flow measurements, collected on seven occasions (Table 3), were used to develop a rating curve between lake levels and outflows for the lake outlet located in the northeast corner of Jackfish Lake shown on Figure 2. Data collected by the water level logger, located within the lake in the vicinity of the lake outlet was consequently converted into outlet flow timeseries to represent lake outflows for the period of simulation.

Table 3: Outflow Water Level and Streamflow Measurements collected within Jackfish Lake's Discharge Channel

Date (MDT; UTC-06)	Surveyed Water Surface Elevation (m; geodetic)	Measured Outflow (m3/s)
29 Sep 2021 17:00	174.549	No flow observed
30 Sep 2021 11:20	174.549	No flow observed
23 Mar 2022 16:10	174.639	No flow observed
24 May 2022 11:45	174.791	0.0137
06 Jul 2022 14:05	174.600	0.0015
24 Aug 2022 11:30	174.475	No flow observed
27 Sep 2022 10:45	174.421	No flow observed

MDT = Mountain Daylight Time; UTC = Universal Coordinated Time; NW = northwest; m^3/S = cubic metres per second.

2.2.6 Inflow Temperature Inputs

Insufficient flow from watercourses at both inlets to Jackfish Lake resulted in long periods when deployed loggers reflected air, rather than water temperature. As a result, no observational data for water temperatures collected at the inlets was used as input to the model and inflow temperatures were synthesised according to the methods discussed in Section 2.4.7.

2.2.7 Operational Inputs

2.2.7.1 *Intake and Discharge Configuration*

Each plant discharge was surveyed (e.g., depth and location) by the WSP field technician team during a field visit conducted on 29 September 2021. Approximate intake locations, assumed to be located at the lakebed, were estimated from design drawings received from NTPC. Information regarding the precise orientation and diameter of each discharge and intake are not known and were estimated using CORMIX (Section 2.4.8.1).

2.2.7.2 *Cooling Water Flow and Delta Temperature (Delta-T)*

Operational data, measured by instrumentation installed by a third-party supplier, was measured at 15-minute increments between 1 October 2021 and 30 September 2022 for each of the three facilities. The operational data were provided to WSP by NTPC. The specific operational inputs for the model provided by NTPC included:

- Water used (cumulative discharge flow in metres cubed per quarter hour)
- Intake temperature (in degrees Celsius)
- Discharge temperature (in degrees Celsius)

Measured intake and discharge temperatures for reach plant were used to derive delta-T temperatures. These delta-T temperatures were calculated to develop a timeseries of unit heat increases for each 15-minute timestep. Cumulative quarter-hour discharge flows were divided by 900 to derive cubic metres per second (m^3/s) values.

2.3 Model Calibration and Validation Data

Field data not used as model inputs were used to initially calibrate the model using reiterative adjustments to model setup and subsequently validated using a separate array of location data.

2.3.1 Temperature Timeseries

Multi-depth logger arrays were deployed at six locations throughout Jackfish Lake between 1 October 2021 and 30 September 2022. Each location was equipped with two to four loggers positioned at different depths in order to obtain a continuous timeseries of thermal profiles.

A subset of four of these logger arrays: Southwest Bay, Mid-Lake, CAT discharge and K discharge, were dedicated to model calibration with the remaining two being used for model validation: Northwest Bay and EMD discharge.

2.3.2 Water Level Inputs

Water levels were recorded at 15-minute intervals between 30 September 2021 and 27 September 2022, at a location close to the outlet to Jackfish Lake (Figure 2). These data were used for calibrating the water balance component of the model.

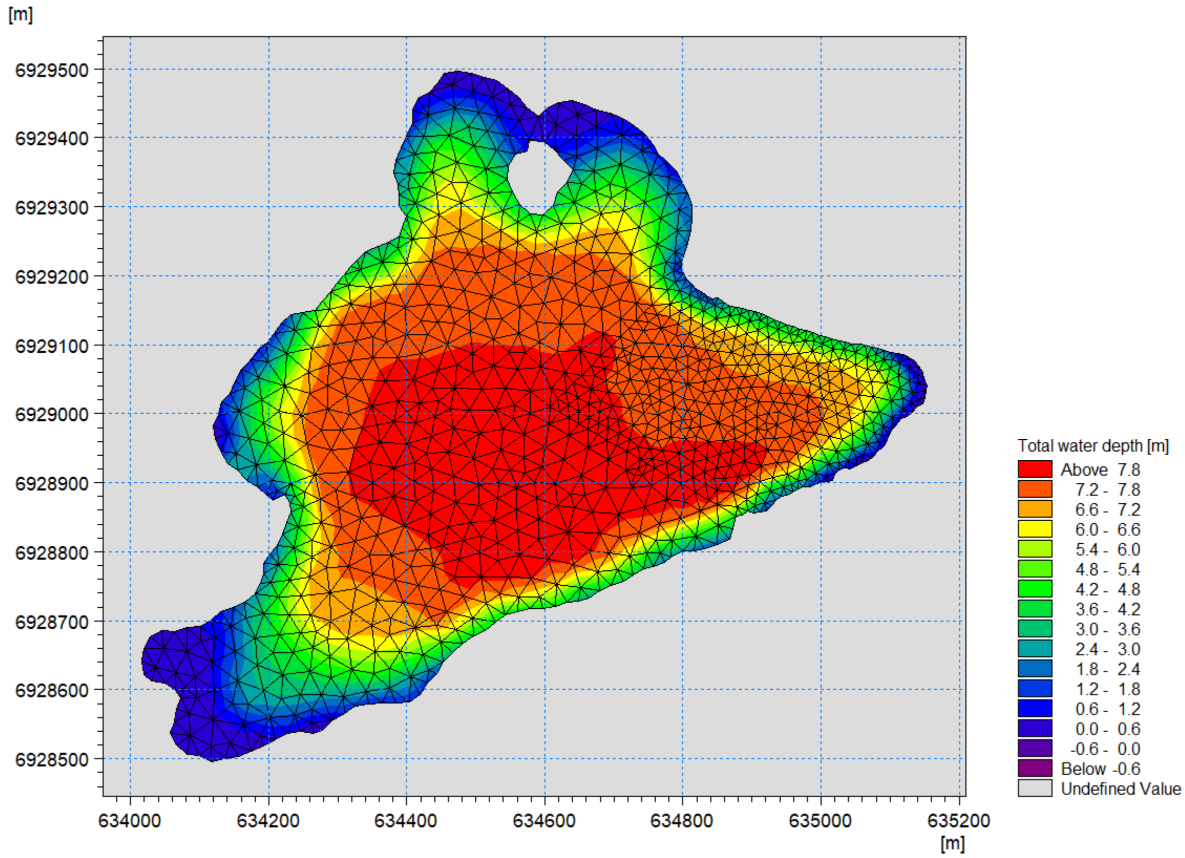
2.4 Data Screening, Adjustment or Synthesis

2.4.1 Bathymetric and Topographical Data

Bathymetric and topographic data were visually inspected to identify outliers that could erroneously affect the interpolation and meshing processes. No outliers or visually detectable errors were identified, and no adjustments or elimination of values were deemed necessary.

The spatial discretization of the model domain and interpolated water depths derived from bathymetric surveys of Jackfish Lake are illustrated on Figure 3.

Figure 3: Hypsographic Curves for Jackfish Lake



2.4.2 Meteorological Data

Meteorological data obtained from Environment Canada (Station 2204101; ECCC 2022) were inspected to identify data gaps or anomalies. No anomalies were noted, but a number of data gaps were addressed, where possible. Details of each meteorological input requiring gap filling and assumptions are provided below:

- Data gaps in the hourly air temperature timeseries obtained from Yellowknife A climate station (Station 2204101; ECCC 2022) were filled using linear interpolation given the small length and number of gaps in the data series.
- Precipitation data were used as provided though it is noted that total recorded rainfall for the simulation period was below the long-term annual average and may reflect some gaps that cannot be manually filled.
- Cloud cover was assumed to be 70%, which is consistent with values used in other models developed for the region (Golder 2022) and applied in the model in the form of a clearness coefficient.

2.4.3 Ice Cover

Ice thickness and time of ice formation and thawing are based on input timeseries developed using monitored data collected by technical field specialists (Section 2.2.3). Because MIKE 3FM does not include a dynamic ice module that calculates ice thicknesses based on wind, air, and water temperature influences, these dynamics need to be manually applied to the model using synthesized inputs.

To replicate the effects of ice on water temperatures in MIKE 3FM a blanket ice cover is applied to reduce thermal energy exchanges between atmosphere and the lake. However, the evolution of ice thickness influences water level i.e., as ice thickness increases and eventually recedes; therefore, synthesised ice thickness developed from observational data were input into the model using the following methodology:

- Water was gradually withdrawn from the lake surface via excess evaporation to compensate for the rate of ice development. Water is gradually removed over the ice formation period to simulate the reduction in volume and, in cases of shallow water applications, the reduction in cross-sectional area through which water can move. To simulate the effects of ice on water temperatures the following assumptions were made:
  - Ice thickness was assumed to be constant across the entire lake.
  - Ice formation was applied over a 168-day period from 22 November 2021 to 10 May 2022.
  - Ice thawing was applied over a 20-day period from 21 April 2022 to 10 May 2022.
- A maximum ice thickness of 0.8 m was assumed based on measurements described in Section 2.2.3.
- Precipitation (i.e., snow, as water equivalent) that accumulated over ice was gradually added to the lake surface in the form of precipitation over the lake to simulate the effects during the melting period, along with precipitation to simulate ice melt.
- The volume of water removed to form ice and returned during melting was adjusted by a factor of 0.92 to account for the density difference between ice and freshwater.

2.4.4 Lake Substrate Temperature

Lake substrate temperatures were defined below the lakebed as a function of bed depth across the lake to simulate the influence of discontinuous permafrost on deep water temperatures. Literature values were examined to provide a general sense of suitable ground surface boundary conditions to simulate the influence of sub-lakebed temperatures on the thermal regime of Jackfish Lake and to avoid the logistical challenges of obtaining reliable measurements of in-lake substrate temperatures.

Karunaratne (2008) defined peatland near surface temperatures at nine locations in the vicinity of Yellowknife as annual averages (0.9°C), during the freezing season (-3.6°C) and during the thawing season (7.3°C). These were interpreted to generate a synthesized substrate temperature series under Jackfish Lake. Due to the thermal influence of Jackfish Lake itself, it was assumed that winter (November through ice-off in mid-May) substrate temperatures under the lake would remain approximately 1°C warmer than measured with peat (i.e., approximately 2°C) and summer substrate temperatures in the lake under the lake would remain about 2°C cooler than measured within peat (i.e., approximately 5°C). The transition of these two substrate temperature periods was assumed to be reasonably quick (i.e., over a period of 31 days from summer to winter and over a period of 41 days from winter to summer as shown on Figure 4). The conductivity of these temperatures was consequently refined throughout the model calibration process to reflect the observed depth-varying influence of substrate temperatures on lake bottom temperatures (Figure 5).

Figure 4: Illustration of Synthesized Substrate Temperatures for Jackfish Lake

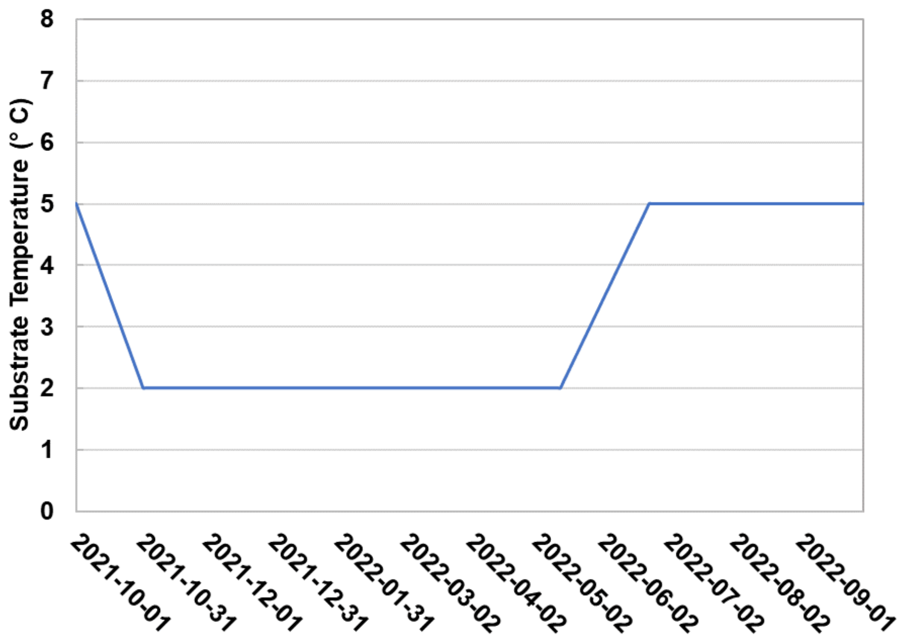
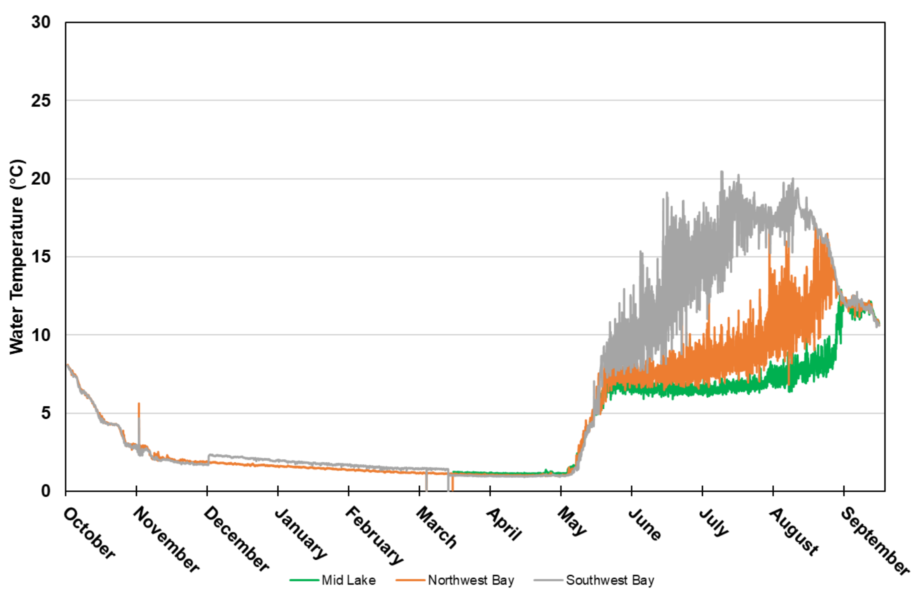


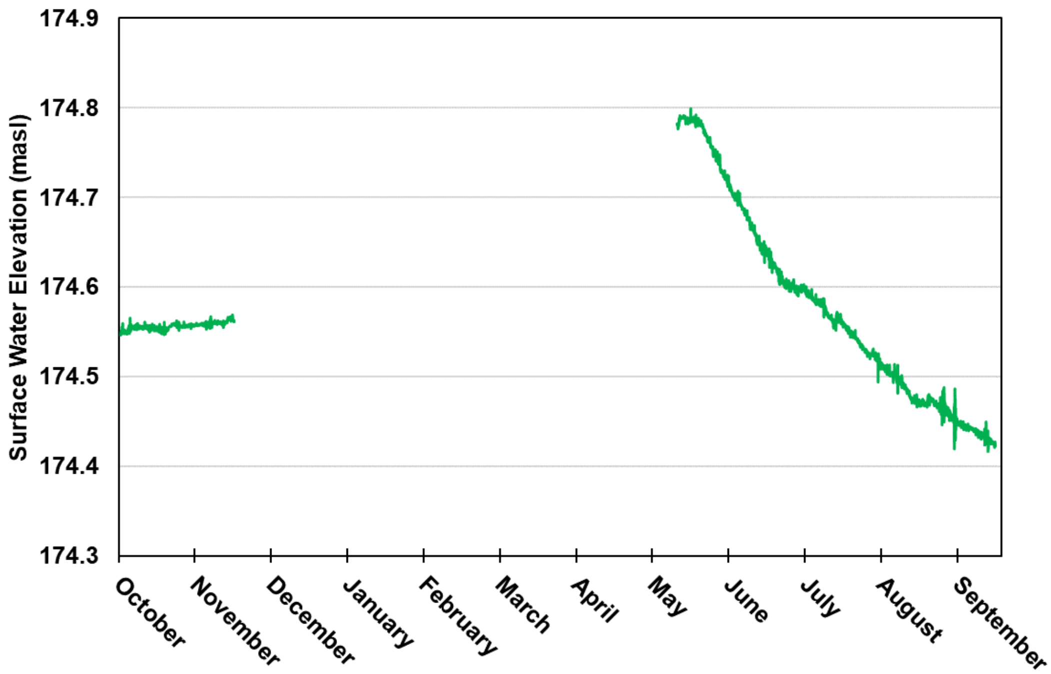
Figure 5: Lake-Bed Temperatures measured at Mid-Lake, Northwest Bay, Southwest Bay from October 2021 to September 2022



2.4.5 Water Level Data

Over the deployment period, negative pressure caused by the formation of lake ice was found to have compromised the data, particularly data collected between 6 December 2021 and 22 March 2022. Because ice pressure can compromise logger transducer readings in such environments, all data coinciding to the ice cover period between 22 November 2021 through 10 May 2022 were screened out (Figure 6), allowing comparisons between observed and simulated water levels to be made for the ice-free period alone.

Figure 6: Water Level Elevation Recorded for Jackfish Lake



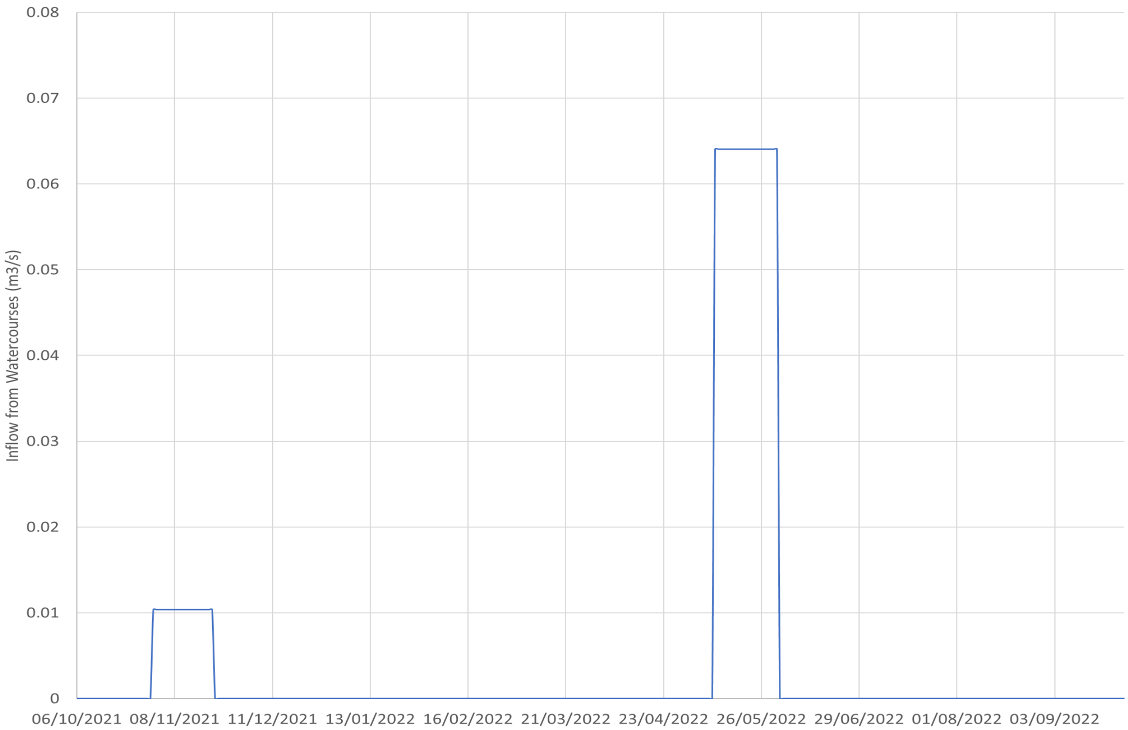
masl = metres above sea level

2.4.6 Hydrological Inflows and Outflow Data

2.4.6.1 Lake Inflows

Given the limited flow data with which to quantify inflows to Jackfish Lake from the two contributing catchments, lake inflow timeseries were synthesized as a calibration parameter focused on the water level performance of the model. Following several iterations, which considered the variable influence of water temperatures and evaporative rates on lake levels, the timeseries illustrated on Figure 7 was used to characterise runoff from adjacent catchments to the lake and assigned to the two inflow locations shown on Figure 2. The resulting inflows show reasonable agreement with generally low inflow rates measured at each of these locations.

Figure 7 : Inflow Timeseries Applied to the Model for Jackfish Lake



m^3/s = cubic metres per second

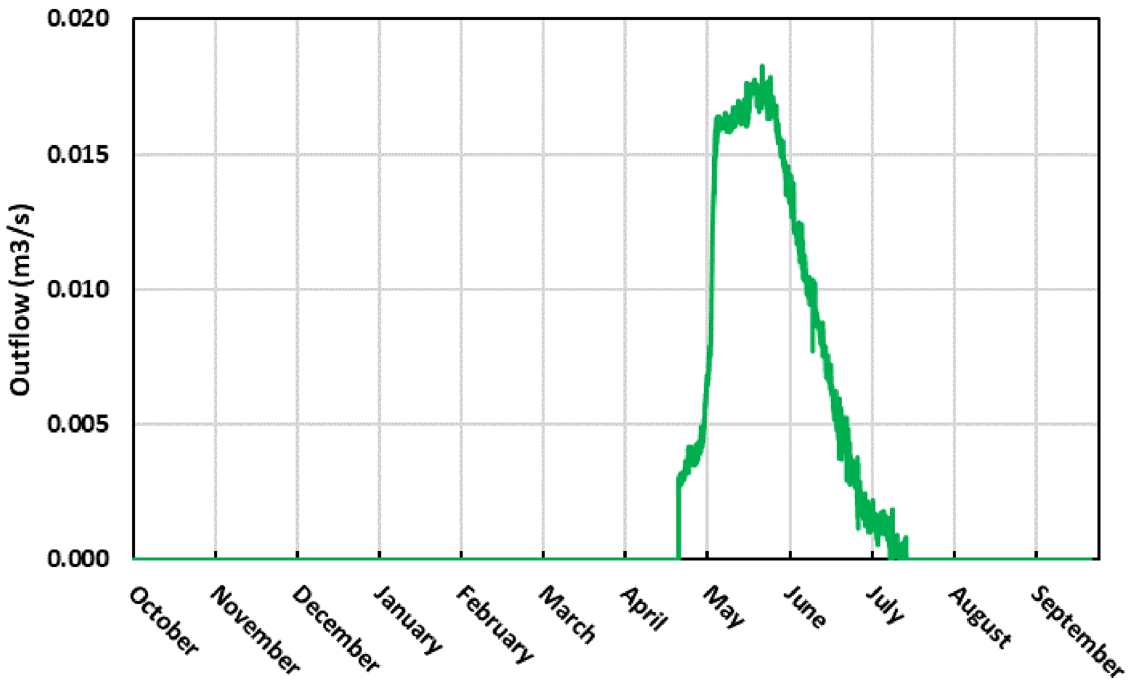
2.4.6.2 Lake Outflows

Outflows from Jackfish Lake were calculated based on an open water rating curve that was developed using measured lake levels and corresponding discharge flows, with no outflows assumed to occur during the ice cover period. Equation 1 was used to calculate the rating curve for the open water period:

$$Q = 0.0912 \times \left((Stage)\right)^{1.0630} \qquad \text{Equation (1)}$$

The datum elevation for the rating curve is 174.579 m. There is a period when the lake water surface elevation was above the outlet invert for this rating curve during the ice cover period; this is likely misrepresented due to the effects of ice formation. An assumption of no outflow was made throughout this period as the presence of lake ice would likely physically obstruct the outlet. Outflow values were calculated for the open water period between 11 May 2022 and 21 November 2022 (Figure 8).

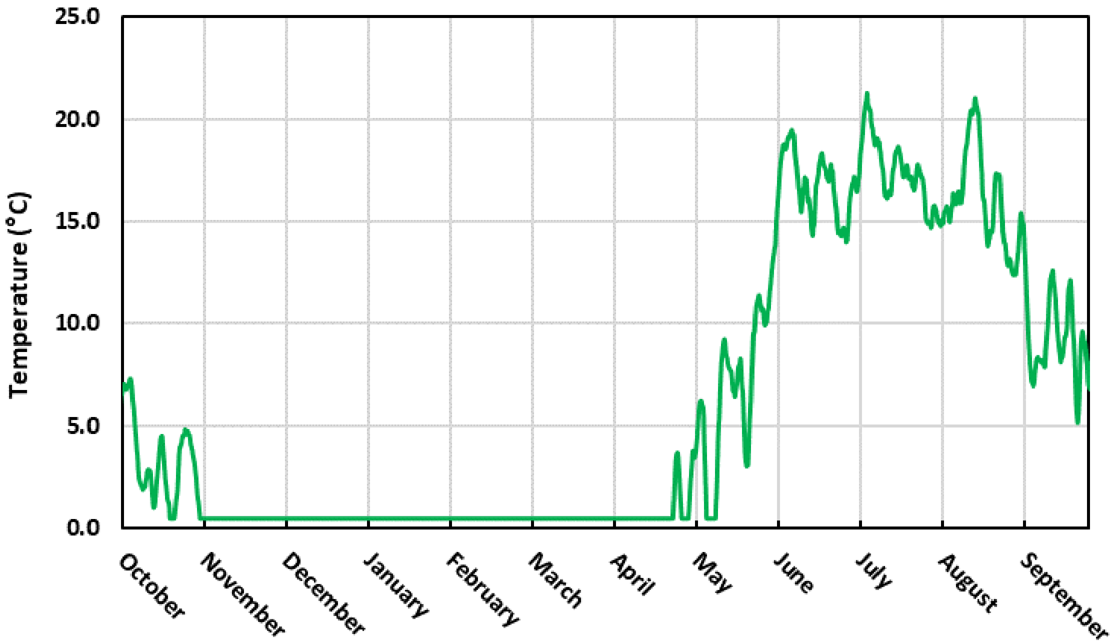
Figure 8: Outflow Timeseries Developed from Rating Curve



2.4.7 Inflow Temperature Data

Inflow temperature inputs, corresponding to weekly rolling average air temperatures capped at a minimum discharge temperature of 0°C, were generated using the meteorological data discussed in Section 2.2.2. These temperature data were applied to all non-operational inflow timeseries data applied to the model. Synthesized inflow water temperatures applied to the model during flow periods as well as the air temperature measurements upon which these were based are presented in Figure 9.

Figure 9: Air Temperatures and Synthesized Watercourse Temperatures



2.4.8 Operational Data

A number of assumptions and adjustments were made to configure the model for Jackfish Lake for a simulation of the operational effects. These are detailed in the following subsections.

2.4.8.1 Intake and Discharge Configurations

A schematic configuration of the plants including the approximate location of intakes and discharges were provided to WSP by NTPC, with approximations for each discharge confirmed through field data collection by WSP's technical field specialists.

Historical Google Earth Imagery was examined under a variety of lake conditions to estimate the aerial sizes of turbulent mixing zones for each of the three discharges during operational conditions. These estimates, as well as corresponding typical discharge flow rates, were consequently used to estimate orifice size and jet velocity at each of the discharges. The resulting information was input into the Jackfish Lake model to represent the easting, northing, depth, orientation, and orifice size of each discharge.

Discharges from the facility to Jackfish Lake for the simulation period were represented as flow and delta-T linked sources to each of the intakes, with hourly flows based on measured data provided by NTPC and delta-T's over modelled intake temperatures, calculated from measured intake and discharge temperature data provided by NTPC.

2.4.8.2 Review and Adjustment of Operational Data

The operational data received from NTPC were screened to identify data gaps and anomalies. Identified data issues were shortlisted with four suggestions for approval by NTPC; deletion (deletion of outliers identified as being associated with operational maintenance activities), interpolation (using interpolated values to fill gaps in the record of up to one hour), global adjustments (to correct for observed temperature shifts in recorded values) or removal (to eliminate sequences deemed unreliable due to data integrity issues).

A number of adjustments and deletions were consequently made to the operational inputs prior to converting operational data received from NTPC into model inputs. In summary these adjustments include:

- Interpolation of operational values to fill data gaps:
  - 06 October 2021 16:45 for K plant
  - 26 October 2021 15:45 to 26 October 2021 16:15 for K plant
  - 28 October 2021 8:15 for EMD plant
  - 03 November 2021 12:00 for EMD and CAT plants
  - 30 December 2021 16:45 for CAT plant
  - 06 June 2022 14:30 and 06 June 2022 14:45 for EMD plant
  - 09 June 2022 8:15 for K plant
  - 09 June 2022 15:15 for K plant
  - 11 September 2022 11:30 to 11 September 2022 12:00 for K plant
  - 11 September 2022 16:15 and 11 September 2022 16:30 for K plant
- Adjustments to operational values to correct for observed shift in values:
  - 01 December 2021 0:00 to 30 September 2022 23:45: 0.26°C decrease in intake temperatures at CAT plant; 0.26°C increase in discharge values at CAT plant to adjust for instantaneous shift in recorded temperatures, excluding those coinciding with active thermal discharges
  - 06 October 2021 16:15 to 30 September 2022 23:45; global increase in all delta-T temperatures for K plant to eliminate/reduce negative temperature increases during non-operations
  - 11 September 2022 11:30; value interpolated across pre- and post-timestep values due to instantaneous large negative flow value at EMD and CAT plants
- Eliminated operational data:
  - 23 March 2022 9:30 to 23 March 2022 15:15 at all three plants due to maintenance activities
  - 02 May 2022 12:45 to 03 May 2022 13:00 at all three plants due to negative or null value flows at CAT plant
  - 05 June 2022 9:15 to 06 June 2022 13:15 at all three plants due to negative or null value flows at CAT plant

  - 01 August 2022 00:00 to 23 August 2022 14:30 at all three plants due to unexplained instantaneous 10°C decrease at K plant
  - 17 August 2022 17:30 to 31 August 2022 8:45 at all three plants due to null values at CAT plant
  - 17 August 2022 17:30 to 31 August 2022 8:45 at all three plants due to null values at CAT plant
  - 06 September 2022 4:45 to 08 September 2022 18:30 at all three plants due to null values at EMD plant
  - 08 September 2022 18:45 to 30 September 2022 23:45 at all three plants due to unreliable discharge temperature measurements at K plant
- Initially queried but retained anomalous data:
  - 08 October 2021 9:30 to 08 October 2021 10:00 initially identified as temporary high flux variation

The four measured operational time periods, amounting to a total period of 295.8 days, deemed reasonably suitable for use as model input to define operational influences are presented in Table 4.

Table 4: Retained Operational Time Periods Applied in Thermal Modelling

Time Period ID	Period Start	Period End
1	06 Oct 202116:15	23 Mar 2022 9:15
2	23 Mar 2022 15:30	02 May 2022 12:30
3	03 May 2022 13:15	05 July 2022 9:00
4	06 Jul 2022 13:30	31 July 2022 23:45

ID = identification

2.4.8.3 Application of Operational Data to Thermal Modelling Assessment

The screened operational data were employed as inputs for a number of modelling applications in the manner described below.

Model Calibration and Validation

The full screened operational data available were employed to simulate hydrodynamic and thermodynamic conditions in Jackfish Lake between 06 October 2021 16:15 (having applied a simulated model warm-up period) and 07 August 2022 23:45 (allowing for the assimilation of the last operational discharge on 31 July 2022 23:45 for one week after end of discharge). Short intervals i.e., less than 1.2 days, between the retained operational data were infilled with null data to allow for a continuous simulation (Table 4). See Section 3 for further details.

Determination of Median and Maximum (95th percentile) Operational Effects across Period of Record

The same simulation period used for the purposes of model calibration and validation was employed for characterising median (50th percentile) and maximum (95th percentile) absolute (operational and meteorological influences combined) lake surface and lake-bed temperature extents and magnitudes over the period of record.

Characterisation of Hypothetical Seasonal Operational Effects

Owing to the extremely intermittent nature of operational discharges between October 2021 and July 2021 (e.g., diesel generators were only operated during peak demand periods), it was not possible to develop a consistently meaningful characterisation of representative seasonal thermal plumes during the following time frames:

- late fall (October 2021 or September 2022),
- late winter immediately before ice break up (March/April 2022),
- spring freshet (May/June 2022),
- early summer (July 2022) and
- late summer (August 2022)

Instead, the screened operational data identified in Table 4 were reviewed to identify the maximum combined operational heat load period for all three plants operating in unison over the period of record. Periods when delta-T (the difference between intake and discharge temperatures) were lower than 1.0°C were not considered for this specific exercise as these generally include periods of no power generation when ambient factors (such as diffusive heat flux from indoor pipes) contributed to heat load. By summing the individual heat loads generated by each plant during periods of power production, a timeseries of waste heat output directed to the lake was developed (Figure 10) and visually scrutinized to identify the period corresponding to the maximum continuous heat waste output. For the purposes of this exercise, it was assumed that discharge heat loads could have a residual thermal footprint in Jackfish Lake for up to 24 hours, meaning that the period corresponding to the highest combined cumulative heat load, not separated by 24 hours or more of intermittency, was identified to determine a Hypothetical Seasonal Operational Effect scenario (also referred to as hypothetical discharge scenario). Based on the information screened, the maximum continuous combined output for the Jackfish Lake Generating Facility amounted to a total of 453.82 megawatts (MW), or an average rate of 2,313 watts per second (W/s), of heat load discharged to Jackfish Lake between 23 December 2021 12:30 and 25 December 2021 19:00 (Figure 11).

The hypothetical discharge scenario observed between December 23, 2021, 12:30 and December 25, 2021, 19:00 was applied across a one-year model simulation on five occasions, commencing with the outset of each 4-day period used to develop results. The 4-day sequence used to represent each hypothetical seasonal discharge event therefore includes the 2.5-day discharge period, followed by 1.5 days to allow the thermal plume to vertically mix and influence bottom temperatures if conditions are favourable. Because hypothetical discharges are applied to a year-long simulation influenced by atmospheric and hydrologic influences, these 4-day sequences also included adequate model run time before each discharge event.

Figure 10: Instantaneous and Cumulative Heat Waste Output Over Period of Record for EMD Plant, K Plant, and CAT Plant Combined in MegaWatts

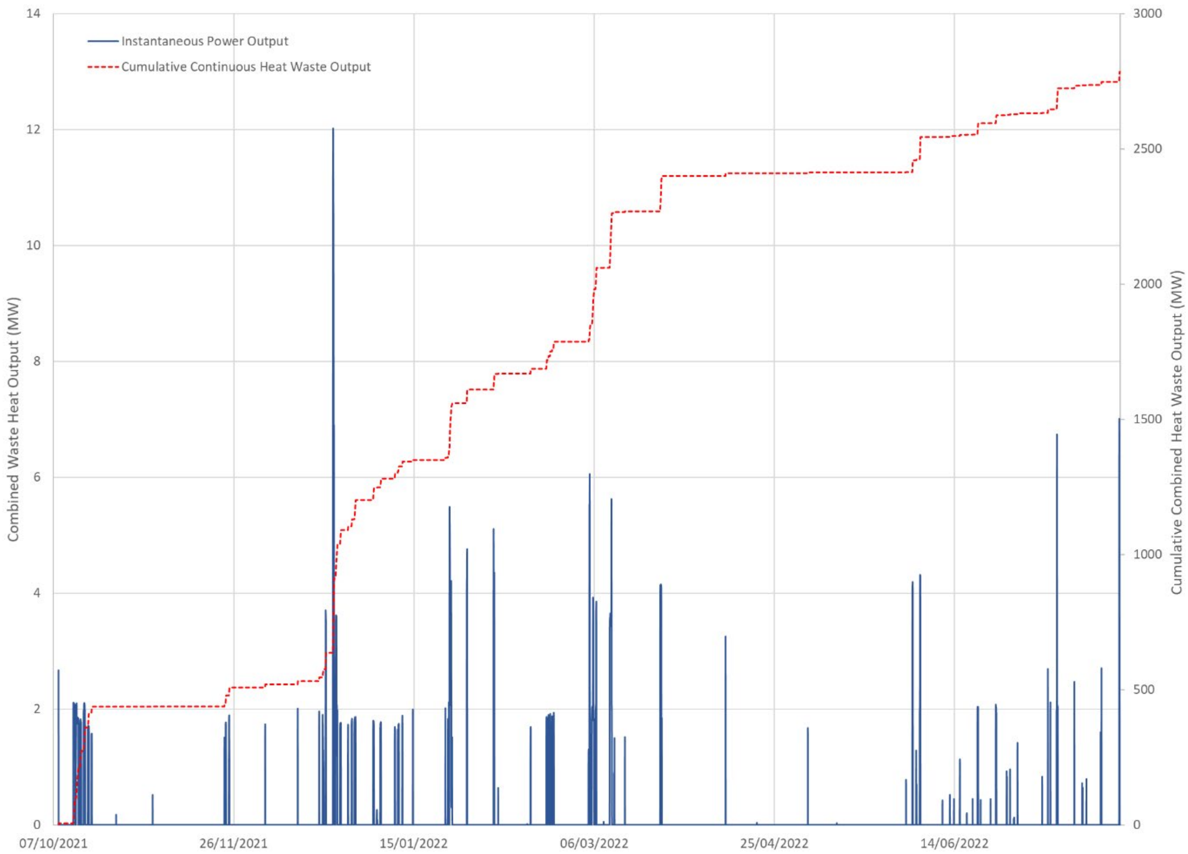
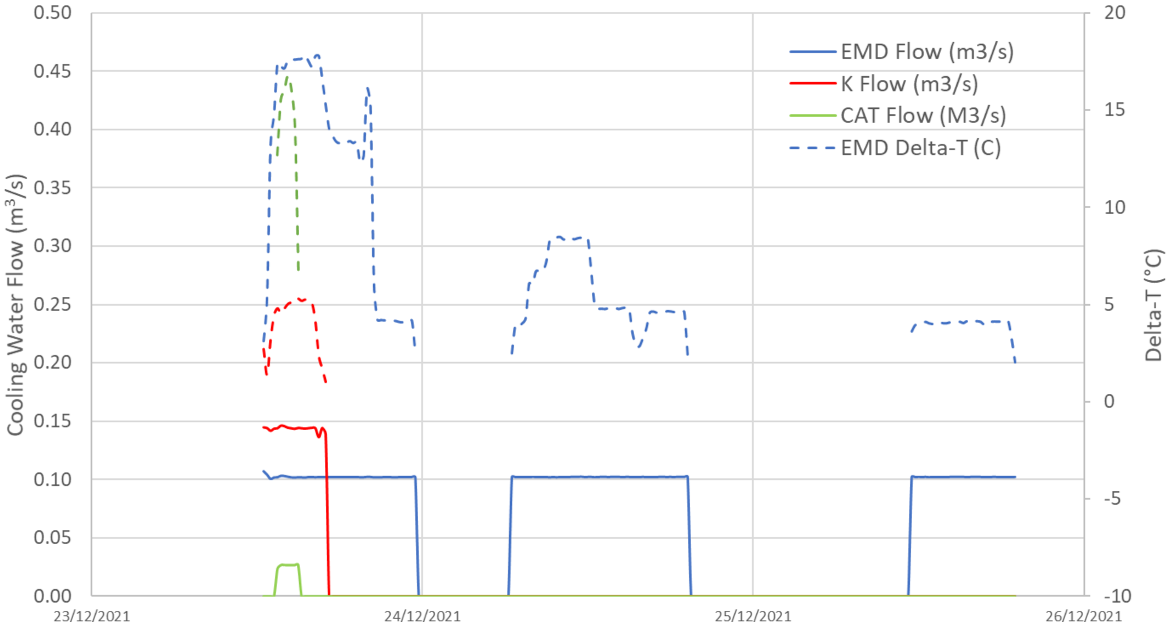


Figure 11: Maximum Cumulative Heat Load Event Measured between 23 December 2021 12:30 and 25 December 2021 19:00



2.5 Model Setup

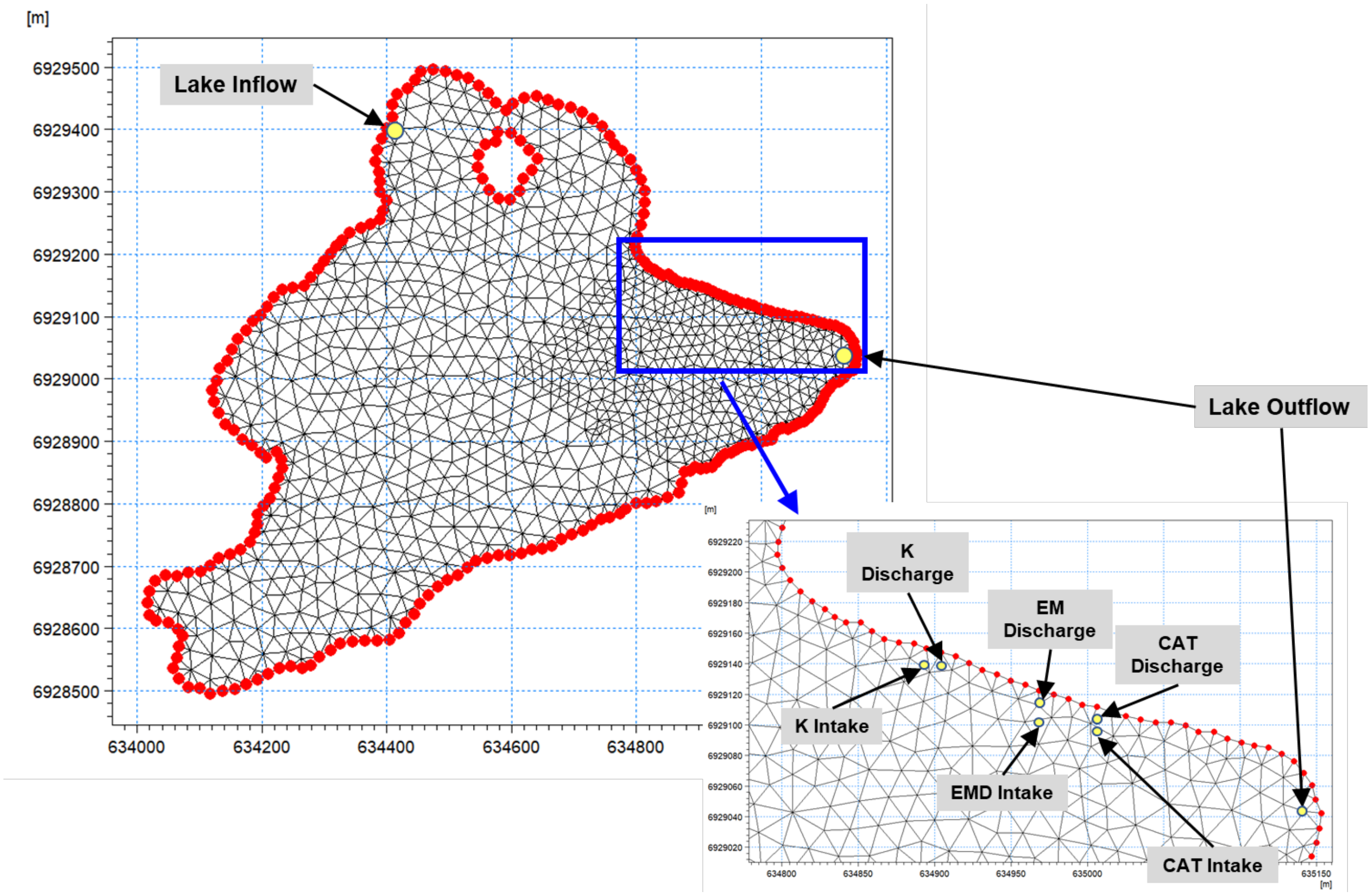
2.5.1 Model Domain

A 3-D flexible computational domain of the Jackfish Lake was developed in MIKE Zero (the external data processing interface provided in MIKE) and MIKE Mesh Generator. The available bathymetric data described in Section 2.2.1 were coupled with a digitized land-water boundary of the lake (based on digital imagery taken on the date when the bathymetric survey was conducted, i.e., 29 September 2021), and the measured average water level elevation of 174.55 masl over the survey period. The model domain is capable of simulating future lake conditions under higher than measured water levels, if required in the future, assuming a maximum wetted surface consistent with that observed in satellite imagery.

Model resolution varies across the domain from approximately 10 m resolution in nearshore areas and areas of increased hydrodynamic complexity, i.e., the area around intake and discharge infrastructure, up to approximately 40 m in the centre of the lake.

Bathymetric values for the computational mesh were interpolated and smoothed using surveyed bathymetry. The digitized land-water boundary and topographic data were interpolated and smoothed using a Natural Neighbour method (Sibson 1980). Following interpolation, the MIKE Mesh Analyze tool was used to identify and refine (to reduce the geometric angles of intercept along some nodes) some mesh elements to optimize model run times. Figure 12 illustrates the finalised mesh configuration from an aerial perspective.

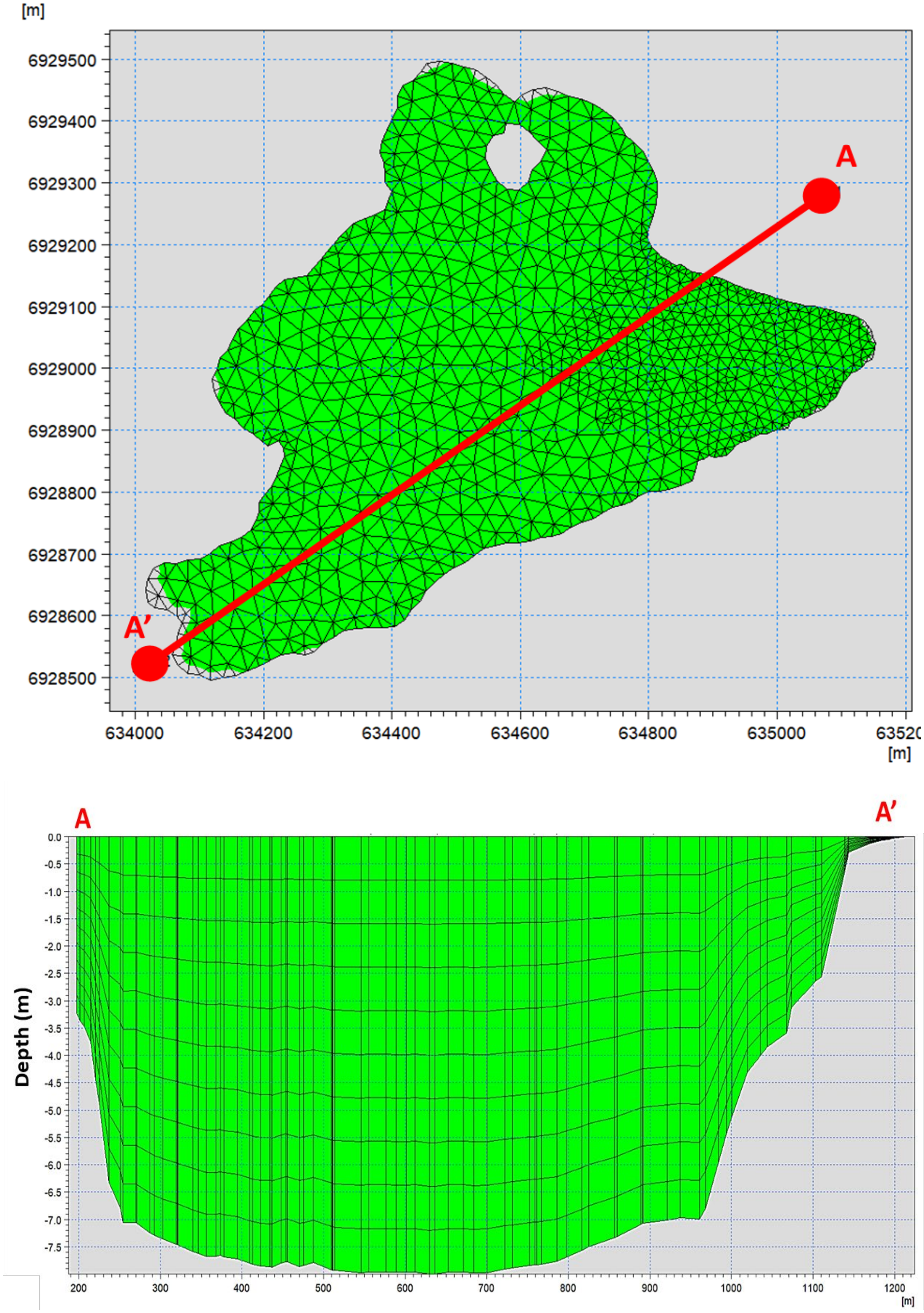
Figure 12 : Aerial Perspective of Finalized Mesh Configuration for Jackfish Lake Thermal Model



2.5.2 Vertical Discretisation

Given the shallow nature of the lake (average water depth of 5.0 m and maximum water depth of 7.8 m [Golder 2019]), and the relatively small range of water level fluctuations (0.64 m [Golder 2019]), the vertical resolution of the model was represented using ten equidistant sigma layers (i.e., depth-integrated layers that each represent a vertical fraction of the water column at any given point). This modelling approach provides variable thickness of layers based on the total depth of the water column, with increased resolution at nearshore and operational infrastructure locations. Figure 13 illustrates the variation in vertical discretisation by depth for a nominal cross-section of Jackfish Lake.

Figure 13: Cross-sectional Perspective of Vertical Discretisation Illustrating Variability of Spatial Resolution with Depth



2.5.3 Model Simulation Periods

The calibration and validation periods, as well as production simulation periods considered in this report, are limited to the periods over which operational data were available to simulate the thermal effects of operations on Jackfish Lake (Section 2.4.8). Seasonal thermal effects simulations, simulated using the Hypothetical Seasonal Operational Effects scenario specified in Section 2.4.8.3, were conducted over 4-day simulation periods coinciding with seasonal periods of interest.

Model warm up simulations or “hot” starts are typically needed prior to sequencing production simulations that render meaningful results as meteorological influences on the lake need to be simulated for an extended period of time before lake conditions mimic lake processes. Such warm-up periods are eliminated from simulation results as they do not provide meaningful information regarding operational influences. Table 5 details the start and end dates of all simulations conducted for the purposes of developing results documented in this assessment report.

Table 5: Model Initialization and Simulation Periods Considered for the Jackfish Thermal Plume Study

Characterisation Purpose	Simulation Period	
	Start	End
Calibration and Validation	06 Oct 2021 00:00[(a)]	27 Sep 2022 00:00[(a)]
Annual Thermal Plume	06 Oct 2021 00:00[(a)]	27 Sep 2022 23:00[(a)]
Late Fall	21 Oct 2021 00:00	25 Oct 2021 00:00
Late Winter before Ice Break Up	10 Apr 2022 00:00	14 Apr 2022 00:00
Spring Freshet	25 May 2022 00:00	29 May 2022 00:00
Early Summer	01 Jul 2022 00:00	05 Jul 2022 00:00
Late Summer	01 Aug 2022 00:00	05 Aug 2022 00:00

Notes: (a) excludes possible operational interactions with Jackfish Lake between 23 Mar 2022 9:15 and 23 Mar 2022 15:30; between 02 May 2022 12:30 and 03 May 2022 13:15; between 05 Jul 2022 9:00 and 06 Jul 2022 13:30; and between 01 Aug 2022, 00:00 and 27 Sep 2022 00:00, as these were eliminated during the data screening process (Section 2.4.8).

3.0 MODEL CALIBRATION AND VALIDATION

3.1 Model Calibration and Validation Approach

The conventional approach to model calibration and validation is to perform these two tasks over two independent simulation periods. However, the limited temporal availability of operational data, as well as the need to consider varying seasonal conditions in the calibration process, necessitated an alternate, yet appropriate, approach for model calibration and validation.

The locations selected for the calibration process were necessarily focused to maximising spatial separation between loggers, as well as including the deepest water location available, at the Mid-Lake monitoring station. The far-field calibration location may have included Southwest Bay or Northwest Bay; however, it was decided that including Southwest Bay, the location most remote from the discharge locations, made the most sense as it would be least influenced by thermal discharges, and thus, provide the best available examination of environmental influences on lake temperature conditions. Lastly, a subset of two of three in-lake discharge monitoring locations was selected, noting that K plant delivered almost no thermal loading throughout the monitoring period.

As such, two locations remained for the purposes of model validation, the first coinciding with the EMD discharge which delivered the highest thermal loading to the lake over the monitoring period and Northwest Bay, which was located suitably remote from the discharge.

The division of calibration and validation locations is considered reasonable and fit for purpose, as borne out of the calibration and validation results presented in Section 3.2.

3.1.1 Calibration Parameters

A number of model setup parameters were considered for optimizing model performance across the calibration period:

- applying variable computational timesteps
- variable horizontal and vertical eddy viscosity
- bed roughness
- the wind friction coefficient
- horizontal and vertical dispersion
- watershed inflows
- transfer coefficient for heating and cooling
- substrate temperature characteristics
- light extinction coefficient
- β in Beer's Law

Using different combinations of these calibration parameters, 51 separate calibration simulations (with varying configurations) were created and iteratively tested against measurement parameters collected for calibration locations to gradually improve model performance. The aim of the calibration effort was to configure a model set up in which the reasonable results could be achieved at each of the selected calibration locations discussed in Section 2.3.

3.1.2 Performance Statistical Metrics

To evaluate model performance in predicting lake hydrodynamics and thermodynamics, several quantitative statistical metrics and qualitative comparisons can be used to assess confidence in a model's ability to provide predictions with precision. "Goodness-of-fit" quantifies the ability of a model to predict observed conditions, recognising that no model can always deliver absolute accuracy in all areas. Measuring the "goodness-of-fit" for a 3-D hydrothermal model is difficult since model errors can occur both spatially and temporally. Results for "goodness-of-fit" should be interpreted with caution and should also include a visual inspection of the predicted and measured values to distinguish errors attributed to small temporal shifts, which can be considered inconsequential for many numerical applications, from absolute errors.

Calibration and validation results for the Jackfish Lake model are presented and discussed throughout the following sections in qualitative terms (graphical format as time series) and quantitative terms (tabular format) according to the model performance metrics outlined below.

Two of the most common methods used to determine a model's accuracy are (i) the correlation coefficient and (ii) Root Mean Squared Error (RMSE). For comparisons between predicted and measured water levels and water temperatures at selected depth intervals (i.e., surface, mid depth and bottom), this study has applied the correlation coefficient and RMSE as measures of accuracy.

3.1.2.1 Correlation Coefficient

The Pearson product-moment correlation coefficient (also referred to as Pearson's r) is a measure of the linear correlation between two variables, where a value of 1 is a perfect correlation, a value of 0 indicates no correlation and a value below 0 indicates a negative correlation. In the case of dynamic models, the two variables compared are measured (x_o) and predicted/calculated (x_c) values. Each model parameter must be evaluated separately (e.g., water temperature, water levels).

The general formula for the correlation coefficient is:

$$r = \frac{\sum(x_{o,i} - \overline{x_o})(x_{c,i} - \overline{x_c})}{\sqrt{\sum(x_{o,i} - \overline{x_o})^2 \sum(x_{c,i} - \overline{x_c})^2}} \qquad \text{Equation (2)}$$

Where; $x_{o,i}$ measured value at time *i*,
$\overline{x}_o$ mean of measured values,
$x_{c,i}$ predicted value at time *i*, and
$\overline{x}_c$ mean of measured values.

Based on the literature values reported in Table 6, the correlation coefficients for comparisons of predicted water temperature to measured values are typically greater than 0.8. Only one paper (He et al., 2011) reported correlation coefficients for current components with a range of 0.25 to 0.67. Typical correlation coefficients for comparison of water levels are not available. In evaluating this calibration metric, it is important to note that lower correlation values can often coincide with reduced RMSE but do not necessarily constitute poor model performance given that these minor discrepancies are negligible in terms of the reliability of the model.

3.1.2.2 Root Mean Squared Error

The RMSE provides a weighted indication of model accuracy and can be used to evaluate the model ability to predict water temperature or water level. It should be noted that because RMSE is a weighted error formulation, RMSE generally produces a higher error value than would be expected to be the case for average error. An RMSE value of zero, which has the same units as the parameter being evaluated, indicates a perfect model fit to the measured values. RMSE is calculated as follows:

$$RMSE = \sqrt{\frac{1}{M}\sum(x_{o,i} - x_{c,i})^2} \qquad \text{Equation (3)}$$

Where; M number of observations (time steps),
$x_{o,i}$ observed value at time *i*, and
$x_{c,i}$ predicted value at time *i*.

Based on the literature values reported (Table 6), the RMSE for comparisons of predicted water temperature to measured values are typically less than 0.5ºC at depths greater than 50 m (depths which are irrelevant for

Jackfish Lake given its shallow profile) and ranged from 0.9ºC to 3.6ºC at the surface. Typical RMSE values for comparison of water levels are not available.

3.1.3 Reference Statistical Metrics

Several literature sources related to hydrodynamic modelling in the Great Lakes (which generally include the most common and authoritative lake models produced in Canada) were reviewed to determine the typical statistical results when model predictions were compared to measured values for currents and water temperature. The statistical results presented in Table 6 include correlation coefficients and RMSE for water temperature. None of the papers reviewed reported comparisons for water levels. The type of statistic reported for various parameters was not consistent between the references.

Table 6: Summary of Model Fit Parameters from Literature

Waterbody	Software Used	Water Temperature	
		Correlation Coefficient	Root Mean Squared Error (°C)
Lake Michigan (Beletsky and Schwab, 2001)	POM	0.78 to 0.99	1.2 to 1.5 at surface 2.5 at 15 m 0.7 at 50 m
Lake Michigan (Beletsky et al. 2006)	POM	-[2]	2.9 above 20 m 1.6 at 59 m 0.3 below 100 m
Green Bay (Hamidi et al. 2015)	POM	0.98[1]	1.79[1]
Lake Ontario (Huang et al. 2010a)	POM	-	0.95 to 1.43
Lake Ontario (Huang et al. 2010b)	POM	0.96 to 0.98	0.89 to 1.12
	CANDIE	0.96 to 0.97	1.01 to 1.42
	ELCOM	0.96 to 0.98	0.85 to 1.73
Lake Ontario (Dewey 2013)	MIKE3	0.82	3.65

Notes: [1]RMSE for temperatures reported for ensemble (all locations) data sets, range not reported.
[2]Metrics not reported in source document.
RMSE = Root Mean Squared Error.

The statistics presented in Table 6 were reviewed to develop model fit benchmarks for water temperatures that could be used to assess the performance of the Jackfish Lake model. The selected benchmarks are provided in Table 7.

Table 7: Summary of Model Fit Benchmarks Selected to Assess Jackfish Lake Model

Benchmark	Water Temperature	Water Level
Correlation Coefficient	>0.8[1]	none available
RMSE	<50m depth: 0.9 to 3.6°C[2]	none available

Notes: [1]Beletsky and Schwab, 2001; Hamidi et al., 2015, Huang et al., 2010b & Dewey 2013
[2]Dewey 2013.
RMSE = Root Mean Squared Error.

3.2 Model Calibration and Validation Results

The following subsections present model calibration results at selected calibration locations (Section 2.3) for the best performing simulation that was then examined for performance at independent validation locations (Section 2.3).

3.2.1 Model Calibration Results

3.2.1.1 Thermal Calibration Results

The performance metrics at each thermal calibration location (CAT Plant, K Plant, Southwest Bay and Mid Lake) for the best performing calibration simulation are presented in Table 8, with graphical illustrations of performance at each calibration location provided in Figures 14 through 25. The results are generally indicative of extremely high performance with some minor temporal issues resulting in accelerated cooling of the water column following ice cover relative to observed water temperatures, slightly accelerated heating of the water column following ice cover and some localized challenges in replicating observed temperature conditions at the “Middle 2” location during these times. The statistical metrics are all well within the range of published literature values and indicate the model is capable of delivering good performance at all evaluated water temperature stations used during the calibration process. It is noted that although operational influences may have occurred in Jackfish Lake between 1 August 2022 and 27 September 2022, these were not included in the model due to data integrity issues described in Section 2.4.8.

Table 8: Water Temperature Calibration Performance for Jackfish Lake

Calibration Location	RMSE (°C)	Correlation Coefficient
CAT Bottom	1.14	0.99
CAT Middle	1.50	0.99
CAT Top	1.30	0.99
K Bottom	1.19	0.99
K Top	1.21	0.99
Southwest Bay Bottom	1.76	0.97
Southwest Bay Middle	1.82	0.98
Southwest Bay Top	1.96	0.99
Mid Lake Bottom	1.88	0.89
Mid Lake Middle 2	1.91	0.96
Mid Lake Middle	1.26	0.99
Mid Lake Top	1.46	0.99

RMSE = Root Mean Squared Error.

Figure 14: Modelled Water Temperature Performance at CAT Plant (Top)

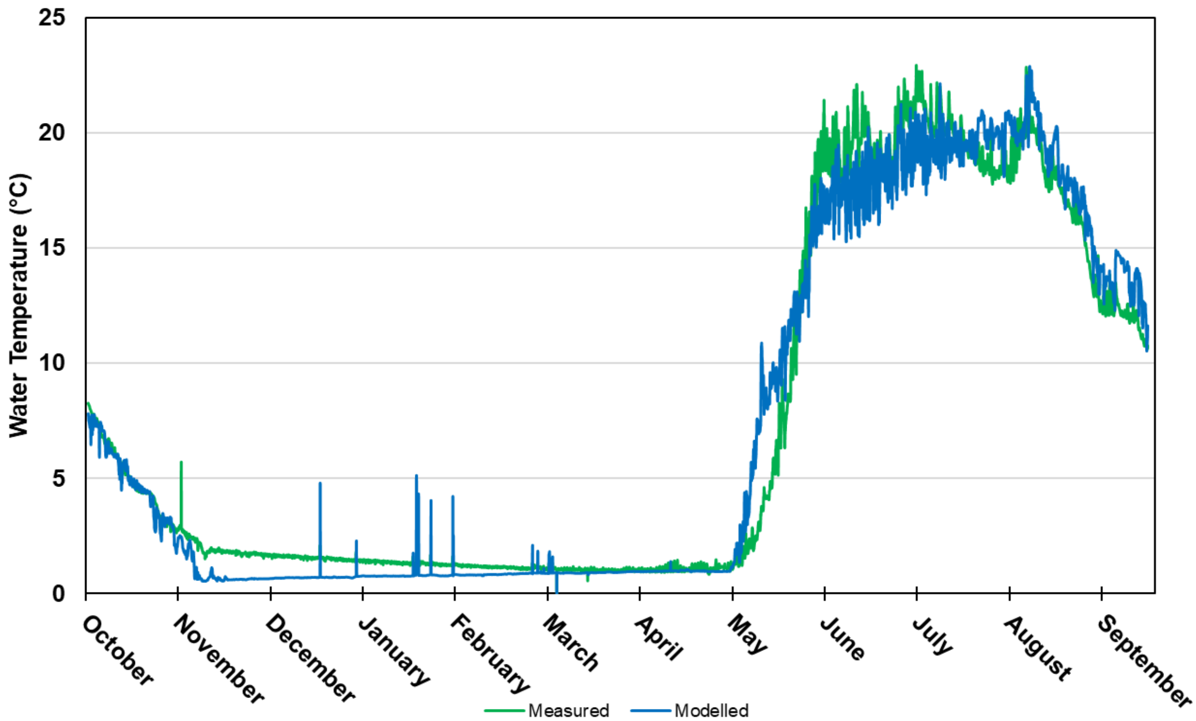


Figure 15: Modelled Water Temperature Performance at CAT Plant (Middle)

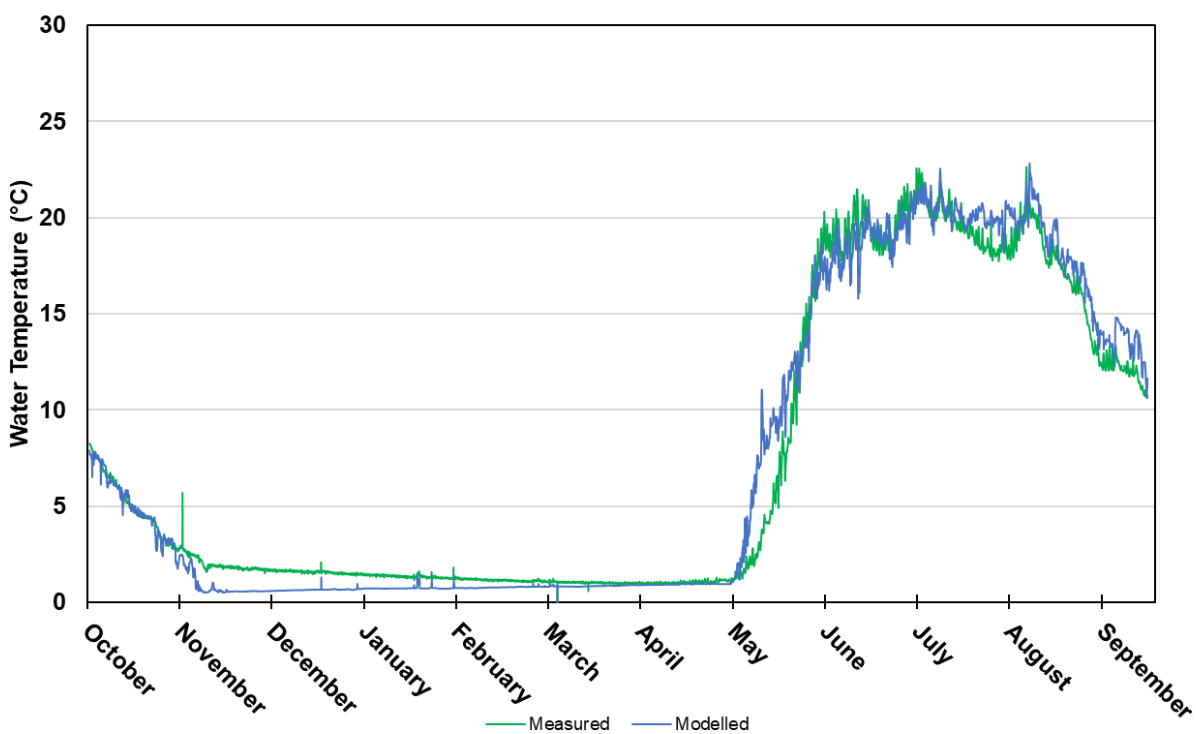


Figure 16: Modelled Water Temperature Performance at CAT Plant (Bottom)

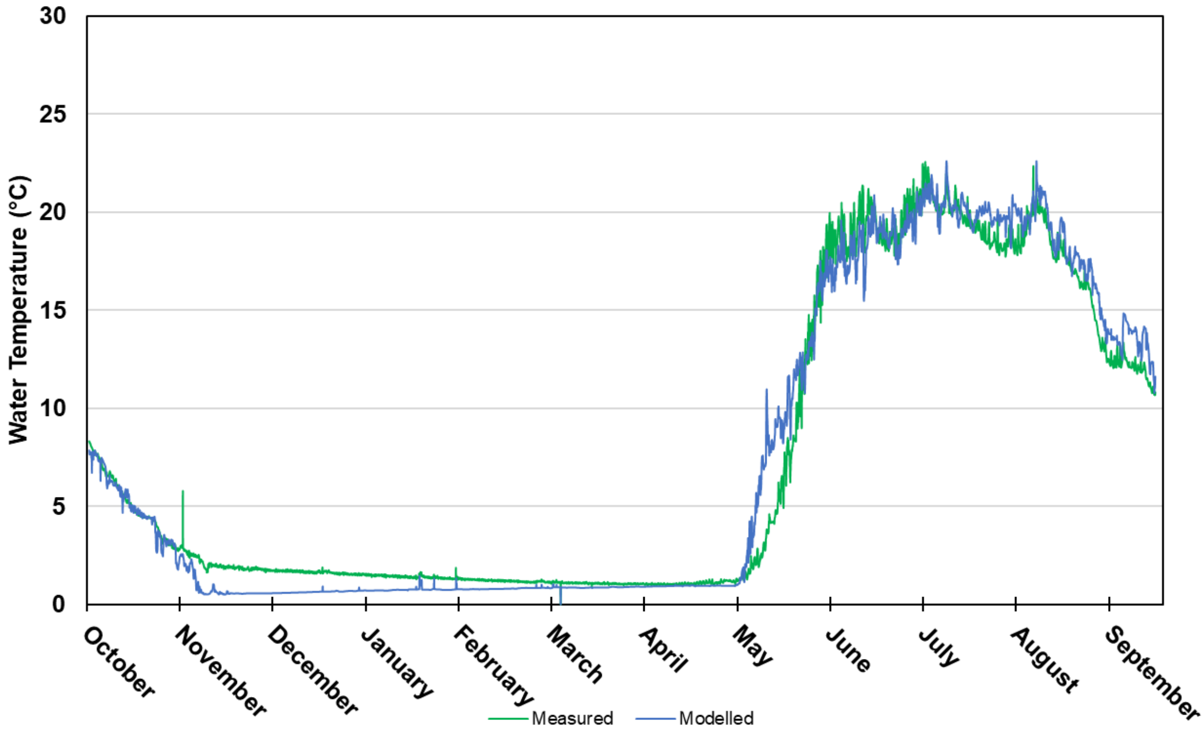


Figure 17: Modelled Water Temperature Performance at K Plant (Top)

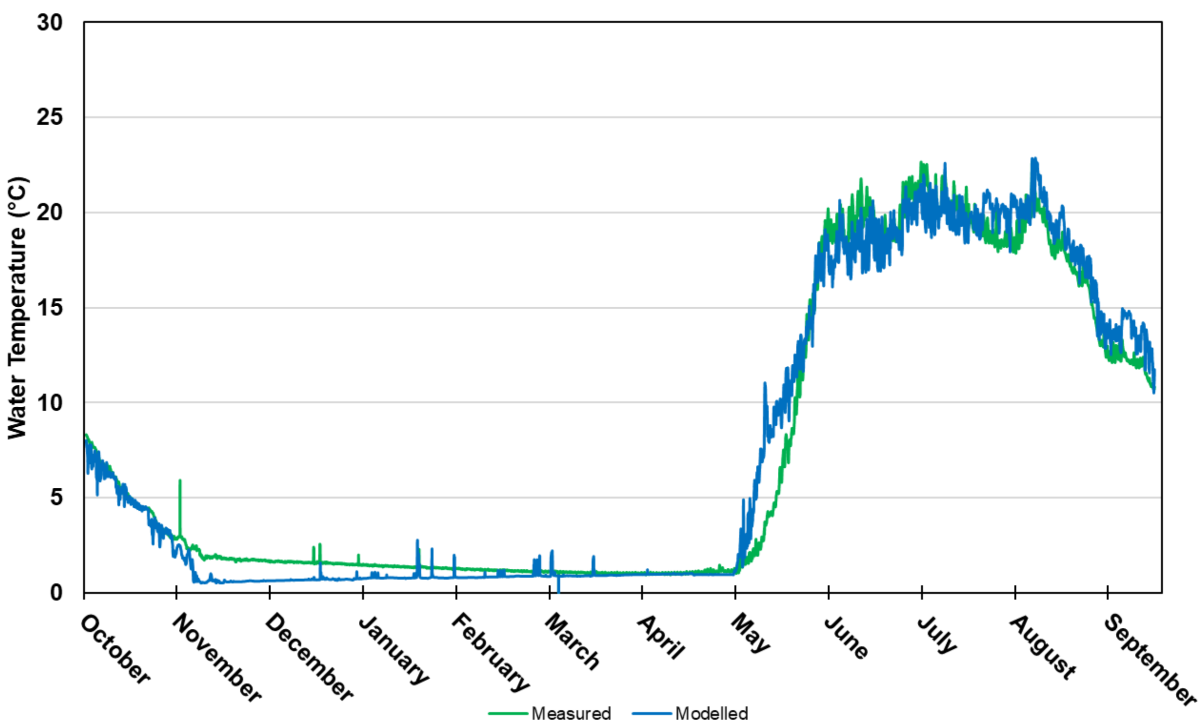


Figure 18: Modelled water Temperature Performance at K Plant Bottom

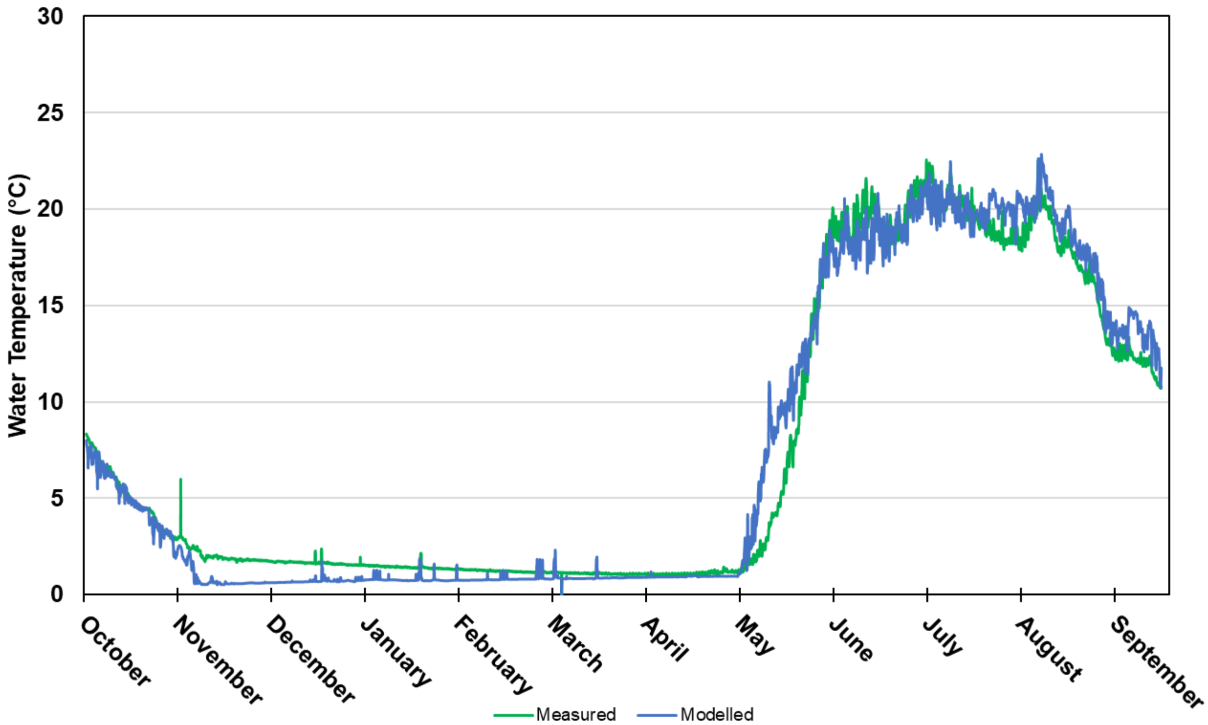


Figure 19: Modelled Water Temperature Performance at Southwest Bay (Top)

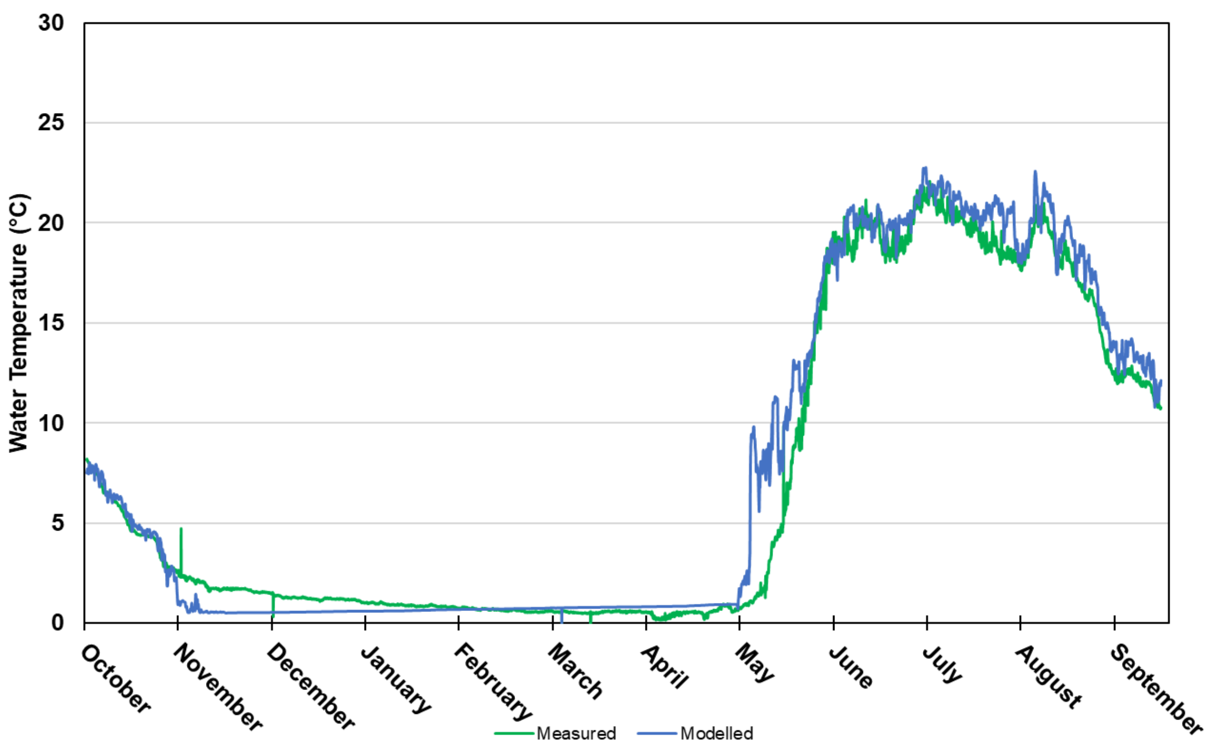


Figure 20: Modelled Water Temperature Performance at Southwest Bay (Middle)

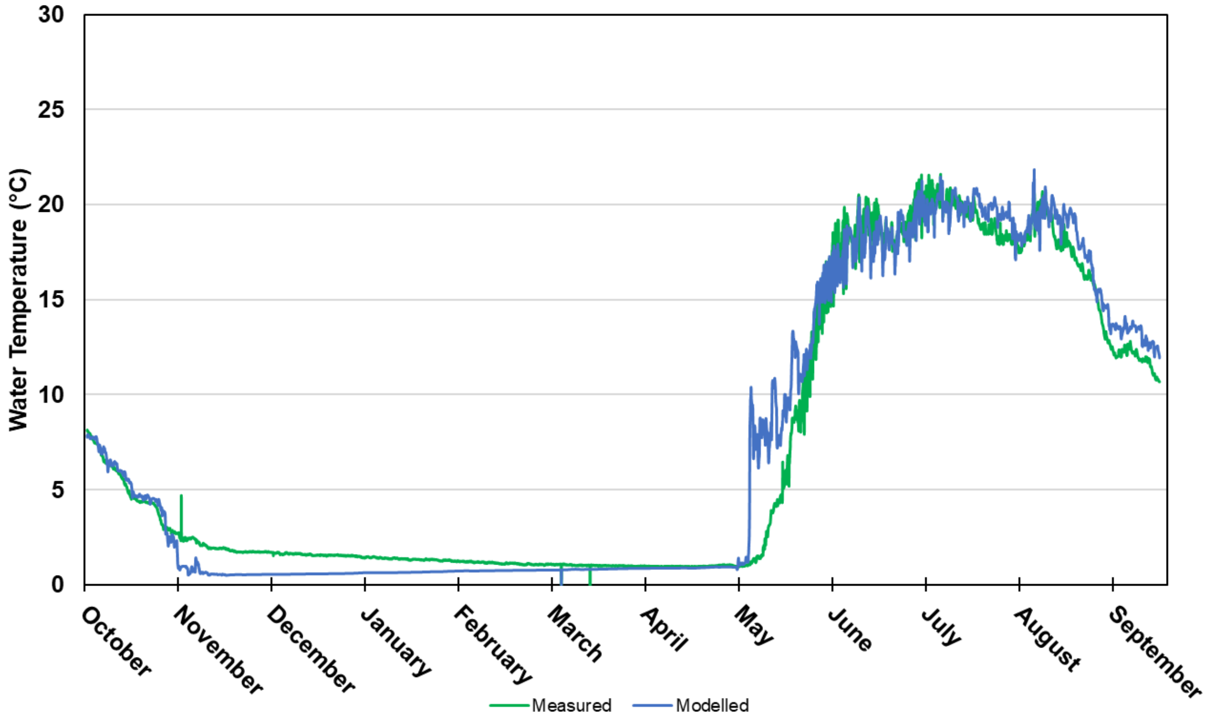


Figure 21: Modelled Water Temperature Performance at Southwest Bay (Bottom)

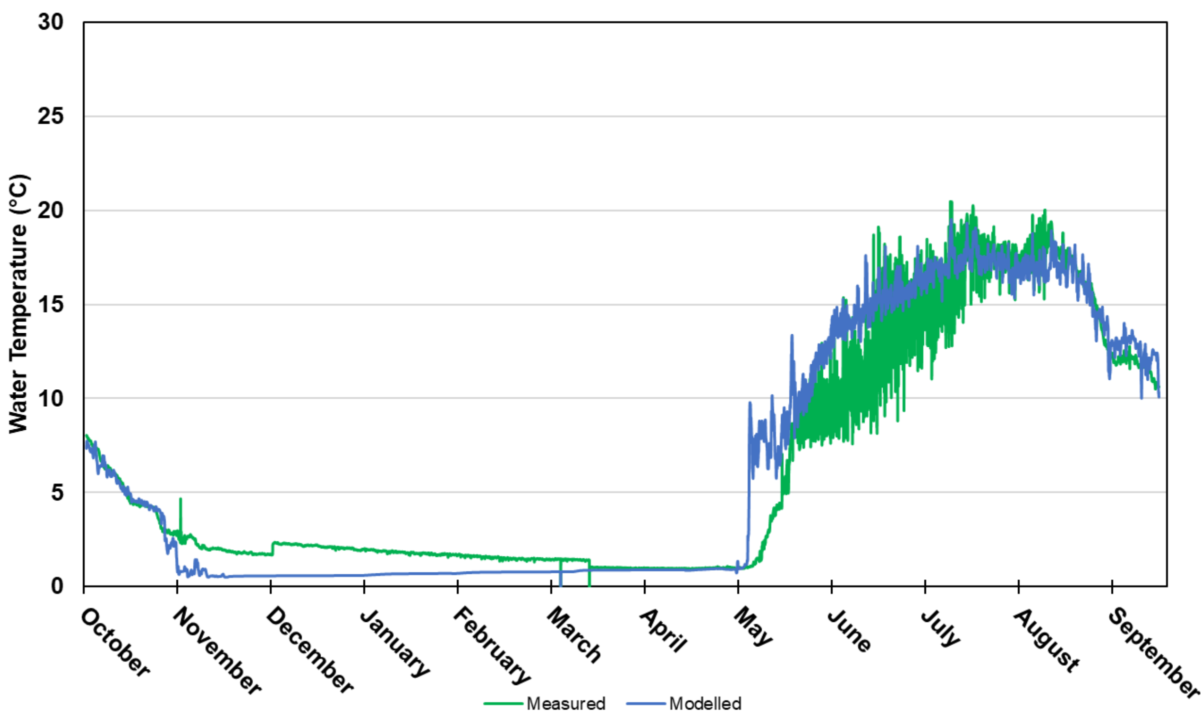


Figure 22: Modelled Water Temperature Performance at Mid lake (Top)

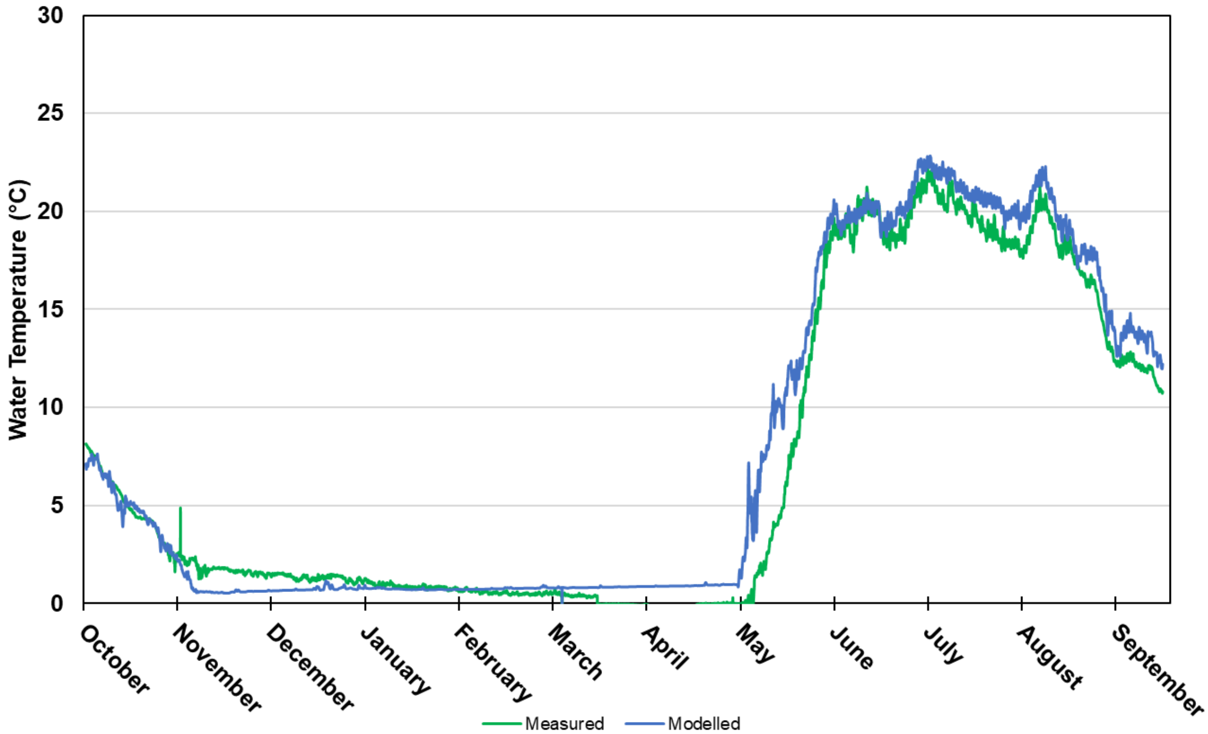


Figure 23: Modelled Water Temperature Performance at Mid Lake (Middle)

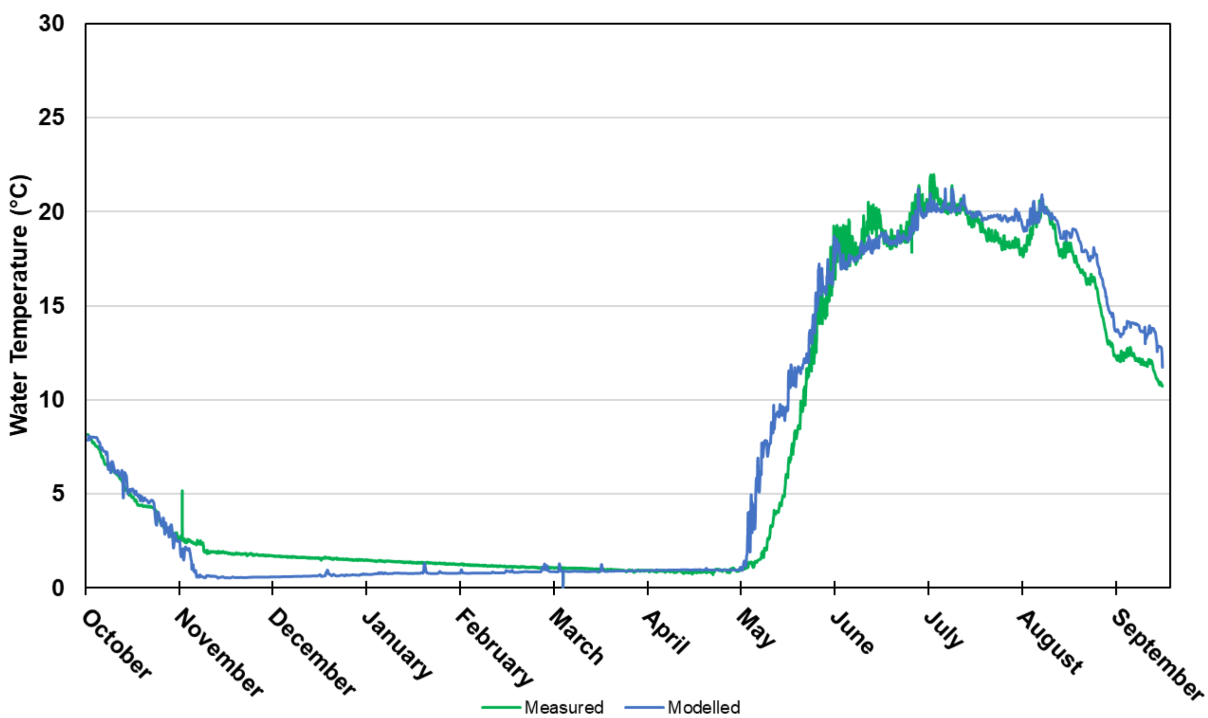


Figure 24: Modelled Water Temperature Performance at Mid Lake (Middle 2)

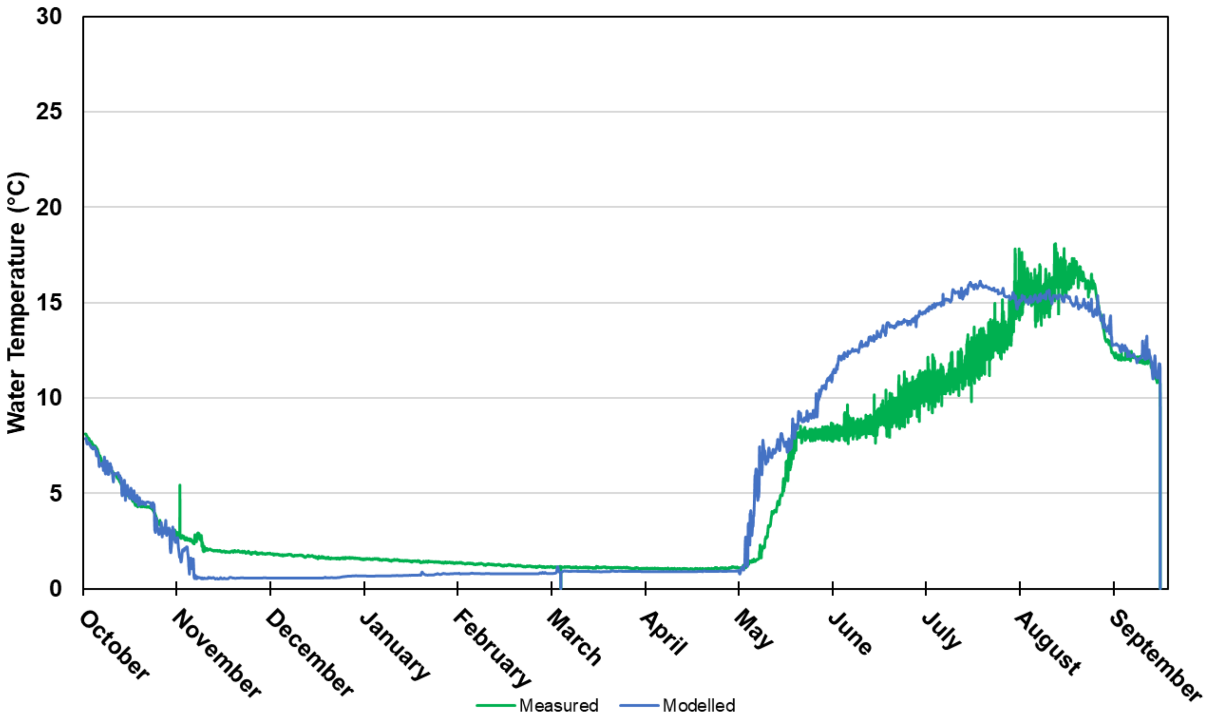
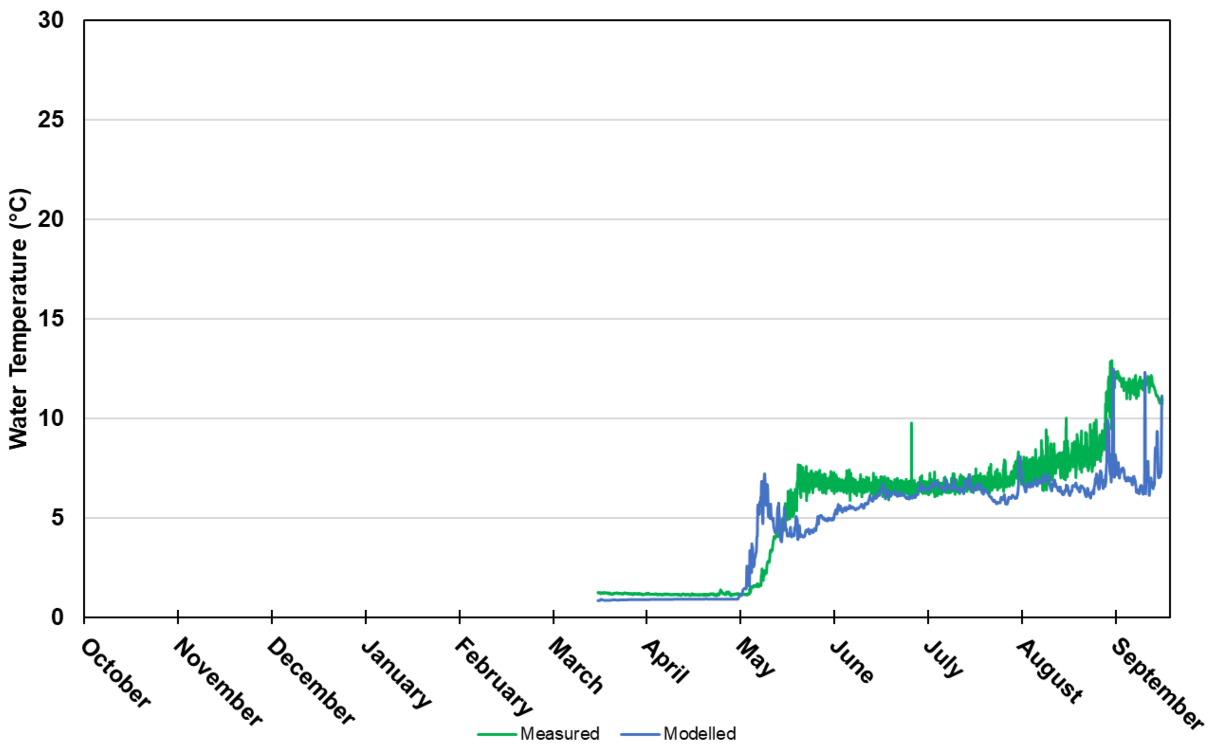


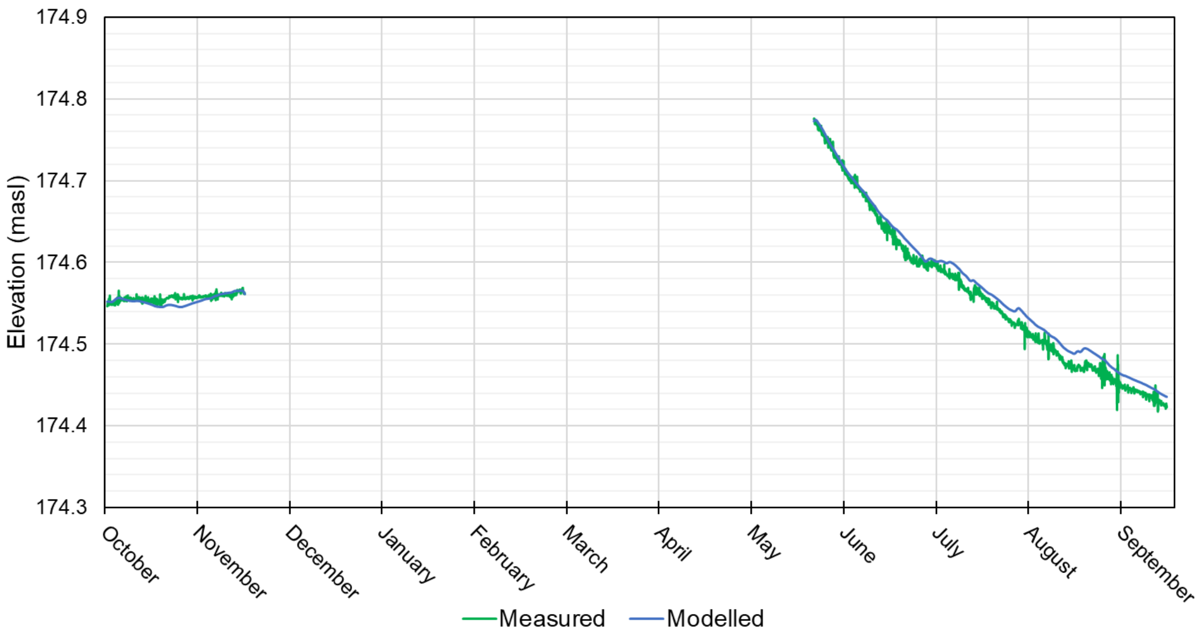
Figure 25: Modelled Water Temperature Performance at Mid Lake (Bottom)



3.2.1.2 Water Level Calibration Results

The performance metrics for modelled water level elevations for the period between 6 October 2021 and 21 November 2021 and between 1 June 2022 and 27 September 2022 delivered an RMSE of 0.01 m and a correlation coefficient of 0.99. A visual examination of modelled and measure water levels over these periods are provided in Figure 26. In summary, the model can provide a very good replication of observed water level conditions during the ice-free period.

Figure 26: Modelled Water Level Performance during Ice-Free Period between 6 October 2021 and 27 September 2022



3.2.2 Model Validation Results

The performance metrics at each thermal validation location (EMD Plant and Northwest Bay) are presented in Table 9, with graphical illustrations of performance at each calibration location provided in Figures 27 through 32. As for the calibration locations, the results presented are indicative of extremely high performance with some minor temporal issues resulting in accelerated cooling of the water column following ice cover relative to observed water temperatures and slightly accelerated heating of the water column following ice cover. The statistical metrics are all well within the range of published literature values and verify the model can deliver good performance at all evaluated water temperature stations used during the calibration and validation process.

Table 9: Water Temperature Validation Performance for Jackfish Lake

Calibration Location	RMSE (°C)	Correlation Coefficient
EMD Bottom	1.34	0.98
EMD Middle	1.13	0.99
EMD Top	1.60	0.99
Northwest Bay Bottom	1.46	0.99
Northwest Bay Middle	1.21	0.99
Northwest Bay Top	1.23	0.99

RMSE = Root Mean Squared Error.

Figure 27: Modelled Water Temperature Performance at EMD Plant (Top)

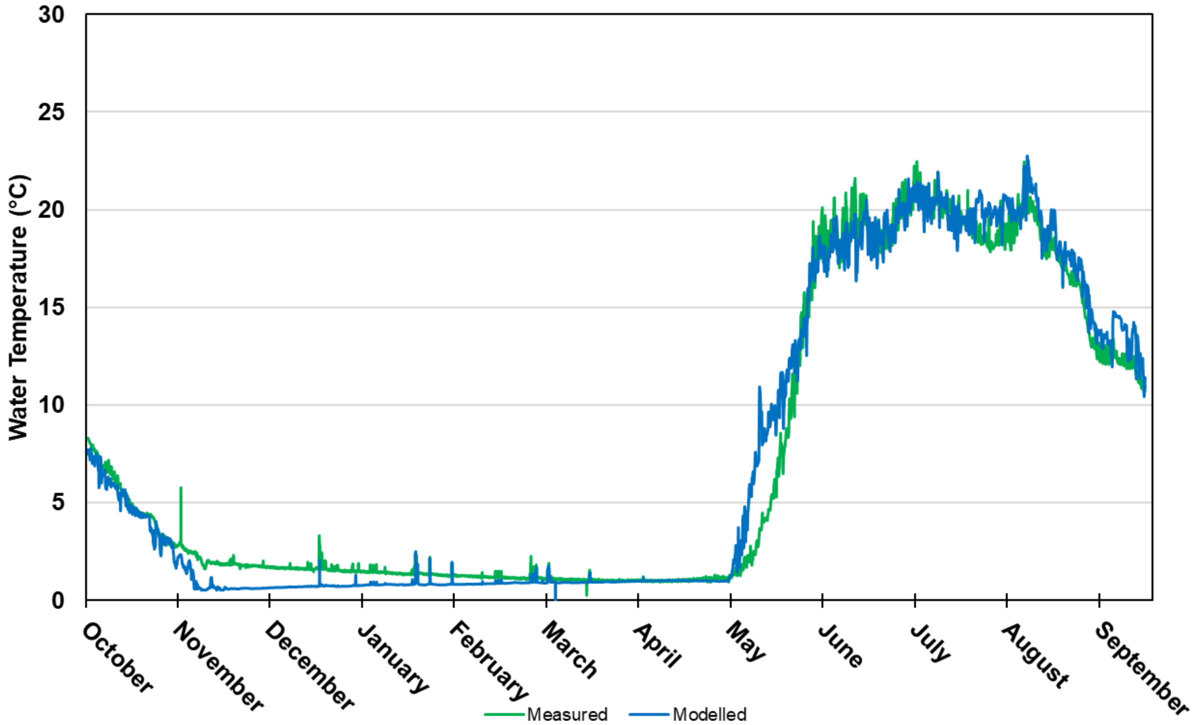


Figure 28: Modelled Water Temperature Performance at EMD Plant (Middle)

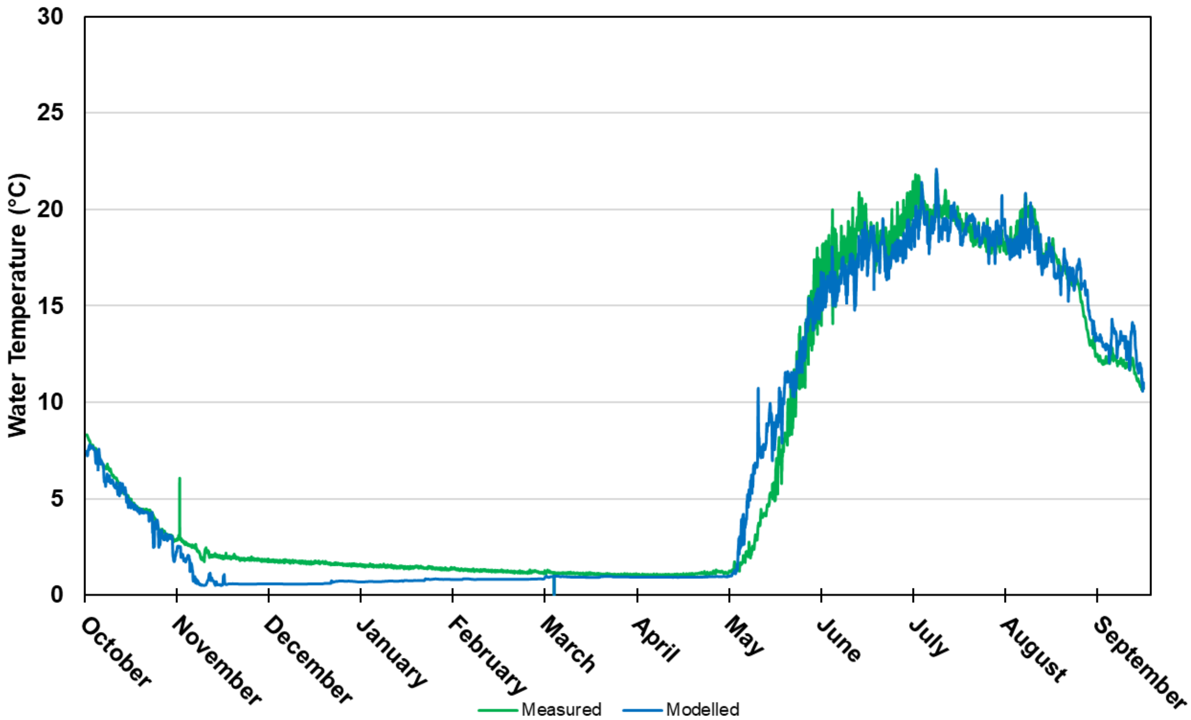


Figure 29: Modelled Water Temperature Performance at EMD Plant (Bottom)

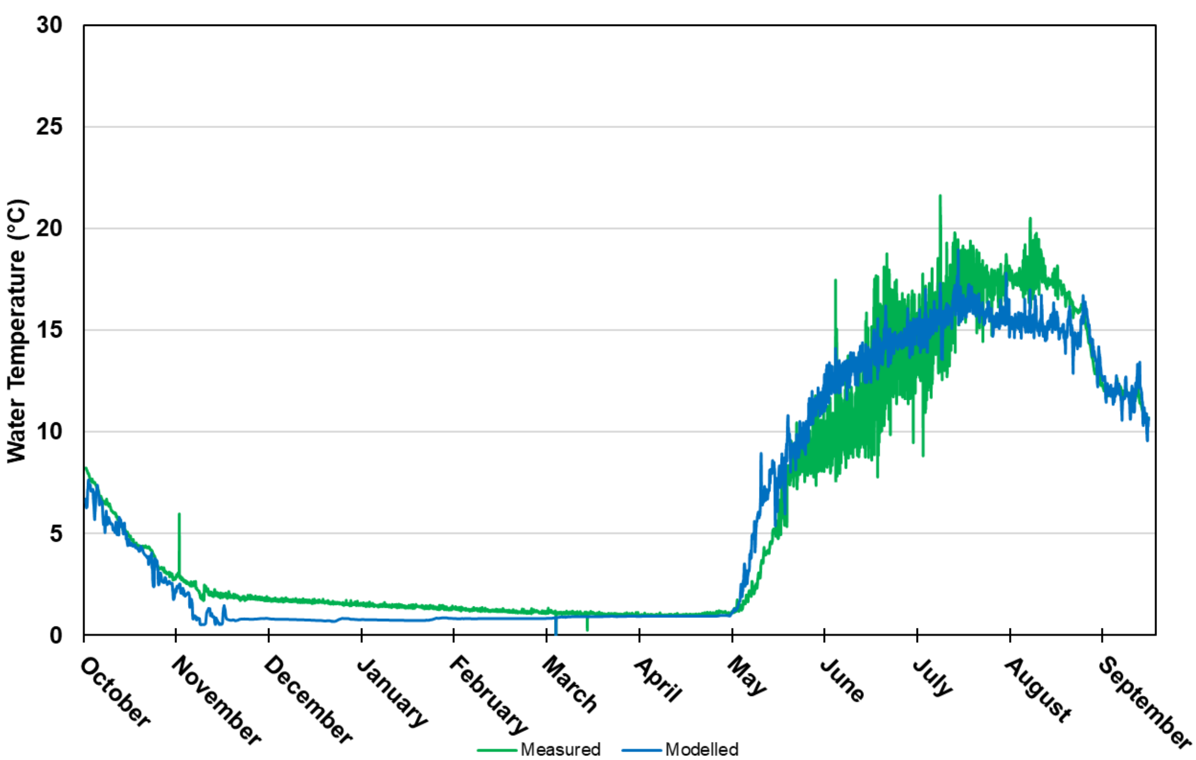


Figure 30: Modelled Water Temperature Performance at Northwest Bay (Top)

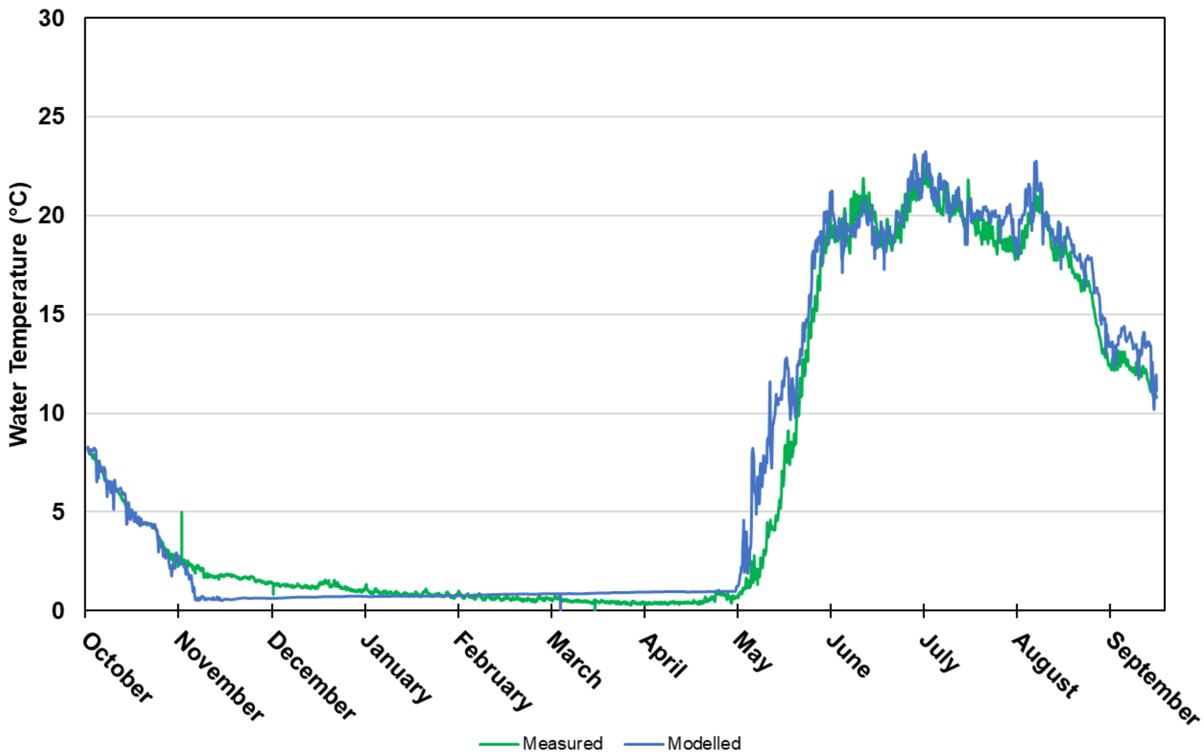


Figure 31: Modelled Water Temperature Performance at Northwest Bay (Middle)

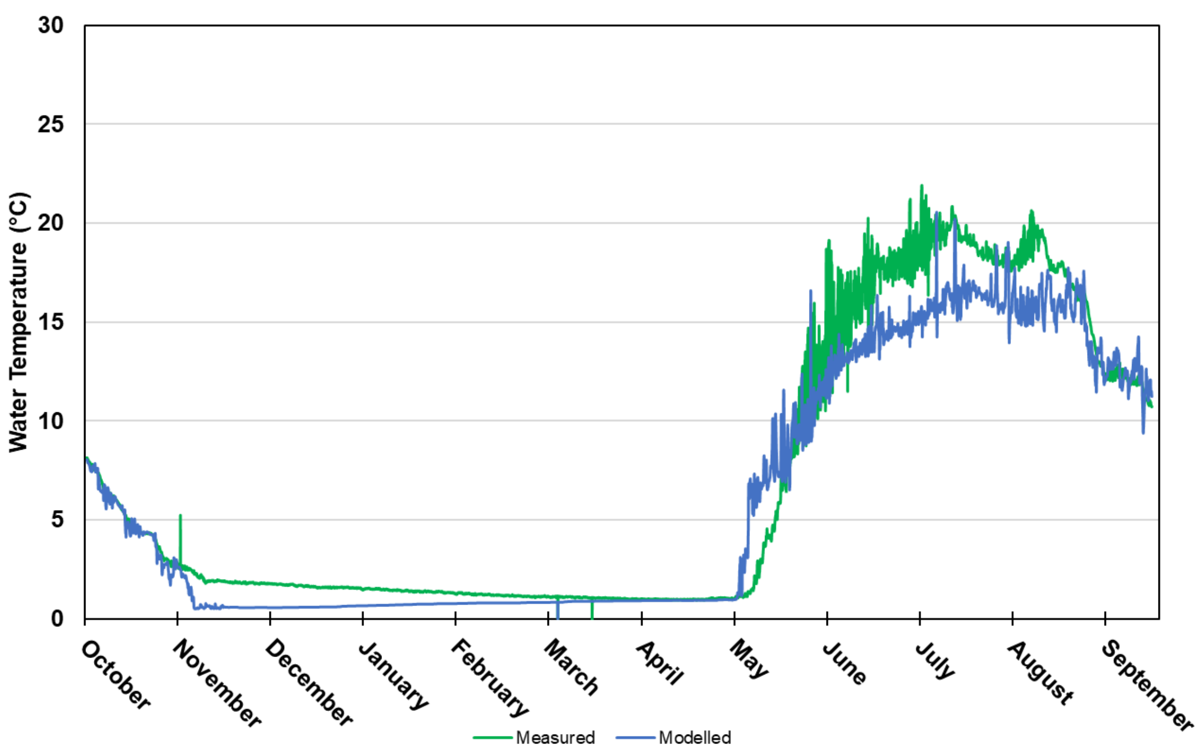
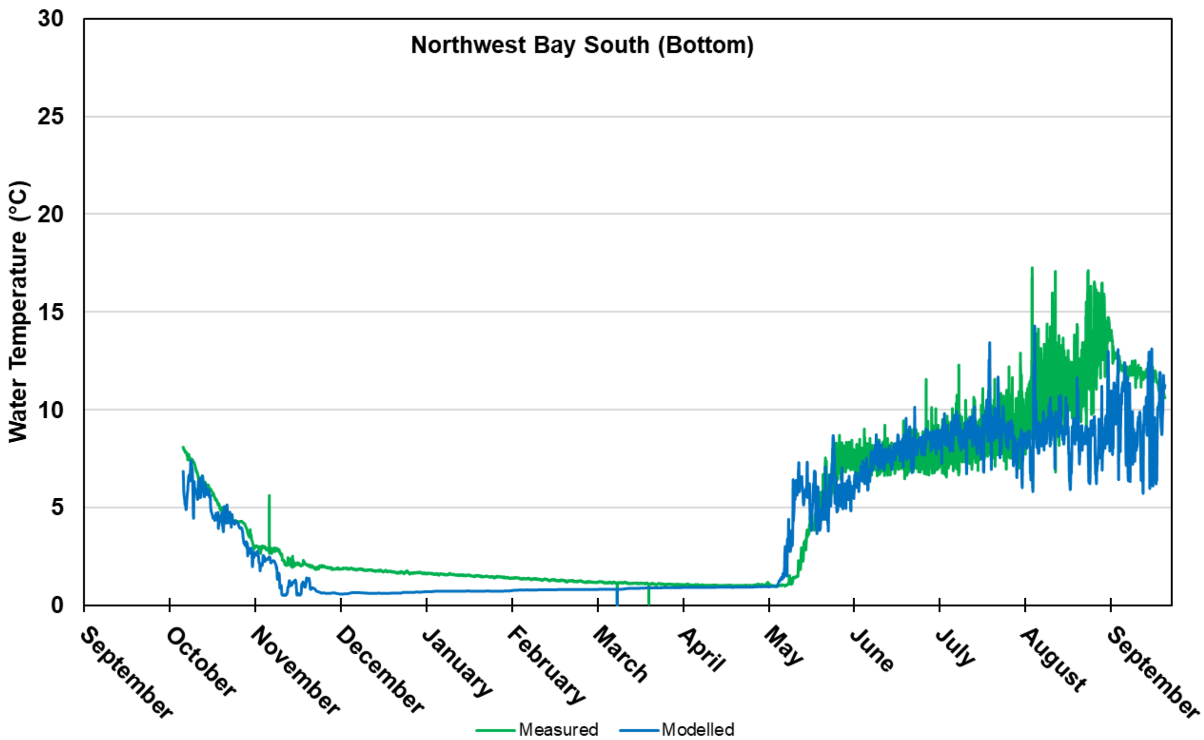


Figure 32: Modelled Water Temperature Performance at Northwest Bay (Bottom)



3.2.3 Model Performance Findings

Model calibration and validation metrics show that model performance is well within industry standards for three-dimensional models and particularly good for shallow lake environments. Like all sophisticated modelling platforms, perfect 3D-model performance is not expected to be achievable and has never been achieved based on our professional knowledge of the industry.

It should be noted that model error is expected to remain reasonably consistent between operational and non-operational conditions, seeing as the thermal dynamics of this lake are primarily driven by meteorological influences, rather than operational influences. Given that the extent of operational effects reported in this study is determined by subtracting the non-operational scenario results at each model node, and for each time step, from operational scenario results, error in presented modelling results is expected to be relatively consistent between simulation scenarios, and well within the model performance metrics presented.

It should also be noted that RMSE (detailed in Section 3.1.2) does not represent a simple arithmetic average of model error (which would be much lower than presented) but is developed using a root-mean squared error approach which provides a more conservative representation of model performance.

4.0 ENVIRONMENTAL AND OPERATIONAL SCENARIOS CONSIDERED FOR PRODUCTION SIMULATIONS

The following subsections detail the environmental and operational scenarios considered for production simulations that pertain to the results presented in Section 6.

4.1 Environmental Conditions

Several environmental conditions corresponding to the October 2021 through September 2022 study period were considered for the purposes of production simulations to address the objectives of the thermal plume study for Jackfish Lake. The following environmental scenarios were considered:

- The full study period, for the purposes of developing actual median and maximum (95^{th} percentile) water temperatures under measured operational conditions as well as for developing median and maximum (95^{th} percentile) temperature differences (delta Ts) at lake surface and lake bottom relative to non-operational conditions.
- Thermal discharges did not occur during each of the seasonal conditions when thermal plume representations were stated in the Thermal Plume Delineation Study Design Plan (Golder 2021). Instead, for the purposes of providing a meaningful output, hypothetical operational implications resulting from seasonal event-based discharges during each of the seasonal conditions requested by regulators were examined:
  - late fall (simulated to coincide with environmental conditions between 21 October 2021 at 00:00 and 25 October 2021 at 00:00)
  - late winter immediately before ice break up (simulated to coincide with environmental conditions between 10 April 2022 at 00:00 and 14 April 2022 at 00:00)
  - spring freshet, (simulated to coincide with environmental conditions between 25 May 2022 at 00:00 and 29 May 2022 at 00:00)
  - early summer, (simulated to coincide with environmental conditions 1 July 2022 at 00:00 and 5 July 2022 at 00:00)
  - late summer (simulated to coincide with environmental conditions between 1 August 2022 at 00:00 and 5 August 2022 at 00:00)

It is noted that all environmental conditions coinciding with the above simulation windows were directly developed from operational and hydrological conditions obtained from government or field-measured data.

4.2 Operational Conditions

Production simulations were carried out to simulate thermal influences on Jackfish Lake for the following operational scenarios:

- ***Non-Operational Conditions*** – between 6 October 2021 and 27 September 2022 to establish environmental baseline conditions against which to compare operational effects on Jackfish Lake.
- ***Measured Operational Conditions*** – between 6 October 2021 and 27 September 2022 corresponding to the screened operational output documented in Section 2.4.8.3.
- ***Hypothetical Operational Conditions*** – corresponding to the maximum combined operational heat output event recorded in screened operational data between 23 December 2021 at 12:30 and 25 December 2021 at 19:00. This operational scenario was selected in the absence of operational outputs during some seasonal conditions to ensure that hypothetical operational effects during the seasonal event-based conditions could be quantified in a meaningful manner.

4.3 Simulated Model Scenarios

Table 10 outlines the model scenarios developed and simulated for the purposes of examining the combined effects of operational/non-operational and measured environmental conditions. Corresponding results are presented in Section 6.

Table 10: Model Scenarios simulated for the Purposes of Establishing Operational Effects on Jackfish Lake

Model Scenario	Simulation Period	Operational Condition	Environmental Condition
Non-Operational Scenario	6 Oct 2021 to 27 Sep 2022	No heat load applied	As measured between 6 Oct 2021 and 27 Sep 2022
Measured Operational Scenario	6 Oct 2021 to 27 Sep 2022	Measured heat load for 6 Oct 2021 to 27 Sep 2022 applied (Section 2.4.8.3)	As measured between 6 Oct 2021 and 27 Sep 2022
Hypothetical Operational Scenario – Late Fall	21 Oct 2021 to 25 Oct 2021	Measured heat load (Section 2.4.8.3) for 23 Dec 2021 to 25 Dec 2021 applied to 21 Oct 2021 to 23 Oct 2021	As measured between 21 Oct 2021 to 25 Oct 2021
Hypothetical Operational Scenario – Late Winter	10 Apr 2022 to 14 Apr 2022	Measured heat load (Section 2.4.8.3) for 23 Dec 2021 to 25 Dec 2021 applied to 10 Apr 2022 to 16 Apr 2022	As measured between 10 Apr 2022 to 14 Apr 2022
Hypothetical Operational Scenario – Spring Freshet	25 May 2022 to 29 May 2022	Measured heat load (Section 2.4.8.3) for 23 Dec2021 to 25 Dec 2021 applied to 25 May 2022 to 27 May 2022	As measured between 25 May 2022 to 29 May 2022
Hypothetical Operational Scenario – Early Summer	1 Jul 2022 to 5 Jul 2022	Measured heat load (Section 2.4.8.3) for 23 Dec 2021 to 25 Dec 2021 applied to 1 Jul 2022 to 3 Jul 2022	As measured between 1 Jul 2022 to 7 Jul 2022
Hypothetical Operational Scenario – Late Summer	1 Aug 2022 to 5 Aug 2022	Measured heat load (Section 2.4.8.3) for 23 Dec 2021 to 25 Dec 2021 applied to 1 Aug 2022 to 3 Aug 2022	As measured between 1 Aug 2022 to 5 Aug 2022

5.0 MODEL ASSUMPTIONS AND LIMITATIONS

A number of assumptions and limitations apply to the information presented in this report, including:

- All operational data screened into the assessment, including minor gap-filling and adjustments, provide a reasonably accurate representation of operational heat loads discharged from the plant during the October 2021 through September 2022 monitoring period.
- Ice thickness remained consistent across Jackfish Lake for the duration of ice cover.
- Minor infilling of meteorological data, where short data gaps were identified, provides acceptable characterizations of conditions at the time.
- Simulation of natural inflows to Jackfish Lake to maintain the water balance and substrate temperatures under Jackfish Lake required to match the lake's thermal profiles represent a reasonable proxy for actual conditions.
- Synthesis of natural inflow temperatures using a modified interpretation of air temperatures, when inflows are active, are a reasonable approximation of actual conditions.
- Orifice sizes for each discharge, estimated using CORMIX to match turbulent mixing zones observed in Google Earth imagery, are reasonable.

6.0 RESULTS

6.1 Foreword

Complex thermal and hydrodynamic processes are simulated within the Jackfish Lake model that include the combined cumulative and inter-linked hydrodynamic and thermodynamic effects of meteorological variations, substrate temperature variations, and operational variations, among others. These effects can manifest themselves in slightly modified temperatures throughout the domain when localized changes in one area of the lake are caused by the accumulation of thermal load from operations that remained small throughout the 2021 through 2022 monitoring period. As such, while the emphasis of operational effects is maintained in the presentation of results, it should be noted that ancillary effects that can cause increases or decreases over non-operational conditions do not necessarily reflect the direct effects of operational thermal loads introduced to the lake. These effects can occur within isolated areas of the lake as a result of minor modified thermal structures that can be unrelated to operational effects. In such instances, small phasal shifts in temperature fluctuations of an hour or more can yield results that do not directly represent the effect of thermal loadings from operations.

As a result of these infrequent and low heat loads introduced to the lake over the 2021 through 2022 monitoring period, comparisons of 95th percentile and median plume delineations for operational effects were rendered largely meaningless under the seasonal scenarios requested by regulators. Accordingly, presented results include annual 95th percentile thermal plume and median thermal plume plots for measured operational effects alone, while hypothetical operational discharges (discussed in Section 2.4.8.3) were simulated during each seasonal condition to provide an indication of thermal effects relating to the maximum discharge event recorded over the monitoring period.

The following subsection presents modelling results in a number of formats intended to confer an easily interpreted means of surface and bottom temperatures in Jackfish Lake between 6 October 2021 and 27 September 2022, the effect of operational influences on these and, lastly, the effect that hypothetical operational discharges, measured at the facility between 23 and 25 December 2021 would have during each of the seasonal conditions requested by regulators.

6.2 Water Temperatures in Jackfish Lake under Measured Operational Conditions - October 2021 through September 2022

The 95th percentile plots of measured operational conditions at lake surface and lake bottom between 6 October 2021 and 27 September 2022 (noting that no operational conditions were simulated from 1 August 2022 onwards) are provided in Figures 33 and 34, respectively. Given that operational discharges over a delta-T of 1°C occur less than five percent of the simulation period, both figures largely reflect a natural thermal state for Jackfish Lake, with some minor exceptions. Surface temperatures reflect warmer surface temperatures within the deeper portions of the lake resulting from atmospheric heating throughout the ice-free period, while cooler surface temperatures in the shallows along the southwestern, western, and northern shorelines reflect the influence of cooler substrate temperatures. The surface area around the discharges reflects the influence of continuous circulation of cooler bottom waters being drawn in via the intakes and discharged to surface through the system when heat loads are rarely applied. Bottom temperatures within the deeper portion of the lake remain less warm due to the influence of cooler substrate temperatures and reduced light penetration with depth, while 95th percentile bottom temperatures in the shallows remain warmer and close to, though slightly below 95th percentile surface temperatures at those locations.

In brief, very little operational influence, other than the circulation of cooler bottom waters through the plant cooling systems, is visually detectable under measured conditions, largely because operational discharges equal to or greater than 1°C occur for less than five percent of the simulation period.

LEGEND

HIGHWAY

LOCAL ROAD

ABSOLUTE TEMPERATURE (SURFACE) - 95TH PERCENTILE

High : 20.78

Low : 6.21

0 100 200

1:7,000 METRES

REFERENCE(S)

HYDROGRAPHY AND ROAD DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. IMAGERY COPYRIGHT © 20220817 ESRI AND ITS LICENSORS. SOURCE: DIGITAL GLOBE. USED UNDER LICENSE, ALL RIGHTS RESERVED.
PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

ANNUAL 95TH PERCENTILE LAKE TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE DURING MEASURED OPERATIONS

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	MLE
PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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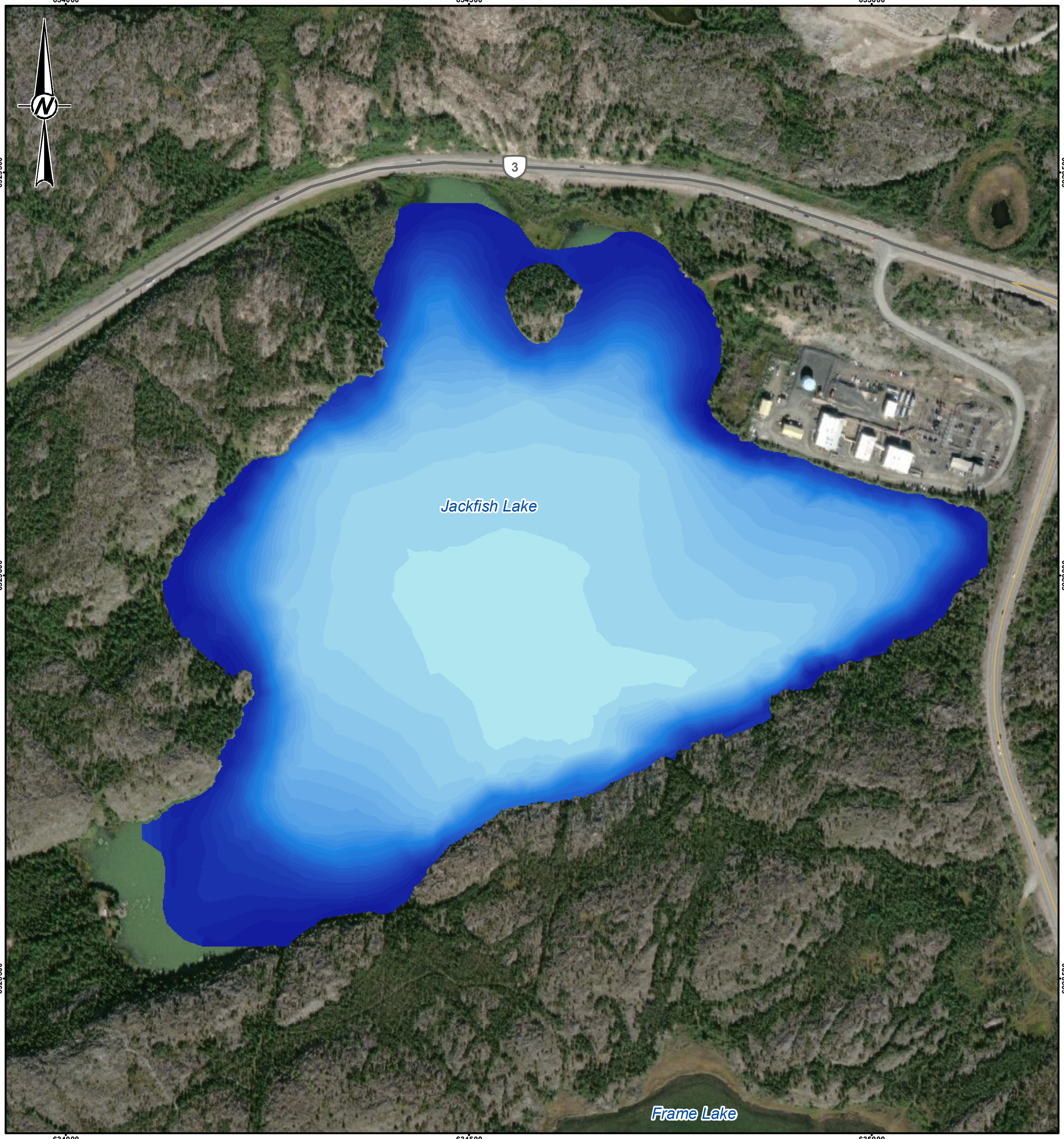

LEGEND

HIGHWAY

LOCAL ROAD

ABSOLUTE TEMPERATURE (BOTTOM) - 95TH PERCENTILE

High : 20.78

Low : 6.21

0 100 200

1:7,000 METRES

REFERENCE(S)

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CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

ANNUAL 95TH PERCENTILE LAKE TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM DURING MEASURED OPERATIONS

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
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PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
21482915		0	34

6.3 Effect of Measured Operational Discharges on Jackfish Lake – October 2021 through September 2022

The notable absence of visually detectable thermal impacts on Jackfish Lake are illustrated in Figures 35 through 38. These figures provide a visualization of the 95th percentile temperature differences between measured and operational conditions (Figures 35 and 37), as well as 50th percentile (median) temperature differences between measured and operational conditions (Figures 36 and 38).

The 95th percentile (Figure 35) and median temperature (Figure 36) differences at the lake surface resulting from operational effects indicate that the thermal effects of measured operations over the simulation window were extremely small. i.e., generally between 0.2°C and 0.4°C and between 0°C and 0.2°C, respectively. Similar increases in temperature were observed at lake bottom, with the 95th percentile temperature increase amounting to between 0.1°C and 0.4°C (Figure 37), and the median temperature increase amounting to between 0°C and 0.2°C (Figure 38). These changes largely reflect the residual effects of assimilated temperature increases after discharges have occurred, which collectively occur less than five percent of the time at an increase of 1°C or higher. The 95th percentile and median aerial extents of operational effects on Jackfish Lake are presented in Tables 11 and 12.

These findings indicate that the magnitude of thermal effects from operational heat loads applied to the lake was relatively small from over the October 2021 through July 2022 (after which operational data were screened out) simulation period.

Table 11: Aerial Extent of 95th Percentile and Median Measured Operational Effects on Jackfish Lake at Lake Surface (6 October 2021 to 27 September 2022 Simulation Period)

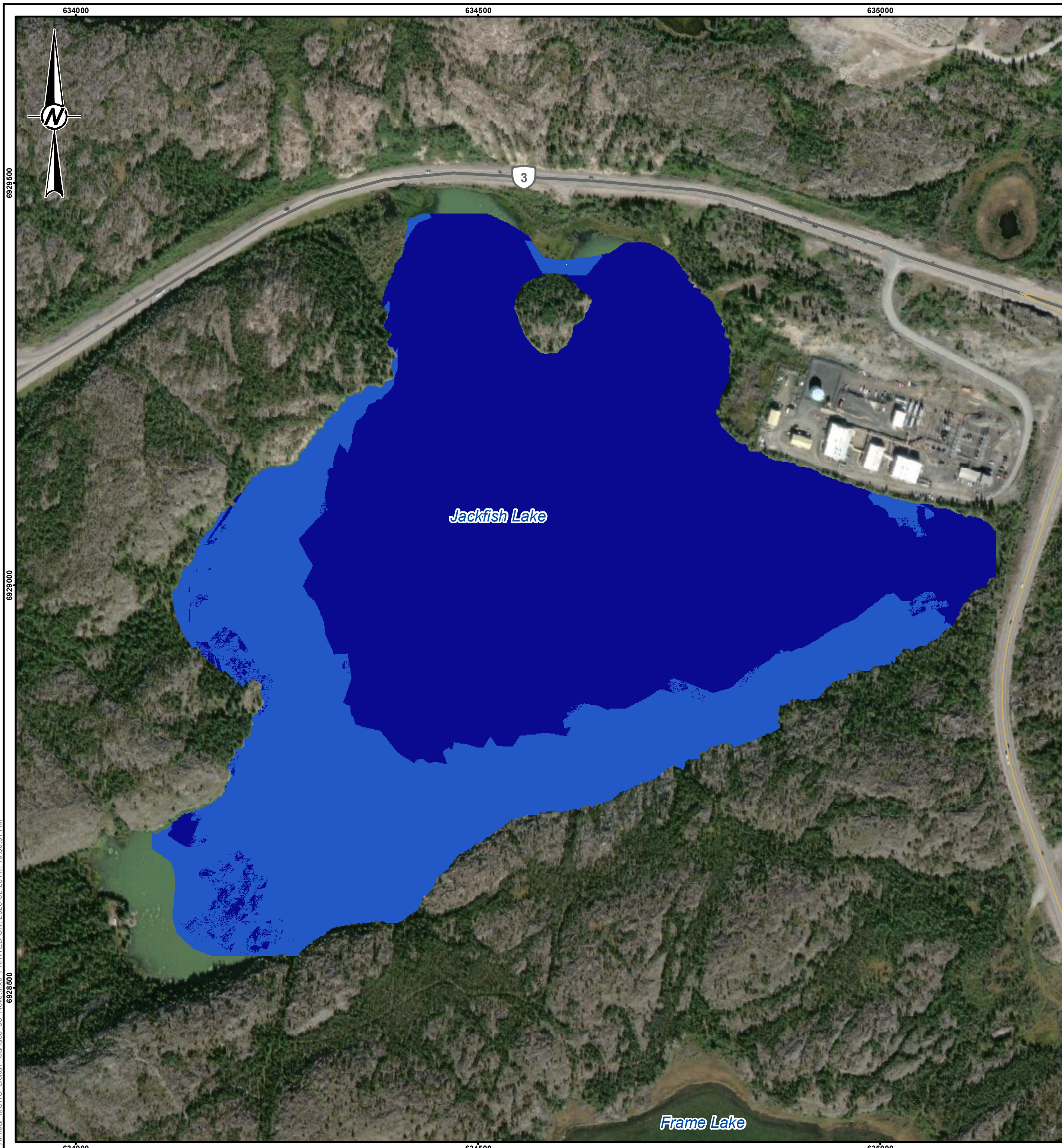
Temperature Effect	95th Percentile Extents (ha)	95th Percentile Extents (% of Extracted Area)	50th Percentile Extents (ha)	50th Percentile Extents (% of Extracted Area)
0°C to 0.1°C	-	-	35.9	70
0.1°C to 0.2°C	-	-	15.4	30
0.2°C to 0.3°C	18.7	36	-	-
0.3°C to 0.4°C	32.6	62	-	-
0.4°C to 0.5°C	0.9	2	-	-

ha = hectares

Table 12: Aerial Extent of 95th Percentile and Median Measured Operational Effects on Jackfish Lake at Lake Bottom (6 October 2021 to 27 September 2022 Simulation Period)

Temperature Effect	95th Percentile Extents (ha)	95th Percentile Extents (% of Extracted Area)	50th Percentile Extents (ha)	50th Percentile Extents (% of Extracted Area)
0°C to 0.1°C	-	-	33.8	66
0.1°C to 0.2°C	0.1	0	17.5	34
0.2°C to 0.3°C	0.2	0	-	-
0.3°C to 0.4°C	49.4	96	-	-
0.4°C to 0.5°C	1.1	2	-	-
0.5°C to 0.6°C	0.4	1	-	-
0.6°C to 0.7°C	0.1	0	-	-
0.7°C to 0.8°C	0.0	0	-	-
0.8°C to 0.9°C	0.0	0	-	-
0.9°C to 1.0°C	0.0	0	-	-

ha = hectares; “-“ = not applicable.



LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0.3 - 0.4

0 100 200

1:7,000 METRES

REFERENCE(S)

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CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

ANNUAL 95TH PERCENTILE MEASURED OPERATIONAL EFFECT TEMPERATURES IN JACKFISH LAKE AT SURFACE

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	MLE
PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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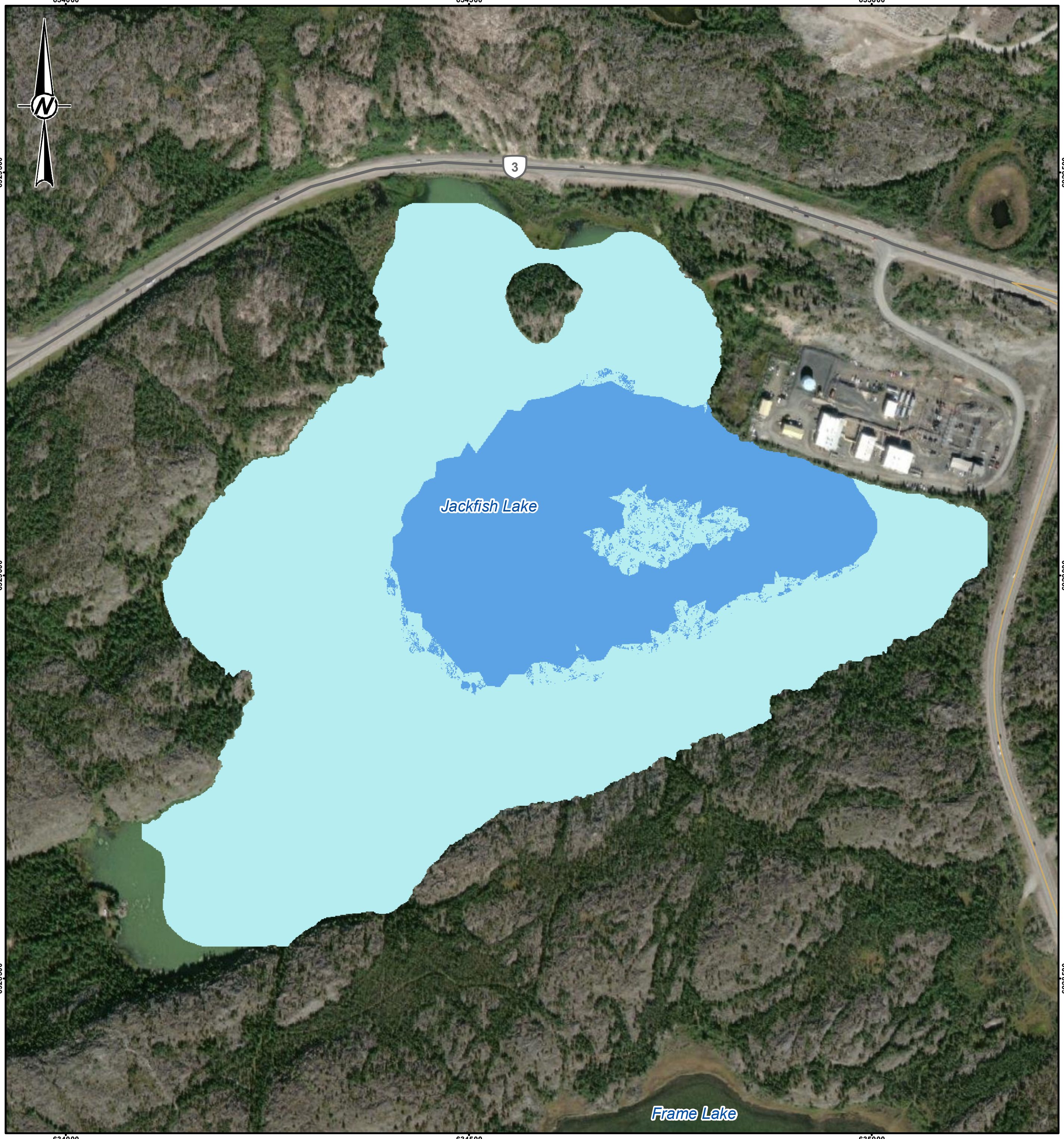

LEGEND

- HIGHWAY
- LOCAL ROAD

DELTA T (SURFACE) - 50TH PERCENTILE

- 0 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4

0 100 200

1:7,000 METRES

REFERENCE(S)

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PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

ANNUAL MEDIAN MEASURED OPERATIONAL EFFECT TEMPERATURES IN JACKFISH LAKE AT SURFACE

CONSULTANT

wsp

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PROJECT NO.	CONTROL	REV.	FIGURE
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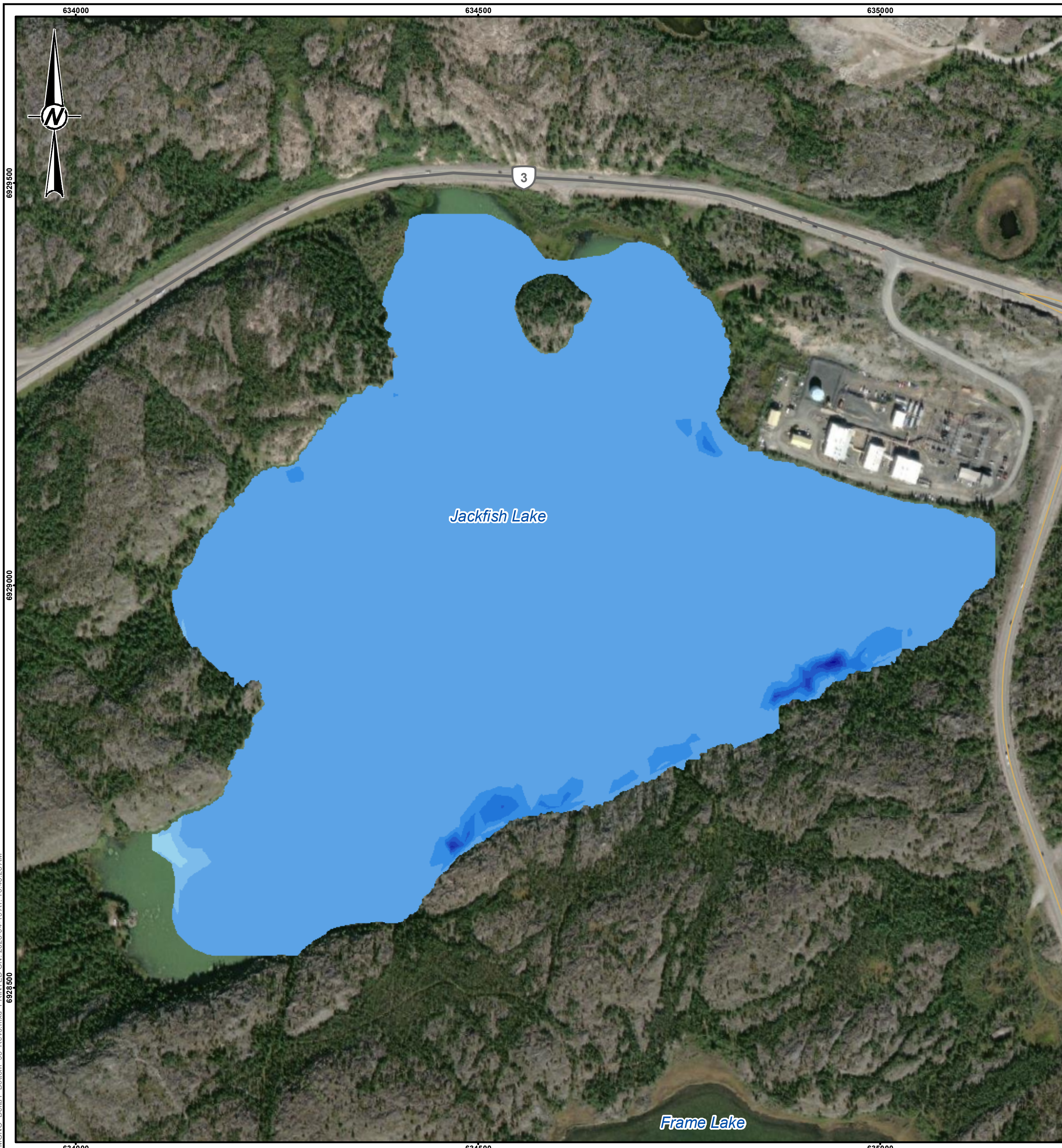

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM - 95TH PERCENTILE

0 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0

0 100 200
1:7,000 METRES

REFERENCE(S)

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PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

ANNUAL 95TH PERCENTILE MEASURED OPERATIONAL EFFECT TEMPERATURES IN JACKFISH LAKE AT BOTTOM

CONSULTANT

wsp

YYYY-MM-DD	2023-04-19
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APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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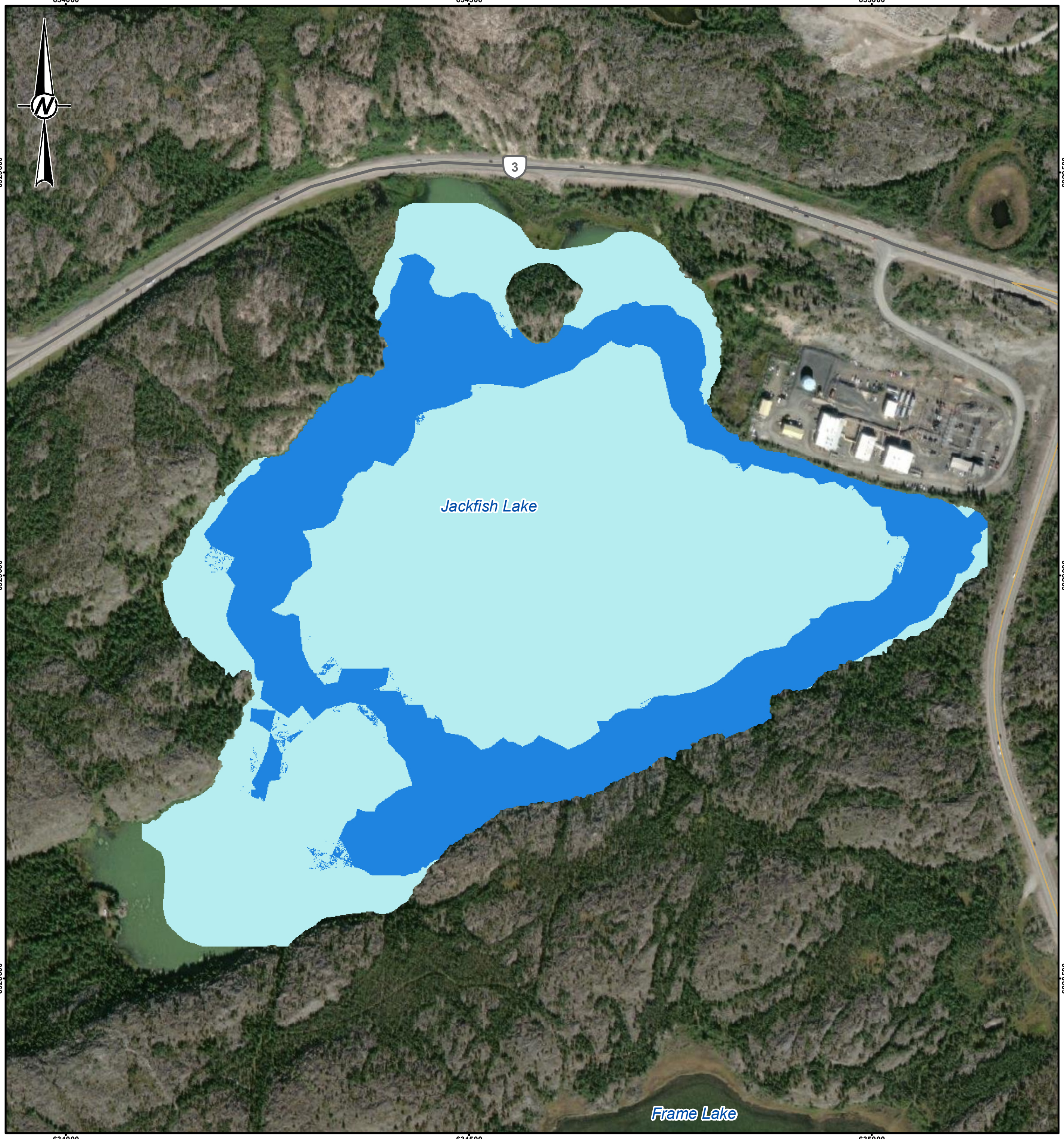

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 50TH PERCENTILE

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0 100 200

1:7,000 METRES

REFERENCE(S)

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JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

ANNUAL MEDIAN MEASURED OPERATIONAL EFFECT TEMPERATURES IN JACKFISH LAKE AT BOTTOM

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	MLE
PREPARED	AB
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PROJECT NO.	CONTROL	REV.	FIGURE
21482915		0	38

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25mm 0

6.4 Seasonal Water Temperatures in Jackfish Lake resulting from Hypothetical Maximum Operational Discharges

The following hypothetical simulation results reflect identical operational heat loads being applied to Jackfish Lake for each of the five seasonal conditions. In interpreting these results it should be noted that all differences observed are related to environmental differences including different wind directions and speeds, different thermal structures and atmospheric forcings associated with each simulation window.

6.4.1 Late Fall

The late fall condition reflects the 95th percentile temperature differences between the two-and-a-half-day hypothetical discharge scenario and non-operational scenario, calculated over a four-day period commencing at the start of discharge. Figures 39 and 40 illustrate the 95th percentile temperature difference between hypothetical operational lake conditions and non-operational lake conditions between 21 and 25 October 2021 at lake surface and lake bottom, respectively.

The fall discharge event coincided with wind conditions that directed currents to the northwest. Given the lake's cooling temperatures at this time, the figures illustrate that the resulting thermal plume generally remained positively buoyant for most of this period. Vertical mixing was also relatively limited until it reached the shallows surrounding the lakes northern island, where sufficient vertical mixing and/or thermal diffusion resulted in a slight elevation (less than 0.5°C) of lake bottom temperatures. Table 13 presents the sizes of the surface and bottom plumes associated with this discharge event demonstrating that the magnitude of operational effects during fall is negligible even under maximum heat output conditions recorded between 6 October 2021 and 31 July 2022. Overall, these results indicate that the magnitude of temperature increases in the late fall period was relatively small.

Table 13: Aerial Extent of 95th Percentile and Median Hypothetical Operational Effects on Jackfish Lake during Late Fall (21 and 25 October 2021 Simulation Period)

Temperature Effect	95th Percentile Extents (ha) at Surface	95th Percentile Extents (% of Extracted Area) at Surface	95th Percentile Extents (ha) at Bottom	95th Percentile Extents (% of Extracted Area) at Bottom
0°C to 0.25°C	46.5	91	49.8	97
0.25°C to 0.5°C	1.8	3	1.5	3
0.5°C to 0.75°C	2.2	4	-	-
0.75°C to 1°C	0.4	1	-	-
1°C to 1.25°C	0.2	0	-	-
1.25°C to 1.5°C	0.3	1	-	-
1.5°C to 1.75°C	0.0	0	-	-
1.75°C to 2°C	0.0	0	-	-

Note: Tabulated values may not sum to 100% in all instances due to a function of rounding.
ha = hectares; "-" = not applicable.

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 0.25

0.25 - 0.5

0.5 - 0.75

0.75 - 1

1 - 1.25

1.25 - 1.5

1.5 - 1.75

0 100 200

1:7,000 METRES

REFERENCE(S)

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PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE - LATE FALL

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
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REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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25mm

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LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

- 0 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- 1.25 - 1.5
- 1.5 - 1.75

0 100 200

1:7,000 METRES

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JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM - LATE FALL

CONSULTANT

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PROJECT NO.	CONTROL	REV.	FIGURE
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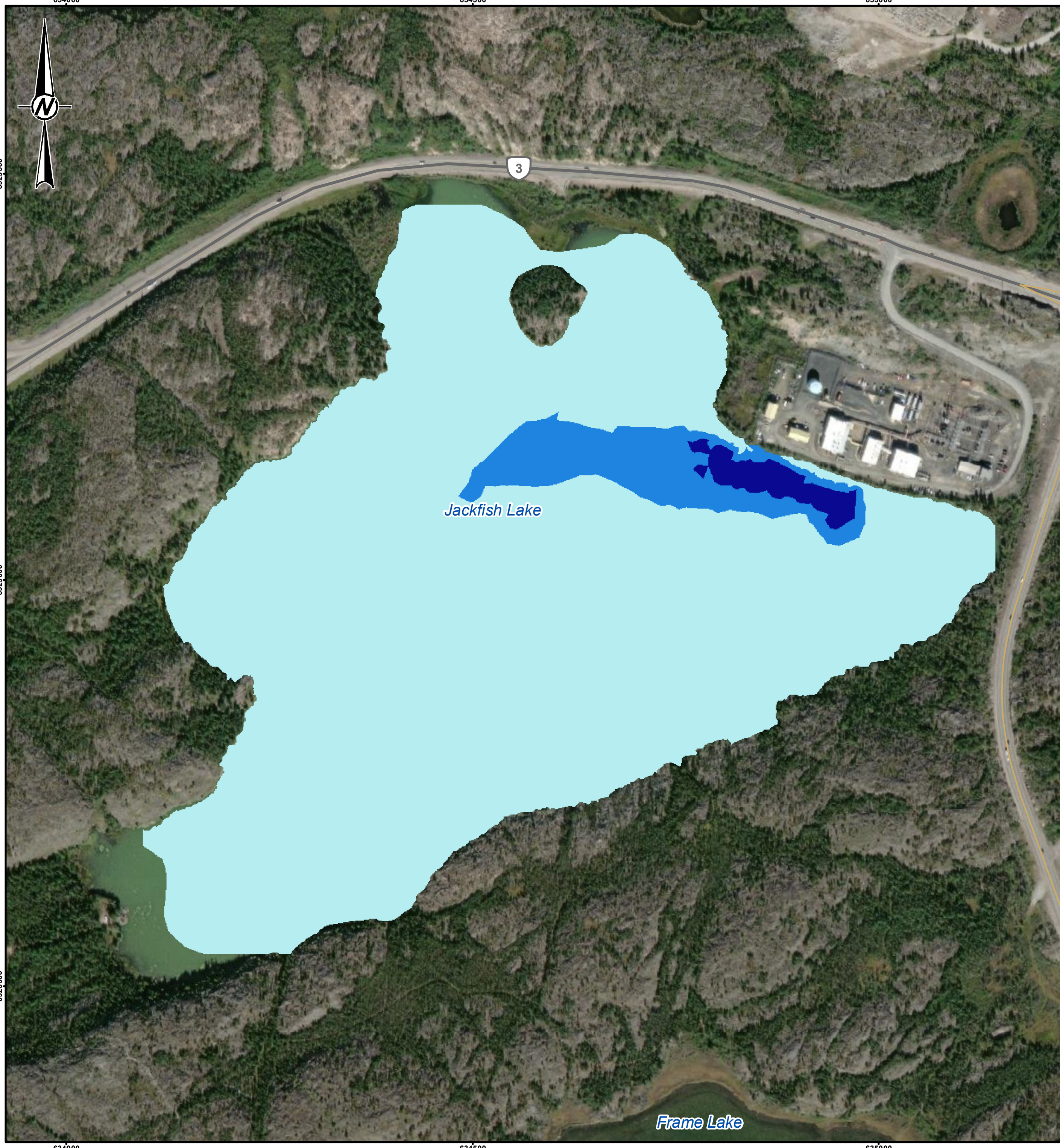
25mm

6.4.2 Late Winter

The late winter condition reflects the 95th percentile temperature differences between the two-and-a-half-day hypothetical discharge scenario and non-operational scenario, calculated over a four-day period commencing at the start of discharge a few weeks prior to ice break-up. Figures 41 and 42 illustrate the 95th percentile temperature difference between hypothetical operational lake conditions and non-operational lake conditions between 10 and 14 April 2022 at lake surface and lake bottom, respectively. Table 14 presents the aerial extent of the 95th percentile surface and bottom temperature increases resulting from this discharge event.

As illustrated on Figures 41 and 42, the thermal plume remained largely confined to surface, with very little heating of bottom waters in the area of the discharge area, and only minimal bottom contact identified in the area to the northwest of the discharge. A relatively small area of localized temperature increases is illustrated at lake bottom in the deep portions of the lake towards the south (Figure 42), which may suggest that the plume had cooled sufficiently to begin sinking as it cooled to within 0.1°C to 0.2°C of ambient lake temperatures. Overall, these results indicate that the magnitude of temperature increases in the late winter period was extremely small.



LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0 100 200

1:7,000 METRES

REFERENCE(S)

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PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE - LATE WINTER

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	MLE
PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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25mm

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0 100 200

1:7,000 METRES

REFERENCE(S)

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PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM - LATE WINTER

CONSULTANT

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APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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25mm

Table 14: Aerial Extent of 95th Percentile and Median Hypothetical Operational Effects on Jackfish Lake during Late Winter (10 and 14 April 2022 Simulation Period)

Temperature Effect	95th Percentile Extents (ha) at Surface	95th Percentile Extents (% of Extracted Area) at Surface	95th Percentile Extents (ha) at Bottom	95th Percentile Extents (% of Extracted Area) at Bottom
0°C to 0.1°C	47.7	93	51	100
0.1°C to 0.2°C	2.9	6	0.3	0
0.2°C to 0.3°C	0.7	1	-	-
0.3°C to 0.4°C	0.1	0	-	-

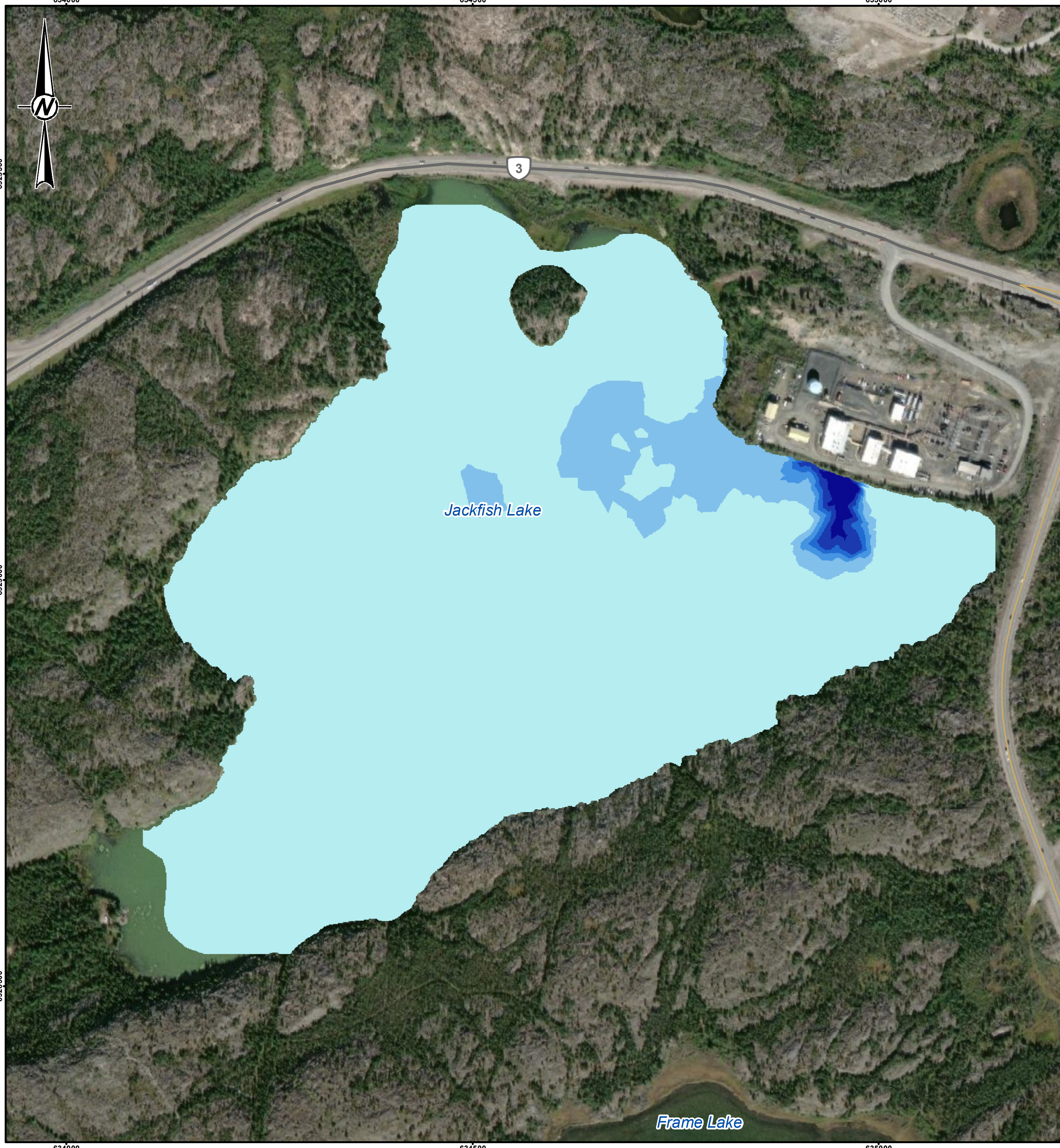
Note: Tabulated values may not sum to 100% in all instances due to a function of rounding.

ha = hectares; "-" = not applicable.

6.4.3 Spring Freshet

The spring freshet condition reflects the 95th percentile temperature differences between the two-and-a-half-day hypothetical discharge scenario and non-operational scenario, calculated over a four-day period commencing at the start of discharge during spring freshet. Figures 43 and 44 illustrate the 95th percentile temperature difference between hypothetical operational lake conditions and non-operational lake conditions between 25 and 29 May 2022 at lake surface and lake bottom, respectively. Table 15 presents the aerial extent of the 95th percentile surface and bottom increases resulting during this discharge event, noting that some of the temperature increases along the lake's south-eastern shoreline are not necessarily directly related to operational heating.

The surface plume illustrated on Figure 43 suggests that a current reversal may have occurred during active discharge with minor temperature increases located to the north and west of the discharge array and slightly larger temperature increases to the south. Figure 44 illustrates minor increases of bottom temperatures along both of these trajectories; a small localized area of 0.5°C increase is located to the northwest of the discharge array. A number of similar temperature increases are also shown along the lakes south-eastern shoreline that could be the direct result of the thermal plume or simply an artifact of moderately altered thermal structures at this location that would manifest themselves in phasal shifts of diurnal temperature fluctuations and thus not reflect direct heating of the plume. Overall, these results indicate that the magnitude of temperature increases during the spring freshet period was relatively small.



LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3

0 100 200

1:7,000 METRES

REFERENCE(S)

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JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE - SPRING FRESHET

CONSULTANT

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PROJECT NO.	CONTROL	REV.	FIGURE
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25mm

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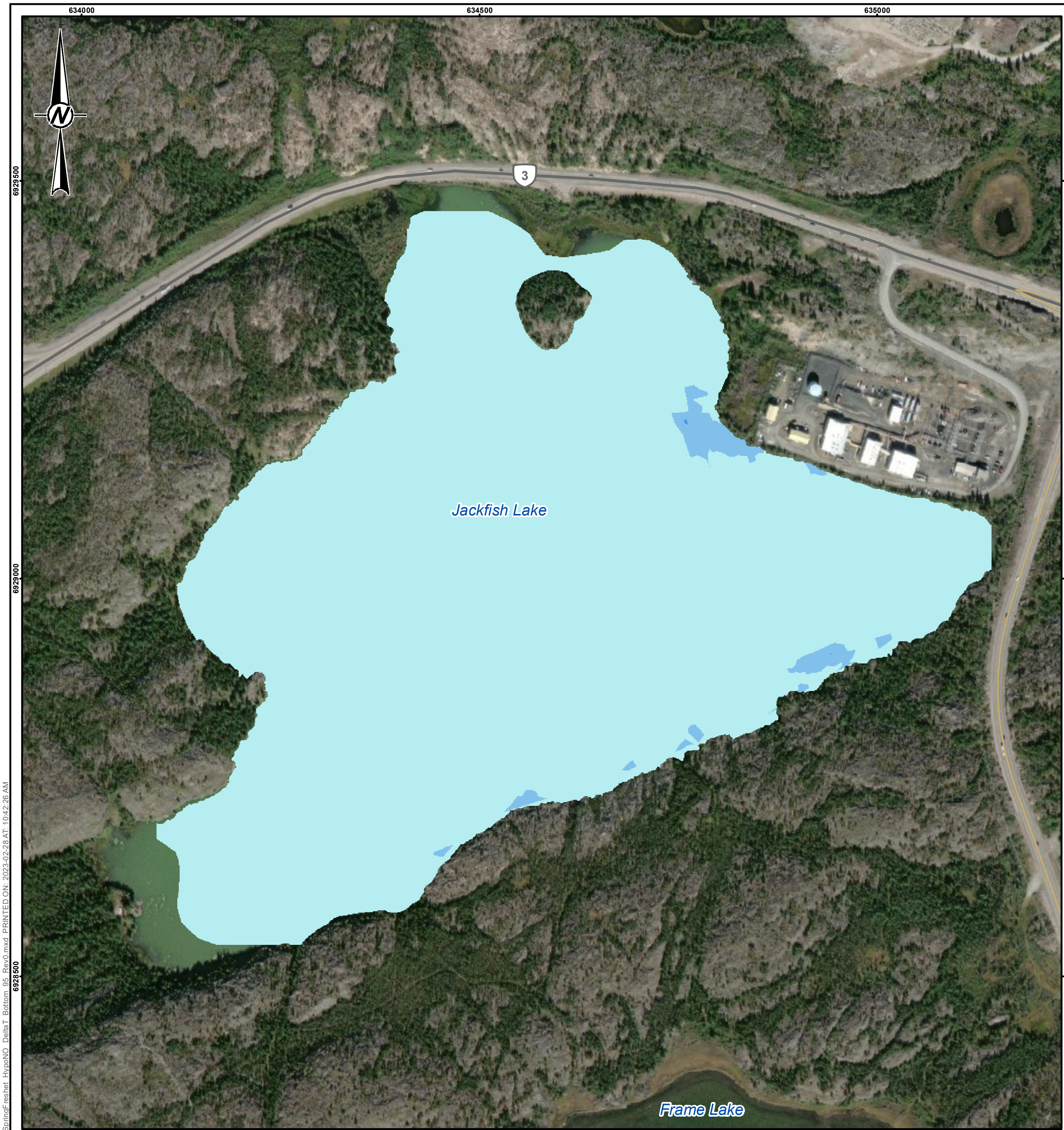

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

0 - 0.5

0.5 - 1

1 - 1.5

1.5 - 2

2 - 2.5

2.5 - 3

0 100 200

1:7,000 METRES

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25mm

Table 15: Aerial Extent of 95th Percentile and Median Hypothetical Operational Effects on Jackfish Lake during Spring Freshet (25 and 29 May 2022 Simulation Period)

Temperature Effect	95th Percentile Extents (ha) at Surface	95th Percentile Extents (% of Extracted Area) at Surface	95th Percentile Extents (ha) at Bottom	95th Percentile Extents (% of Extracted Area) at Bottom
0°C to 0.5°C	47.1	92	50.5	98
0.5°C to 1°C	3.4	7	0.8	2
1°C to 1.5°C	0.2	0	0	0
1.5°C to 2°C	0.2	0	-	-
2°C to 2.5°C	0.2	0	-	-
2.5°C to 3°C	0.2	0	-	-
3°C to 3.5°C	0.0	0	-	-

Note: Tabulated values may not sum to 100% in all instances due to a function of rounding.

ha = hectares; “-“ = not applicable.

6.4.4 Early Summer

The early summer condition reflects the 95th percentile temperature differences between the two-and-a-half-day hypothetical discharge scenario and non-operational scenario, calculated over a four-day period commencing at the start of discharge during the early summer. Figures 45 and 46 illustrate the 95th percentile temperature difference between hypothetical operational lake conditions and non-operational lake conditions between 1 and 5 July 2022 at lake surface and lake bottom, respectively. Table 16 presents the aerial extent of the 95th percentile surface and bottom increases resulting during this discharge event.

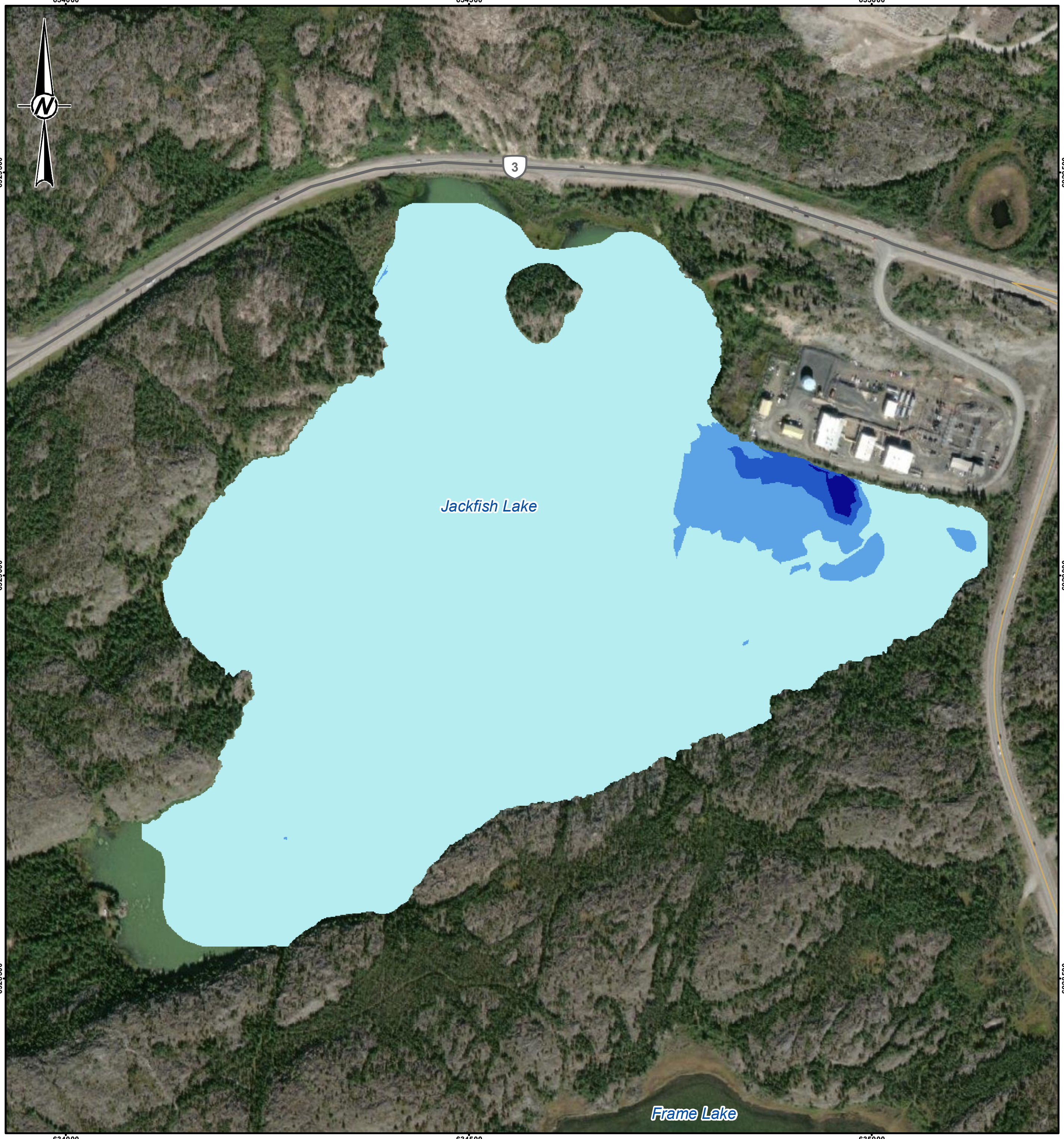
Figure 45 depicts the surface plume resulting from the hypothetical discharge event at a time when current conditions were reasonably calm, and only slightly directed to the east. Small, localized, temperature differences are depicted to the southwest and north of the lake and are the product of small alterations in thermal structure that result in minor phasal shifts in temperature fluctuation and thus not illustrative of thermal impacts. Figure 46 indicates that some changes to bottom temperatures in the vicinity of the discharges resulted from the hypothetical discharge event; however, it is considered unlikely that operational effects contributed directly to temperature differences observed towards the southern extent of Jackfish Lake; a phasal shift resulting from slightly modified thermal structure is likely the cause. Overall, these results indicate that the aerial extent of temperature increases greater than 1°C were relatively small during the early summer period.

Table 16: Aerial Extent of 95th Percentile and Median Hypothetical Operational Effects on Jackfish Lake during Early Summer (1 and 5 July 2022 Simulation Period)

Temperature Effect	95th Percentile Extents (ha) at Surface	95th Percentile Extents (% of Extracted Area) at Surface	95th Percentile Extents (ha) at Bottom	95th Percentile Extents (% of Extracted Area) at Bottom
0°C to 1°C	48.3	94	50.2	98
1°C to 2°C	2.3	5	1	2
2°C to 3°C	0.5	1	0.1	0
3°C to 4°C	0.1	0	0	0
4°C to 5°C	0.0	0	-	-

Note: Tabulated values may not sum to 100% in all instances due to a function of rounding.

ha = hectares; “-“ = not applicable.



LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 1

1 - 2

2 - 3

3 - 4

0 100 200

1:7,000 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE - EARLY SUMMER

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	MLE
PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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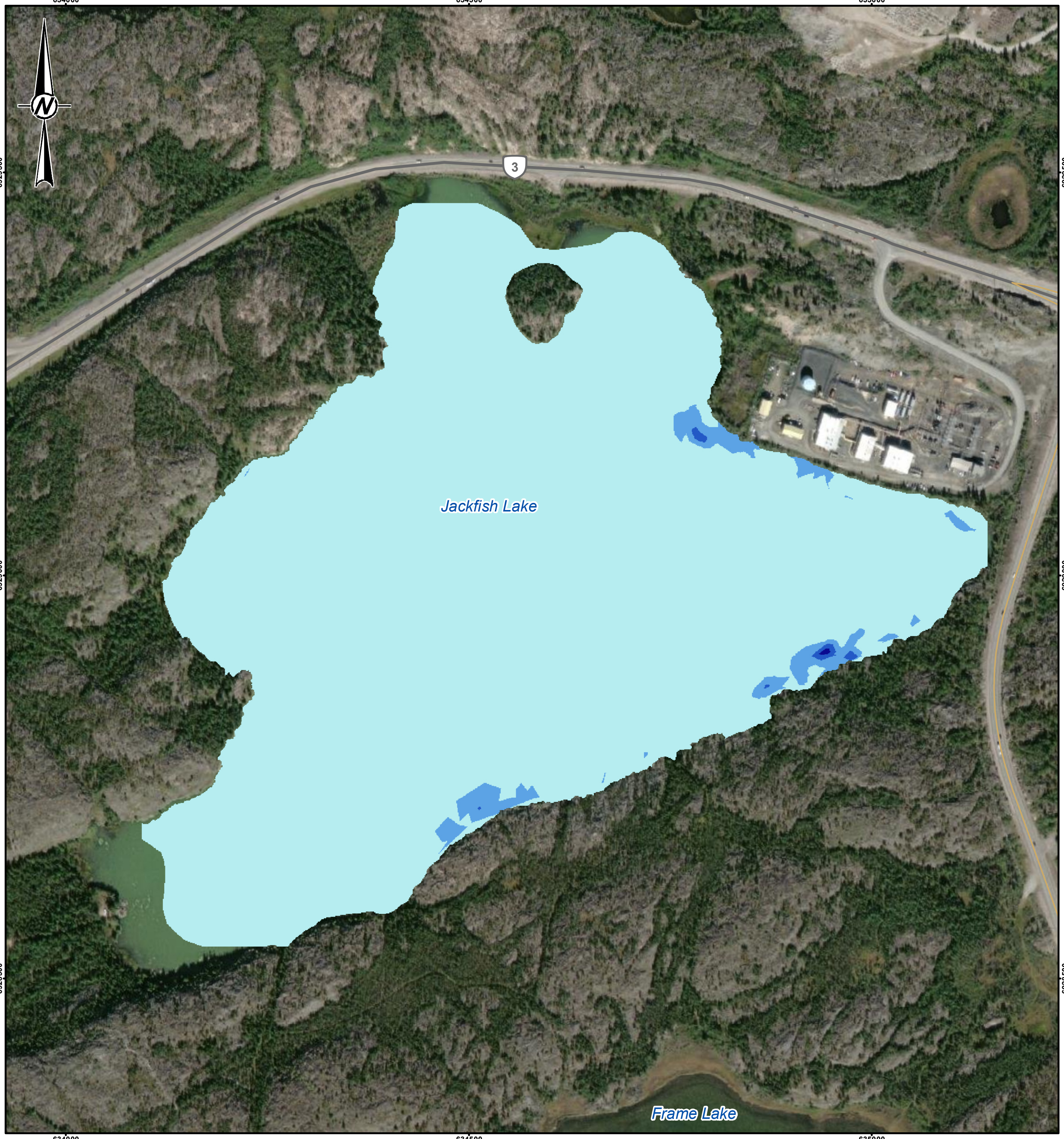

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

0 - 1

1 - 2

2 - 3

3 - 4

0 100 200

1:7,000 METRES

REFERENCE(S)

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CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM - EARLY SUMMER

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	MLE
PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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6.4.5 Late Summer

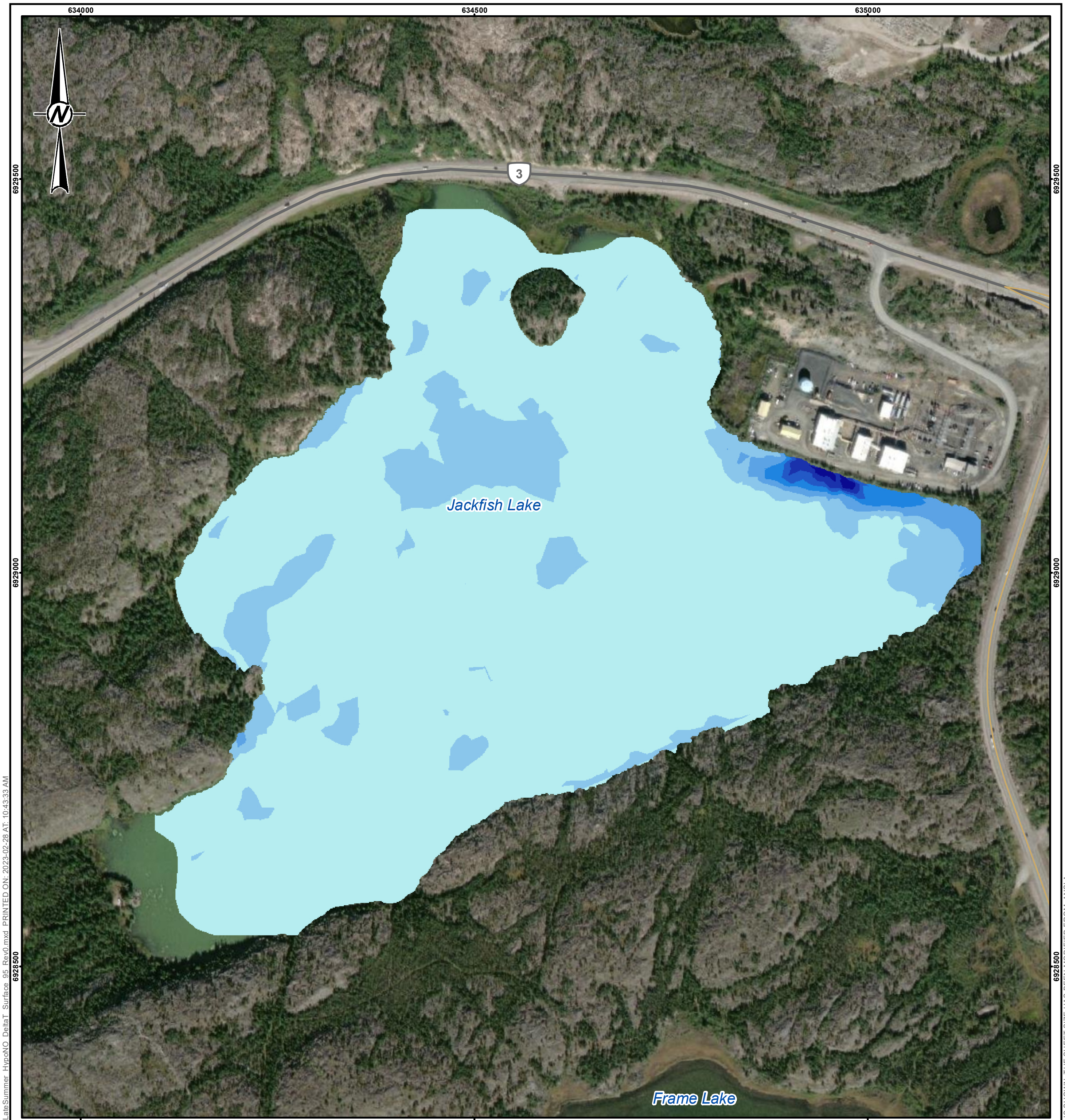
The late summer condition reflects the 95th percentile temperature differences between the two-and-a-half-day hypothetical discharge scenario and non-operational scenario, calculated over a four-day period commencing at the start of discharge during the late summer. Figures 47 and 48 illustrate the 95th percentile temperature difference between hypothetical operational lake conditions and non-operational lake conditions between 1 and 5 August 2022 at lake surface and lake bottom, respectively. Table 17 presents the aerial extent of the 95th percentile surface and bottom increases resulting during this discharge event.

Figure 47 illustrates surface temperature differences between the hypothetical operational and non-operational simulations over the four-day period. While some localized changes in the vicinity of the discharges are indicative of operational heat loads introduced to the lake, most of the temperature differences shown on the lake are illustrative of modified thermal structures in the lake that result in slightly modified timings of peak surface temperatures and manifest themselves as statistically notable temperatures at lake surface. In terms of lake bottom temperature differences, these are mostly unrelated to the direct thermal effects of the thermal plume (Figure 48) but are likely the result of indirect effects that slightly modify the thermal structure of the lake and cause temporal differences in temperature responses to diurnal atmospheric effects. Overall, these results indicate that the aerial extent of temperature increases greater than 1°C were relatively small during the late summer period.

Table 17: Aerial Extent of 95th Percentile and Median Hypothetical Operational Effects on Jackfish Lake during Late Summer (1 and 5 August 2022 Simulation Period)

Temperature Effect	95th Percentile Extents (ha) at Surface	95th Percentile Extents (% of Extracted Area) at Surface	95th Percentile Extents (ha) at Bottom	95th Percentile Extents (% of Extracted Area) at Bottom
0°C to 1°C	44.0	86	50.5	98
1°C to 2°C	6.2	12	0.8	1
2°C to 3°C	0.6	1	0	0
3°C to 4°C	0.3	1	-	-
4°C to 5°C	0.1	0	-	-
5°C to 6°C	0.1	0	-	-
6°C to 7°C	0.0	0	-	-
7°C to 8°C	0.0	0	-	-

Note: Tabulated values may not sum to 100% in all instances due to a function of rounding.
ha = hectares; "-" = not applicable.



LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 1

1 - 2

2 - 3

3 - 4

4 - 5

5 - 6

6 - 7

0 100 200

1:7,000 METRES

REFERENCE(S)

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CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE - LATE SUMMER

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	MLE
PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
21482915		0	47

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

0 - 1

1 - 2

2 - 3

3 - 4

4 - 5

5 - 6

6 - 7

0 100 200

1:7,000 METRES

REFERENCE(S)

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CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH LAKE THERMAL PLUME DELINEATION STUDY REPORT

TITLE

SEASONAL 95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM - LATE SUMMER

CONSULTANT

wsp

YYYY-MM-DD	2023-02-28
DESIGNED	MLE
PREPARED	AB
REVIEWED	KH
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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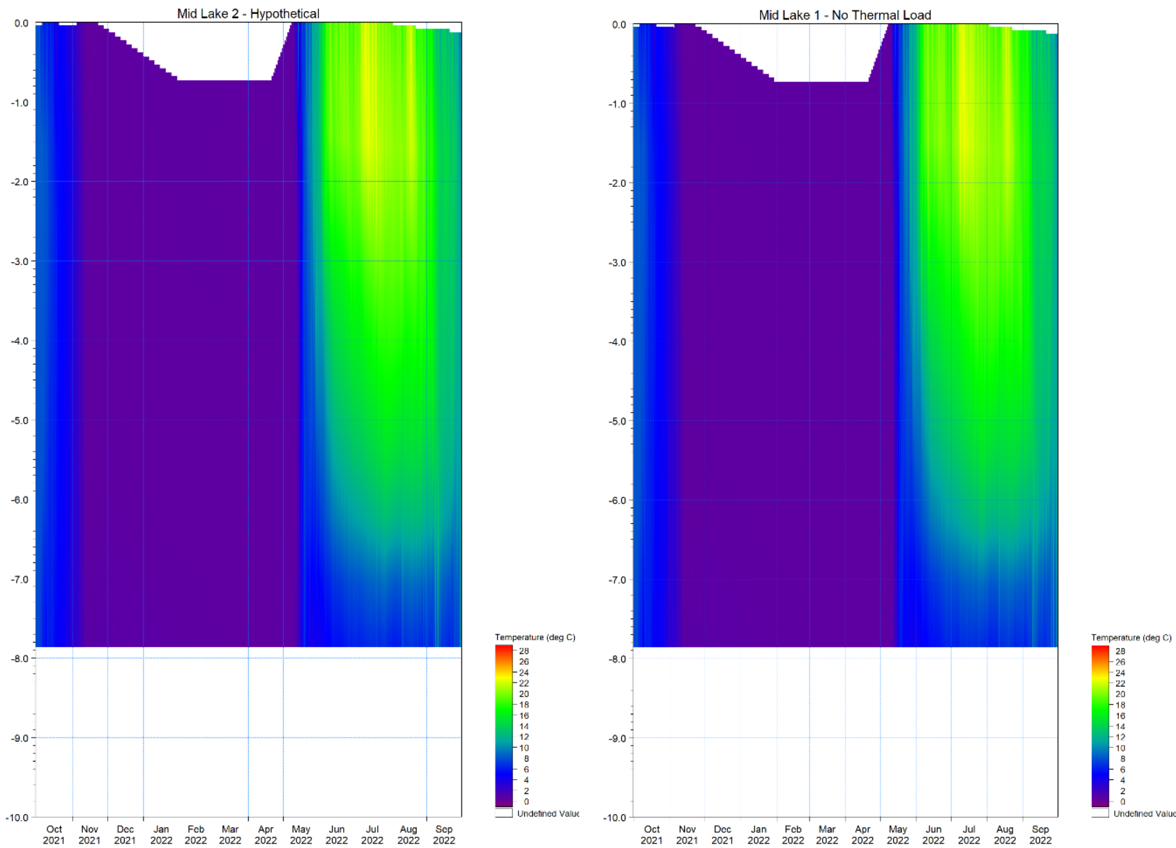
6.5 Thermal Structure of Jackfish Lake

Figure 33 provides an overview of the thermal structure of Jackfish Lake over time at the Mid-Lake monitoring location for non-operational (baseline) and hypothetical discharge conditions. Despite minor temporal differences at this location observed in the form of timeseries data, the illustrated isopleths demonstrate that no substantial changes to the thermal structure of Jackfish Lake have occurred as a result of the hypothetical discharges.

Figure 49: Thermal Structure of Jackfish Lake (Mid-Lake Location) under Hypothetical and Non-Operational Conditions (6 October 2021 through 27 September 2022)



7.0 CONCLUSIONS

The following conclusions are based on the assumptions and limitations documented in Section 5:

- The model developed for Jackfish Lake performs well and within published literature values for other 3-D model applications, and the model is considered fit for the purposes of simulating the thermal effects of operations on Jackfish Lake.
- The thermal impacts from the NTPC facility on Jackfish Lake between 6 October 2021 and 31 July 2022 were very small, i.e., the 95th percentile effect of measured operations at the facility on Jackfish Lake was generally within 0.4°C of non-operational (baseline) conditions for the lake, while the median temperature change was with 0.2°C of non-operational conditions. These small changes are likely the result of the highly intermittent nature and low heat loads discharged to the lake during this time. However, a full evaluation of representative thermal plume extents under the operational conditions measured during this period was not possible for each of the seasonal conditions requested by regulators.
- An assessment of hypothetical operational effects, based on the maximum measured heat load directed to the lake during the monitoring period, was carried out for late fall, late winter, spring freshet, early summer, and late summer. The results indicated that the thermal extents of the 95th percentile temperature increases were generally negligible or relatively small based on the following:
  - In late fall, the 95th percentile effect on lake surface temperatures was generally within 1°C, while the 95th percentile effect on lake bottom temperatures was within 0.5°C of non-operational (baseline) lake temperatures.
  - In late winter, the 95th percentile effect on lake surface temperatures was generally within 0.3°C, while the 95th percentile effect on lake bottom temperatures was within 0.2°C of non-operational (baseline) lake temperatures.
  - During spring freshet, the 95th percentile effect on lake surface and bottom temperatures generally remained within 1°C.
  - In early summer, the 95th percentile effect on lake surface temperatures was generally within 1°C, with small portions of the lake surface (1%) increasing by more than 2°C. The 95th percentile effect on lake bottom temperatures was generally within 1°C of non-operational (baseline) lake temperatures, with only a small portion of the lake bottom (2%) increasing by more than 1°C.
  - In late summer, the 95th percentile effect on lake surface temperatures was generally within 1°C, with only small portions of the lake surface (2%) increasing by more than 2°C over non-operational (baseline) temperatures. The 95th percentile effect on lake bottom temperatures generally remained within 1°C of non-operational (baseline) lake temperatures, with less than 2% of the lake bottom increasing by more than 1°C over non-operational conditions.
- Temperature effects of hypothetical maximum measured operations tended to peak in summer and be lowest over the winter months.
- Although the thermal structure of the lake experienced minor modifications outside the turbulent mixing zone of the discharges, they are not visually detectable at the mid-lake location meaning discharges of the nature observed in September 2021 through July 2022 are not altering the thermal structure or behaviour of the lake.

8.0 REFERENCES

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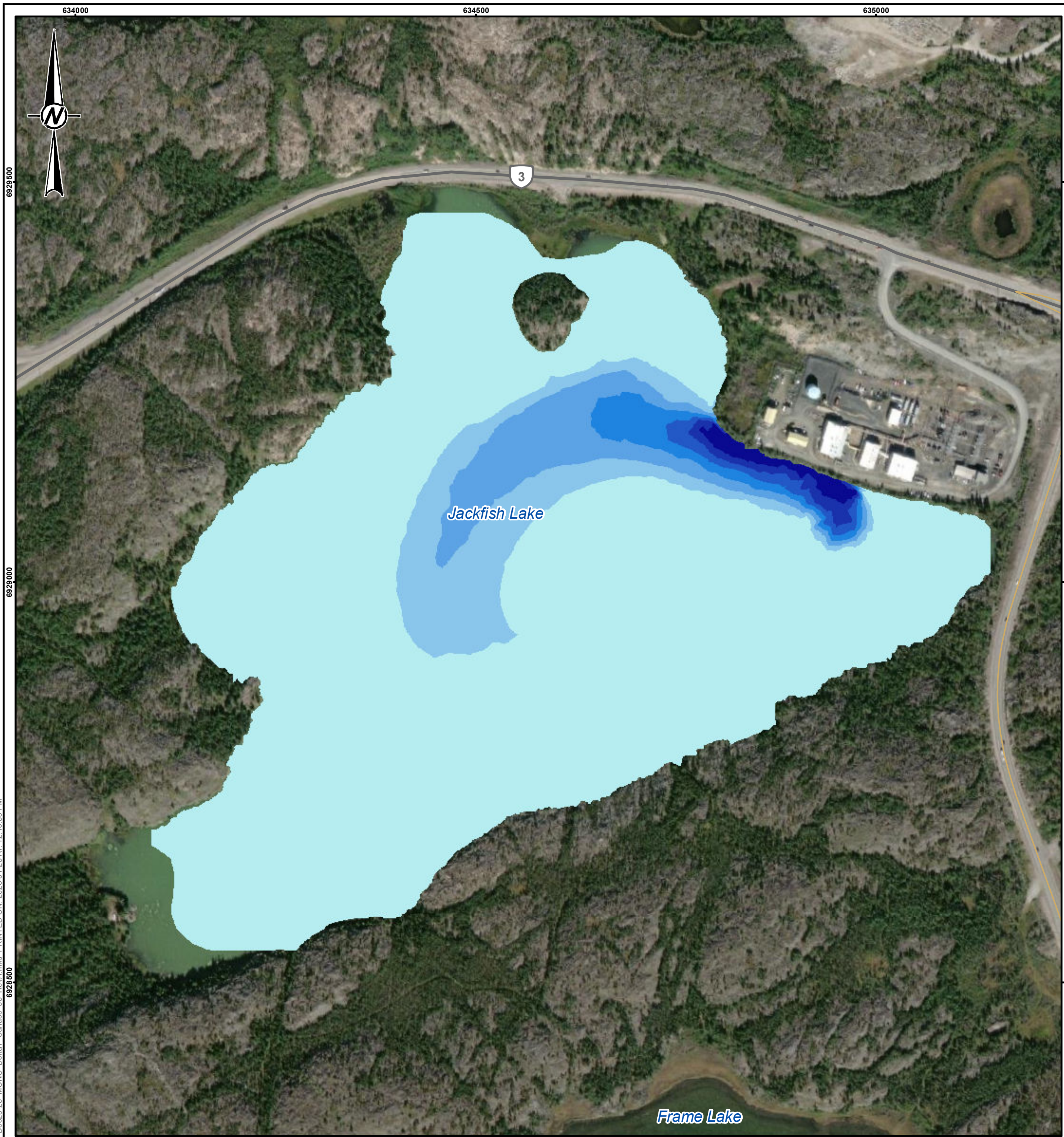
ATTACHMENT A



LEGEND

- HIGHWAY
- LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5

DRAFT

0 100 200

1:7,000 METRES

REFERENCE(S)

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CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH THERMAL PLUME STUDY

TITLE

95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE DURING DECEMBER 2021, 23 TO 25 FIELD VISIT

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2023-01-25
DESIGNED	MLE
PREPARED	AB
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
21482915		A	17

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

0 - 0.5

0.5 - 1

1 - 1.5

1.5 - 2

2 - 2.5

2.5 - 3

3 - 3.5

DRAFT

0 100 200

1:7,000 METRES

REFERENCE(S)

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CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH THERMAL PLUME STUDY

TITLE

95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM DURING DECEMBER 2021, 23 TO 25 FIELD VISIT

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2023-01-25
DESIGNED	MLE
PREPARED	AB
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
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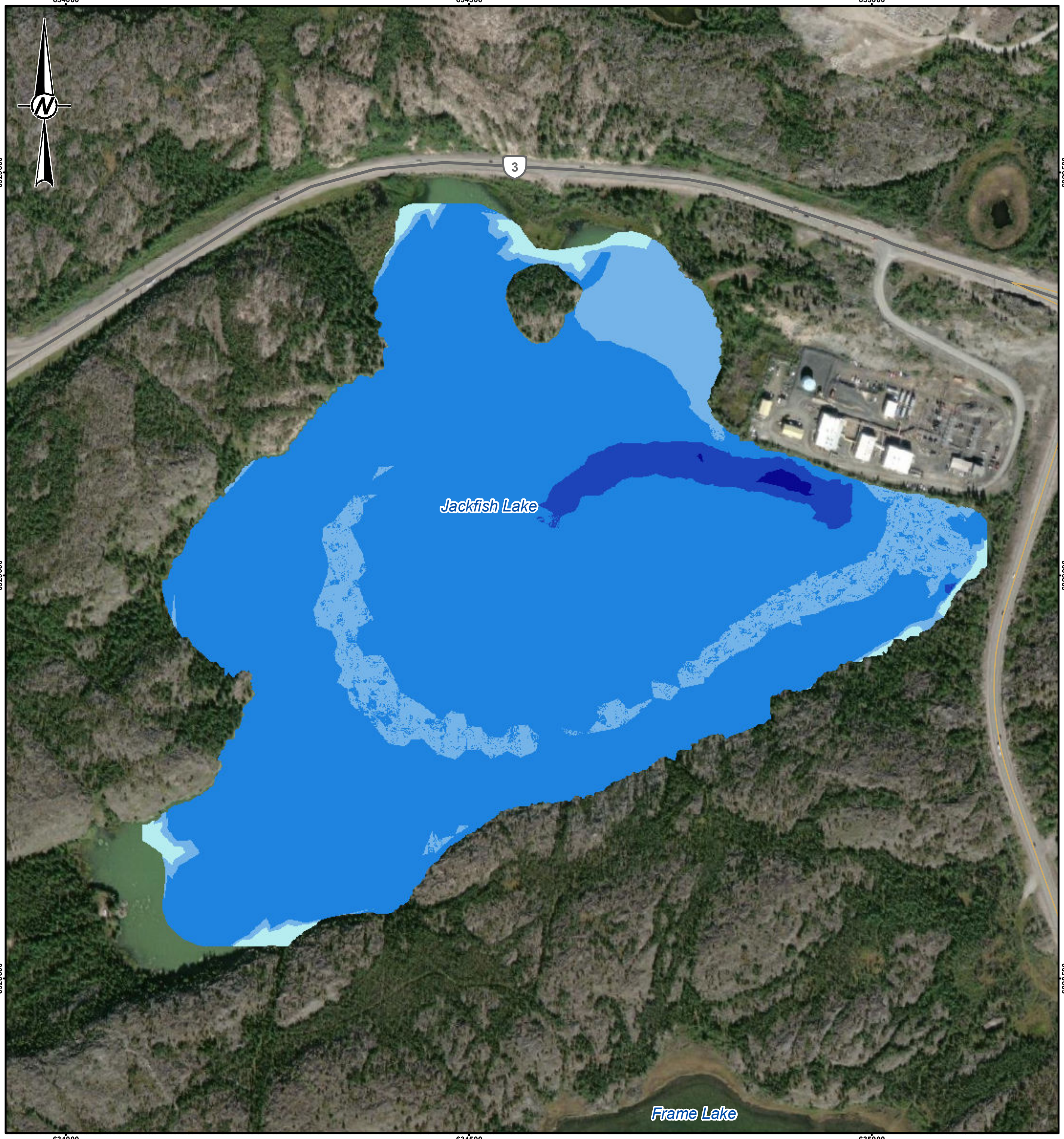

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0.3 - 0.4

0.4 - 0.5

DRAFT

0 100 200

1:7,000 METRES

REFERENCE(S)

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NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH THERMAL PLUME STUDY

TITLE

95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE DURING MARCH 2022, 22 TO 25 FIELD VISIT

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2023-01-25
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PREPARED	AB
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
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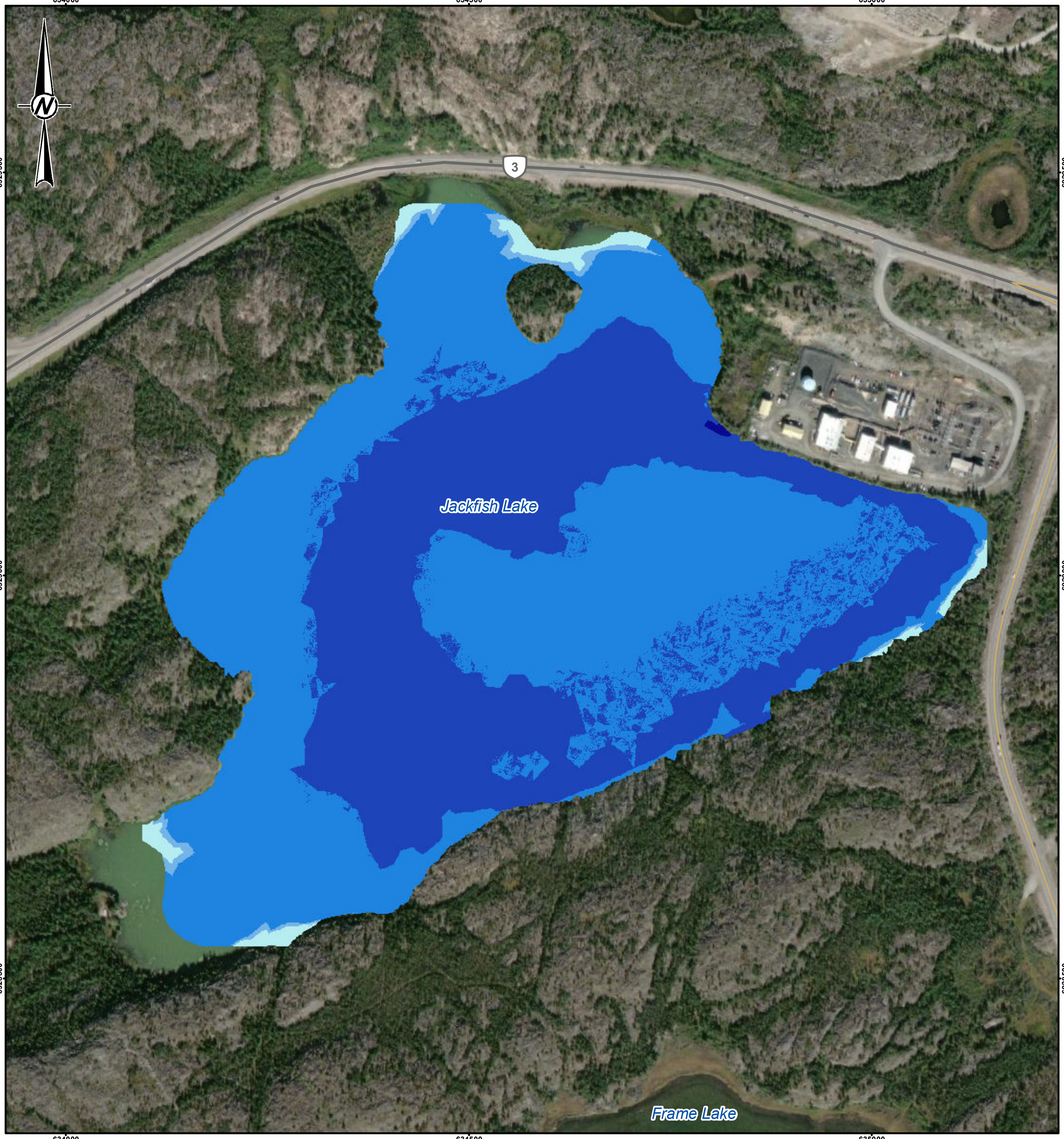

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0.3 - 0.4

0.4 - 0.5

DRAFT

0 100 200

1:7,000 METRES

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CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH THERMAL PLUME STUDY

TITLE

95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM DURING MARCH 2022, 22 TO 25 FIELD VISIT

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2023-01-25
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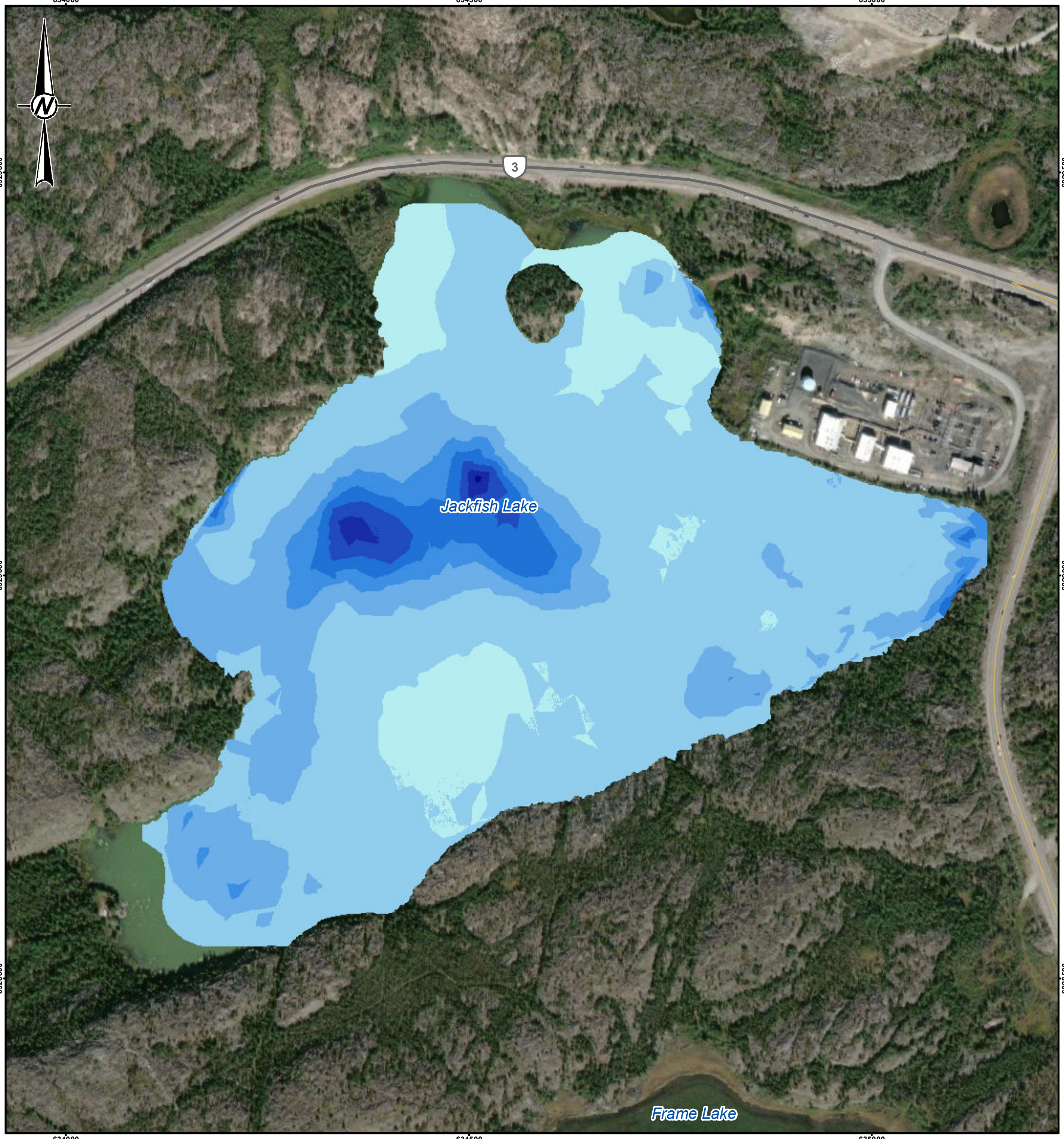

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0.3 - 0.4

0.4 - 0.5

0.5 - 0.6

0.6 - 0.7

0.7 - 0.8

DRAFT

0 100 200

1:7,000 METRES

REFERENCE(S)

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PROJECT

JACKFISH THERMAL PLUME STUDY

TITLE

95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE DURING MAY 2022, 24 TO 26 FIELD VISIT

CONSULTANT

wsp GOLDER

YYYY-MM-DD	2023-01-25
DESIGNED	MLE
PREPARED	AB
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
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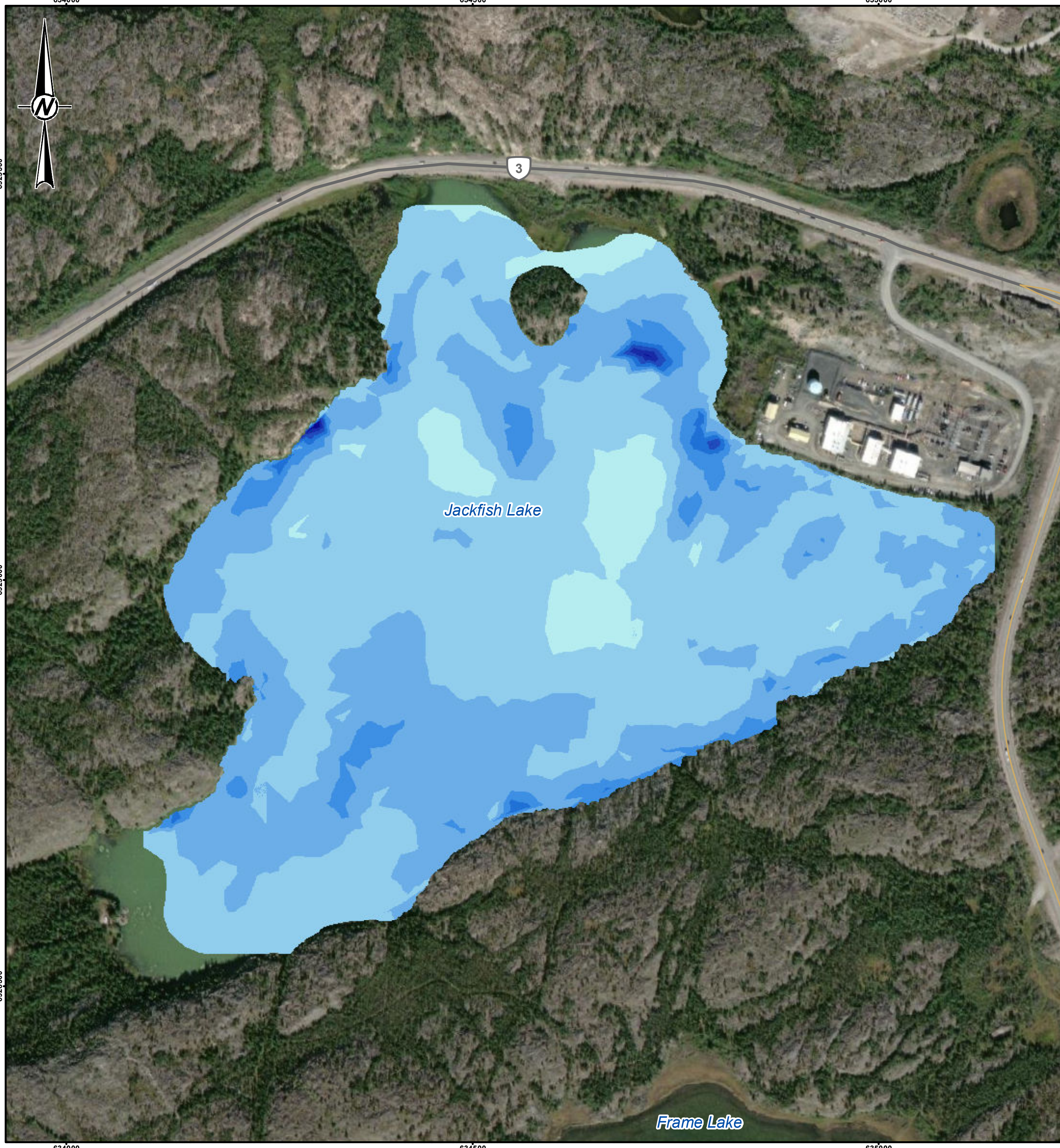

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

- 0 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8

DRAFT

0 100 200

1:7,000 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH THERMAL PLUME STUDY

TITLE

95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM DURING MAY 2022, 24 TO 26 FIELD VISIT

CONSULTANT

wsp GOLDER

YYYY-MM-DD	2023-01-25
DESIGNED	MLE
PREPARED	AB
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
21482915		A	22

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

0 25mm

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (SURFACE) - 95TH PERCENTILE

0 - 0.5

0.5 - 1

1 - 1.5

1.5 - 2

2 - 2.5

DRAFT

0 100 200

1:7,000 METRES

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH THERMAL PLUME STUDY

TITLE

95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE SURFACE DURING JULY 2022, 5 TO 6 FIELD VISIT

CONSULTANT

wsp GOLDER

YYYY-MM-DD	2023-01-25
DESIGNED	MLE
PREPARED	AB
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
21482915		A	23

PATH: I:\CLIENTS\NTPC\21482915\Mapping\Products\Hydrology\21482915_Fig23_July5-6_MONO_DeltaT_Surface_95_RevA.mxd PRINTED ON: 2023-01-25 AT: 12:13:19 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

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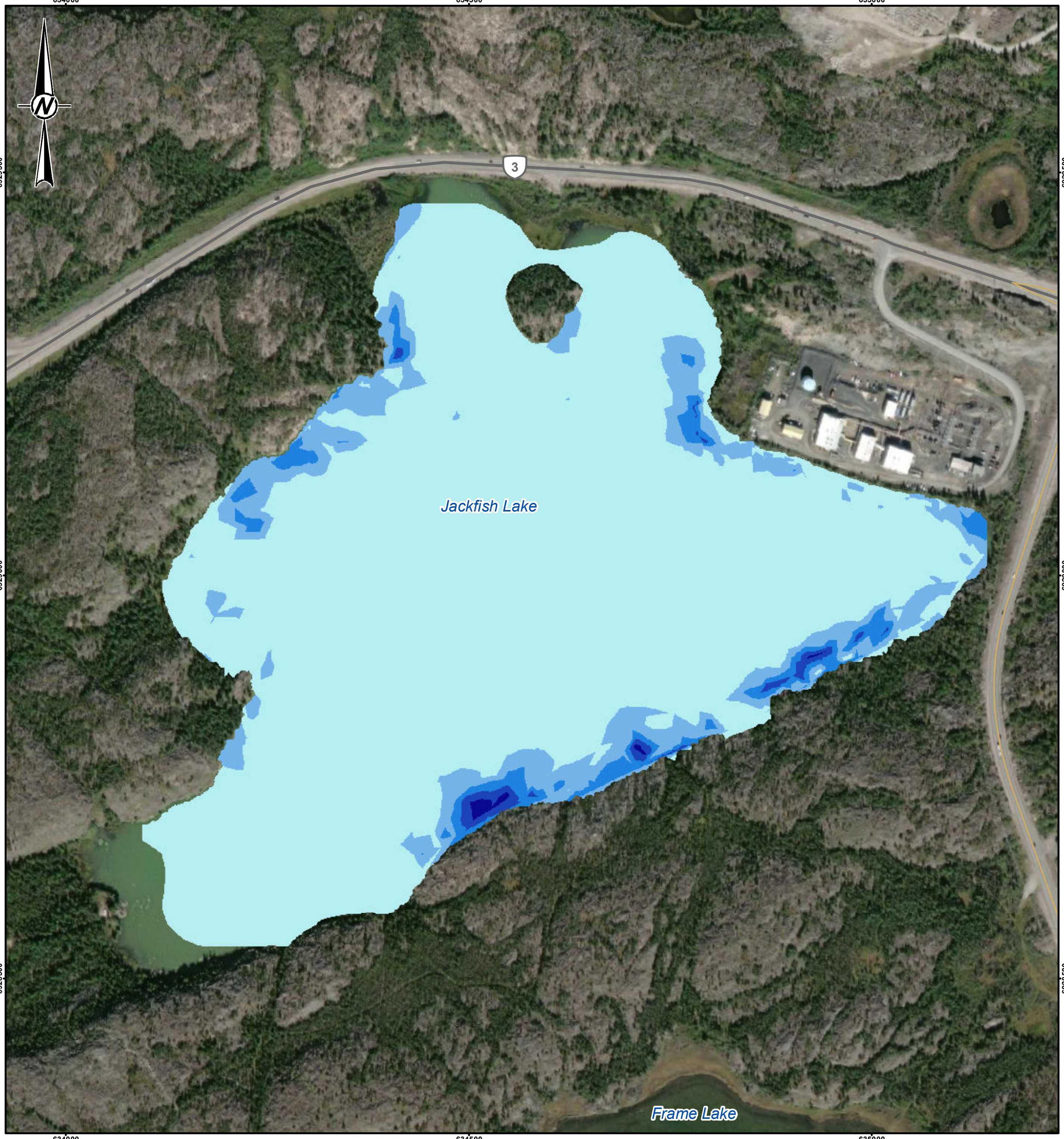

LEGEND

HIGHWAY

LOCAL ROAD

DELTA T (BOTTOM) - 95TH PERCENTILE

0 - 0.5

0.5 - 1

1 - 1.5

1.5 - 2

2 - 2.5

DRAFT

0 100 200

1:7,000 METRES

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT

NORTHWEST TERRITORIES POWER CORPORATION

PROJECT

JACKFISH THERMAL PLUME STUDY

TITLE

95TH PERCENTILE HYPOTHETICAL EFFECT TEMPERATURES IN JACKFISH LAKE AT LAKE BOTTOM DURING JULY 2022, 5 TO 6 FIELD VISIT

CONSULTANT

wsp GOLDER

YYYY-MM-DD	2023-01-25
DESIGNED	MLE
PREPARED	AB
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
21482915		A	24

PATH: I:\CLIENTS\NTPC\21482915\Mapping\Products\Hydrology\21482915_Fig24_July5-6_MONO_DeltaT_Bottom_95_RevA.mxd PRINTED ON: 2023-01-25 AT: 12:13:44 PM

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ATTACHMENT B

1.0 PURPOSE

As part of our technical excellence initiatives, Golder is committed to high standards in the planning, implementation, and management of quality assurance and quality control (QA/QC) activities for numerical modeling projects. This document provides guidance on how to achieve and meet the intent of Golder's quality requirements for the development of models and includes guidance on roles and responsibilities, version tracking, and critical retention of documentation.

This document must be read in conjunction with Global Procedure 1: Project Delivery Manual, which describes the approach to project delivery and key processes that are the fundamental component to achieve QA/QC objectives.

2.0 SCOPE

The described processes are intended to be applicable to all types of numerical models and applied to the various stages of model development to ensure appropriate representation of a physical system, characterized by agreed upon parameters, calibrated over an appropriate range (as necessary), and suitable for predictive scenarios in which it has been applied. The intention is that these processes will be applicable over a wide range of modeling scenarios, and therefore the specific implementation will be tailored to reflect the software being used, the scale and/or complexity of the model and other aspects of the assignment. The processes address the following key objectives:

- software used for modeling is within its intended purpose
- model parameters have been verified
- numerical model geometry/configuration adequately reflects the actual/expected conditions
- parameters have been correctly assigned within the model
- version history of input/output files is maintained
- model results have been independently checked

The expectation is that the objectives of this protocol will be met for all numerical modeling assignments, but the mechanisms used to achieve the objectives will be tailored accordingly.

3.0 RESPONSIBILITIES

The key personnel within the project team typically consist of the Project Manager, Project Director, Modeler, Peer Reviewer, and Approved Reviewer. For the purpose of this document, it is assumed that each of these roles will be held by distinct individuals; however, it is understood that more than one role may be held by the same individual (e.g., Approved Reviewer may be the Project Director).

A RASCI (Responsible, Accountable, Support, Consulted, Informed) Matrix is provided in **Table 1** as a guideline to bring clarity to the roles of the key personnel who are responsible, accountable, provide support, and, where appropriate, who needs to be consulted or informed for key process action items and tasks.

- **Responsible (R):** the team member who does the work to complete the task. Every task needs a minimum of one responsible party, but the completion of the task can be assigned to other team members.

- **Accountable (A):** person who delegates the work and is the last one to review the task or deliverable before it is deemed complete.
- **Support (S):** person providing support during the task or process.
- **Consulted (C):** person consulted to provide input based on their domain expertise.
- **Informed (I):** team members who need to be informed but are not directly involved.

Table 1: RASCI Matrix

Section	QA/QC Responsibilities Matrix	Project Manager	Modeler	Peer Reviewer	Approved Reviewer	Project Director
4.0	**Planning the Modeling Approach**					
4.1	Selection of appropriate software and verification of suitability for the assignment	S	R		A	S
4.2	Identify personnel roles and responsibilities, including communication of results to and from the client.	R	S	I	S	A
4.3	Document input requirements, input data, validation requirements, and frequency of checking. *Note: This could be detailed in a proposal, workplan, schedule, or a management plan, etc*	A	I	I	R	S
4.4	Define filing protocols for storing data (see Appendix A). *Note: Reference the location of project records that are stored outside of SharePoint to comply with GAIMS and Complex Data Protocols.*	R	S	I	S	A
5.0	**Executing**					
5.0	Create subfolder structure as per *Appendix A File and Folder Structure* or as defined.	S	R		A	S
5.1	Store received and processed data. Maintain and update a *Data Received Log* or alternate format to document all data received.	R	S	S	S	A
5.2	Maintain and update the *Model Tracking Spreadsheet* or another format to document checks/review.	S	R	S	A	I
5.2.1	Conduct initial QA/QC checks on input parameters for model construction and on any revisions to properties during this process.	S	R	S	A	S

Section	QA/QC Responsibilities Matrix	Project Manager	Modeler	Peer Reviewer	Approved Reviewer	Project Director
5.2.1	Execute and monitor QA/QC activities for model construction (Table 3).	S	R	S	A	S
5.2.2	Execute and monitor QA/QC activities for model calibration (Table 4).	S	R	S	A	S
5.2.3	Execute and monitor QA/QC activities for predictive analyses (Table 5).	S	R	S	A	S
5.2.1-5.2.3	Provide feedback on inconsistencies or errors discovered. Provides points of interrogation into model for anything providing unexpected results. Determine if comments have been addressed appropriately.	S	R	S	A	I
5.2.1-5.2.3	Communicate and manage deliverables.	R	S		I	A
6.0	**Project Closure**					
6.0	Merge base folder with SharePoint folder (Transfer files from modeling server to SharePoint) at project closure.	A	R		S	I
6.0	Confirm all project delivery requirements have been met, including record filing and retention.	R	S	S	S	A

Note: Approved Reviewers are senior staff as agreed by the Operating Company to review outgoing documents and deliverables on behalf of Golder. The Approved Reviewer must have expertise within the specific modeling processes to appropriately review the development of the model, the overall implementation within the software package, the form and values of input parameters, and the outputs, or they may work in conjunction with a Peer Reviewer having such experience.

4.0 PLANNING THE MODELING APPROACH

4.1 Selection of the Modeling Software

The Modeler and Approved Reviewer should identify the appropriate software to utilize to conduct numerical modeling based on the needs identified by the project team. The software selected may be commercially available software or Golder-developed software. The choice of software and intended application will govern if additional *software verification* is required prior to project use. Software verification is the process of confirming that a software package correctly calculates or implements its intended functionality. This is certainly applicable to

Golder-developed software, for example, as independent or third-party verification has not occurred. However, there are also many examples where commercially available software may require additional verification when the intended use may be in a different technical discipline (for example, applying geotechnical software in the nuclear industry requires additional verification).

In the majority of cases additional software verification is not required, so the intent of this requirement is primarily to highlight and schedule a deliberate discussion on the use of software for the particular application.

4.2 Assembling the Modeling Project Team

Resources and the right level of competence required to meet the quality requirements for project deliverables should be identified at the planning stage of a project. The Project Manager with support from the Project Director should identify project resources, including who will be involved in managing quality and when and what their specific duties will be. They should also determine the project communication plan and define authorization levels for direct communication of results to and from the client.

Along with the key personnel described in Section 3.0, additional roles may also be identified by the Project Manager and Project Director, which may or may not overlap with the key personnel. For example, a Professional of Record may take responsibility for the technical works, recommendations, and professional judgment registered in the jurisdiction. Where appropriate, the project team may include a QA/QC Manager who tracks compliance to this protocol. They may work with the Modeler, Project Manager, and Approved Reviewer to ensure that the QA/QC protocols documented here are adhered to throughout the execution of modeling work and that records are maintained in the project file.

4.3 QA/QC Criteria

A key responsibility of the Project Manager is communicating the QA/QC requirements to the project personnel and monitoring project performance against these project metrics to confirm that project personnel are conducting their work in accordance with the project scope, schedule, specifications, technical procedures, and QA/QC requirements. Key quality efforts that should be documented include:

- identifying input requirements that must be met or used as the basis for the model development approach (acceptance criteria, contractual requirements, regulatory requirements, and any applicable internal/external procedures or guidelines)
- defining requirements associated with the verification of modeling software (as required) or spreadsheets to confirm they are performing as intended
- identifying the input data that will be received and the checking requirements (to confirm data is current, complete, accurate, suitable, and sufficient for the purposes for which it will be used). The Data Received Log should be utilized to track data received from the client
- agreeing upon the frequency and types of checks required during model development based on the scope of work, level of complexity, and input requirements; all staff completing tasks associated with QA/QC are to ensure that appropriate review records are maintained and uploaded to SharePoint when possible
- the Model Tracking Spreadsheet should be utilized to document review efforts with supporting detailed QA/QC Documentation targeted for the different stages of review. Additional Discipline-Specific QA/QC Documentation are available for the purposes of reviewing input and output model parameters specific to the type of model constructed. All completed documents should be stored in the QA/QC folder on SharePoint

- if applicable, planning for the use of version control system (VCS) software to track revision histories of files more explicitly. If a version control system is not used, at a minimum, the Modeler and Approved Reviewer should discuss the version history process. Each model run or simulation should be saved with a ‘unique case name’ and referenced in the log (i.e., Simulation 001, Simulation 002, etc). See *Appendix B* for more details.

As part of project kick-off, the quality requirements should be documented and reviewed by all team members prior to commencing work.

4.4 Modeling Document Management

A consistent file and folder structure for projects involving modeling components, adds transparency to the modeling processes, facilitates more comprehensive reviews, and permits a smooth transition of projects between modelers. Electronic filing of project documents must follow the high-level folder structure defined in the Global E-filing Structure for Project Files (GP1 Appendix A).

All modeling work will be contained in the `05_Technical_Work` folder, either on SharePoint or the local server. SharePoint is preferred for smaller modeling projects but not always possible when working with large amounts of data or file types. The naming convention (`05_Technical_Work`) is derived from the Global E-filing structure above but customized given the limitations of working with large data in the SharePoint environment (Figure 1). The ‘underscores’ are not required, but certain software interpret spaces differently so were added for (modeling) convenience.

For the purposes of this protocol, it is assumed that a local server will be used. The base folder path of all modeling components on the local server should mirror the SharePoint structure preferably in the Complex Data folder. Subfolders have been customized for the local server to reflect the typical modeling workflow and are described in more detail in *Appendix A: File and Folder Structure*. When a local server is required, the storage approach attempts to separate more standard project related files (SharePoint compatible) from application specific modeling files (local server). See Figure 1 for a high-level schematic.

The `05_Technical_Work` folder on SharePoint and in the local server are intended to be complementary—there should be no overlap, with the exception of data received, as described in Section 5.1. A reference to the local server location must be added to SharePoint to identify where the modeling files are stored.

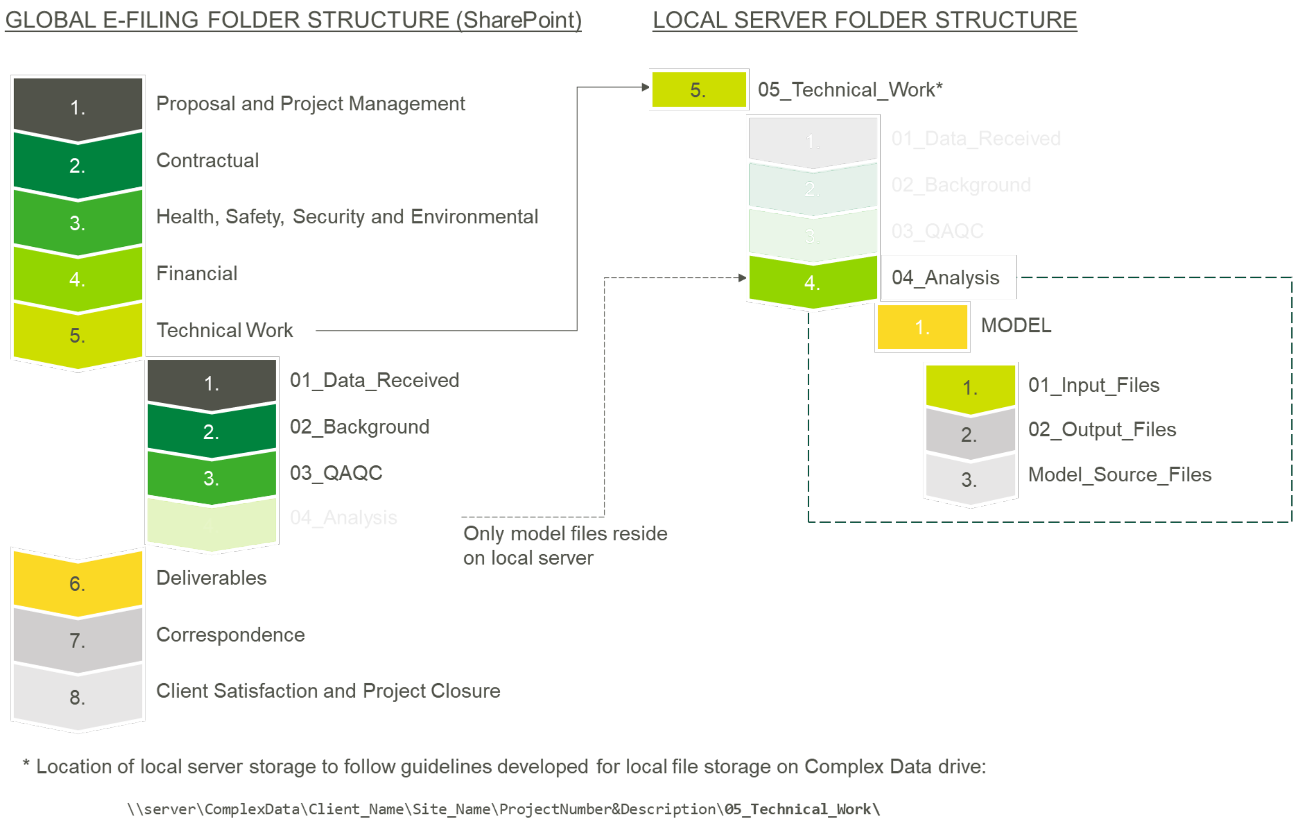

Figure 1: Schematic view of Global E-Filing structure for SharePoint and derived Technical Work folder on Local Server (if required)

5.0 EXECUTING

The Modeler, in discussion with the Approved Reviewer, will begin the execution of the project by developing the filing structure suitable to the needs of the scope. Throughout the execution stage of modeling, different data file terminology will be mentioned. To summarize, all data related to modeling can be clearly classified as “model input,” “model output,” or “model construction” project files as outlined in Table 2.

Table 2: Classification of Modeling Files by Type

File Type	Description
Model input files	Files external to the numerical modeling tool, imported or processed for inclusion in the model. Examples include tables from Excel (xlsx), CAD files (dxf, dwg), other documents (doc, pdf), 3D models received from the client, separate work product from internal Golder personnel working on separate scopes of work, etc.
Model output files	Any data that has been produced by executing a numerical model or developed based upon model results in support of project delivery. Output files could be images (png, jpg), PowerPoint files (pptx), native software save files (dac, sav), tables, etc.

File Type	Description
Model construction project files	Model files and scripts/code used to construct the models. Examples include ASCII-based model construction files (dat), FISH files (fis), Python scripts (py), and project files (prj) or binary save files such as FEFLOW (fem) files, RS2/RS3/Plaxis model setup files, etc.

5.1 Receiving and Processing Data

Proper data storage and processing protocols reduce the risk of error in complex models and provide a history of model development. The intent is to achieve clarity regarding where data received from the client related to this project resides, and what data is original and what data was processed for use in the model.

It should be noted that these protocols sacrifice storage space for the purpose of transparency in model development. It is acknowledged that files are duplicated in the data received folders of SharePoint and the local server and may again be duplicated as we process the files for inclusion in the model. This duplication is necessary to achieve the above objective.

5.1.1 Receiving Data

When receiving information from the client, from other external sources, or internally from Golder colleagues working on the project, the data should be collected and stored in a consistent manner. A key objective of this process is to ensure the data received is not altered and is protected prior to processing. When any external data is received, the following process is recommended:

1) Create a new folder in the `05_Technical_Work\01_Data_Received` *[on SharePoint].* Name the folder in the format `YYYYMMDD_Data_Description`. The description is meant to help identify the data. The date, ordered by year, month, and day, sorts documents in a chronological order received for easy viewing on computer file systems and SharePoint.

2) Save the data received to this folder. Ensure the original file is named as received. ➲ Do not change the name of the file.

3) Create a record in the Data Received Log, which resides in the Data Received folder on SharePoint. All information related to receiving data should be tracked, including:

    a) date the data was received

    b) who received the data, and the person from whom it was received

    c) how the data was transmitted

    d) brief description of the data received

4) Save any email(s) related to the data transmission in this folder. When data is not received via email, for easy reference, a Readme.txt (Ascii text file) can be added into the folder, with a description. For example, "*New pit shells for LOM design options received by John Doe (Golder) from Jane Doe (Mining Company) on July 1, 2018, via email.*"

Although the data received now resides on SharePoint, the model may reside on a local server (as described in Section 4.3 Modeling Document Management). Therefore, if this data will be used in the model in some way, the data and all associated files should be copied to the local server by creating a Data Received folder in the `01_Input_Files` folder (as they are specific to the model development):

```
05_Technical_Work\04_Analysis\MODEL\01_Input_Files\01_Data_Received\YYYYMMDD_Data_Description
```

The 'MODEL' folder is a placeholder to be provided by a more descriptive name in case multiple modeling scopes exist within the project. At the end of the project, this folder should be a subset of the SharePoint version of the `05_Technical_Work\01_Data_Received` folder if all data receiving processes were adhered to (since not all data received may be related to the numerical model).

5.1.2 Processing Data

During the course of the project, the data received may need to be processed prior to use in analysis or design. If it does require processing, **DO NOT** edit the data in the `01_Data_Received` folder on SharePoint. Instead, mirror this directory in the following folder on the local server (or SharePoint if there is no requirement for a local server):

```
05_Technical_Work\04_Analysis\MODEL\01_Input_Files\02_Data_Processed\YYYYMMDD_Data_Description
```

Then process the data accordingly. It is also good practice to include a Readme.txt file to describe why the processing was necessary and what specifically was performed in the processing. Any files used to process the data (for example, Python scripts) should also be included. This provides a transparent record of data receipt and processing (i.e., data was received and stored on SharePoint, copied to the modeling project for use, and potentially edited prior to inclusion).

5.2 Model Development Processes

The following sections provide guidance on the three general stages in the development of a model that should undergo a documented QA/QC check: construction, calibration, and predictive analyses. It is understood that these practices will need to be adapted to the size, complexity, and nature of the modeling work, and QA/QC activities are therefore discussed in a generic manner with this need for flexibility in mind.

The Model Tracking Spreadsheet should be stored on SharePoint in `05_Technical_Work\03_QAQC` and should be used throughout all stages of model development to document QA/QC steps detailed in Tables 3 to 5. The following information related to model development data should be tracked either in this spreadsheet or via another method (i.e., within readme text) including:

a) project number

b) phase number of project (typically modeling projects have independent phases for construction, calibration, predictive, sensitivity analyses)

c) input parameters or change in input parameters

d) purpose or intent of change

e) who conducted the check/review

5.2.1 Model Construction

Model construction refers to the development of the mesh or geometry or initial files that will be used to assign of characteristics/parameters to the model. Table 3 shows the key steps or tasks involved in model construction stage.

Table 3: Quality Assurance / Quality Control Milestones for Model Construction

Step or Task	What Should be Checked	Checking Frequency
Development of conceptual model and/or geometry	■ A conceptual or wireframe model presents a clear understanding of the objectives of the project. The Modeler (with Peer Reviewer), in discussion with the Approved Reviewer, should document the conceptual model prior to model construction.	■ At commencement of project. ■ Following any significant change in conceptual understanding.
Developing input parameters	■ Input parameters are reviewed and accepted by the Approved Reviewer and submitted to the Modeler for implementation. *Note that parameters are often developed during the characterization phase or prior to Golder's involvement with the project. However, it is necessary that the confirmation of proper review and documentation be achieved here.*	■ On completion of the initial Model Tracking Spreadsheet (prior to implementation into the model) ■ Following all subsequent revisions to the properties
Implementation of input parameters	■ Once the input parameters are entered into the model (or updated in the case of a revision), the Modeler will export the parameters from each unique unit within the model and conduct a self-check to ensure they match the source data. ■ The exported parameters will then be compared to the input parameters by a Peer Reviewer to check that the correct properties have been assigned. ■ Where possible, the Modeler will also provide figures (i.e., cut sections through the model) as a secondary visual check. ■ Once the model has run, the Modeler will export images of key results, which would typically be presented in a PowerPoint file to review with the Approved Reviewer. These documents should be stored in the SharePoint folder `05_Technical_Work\03_QAQC`. ■ Review of geometry and/or meshes (i.e., quality) developed during implementation, if applicable, will be contained in the QA/QC documentation.	■ Each time parameters are exported and prior to each model run

Step or Task	What Should be Checked	Checking Frequency
	■ This documentation should be linked back to the conceptual model outlined earlier.	
Full model review	■ The full code and model files for the base case model should be checked by a Peer Reviewer followed by the Approver Reviewer. ■ Where applicable, user-specified scripts or data processing steps require validation and formal approval by the Approved Reviewer. *Note: Previous scripts that have gone through comprehensive review and have not been changed for the current application do not need to go through this process.*	■ Once, when the base case model is complete ■ Code and/or scripts should be reviewed when edits have been performed.
HOLD POINT A – QA/QC documentation of all protocols outlined in Table 3 must be fully executed prior to proceeding to submission to client (if applicable) for approval or initiation of model calibration or predictive modeling. In the event that any of the above items are updated, this Hold Point A is reinstated.		
Approval	■ Once the model has been constructed and the above steps have been undertaken, a summary PowerPoint will be sent to the client including all inputs assumed and notes documenting the reference files used, their date, and their approval from the Approved Reviewer and client as applicable. *Note: Deliverables must be approved for issue. Ensure all correspondence to/from the client are stored on SharePoint.*	■ Prior to commencing model calibration

5.2.2 Model Calibration

Model calibration typically refers to the process of reviewing/adjusting/refining of parameters as necessary such the model reasonably matches measured current conditions, and hence achieve a credible basis for predicting future scenarios. As model calibration is an iterative process, version history is of the utmost importance, as are continuous checks throughout the various calibration runs.

The Model Tracking Spreadsheet ensures accurate documentation of each calibration case that is run, and any changes made to achieve calibration. It includes columns for the Modeler to document the key attributes of the run (or case), the status of the run, the reviewer signoff, and notes on the results/conclusions of each case. In conjunction with this tracking spreadsheet, Modelers will implement a version history workflow, as seen appropriate by the Project Manager. In some instances, a version control system (see *Appendix B*) may be utilized. The objective of a comprehensive version history is to provide transparency into the modeling process and allow more experienced engineers to follow (and guide) the decision process of the individual Modeler. In practice, this could be as simple as having the Modeler save each unique model case in a predefined folder structure at each stage of model development/calibration.

Table 4 shows the key steps or tasks of the model calibration stage. Every calibration case should be given its own unique case name as discussed earlier, with the model files stored in the Model Source Files directory (see Figure 1) and the corresponding output stored in the Output Files folder structure (Figure 1). Model file folders will be named in a sequential order and with a unique case name to provide transparency in relating each model to each set of outputs (suggested naming: 001_Simulation1, 002_Simulation2, etc.).

Table 4: Quality Assurance / Quality Control Milestones for Model Calibration

Step or Task	What Should be Checked	Checking Frequency
Each calibration run (case)	■ The Peer Reviewer will confirm that the parameters that have been revised for a particular run have been implemented properly in the model. ■ The Approved Reviewer will review the results of each calibration run with the Modeler. This check will be looking at the results and behavior to confirm the output of the models are consistent with practical or theoretical expectations.	■ Prior to commencing each run ■ Following completion of each run
Calibration achieved	■ A detailed review by the Approved Reviewer of the code, input and output parameters, and the results/plots will be undertaken on the final run, which achieves calibration. ■ All results presented for review will be cross-referenced to the model output files and a redundant check will be performed to demonstrate that the presented results can be produced from the referenced model result.	■ On reaching calibration and prior to presenting the results to the client
HOLD POINT B – QA/QC and proper documentation of all protocols outlined in Table 4 must be fully executed prior to proceeding to submission to client and initiating predictive modeling.		
Approval	■ Once the model has been calibrated, the summary results will typically be presented in a meeting for acceptance and approval from the Approved Reviewer and client as applicable. *Note: Wherever practicable, all advice provided to a client, whether in meetings, telephone conversations etc., must be documented and appropriately reviewed. Ensure all correspondence to/from the client is stored on SharePoint.*	■ Prior to commencing predictive analyses and sensitivity runs

5.2.3 Predictive Analyses

Once the model has been accepted as calibrated, the base case models will be run for the chosen predictive scenarios. Table 5 summarizes the key steps or tasks for the predictive analyses that will be documented in the Model Tracking Spreadsheet.

Every predictive case should be given its own unique case name with results stored within a folder in the Output Files (Figure 1) folder structure, named in a sequential order. Each folder should contain the relevant results for an associated model file, as documented in the *Model Tracking Spreadsheet* and stored in the Model Source Files (Figure 1) directory.

Table 5: Quality Assurance / Quality Control Milestones for Predictive Analyses

Step or Task	What Should be Checked	Checking Frequency
Predictive case	■ A review will be undertaken by a Peer Reviewer followed by the Approved Reviewer to confirm that the correct configuration has been included in the model for the predictive case.	■ Prior to the run commencing
Predictive case results	■ The results of the predictive case will be reviewed by the Approved Reviewer with the Modeler. *Note: Formal PowerPoint presentations are not required for results. The Approved Reviewer will validate incremental changes between individual predictive case models and deem if results may be considered the final results. All individual cases will however be documented in the Model Tracking Spreadsheet.*	■ On completion of each predictive case
Final predictive case	■ A detailed review by the Approved Reviewer of the input and output parameters will be undertaken on each predictive case.	■ On completion of the predictive case, and prior to providing the results to the client
Approval	■ Once the final predictive analyses have been completed, the results will be presented in a meeting for acceptance and approval by the Approved Reviewer and client as applicable. *Note: Wherever practicable, all advice provided to a client, whether in meetings, telephone conversations etc. must be documented and appropriately reviewed. Ensure all correspondence to/from the client are stored on SharePoint.*	■ On completion of predictive analyses

In addition to the high-level activities documented above, the following QA/QC guidelines should also be followed:

- All figures generated from the modeling software will be set up such that they are repeatable and include unique case identifier (if possible); all figures and exports should be stored in the Output Files folder (Figure 1) within a subfolder which represents the case name.
- All presentations will include the model file name (or unique case name identifier) on each PowerPoint slide which presents results (or upfront in a summary slide).
- The QA/QC PowerPoint for each calibration and/or predictive case, must be stored on SharePoint in the QA/QC folder to be visible to the entire project team (even if duplicated from the base folder).
- All code that is regularly used or may be used at later date will be checked by an Approved Reviewer approved for use and stored in a version control system (see *Appendix B*). This provides transparency and consistency in using code or scripts on projects and is considered an easy addition for people involved in code development.

6.0 PROJECT CLOSURE

At the end of each project, the contents of the folder on the local server (if utilized) will be merged with the SharePoint folder and archived to the appropriate location. As a rule of thumb, all files related to model construction and simulation will be stored in this base folder on the local server and all other files (presentations, reports, QA/QC documents, background information) will be stored on SharePoint. In the typical workflow of a numerical modeling project, the modeling input/output/construction files will reside on the local server and all other files will reside on SharePoint.

The Project Manager is accountable for confirming Project Delivery requirements have been met including record filing and retention. For modeling projects, which are often incompatible with SharePoint storage, it is important to validate that all modeling files (with supporting files) are centrally located following the SharePoint / local server structure outlined in this protocol. Documentation that is required to be stored is referenced in the Global Procedure 1: Project Delivery Manual Section 6.0 and in the North America Electronically Stored Information Guidance.

7.0 REFERENCE DOCUMENTS

- Global Procedure 1: Project Delivery Manual
- Global E-filing Structure for Project Files (GP1 Appendix A)
- North America Electronically Stored Information Guidance.
- Canada: Final Word on Signing (Policy on Review and Signing of Documents)
- Canada: Project Deliverable Approved Signatory List
- US: PMiG Deliverables and Review Requirements – Section 7.0 Deliverables and Review Requirements
- BIS Guidance for Working with Complex Files (CAD, GIS, Models, etc.)

DOCUMENT HISTORY

This document will be reviewed and updated annually. Revision to the document will be tracked in the Document History and Approval table below.

Table 6: Document History and Approval Record

Version	Section	Description	Date	Approval
RL1		First Edition	January 25, 2021	Richard Beddoes

APPENDIX A: FILE AND FOLDER STRUCTURE

A.1 Base Folder Structure

All modeling work will be contained in `05_Technical_Work`, either on SharePoint or the local server as discussed in Section 4.4. The `05_Technical_Work` folders in both locations are intended to be complementary—there should be no overlap (with the exception of data received). The `05_Technical_Work` content is split between SharePoint and the server base folder location as follows:

A.1.1 Located on SharePoint

- `05_Technical_Work\01_Data_Received`
  - This folder contains an **unedited version of all data received** from the client of external or internal source for model construction, calibration, or predictive purposes. The structure of this folder is discussed in Section 5.1.
- `05_Technical_Work\02_Background`
  - This folder contains any **background information** (e.g., previous Golder reports, documents providing background information on the site or project).
- `05_Technical_Work\03_QAQC`
  - This folder contains **QA/QC documents** for the modeling and review as developed. This may include model reviews conducted by other engineers, automated review documents generated by other tools, or email correspondence documenting reviews. The Model Tracking Spreadsheet, which documents the case history and/or model scenario evolution, should also be located in this folder. Model or scenario tracking is considered a critical QA/QC record in this history. This spreadsheet should reference the unique case identifier discussed in Section 5.2.

A.1.2 Located on the Local Server

- `05_Technical_Work\04_Analysis\MODEL\`
  - This folder contains all **model files, including input files, scripts, output files, processed results**, etc.
  - This folder should be a standalone working copy of any models and as such may contain duplicate data. For example, files received from the client and stored in the `05_Technical_Work\01_Data_Received` folder on SharePoint will be duplicated within `04_Analysis\MODEL`—it should work as a standalone independent folder.
  - "`Model`" in this path is a placeholder for a specific name which can contain a brief description of the model (e.g., `04_Analysis\1400458040_RTKC_SW3DModel`). In the case multiple modeling tools are used, create unique `Model` folders for each scope. Further details of `05_Technical_Work\04_Analysis\Model` are provided in Section A.2.

A.2 Model Folder Structure

The model folder (`04_Analysis\Model`) structure presented in this section was developed to be applicable to any modeling project. The structure is intentionally kept simple so that it can be scaled to many types of projects involving modeling.

The general structure for the modeling folder structure is as follows:

- `04_Analysis\MODEL\01_Input_Files`
  - This folder contains all **received and processed input files** required to construct and run the numerical model. These could be geometry files, mechanical parameters, testing data, Excel workbooks, etc.
  - Both original and processed files should be contained in this folder, consistent with data receipt and processing requirements outlined in Section 5.1. All data required for input into the numerical model should be contained in this folder (even if it is duplicated from another location).
    - Unedited input files should be included in `04_Analysis\MODEL\01_Input_Files\01_Data_Received\`.
    - Processed input files should be included in `04_Analysis\MODEL\01_Input_Files\02_Data_Processed\`.
  - <u>**Do not add shortcuts or hyperlinks to other locations**</u> as these become dead links when directories change or projects are archived.
  - The files contained in this folder should be generic and not specific to any one calibration or predictive unique case. If certain files are only used for specific model cases, additional documentation should be provided.
- `04_Analysis\MODEL\02_Output_Files`
  - This folder contains all output files and interpretation of model results. When multiple model simulations/sensitivities/cases exist, create subfolders to store case-specific data. For many products, this structure can be automatically created for a specific case using a scripting language such as Python.
  - Every set of analyses should have a unique case number/identifier, which will be referenced when tracking the work completed in the current scope. Unique case names should be created for complete simulations, partial simulations, or investigative analyses in support of client requests. Consistent case number nomenclature should be determined at the onset of the project.
  - In practice, it is helpful to add an integer identifier to the beginning of the case name, similar to how documents are issued to clients. For example, case 001_Model_ConstructionA and case 002_Model_ConstructionB are potential names (though more descriptive text is desirable).
  - During the life of the model, the case names can be reflected/tracked in a version control system (VCS) so that the work and output folders are linked to specific code instances. If a VCS is not employed, the Modeler should be diligent to keep results from each case in a specific reference directory — the *Model Tracking Spreadsheet* is even more important in the case a VCS is not used, so that the details and version history of each model is captured.
  - The specific structure below the `02_Output_Files` directory (described in Appendix B) is purpose or application specific. File types for your specific applications should be classified by category. An example

of such classification is model log files (detailing construction), model binary save files, and model images (post-processed to visualize results).

- `04_Analysis\MODEL\Model_Source_Files`
  - This folder contains the "source files" for the analysis, i.e., all **model files and scripts/code that construct models**. For example, for Itasca products, all the ASCII-based model construction files (.dat files), FISH files (.fis), Python scripts (.py), and project files (.prj) should be located within this directory. These could also be source FEFLOW (.fem) files or MODFLOW (or Visual Modflow/GW Vistas) source files.
  - Binary graphical user interface (GUI) based model construction files will also be saved here and, if applicable, should be saved in subfolders that follow the unique case name methodology.

APPENDIX B: VERSION CONTROL SYSTEMS

Numerical modeling projects are often complex and involve many iterations, alternative approaches, or sensitivity investigations. As such, models are continuously updated, leading to many revisions that are unforeseen at the commencement of the project. The most difficult task of the modeling project documentation is implementing transparent means of tracking of these dynamic processes. To address this challenge, strict adherence to a detailed folder structure with the version history referenced in the *Model Tracking Spreadsheet* is recommended.

Fortunately, there are additional tools, developed in the software development industry, focused on capturing version history when coding and/or scripting is used. A Version Control System (VCS) or Source Control Manager (SCM) is software used to track revision histories of files and permit concurrent work. SharePoint acts as an SCM or VCS in the way it tracks Microsoft Word files to permit collaboration. For coding and scripting, an example would be Git, which is a widely used SCM/VCS. Git is a free and open source example, originating in the software development industry to coordinate work among multiple contributing programmers, but it has immediate application in our numerical modeling projects. If the project involves custom code or scripting, the use of a VCS is **highly recommended**—if not integrated, tracking of revision history is not possible. The revision history is tracked using the VCS, and individual cases can be differentiated using branches (VCS terminology).

Whenever model development involves custom code or scripting, the `04_Analysis\Model\Source` folder should be tracked using a VCS such as Git. Git can be used to track any ASCII-based text files, which are commonly used to develop custom code or scripts for our models. Git Large File Storage is available to track binary files, but it has not been incorporated into the QA/QC workflow to date. This is intentional. The goal is to track ASCII-based text or coding related files that are used to construct the model, not the large client-specific (confidential) input files or large save files from the models. Note that under this protocol, it is only possible to use Git when "coding" or "scripting" files are used to generate/run models (ASCII-based text files are used). When models are constructed completely in the GUI of the software product, VCSs are not as effective, but the unique case name/identifier protocol is still recommended in developing and processing results.

B.1 Version Control System Specific Instructions

When using a VCS such as Git, all model construction files should reside in the `04_Analysis\Model\Source` folder and be tracked using a VCS. The `01_Input_Files` and `02_Output_Files` folders can be added to the ".gitignore" file so that their contents are not tracked in the Git repository (confidential client-specific data and large output files should not be included in the Git repository). The advantage of a VCS is that it tracks the full history of the numerical model evolution on a case by case (branch) basis. As a result, the files to reproduce model output for a specific case are available and tracked.

Files within the `Source` folder will use specific files in the `01_Input_Files` folder during model construction, calibration, or predictive analysis. Using a VCS, edits to model scripts or construction files are tracked for different cases. Therefore, if code or input files change from one case to another, there is a full history of the model changes. Coupled with the clear history of data received, this provides us with a complete history of the model development. Additional details on Git is being provided, but existing user groups withing Golder (Python User Group, R User Group, Rock Mechanics Modeling Group) are familiar with their use and can act as a resource to other practitioners.

B.2 Detailed Folder Structure Specific Instructions

In the event a VCS cannot be used, adhere to a subfolder structure that uses a unique case name/identifier for each case. Files within the `Source` folder should be separate versions of models, with a new version saved when the model deviates (for the purpose of model construction, calibration, or predictive simulation). ***Note:*** *We as engineers or scientists are not traditionally trained to work in this way. It is easy to change one specific parameter, save the file and rerun the analyses. As we try to track the numerical modeling workflow, we must be diligent in our file processing, and this will likely be the most difficult practice to modify.* Coupled with the clear history of data received, and *Model Tracking Spreadsheet*, this provides us with a complete history of the model development.

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APPENDIX B

Quality Assurance and Quality Control Procedures and Results

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1.0 INTRODUCTION

Quality assurance (QA) refers to plans or programs encompassing internal and external management and technical practices designed to ensure that data of known quality are collected, and that such collections match the intended use of those data (EC 2012). Quality control (QC) is an internal aspect of quality assurance. It includes the techniques used to measure and assess data quality and the remedial actions to be taken when QC assessment criteria are not met. The QA/QC procedures ensure that field sampling, laboratory analyses, and report preparation produce technically sound and scientifically defensible results.

The QA/QC procedures for the Thermal Plume Delineation Study Report (Thermal Plume Study Report) applied to the following program components:

- field program (e.g., staff training, procedures and responsibilities, technical procedures, and specific work instructions to field crews)
- sample collection (e.g., equipment calibration and cleaning; avoidance of cross contamination; duplicate samples; field, travel, and equipment blanks)
- documentation (e.g., field logs, labelling, chain of custody)
- sample handling and shipping
- sample analysis (e.g., assessment of data quality and decision rules for acceptance/rejection, data entry, manipulations, and analyses)
- data management (e.g., the use of EQuIS for water quality data management)
- model validation, simulation, processing, and reporting (Appendix A, Attachment B)
- report preparation

This appendix provides the detailed QA/QC assessment conducted for the components of the thermal plume study, except for the thermal modelling aspects of the study including model validation, simulation, processing, and reporting, which can be found in Appendix A, Attachment B. The QA/QC results are summarized in Section 3.0 of the Thermal Plume Study Report.

2.0 WATER LEVEL AND FLOW

2.1 Procedures

2.1.1 Field Quality Assurance and Quality Control Procedures

Field Methods

Water surface elevation measurements were taken using a rod and level during each of the water quality field programs and the data were used to correct and validate Levelogger data. Measurements of water surface elevation were taken during each site visit with two independent setups of a survey optical level until two or more results were within 5 mm, to show repeatability of survey results and to reduce rod reading errors.

Flow measurements were performed using handheld velocity meters in a manner that was consistent with technical procedures and practices used by Water Survey of Canada (Terzi et al. 1994). Field measurements that were input into equipment for storage and calculation were also recorded on field datasheets as a redundancy measure.

The water pressure and atmospheric pressure transducers and data loggers (Solinst Leveloggers and Barologger) were tested for proper function in a controlled environment prior to deployment. During the study, a redundant Levelogger was deployed for the whole duration to mitigate the potential loss of data, particularly during the period of ice formation and ice breakup. A redundant Barologger was deployed during the late winter and early spring because data quality issues arise when data loggers are exposed to cold air temperatures (e.g., -40°C). A project-standard time zone for continuous field instrumentation of Mountain Daylight Time (the time zone during open-water season and the majority of the field programs) was adopted for consistency of data.

Equipment

Equipment was calibrated, serviced, and/or tested as part of routine QA/QC for field operations.

2.1.2 Office Quality Assurance and Quality Control Procedures

Any calculations completed by field equipment, or the field crew were independently repeated and checked. Completed data sheets and data files from the equipment were exported and filed in the project folder.

2.1.3 Data Management

Data were checked on an ongoing basis for accuracy and consistency with expected values. Relevant data were plotted to visually confirm trends and agreement. Any inconsistent or unexpected results were investigated further, using adaptive management as applicable to reduce the likelihood of reoccurrence.

2.2 Results and Discussion

Measurements of water surface elevation by level survey and measurement of inflows and outflows using handheld velocity meters were collected without noted issues. Due to intermittent, but frequent erroneous readings (i.e., unrealistic spikes and null values of pressure and temperature) from the Barologger due to cold temperatures, water surface elevation timeseries data were not available from 6 December 2021 to 22 March 2022. Data became available when the redundant Barologger was deployed during the late winter sampling program. This gap in the data was during the winter when there was no outflow expected due to frozen conditions.

2.3 Conclusions

The QA/QC assessment results indicated that:

- The direct measurements of lake water level, lake inflows, and lake outflow are acceptable.
- A water level data gap exists during the winter period, which has no impact to the study as it was during a period when there was no lake outflow.

Overall, the water level and flow data collected during the thermal plume study are considered to be of acceptable quality and adequate to address the objectives of the study.

3.0 WATER TEMPERATURE

3.1 Procedures

3.1.1 Field Quality Assurance and Quality Control Procedures

Field Methods

As part of routine practices for field operations, the following QA procedures were completed on the temperature loggers:

- One duplicate HOBO Pendant MX2204 temperature logger was installed at mid-depth at a single in-lake station to verify repeatability of logged values.
- Serial numbers of temperature loggers and their deployment stations and locations were recorded and updated as necessary to avoid data handling errors.
- Spare temperature loggers were available during sampling programs to replace malfunctioning or lost data loggers.
- Before and after each data download, the location of the instrumentation assembly was recorded.
- An additional field program was included after freeze-up (December 2021), and field planning of the spring freshet sampling program after ice breakup (May 2022) was timed to assess and correct the locations of temperature monitoring equipment to allow prompt correction so continuous data were collected at the intended locations.

The data downloaded from the temperature loggers were checked for validity and completion and for data logger timekeeping agreement. The recorded temperatures were compared to expected ranges and checked to ensure that the logging period was complete. A project-standard time zone for continuous field instrumentation of Mountain Daylight Time (i.e., the time zone during open-water season and the majority of field programs) was adopted for consistency of data.

Equipment

Temperature data loggers and other materials used for deployment for the Study were new to minimize likelihood of failure. Temperature data loggers were specifically selected without a removable portion to avoid water ingress.

3.1.2 Office Quality Assurance and Quality Control Procedures

Datasheets were independently checked for completeness. Downloaded datafiles from individual dataloggers were filed in the project folder and kept as their native file format for posterity, and the uploaded datafiles were checked for completeness.

3.1.3 Data Management

Temperature data were compiled and screened using information recorded on field datasheets, such as location and position by serial number and the “found” and redeployment coordinates of loggers were used to identify data to exclude data or identify data requiring further qualification.

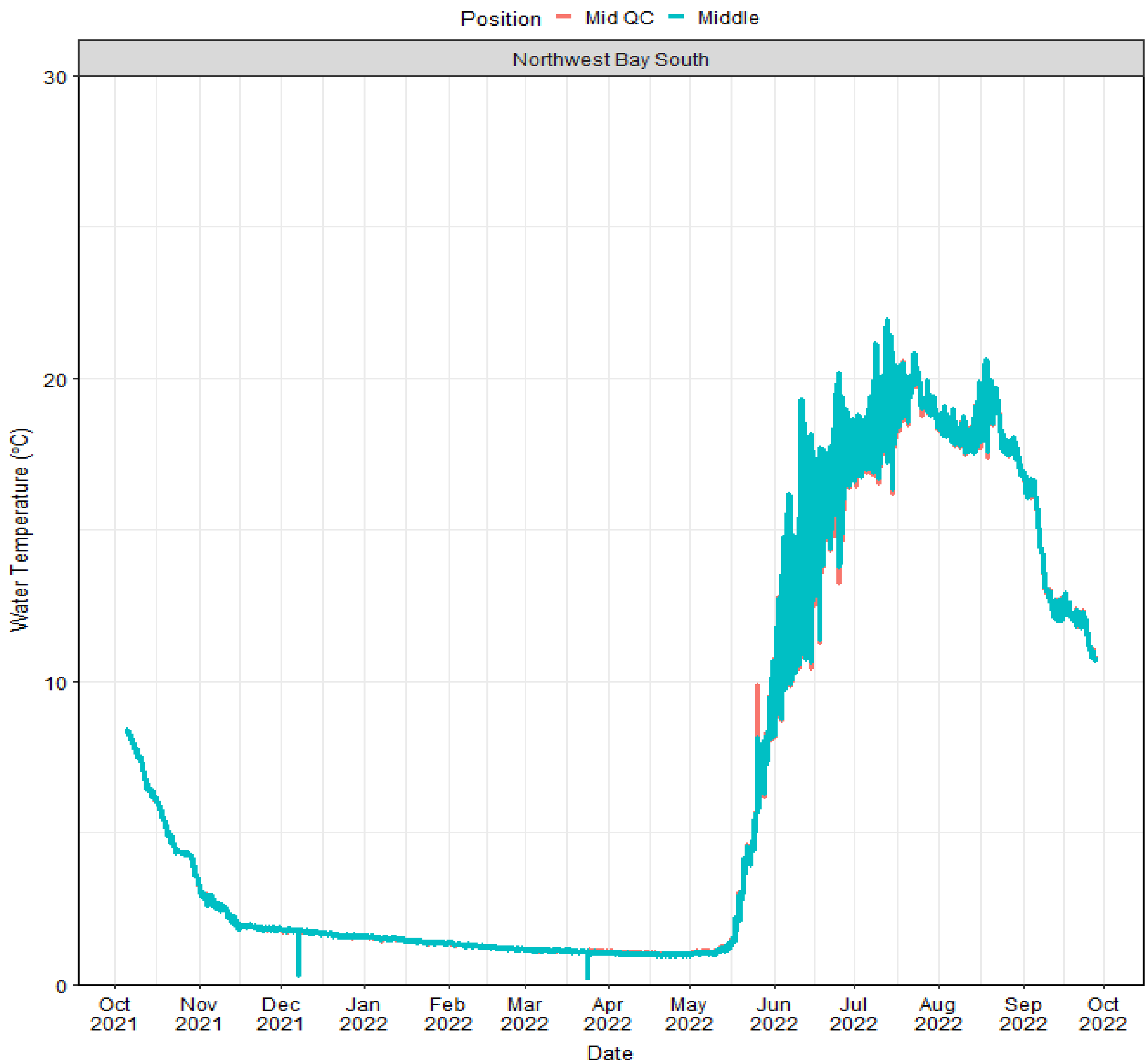
3.2 Results and Discussion

The data collected from the duplicate QC temperature logger are shown in Figure 3-1. During the full thermal study period, excluding times when the loggers were removed from water for download, the average of absolute temperature difference was 0.04°C. The largest instantaneous difference of temperature was 4.2°C was measured on 24 June 2022. If a rolling average of 30 minute timesteps is applied to mitigate the influence of varying timekeeping, the largest measured difference between duplicate temperature loggers is reduced to 2.4°C. The largest variability between the duplicate temperature loggers occurred during the open-water season, when the greatest variability of temperature was observed in the lake. During the winter, when the least variability was observed, the absolute difference in temperature measured during winter, under relatively static conditions was less than 0.07°C.

Operation of the temperature logger stations was successful during the thermal plume study. However, the following deviations were noted:

- There were three instances of temperature loggers that could not be downloaded in the field during the late winter sampling program (March 2022). The three temperature loggers were replaced in the field. Two of the three temperature loggers were able to be downloaded in the office, but data could not be recovered from the third and as a result, data from the Mid Lake 1 station at the 1 m from lake bottom depth are not available from October 2021 to March 2022.
- Freeze-up did not cause considerable shifts to the locations of instrumentation (less than 5 m). However, during the field program in December 2021 to confirm positions of temperature loggers after freeze-up, the Southwest Bay and Northwest Bay — S stations were mistakenly redeployed to the incorrect locations, which triggered a review of procedures to prevent reoccurrence. The positions of these were corrected during the late winter program (March 2022).
- Break-up resulted in considerable shifts (up to 100 m) to the locations of instrumentation that were located away from the Facility (i.e., Southwest Bay, Mid Lake 1, Northwest Bay — S). Positions were checked and corrected as soon as practical during the spring freshet program (May 2022).

Figure 3-1: Results of the Duplicate Temperature Loggers Deploy at the Northwest Bay South Station



3.3 Conclusions

The QA/QC assessment results indicated that:

- Data from the temperature loggers deployed in duplicate at Northwest Bay — S station exhibit good agreement.
- The temperature logger data set is largely complete with minimal missing data (i.e., only one data logger out of the 19 resulted in missing data; 6 months of data).
- Shifting of instrumentation because of ice formation and ice breakup was monitored and controlled.
- Instances of data gaps or data collected from wrong locations occurred during winter when under-ice temperatures were generally stable and predictable.

Overall, the water temperature data collected during the thermal plume study are considered to be of acceptable quality and adequate to address the objectives of the study.

4.0 WATER QUALITY

4.1 General QA/QC Procedures

Water quality QA/QC procedures cover three areas: fieldwork, laboratory analysis, and data management, validation and analyses. Fieldwork QA/QC procedures pertain to the maintenance and operation of equipment and instrumentation, sampling methods, sample handling, and shipping. Laboratory analysis QA/QC procedures incorporate protocols developed by analytical laboratories. Data management, validation and analyses QA/QC procedures include validation of field data and analytical results provided by the respective laboratories.

4.1.1 Fieldwork

Field crew members from WSP are trained to be proficient in standardized field sampling procedures, data recording, and equipment operations. Field work was completed according to relevant requirements of the Thermal Plume Delineation Study Design (Golder 2021), approved specific work instructions (SWI) and established WSP technical procedures. Specific work instructions are standardized forms that reference appropriate technical procedures and provide specific sampling instructions for the work to be undertaken. For example, specific work instructions provide field staff with descriptions of exact sampling locations, equipment needs and calibration requirements, sample handling and storage requirements, sample labelling and shipping protocols, and internal and laboratory contacts. Specific work instructions also provide guidelines for field record keeping and sample tracking. WSP technical procedures are consistent with information described in the relevant scientific literature (e.g., APHA 2012), and outline relevant information regarding protocols for field sample collection and in situ field measurements.

Other key QA processes applicable to field crews were:

- A pre-field meeting with the field crew and the project/task manager was held before the field work to discuss the purpose of the field program, specify the roles of crew members, address questions regarding the specific work instructions, and discuss equipment needs, field logistics, and contingency plans.
- During field work, field data were recorded on standardized field datasheets and in a bound waterproof field notebook, according to established field record-keeping procedures. All field datasheets and notebooks were scanned into electronic copies at the end of the field program. Field crews also wrote daily field reports summarizing tasks completed of the day and plans for the next day.
- Field crews checked in with task managers after each field program to provide an update on work completed.
- All field data were checked at the end of each sampling event or field day for completeness and accuracy and a 10% transcription check was completed by a second qualified person.
- Calibrations were performed on field equipment (e.g., water quality meters) at the beginning of each field day according to the manufacturer's specifications to maintain accuracy of the field data; meters were only used if calibration was successful (i.e., calibration criteria ranges were met). Results of each calibration and any required maintenance were recorded on pre-printed, waterproof calibration sheets. End-of-day calibration checks were completed to evaluate potential drift in the calibration during the field program. Records of calibration and end-of-day checks were reviewed if unexpected field readings were measured.

- Samples were documented using laboratory-provided chain-of-custody (COC) forms and receipt of samples by the analytical laboratory was confirmed. Field crews were responsible for managing sample shipment to the analytical laboratory. Prior to sample shipment, field crews confirmed the following:
  - All required samples were collected and accounted for prior to shipping.
  - COC and analytical request forms were completed.
  - Proper container labelling and documentation procedures were followed.

Four types of QC samples were used in the sampling programs to evaluate the quality of data from samples collected in the field:

- Travel blanks consist of laboratory-filled deionized water in sampling bottles. Travel blanks accompany the samples through collection and transportation. These are shipped, handled, stored, and treated the same as the collected samples, but are not opened in the field. Travel blanks are used to detect potential sample contamination that may be due to ambient conditions, or that may have occurred during shipping and laboratory analysis. Travel blanks were collected during the fall, freshet and late summer programs.
- Field blanks consist of deionized water provided by the analytical laboratory that is transferred to sample bottles in the field. Field blanks are handled the same and analyzed for the same constituents as the water samples collected during the field program (e.g., preserved, filtered). Field blanks are used to detect potential sample contamination during sample collection, handling, shipping, and analysis. Field blanks were collected during the winter and early summer programs.
- Equipment blanks consist of deionized water provided by the analytical laboratory that is used to rinse the water quality sampling equipment (Kemmerer samplers). The equipment blanks were collected during each program.
- Duplicate samples are additional samples collected at the same time and location as the required samples collected during a field program, using the same sampling methods. They are used to check within-site variation, and the precision of field sampling methods or laboratory analysis, or both. Duplicate samples were taken at the Northwest Bay – N station during the fall, freshet and late summer programs, and at the Near Outflow – In lake station during the winter and early summer programs.

4.1.2 Laboratory Analyses

ALS Group (ALS), an analytical laboratory accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA), was subcontracted to analyze water quality samples collected by WSP during the thermal plume study. Under CALA’s accreditation program, performance evaluation assessments are routinely conducted to check laboratory procedures and the results of internal QC samples. Therefore, the analytical data reported by ALS were considered reliable.

4.1.3 Data Management, Validation, and Analyses

Relevant QA procedures for data management, validation and analyses were:

- using appropriately trained personnel for each data management, analysis, and reporting task
- using standardized data manipulation and summary tools, where applicable
- filing hard-copy, electronic data, and project information according to standardized protocols

- using a data management system (e.g., EQuIS for water quality samples) to maintain an organized, consistent system to store, check and export field and laboratory data
- following standardized data validation procedures for laboratory and field results
- reviewing work products (e.g., tables, figures, result descriptions) at appropriate milestones

4.2 Data QA/QC Procedures

A series of twelve data validation checks were performed for *in situ* field measurements and water chemistry results to identify potential data quality issues:

- review of *in situ* field measurements
- confirm required parameters were analyzed and reported on ALS Certificates of Analyses (CoAs)
- review of laboratory analytical methods
- review of detection limits
- review of hold times exceedances
- review of units
- review of laboratory data qualifiers
- review of internal laboratory QA/QC results
- compare total and dissolved concentrations
- compare concentrations in duplicate samples
- check for contamination in blank samples
- review of individual datapoints

4.2.1 In Situ Field Measurements

Field data were entered into a Microsoft Excel spreadsheet at the end of each sampling trip and at least 10% of the data entered electronically were verified by a second qualified person to identify transcription errors. Calibration documentation was reviewed for possible issues with calibrating the field instruments. Electronic copies of the field data were also reviewed for transcription errors using the hardcopy field datasheets. The electronic data were then submitted to the EQuIS database.

The reliability of 2022 field DO, pH and conductivity data were assessed by comparing multi-meter field data to Winkler titration samples (for DO) and laboratory measurements (for pH, turbidity, and conductivity), and by comparing unexpected results to historical results or results collected at the same day from different stations.

Field DO measurements were compared to the corresponding Winkler titration results measured on the same day, at the same station and depth. If the Winkler titration results were not within 1.5 milligrams per litre (mg/L) of the field DO measurement, the multi-meter measurement and Winkler result were considered notably different, and additional Winkler titrations were completed to confirm results. Field DO measurements were reviewed further if confirmed to be notably different from Winkler titrations to determine whether results were inconsistent with expected results (e.g., inconsistent with seasonal historical data or data collected during the same program.

The relative percent difference (RPD) was used to determine the variability between field-measured and laboratory values of specific conductivity and turbidity. The RPD was calculated using the following formula:

$$RPD = \frac{|(\text{field measurement} - \text{laboratory value})|}{(\text{field measurement} + \text{laboratory value})/2} \times 100$$

Variability in field-measured and laboratory values was assessed as notable if the calculated RPD was greater than 20% between the field measurement and laboratory value.

Notable differences in pH were identified if field-measured and laboratory values were greater than 1.0 pH unit.

In situ field measurements (i.e., water temperature, specific conductivity, pH, dissolved oxygen, and turbidity) were also compared to the historical results to identify field measurements outside of expected ranges; these values were further reviewed to assess the need to invalidate or qualify the field measurement.

4.2.2 Required Parameters

Field datasheets were reviewed to check whether required field parameters were collected per the Thermal Plume Delineation Study Design (Golder 2021); the laboratory results reported on the CoAs were reviewed against the Thermal Plume Delineation Study Design (Golder 2021) and the laboratory quote to confirm analysis of all required parameters.

4.2.3 Analytical Methods

Analytical methods were specified for each parameter or group of parameters for sampling programs. The project standard methods and the methods used by the laboratory for individual samples were compared. If laboratory methods differed from standard methods, the laboratory was contacted to determine the reason for the deviation in method.

4.2.4 Detection Limits

The analytical method detection limits (MDL) used by ALS to analyze substances are the minimum concentration of analyte that can be detected, inclusive of all analytical steps, for a given method and matrix, from the absence of that substance (blank) within a specified confidence. The analytical reported detection limit (RDL) is the limit of reliable, quantitative measurement for a specific analyte in a specific sample after any adjustments have been made for sample size, matrix effects and/or dilutions. The RDL was referred to as the detection limit (DL) in the Thermal Plume Study Report. To obtain high quality data, ALS and WSP worked together to develop standard DLs for the required parameters.

4.2.5 Units

Reported units from the electronic data were reviewed against the hard copy report provided by ALS and expected units for each parameter. If units differed from expected units, the laboratory was contacted to correct the units.

4.2.6 Hold Times

Hold times between sample collection and analysis for each parameter are specified by ALS. Exceedances of hold times have the potential to reduce the reliability of results, particularly when hold times are exceeded by a long time period relative to the hold time. Results analyzed after hold times were reviewed to assess the potential for the hold time exceedance to affect the results.

4.2.7 Laboratory Data Qualifiers

Qualifiers, or alphabetical codes, were assigned by the laboratory to results when the laboratory identified a potential issue with the result. If a parameter was frequently assigned a qualifier code, the laboratory was questioned to determine the reason and correct the issue if possible. If results qualified by the laboratory were inconsistent with expected trends or patterns, then further discussions with the laboratory were conducted.

4.2.8 Laboratory Internal Quality Control Samples

Internal laboratory QC samples were analyzed by ALS to demonstrate analytical data quality. Internal laboratory QC samples included laboratory duplicate, laboratory control, method blank, and method spikes samples. A laboratory duplicate sample is a randomly selected intra-laboratory replicate sample. Laboratory duplicate samples provide information regarding method precision and sample heterogeneity. A laboratory control sample is an analyte-free matrix that has been fortified with test analytes at a known concentration and processed in an identical manner to test samples. Laboratory control samples are used to monitor and control test method accuracy and precision, independent of test sample matrix. A method blank sample is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method blank sample results are used to monitor and control for potential contamination from the laboratory environment and reagents. A matrix spike sample is a randomly selected intra-laboratory replicate sample that has been fortified with analytes at a known concentration and processed in an identical manner to test samples. Matrix spike samples provide information regarding analyte recovery and potential matrix effects.

4.2.9 Total versus Dissolved Concentrations

The dissolved concentration of any given metal, metalloid, or other parameter (e.g., organic carbon) should, by definition, be less than or equal to the associated total concentration. Due to inherent variability in reported results, sample heterogeneity and analyses of total and dissolved parameters from different bottles (i.e., total and dissolved results were not analyzed from the same aliquot of water), dissolved concentrations that were greater than total concentrations by 30% or more (i.e., notably higher) were typically confirmed by ALS. These criteria are consistent with those used by ALS for their internal QA/QC procedures (Gregg 2019a, pers. comm.). Reported dissolved concentrations that were notably higher than reported total concentrations for more than 10% of the parameters indicate the potential for errors in laboratory analysis (Dang 2008, pers. comm.) or field collection protocols.

4.2.10 Duplicate Samples

Duplicate water samples were collected at the Northwest Bay — N station on 30 September 2021, 25 May and 25 August 2022 and at the Near Outflow — In lake station on 25 March and 6 July 2022, to assess variability during sample collection, handling, and analysis. The duplicate samples were analyzed for the same set of parameters as the collected water samples. The relative percent difference (RPD) was used to determine the variability between laboratory analysis of the duplicate sample and corresponding field sample. Before calculating the RPD, concentrations below the DL were replaced with the DL value in cases when only one of the concentrations for a given parameter was detectable. The RPD was calculated using the following formula:

$$\text{RPD} = \frac{|(\text{field sample concentration - duplicate sample concentration})|}{\text{average of field and duplicate sample concentration}} \times 100$$

If both concentrations were less than five time the relevant DL used by ALS, the RPD was not calculated. Variability in parameter concentrations between the field and duplicate samples was assessed as notable if the calculated RPD was greater than 20% between sample results. These criteria are consistent with those used by

ALS for their internal QC procedures (Dang 2007, pers. comm.). The five times DL threshold takes into account the potential for analytical uncertainty when concentrations approach DLs (APHA 2012, Weiner 2000).

Field and duplicate sample results that were notably different and outside the range of analytical variability (i.e., absolute difference between field and duplicate samples is above five times the DL) were typically verified by re-analysis (Gregg 2019a, pers. comm.).

Variability between the field and duplicate samples was rated as follows:

- Low, if less than 10% of the parameters included in the duplicate analysis were notably different from one another.
- Moderate, if 10 to 30% of the parameters included in the duplicate analysis were notably different from one another.
- High, if more than 30% of the parameters included in the duplicate analysis were notably different from one another.

4.2.11 Blank Samples

Blank samples were collected to assess for contamination that may occur during collection, handling, shipping and analyses of samples. Three types of blank samples were collected as part of the Thermal Plume Delineation Study Design (Golder 2021):

- Travel blanks: 1 October 2021, 26 May 2022, and 25 August 2022
- Field blanks: 24 March 2022 and 6 July 2022
- Equipment blanks: 30 September 2021, 22 March 2022, 24 May 2022, 5 July 2022, and 24 August 2022

Results above five times the DL in travel, field, and equipment blanks were considered notable, and indicate potential contamination in the samples.

4.2.12 Review of Individual Data Points

Field Data

Field data were reviewed to identify values that were inconsistent with other values in the water quality profile, laboratory data, or historically observed values. Field notes, calibration logs, and historical data from the same location and season were reviewed to determine whether there was a potential cause for the anomalous results. When an error was identified to be the likely cause of the anomalous field data, these data were invalidated and excluded from further assessment; otherwise, the data were qualified providing the rationale for the qualification but used in the assessment. Field data that were invalidated or qualified were flagged with appropriate notes to explain the invalidation or qualification of the data (Appendices F.1 and F.2); invalidated data were excluded from the assessment.

Laboratory Data

Laboratory data were reviewed to identify values that were inconsistent relative to the other data collected during the same program or historically observed values. Field notes, laboratory qualifiers, the results of QC samples, and historical data were reviewed to determine whether there was a potential cause for the anomalous results. ALS completed data rechecks and reanalysis on identified values to confirm the data in question. Occasionally, due to laboratory contamination or sample mix-ups, ALS provided revised CoAs, which would be uploaded to the

EQuIS database to replace the original results. Laboratory data that were invalidated or qualified were flagged with appropriate notes to explain the invalidation or qualification of the data (Appendix F.2); invalidated data were removed from the assessment.

4.3 QA/QC Results and Discussion

4.3.1 In Situ Field Measurements

Field measurements (i.e., DO, pH, specific conductivity, and turbidity) were confirmed by Winkler titration for DO concentration, and laboratory results for pH, specific conductivity and turbidity, respectively.

All field DO concentrations were within 1.5 mg/L of the Winkler titration results. The Winkler kit was not available in the early summer program; however, with the use of the second AquaTROLL, field DO concentrations were confirmed to be within the 1.5 mg/L difference.

Most of field and laboratory pH values were within 1 pH unit. Notable differences (greater than1 pH unit) between field and laboratory pH values were found for 4 out of 56 field samples. The greatest difference, 1.3 pH unit, was observed at the Mid Lake 1 station on 6 July 2022 and at the Near Outflow — In lake station on 25 May 2022. Due to the short hold time of pH (15 minutes), the field pH values were considered more reliable.

Most field and laboratory specific conductivity values were not notably different. Three notable RPD values (greater than 20%) between field and laboratory specific conductivity values were observed at the Mid Lake 1 (mid-depth) station on 1 October 2021, and at the Southwest Bay station on 22 March 2022 for both mid-depth and bottom samples. Additionally, the six field specific conductivity values (106, 106, 125, 203, 401, and 400 µS/cm) at the Southwest Bay station on 22 March 2022 were substantially lower than the range observed at other stations (465 to 512 µS/cm) in March 2022.

High variability between field and laboratory turbidity measurements was observed with RPDs greater than 20% in 32 out of 55 samples. The majority of laboratory turbidity values (46 of the 55 samples) were higher than the field turbidity; the reason for this was unknown. No issues were identified in the calibration of field turbidity or the sampling procedure; although exceedances of the 3-day hold time for laboratory turbidity occurred frequently (i.e., 53 of the 55 samples); these exceedances are unlikely to result in the observed differences (Government of Newfoundland 2010). The differences may be related to inherent variability in turbidity values; both field-measured and laboratory turbidity values were retained in the assessment and the results tables.

No issues were identified in the calibration of the AquaTROLL or field turbidity meter. Therefore, data were retained in the database and in Appendix F.1.

4.3.2 Required Parameters

Field turbidity at the Inflow to NW Bay 2 on 26 May 2022 was not taken due to a field crew oversight. Laboratory parameters required for analyses as part of the Thermal Plume Delineation Study Design (Golder 2021) were analyzed as requested and reported on the CoAs.

4.3.3 Analytical Methods

Parameters were analyzed per the requested analytical methods in the laboratory quote.

4.3.4 Detection Limits

Analytical DLs for most parameters were reported at the DLs provided in the laboratory quote. In some samples, chloride, fluoride, xylenes, m,p-xylenes, and o-xylene were reported with detection limits lower than the DLs in the laboratory quote (Table 4-1).

Raised DLs were observed in one or more samples for total dissolved solids, total nitrogen, total and dissolved phosphorus by colorimetric, total lithium and titanium, and dissolved silver. The majority of the raised DLs were due to sample matrix effects or a dilution required to minimize ionic interference. During analyses, particularly high parameter concentrations must be reduced by dilution so that the concentration is reduced to the analytical range for that parameter or reduces the ability of the high parameter concentration to interfere with the analyses of another parameter (Gregg 2019a, pers. comm.).

Table 4-1: Detection Limits for Water Quality Samples, September 2021 to August 2022

Parameter	Unit	ALS Method Detection Limit[(a)]	Reported Detection Limits							
			Field and Duplicate Samples							Travel, Field, and Equipment Blanks
			Inflow to NW Bay 2	Northwest Bay - N	Mid Lake 1	Southwest Bay	EMD Discharge - In lake	Near Outflow - In lake	Outflow of Jackfish Lake	
Conventional Parameters										
pH	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Specific conductivity	µS/cm	2	2	2	2	2	2	2	2	2
Hardness, as $CaCO_3$	mg/L	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total alkalinity, as $CaCO_3$	mg/L	1	1	1	1	1	1	1	1	1
Alkalinity, Phenolphthalein as $CaCO_3$	mg/L	1	1	1	1	1	1	1	1	1
Total dissolved solids	mg/L	10	**20**	**20**	**20**	**20**	**20**	**20**	**20**	10
Total dissolved solids (calculated)	mg/L	1	1	1	1	1	1	1	1	1
Total suspended solids	mg/L	3	3	3	3	3	3	3	3	3
Dissolved organic carbon	mg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Turbidity	NTU	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Major Ions										
Bicarbonate, as $CaCO_3$	mg/L	1	1	1	1	1	1	1	1	1
Calcium	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Carbonate, as $CaCO_3$	mg/L	1	1	1	1	1	1	1	1	1
Chloride	mg/L	0.5	**0.1 to 0.5**	**0.1 to 0.5**	**0.1 to 0.5**	**0.1 to 0.5**	**0.1 to 0.5**	**0.1 to 0.5**	**0.1 to 0.5**	**0.1 to 0.5**
Fluoride	mg/L	0.02	**0.01 to 0.02**	**0.01 to 0.02**	**0.01 to 0.02**	**0.01 to 0.02**	**0.01 to 0.02**	**0.01 to 0.02**	**0.01 to 0.02**	**0.01 to 0.02**
Hydroxide, as $CaCO_3$	mg/L	1	1	1	1	1	1	1	1	1
Magnesium	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Potassium	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sodium	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sulphate	mg/L	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Reactive silica	mg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Nutrients										
Nitrate	mg-N/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nitrite	mg-N/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Nitrate + nitrite	mg-N/L	0.005	**0.0051**	**0.0051**	**0.0051**	**0.0051**	**0.0051**	**0.0051**	**0.0051**	**0.0051**
Total ammonia	mg-N/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Total nitrogen	mg-N/L	0.03	0.03	**0.03 to 0.15**	**0.03 to 0.06**	**0.03 to 0.09**	0.03	**0.03 to 0.15**	**0.03 to 0.15**	0.03
Total phosphorus (colorimetric)	mg-P/L	0.002	0.002	**0.002 to 0.02**	**0.002 to 0.02**	**0.002 to 0.02**	0.002	**0.002 to 0.02**	**0.002 to 0.02**	0.002
Total phosphorus (ICPMS)	mg-P/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Dissolved phosphorus (colorimetric)	mg-P/L	0.002	0.002	**0.002 to 0.02**	**0.002 to 0.02**	0.002	0.002	0.002	0.002	0.002
Dissolved phosphorus (ICPMS)	mg-P/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
General Organics										
Total oil and grease	mg/L	5	-	5	-	-	-	5	-	5
Volatile hydrocarbons (C6-C10)	mg/L	0.1	-	0.1	-	-	-	0.1	-	0.1
Volatile petroleum hydrocarbons (C6-C10)	mg/L	0.1	-	0.1	-	-	-	0.1	-	0.1
Total Metals										
Aluminum	µg/L	3	3	3	3	3	3	3	3	3
Antimony	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Arsenic	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Barium	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Beryllium	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Bismuth	µg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Boron	µg/L	10	10	10	10	10	10	10	10	10
Cadmium	µg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Calcium	µg/L	50	50	50	50	50	50	50	50	50
Cesium	µg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Chromium	µg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Cobalt	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Table 4-1: Detection Limits for Water Quality Samples, September 2021 to August 2022

Parameter	Unit	ALS Method Detection Limit(a)	Reported Detection Limits							
			Field and Duplicate Samples							Travel, Field, and Equipment Blanks
			Inflow to NW Bay 2	Northwest Bay - N	Mid Lake 1	Southwest Bay	EMD Discharge - In lake	Near Outflow - In lake	Outflow of Jackfish Lake	
Copper	µg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Iron	µg/L	10	10	10	10	10	10	10	10	10
Lead	µg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Lithium	µg/L	1	**1 - 5**	1	1	1	1	1	1	1
Magnesium	µg/L	5	5	5	5	5	5	5	5	5
Manganese	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mercury	µg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Molybdenum	µg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Nickel	µg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Potassium	µg/L	50	50	50	50	50	50	50	50	50
Rubidium	µg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Selenium	µg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silicon	µg/L	100	100	100	100	100	100	100	100	100
Silver	µg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Sodium	µg/L	50	50	50	50	50	50	50	50	50
Strontium	µg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Sulphur	µg/L	500	500	500	500	500	500	500	500	500
Tellurium	µg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Thallium	µg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Thorium	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Tin	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Titanium	µg/L	0.3	0.3	**0.3 to 0.6**	0.3	0.3	0.3	0.3	0.3	0.3
Tungsten	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Uranium	µg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Vanadium	µg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Zinc	µg/L	3	3	3	3	3	3	3	3	3
Zirconium	µg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Dissolved Metals										
Aluminum	µg/L	1	1	1	1	1	1	1	1	1
Antimony	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Arsenic	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Barium	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Beryllium	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Bismuth	µg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Boron	µg/L	10	10	10	10	10	10	10	10	10
Cadmium	µg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Cesium	µg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Chromium	µg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Cobalt	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Copper	µg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Iron	µg/L	10	10	10	10	10	10	10	10	10
Lead	µg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Lithium	µg/L	1	1	1	1	1	1	1	1	1
Manganese	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mercury	µg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Molybdenum	µg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Nickel	µg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Rubidium	µg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Selenium	µg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silicon	µg/L	50	50	50	50	50	50	50	50	50

Table 4-1: Detection Limits for Water Quality Samples, September 2021 to August 2022

Parameter	Unit	ALS Method Detection Limit[a]	Reported Detection Limits							
			Field and Duplicate Samples							Travel, Field, and Equipment Blanks
			Inflow to NW Bay 2	Northwest Bay - N	Mid Lake 1	Southwest Bay	EMD Discharge - In lake	Near Outflow - In lake	Outflow of Jackfish Lake	
Silver	µg/L	0.01	0.01	**0.01 to 0.05**	0.01	0.01	0.01	0.01	0.01	0.01
Strontium	µg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Sulphur	µg/L	500	500	500	500	500	500	500	500	500
Tellurium	µg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Thallium	µg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Thorium	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Tin	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Titanium	µg/L	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Tungsten	µg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Uranium	µg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Vanadium	µg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Zinc	µg/L	1	1	1	1	1	1	1	1	1
Zirconium	µg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Volatile Organics										
Benzene	µg/L	0.5	-	0.5	-	-	-	0.5	-	0.5
Ethylbenzene	µg/L	0.5	-	0.5	-	-	-	0.5	-	0.5
Toluene	µg/L	0.5	-	0.5	-	-	-	0.5	-	0.5
Xylenes	µg/L	0.75	-	**0.5 to 0.75**	-	-	-	**0.5 to 0.75**	-	**0.5 to 0.75**
m,p-Xylenes	µg/L	0.5	-	**0.4 to 0.5**	-	-	-	**0.4 to 0.5**	-	**0.4 to 0.5**
o-Xylene	µg/L	0.5	-	**0.3 to 0.5**	-	-	-	**0.3 to 0.5**	-	**0.3 to 0.5**
Styrene	µg/L	0.5	-	0.5	-	-	-	0.5	-	0.5
Methyl tert-butyl ether	µg/L	0.5	-	0.5	-	-	-	0.5	-	0.5
F1 (C6-C10)-BTEX	µg/L	100	-	100	-	-	-	100	-	100
F1 (C6-C10)	µg/L	100	-	100	-	-	-	100	-	100
F2 (C10-C16)	µg/L	300	-	300	-	-	-	300	-	300
F3 (C16-C34)	µg/L	300	-	300	-	-	-	300	-	300
F4 (C34-C50)	µg/L	300	-	300	-	-	-	300	-	300

Notes:

a) ALS method detection limits were provided on the laboratory quote.

Bolded values are above or below ALS method detection limits.

Lake stations (Northwest Bay - N, Mid Lake 1, Southwest Bay, EMD Discharge - In lake, and Near Outflow - In lake) included samples from mid-depth and bottom.

µS/cm = microsiemens per centimetre; NTU = nephelometric turbidity units; $CaCO_3$ = calcium carbonate; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; µg/L = micrograms per litre; ICPMS = inductively coupled plasma mass spectrometry; BTEX = benzene, toluene, ethylbenzene, and xylenes; - = no data.

4.3.5 Units

Reported units were correct and no issues were identified during the review of electronic data against the expected units (per the laboratory quote) and the hard copy report provided by ALS.

4.3.6 Hold Times

Parameters with hold time exceedances were:

- laboratory pH (15 minutes): all samples
- turbidity (3 days): samples collected on 30 September 2021 and 1 October 2021; 22 to 25 March 2022; 25 and 26 May 2022; 5 and 6 July 2022; and 24 and 25 August 2022
- nitrate and nitrite (3 days): samples collected on 30 September 2021 and 1 October 2021; 22 to 25 March 2022; 25 May 2022; 5 and 6 July 2022; and 24 and 25 August 2022

Shorter hold times (i.e., 3 days or less) were generally exceeded due to shipping and staffing constraints from ALS locations in Yellowknife and Vancouver (Gregg 2019b, 2020, pers. comm.), and due to logistical constraints caused by the COVID-19 pandemic. The hold time for pH expires within 15 minutes (APHA 2012) and samples cannot be collected, transported, and processed by ALS within this time limit. Therefore, field pH was used for assessment of water quality. The limited exceedances of hold times for nitrate, nitrite, and turbidity are unlikely to have resulted in inaccurate laboratory results based on studies by the Government of Newfoundland and Labrador (2010) and Love et al. (2016).

4.3.7 Laboratory Data Qualifiers

Several data qualifiers were identified during the review of CoAs for all samples (Appendix F.6). Most of these data qualifiers were related to reported detection limit adjustments for sample matrix effects, the necessity for dilution of the sample, dissolved concentration greater than the total, and repeat analysis to verify results. The qualifiers had a negligible to minimal effect on the assessment of water quality because they were limited in number and typically applicable to dissolved concentrations (total concentrations are typically used for comparisons to water quality guidelines), or the results were verified by repeat analysis. Reactive silica results were qualified when sample filtration was required due to turbidity interference; the required sample filtrations were not anticipated to affect water quality.

4.3.8 Laboratory Internal Quality Control Samples

Laboratory QC samples analyzed by ALS and are presented in Appendix F.6. The majority of internal laboratory QC samples met laboratory data quality objectives, and the results were considered acceptable.

4.3.9 Total versus Dissolved Concentrations

Dissolved concentrations exceeded total concentrations by more than 30% for the following parameters:

- aluminum at EMD Discharge — In lake (bottom) on 1 October 2021
- copper and lead at Inflow to NW Bay 2 on 30 September 2021
- lithium at Southwest Bay (bottom) on 22 March and 25 August 2022
- molybdenum at EMD Discharge — In lake (bottom) on 24 May 2022, at Near Outflow — In lake (bottom) and Southwest Bay (bottom) on 25 May 2022
- selenium at Mid Lake 1 (bottom) on 25 August 2022 and at the Outflow of Jackfish Lake on 30 September 2021
- silver at Northwest Bay – N (mid-depth) on 25 August 2022
- sulphur at Mid Lake 1 (bottom) on 25 August 2022
- tin at Inflow to NW Bay 2 on 30 September 2021 and at EMD Discharge — In lake (bottom) on 23 March 2022
- uranium at Southwest Bay (bottom) on 25 May 2022
- zinc at Inflow to NW Bay 2 on 30 September 2021
- zirconium at EMD Discharge — In lake (bottom) on 1 October 2021

Overall, dissolved concentrations greater than total concentrations accounted for 1% of the total number of metals analyzed during the Thermal Plume Delineation Study (Golder 2021). Dissolved concentrations were typically below total concentrations.

4.3.10 Duplicate Samples

Five duplicate samples were collected, accounting for approximately 9% of the total number of water samples submitted for analysis. Concentrations of parameters with a notable RPD (i.e., RPD between field and duplicate samples above 20%, when concentrations of one or both parameters were above five times the DL), were identified for the following duplicate samples (Table 4-2):

- Northwest Bay – N (bottom) on 30 September 2021: carbonate as $CaCO_3$ and total uranium (i.e., 2% of total parameters analyzed)
- Northwest Bay – N (bottom) on 25 August 2022: total lithium and dissolved manganese (i.e., 2% of total parameters analyzed)
- Near Outflow —In lake (bottom) on 25 March 2022: laboratory pH (i.e., 1% of total parameters analyzed)
- Near Outflow — In lake (bottom) on 6 July 2022: laboratory pH, carbonate as $CaCO_3$, total phosphorus by colorimetric, and dissolved manganese (i.e., 3% of total parameters analyzed)

The RPDs between field and duplicate parameter concentrations were below 20% for the duplicate samples collected at the Northwest Bay – N (bottom) station on 25 May 2022.

Overall, sample variability was assessed as low based on the results from duplicate samples because less than 10% of parameters had a notable RPD between the field and duplicate sample.

Table 4-2: Quality Control Duplicate Sample Results, September 2021 to August 2022

		Station	Northwest Bay - N									Near Outflow - In lake					
		Sample Depth	4 m		RPD	4 m		RPD	4 m		RPD	4.8 m		RPD	5 m		RPD
		Sample Date	30-Sep-21			25-May-22			25-Aug-22			25-Mar-22			6-Jul-22		
		Sample Type	Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate	
		ALS Sample ID	YL2101440-002	YL2101440-003		YL2200527-001	YL2200527-009		YL2201326-001	YL2201326-011		YL2200265-005	YL2200265-007		YL2200852-007	YL2200852-009	
Parameter	Unit	Detection Limit															
Conventional Parameters																	
pH	-	0.1	8.42	8.35	16%	8.23	8.29	14%	8.47	8.49	5%	8.07	7.98	**21%**	8.47	8.36	**25%**
Specific conductivity	µS/cm	2	446	450	1%	440	446	1%	446	442	1%	503	501	0%	483	443	9%
Hardness, as $CaCO_3$	mg/L	0.6	140	142	1%	135	131	3%	149	148	1%	161	160	1%	144	147	2%
Total alkalinity, as $CaCO_3$	mg/L	1	118	116	2%	108	108	0%	113	111	2%	122	121	1%	110	110	0%
Alkalinity, Phenolphthalein as $CaCO_3$	mg/L	1	3.6	1.7	-	<1	<1	-	3.7	4.3	-	<1	<1	-	3.6	2.8	-
Total dissolved solids	mg/L	20	285	279	2%	278	276	1%	290	274	6%	315	320	2%	262	274	4%
Total dissolved solids (calculated)	mg/L	1	249	248	0%	240	236	2%	252	251	0%	275	276	0%	247	249	1%
Total suspended solids	mg/L	3	14.2	11.8	-	7.7	6.7	-	9.7	7.5	-	<3	<3	-	11.8	12.4	-
Dissolved organic carbon	mg/L	0.5	12.3	12	2%	12.1	13.6	12%	11.3	11.8	4%	14.1	13	8%	12.5	12.8	2%
Turbidity	NTU	0.1	21.1	21	0%	7.24	6.63	9%	9.13	8.51	7%	1.18	1.31	10%	15.2	15.7	3%
Major Ions																	
Bicarbonate, as $CaCO_3$	mg/L	1	110	112	2%	108	108	0%	106	103	3%	122	121	1%	103	105	2%
Calcium	mg/L	0.05	36.3	37.4	3%	37.1	36.1	3%	37.9	38.4	1%	42	42.6	1%	36.9	37.7	2%
Carbonate, as $CaCO_3$	mg/L	1	7.3	3.3	**75%**	<1	<1	-	7.4	8.6	15%	<1	<1	-	7.2	5.6	**25%**
Chloride	mg/L	0.1 to 0.5	59.6	59.6	0%	59.3	59	1%	61.7	62	0%	67.8	68	0%	60.8	61.3	1%
Fluoride	mg/L	0.01 to 0.02	0.084	0.086	-	0.083	0.083	0%	0.086	0.083	4%	0.1	0.102	2%	0.077	0.079	3%
Hydroxide, as $CaCO_3$	mg/L	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Magnesium	mg/L	0.005	12	11.9	1%	10.3	9.83	5%	13.2	12.6	5%	13.6	13.7	1%	12.6	12.9	2%
Potassium	mg/L	0.05	4.01	4.04	1%	4.32	4.08	6%	4.13	4.27	3%	4.59	4.29	7%	4.22	4.28	1%
Sodium	mg/L	0.05	32.4	32.1	1%	30.6	29.2	5%	33.5	33.2	1%	34.1	35.4	4%	33.2	33.5	1%
Sulphate	mg/L	0.3	25.3	25.3	0%	25.5	25.5	0%	25.6	25.7	0%	29.8	29.8	0%	25	25.2	1%
Reactive silica	mg/L	0.5	13	12.6	3%	12.8	12.8	0%	13.3	13.3	0%	14.6	14.8	1%	12.6	12.6	0%
Nutrients																	
Nitrate	mg-N/L	0.005	<0.005	<0.005	-	0.0926	0.0906	2%	<0.005	<0.005	-	0.137	0.138	1%	<0.005	<0.005	-
Nitrite	mg-N/L	0.001	<0.001	<0.001	-	0.0072	0.0076	5%	<0.001	<0.001	-	0.0049	0.0048	-	<0.001	<0.001	-
Nitrate + nitrite	mg-N/L	0.0051	<0.0051	<0.0051	-	0.0998	0.0982	2%	<0.0051	<0.0051	-	0.142	0.143	1%	<0.0051	<0.0051	-
Total ammonia	mg-N/L	0.005	0.0069	0.0079	-	0.0585	0.0599	2%	0.0087	0.009	-	0.0576	0.0562	2%	0.0114	0.014	-
Total nitrogen	mg-N/L	0.03 to 0.15	1.73	1.68	3%	1.28	1.26	2%	1.06	1.09	3%	0.846	0.833	2%	1.21	1.39	14%
Total phosphorus (colorimetric)	mg-P/L	0.002 to 0.02	0.109	0.112	3%	0.0875	0.089	2%	0.0442	0.0448	1%	0.0333	0.031	7%	0.104	0.0453	**79%**
Total phosphorus (ICPMS)	mg-P/L	0.05	0.081	0.113	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	0.097	0.083	-
Dissolved phosphorus (colorimetric)	mg-P/L	0.002	0.0143	0.0132	8%	0.0177	0.0185	4%	0.0131	0.0148	12%	0.0235	0.0218	8%	0.0177	0.017	4%
Dissolved phosphorus (ICPMS)	mg-P/L	0.05	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-
General Organics																	
Total oil and grease	mg/L	5	<5	<5	-	<5	<5	-	<5	<5	-	<5	<5	-	<5	<5	-
Volatile hydrocarbons (C6-C10)	mg/L	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Volatile petroleum hydrocarbons (C6-C10)	mg/L	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Total Metals																	
Aluminum	µg/L	3	6.5	8.5	-	10.8	11.6	-	12.5	13.8	-	5.6	4.8	-	<3	4.4	-
Antimony	µg/L	0.1	1.21	1.27	5%	1.2	1.16	3%	1.25	1.27	2%	1.27	1.3	2%	1.27	1.26	1%
Arsenic	µg/L	0.1	70.5	71.4	1%	59.7	60.7	2%	74.4	75.1	1%	74.6	72.1	3%	60.8	63.5	4%
Barium	µg/L	0.1	31.4	31.3	0%	29.9	31.3	5%	31.4	31.3	0%	36.8	36.9	0%	27.6	28.8	4%
Beryllium	µg/L	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Bismuth	µg/L	0.05	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-
Boron	µg/L	10	29	30	-	27	27	-	31	29	-	32	33	-	27	26	-
Cadmium	µg/L	0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-

Table 4-2: Quality Control Duplicate Sample Results, September 2021 to August 2022

		Station	Northwest Bay - N									Near Outflow - In lake					
		Sample Depth	4 m		RPD	4 m		RPD	4 m		RPD	4.8 m		RPD	5 m		RPD
		Sample Date	30-Sep-21			25-May-22			25-Aug-22			25-Mar-22			6-Jul-22		
		Sample Type	Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate	
		ALS Sample ID	YL2101440-002	YL2101440-003		YL2200527-001	YL2200527-009		YL2201326-001	YL2201326-011		YL2200265-005	YL2200265-007		YL2200852-007	YL2200852-009	
Parameter	Unit	Detection Limit															
Calcium	µg/L	50	39500	40600	3%	36100	37100	3%	37700	37800	0%	42600	44700	5%	35300	34500	2%
Cesium	µg/L	0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Chromium	µg/L	0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Cobalt	µg/L	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Copper	µg/L	0.5	1.43	1.42	-	1.81	1.86	-	1.6	1.59	-	1.96	2.01	-	1.5	1.62	-
Iron	µg/L	10	16	18	-	18	17	-	14	17	-	10	<10	-	14	14	-
Lead	µg/L	0.05	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-
Lithium	µg/L	1	6.2	6.2	0%	5.9	5.8	2%	8.9	6.9	**25%**	6.7	6.9	3%	5.2	5.2	0%
Magnesium	µg/L	5	12200	12200	0%	11100	11300	2%	12500	12900	3%	14300	15200	6%	10600	11400	7%
Manganese	µg/L	0.1	89.7	92.2	3%	63.5	66.3	4%	45.1	46.7	3%	52.7	52	1%	72	59.6	19%
Mercury	µg/L	0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-
Molybdenum	µg/L	0.05	0.177	0.194	-	0.226	0.204	-	0.175	0.192	-	0.191	0.223	-	0.224	0.214	-
Nickel	µg/L	0.5	<0.5	0.58	-	0.53	0.52	-	<0.5	0.51	-	<0.5	<0.5	-	<0.5	0.58	-
Potassium	µg/L	50	4130	4150	0%	4090	4220	3%	4050	4100	1%	4470	4610	3%	3590	3850	7%
Rubidium	µg/L	0.2	2.53	2.55	1%	2.41	2.38	1%	2.65	2.82	6%	2.85	2.82	1%	2.23	2.31	4%
Selenium	µg/L	0.05	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-
Silicon	µg/L	100	6120	6200	1%	6400	6400	0%	6730	6590	2%	7180	7380	3%	5630	5830	3%
Silver	µg/L	0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Sodium	µg/L	50	32400	32500	0%	29800	30200	1%	34400	35200	2%	36800	37600	2%	27300	29200	7%
Strontium	µg/L	0.2	87.8	92.9	6%	85.3	85.9	1%	91.4	92.7	1%	100	103	3%	92.5	92	1%
Sulphur	µg/L	500	9530	9620	1%	9620	9550	1%	8790	8630	2%	10100	10500	4%	8420	8560	2%
Tellurium	µg/L	0.2	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-
Thallium	µg/L	0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Thorium	µg/L	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Tin	µg/L	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Titanium	µg/L	0.3	<0.3	<0.3	-	<0.3	<0.3	-	<0.3	0.35	-	<0.3	<0.3	-	<0.3	<0.3	-
Tungsten	µg/L	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Uranium	µg/L	0.01	0.443	0.554	**22%**	0.456	0.396	14%	0.516	0.524	2%	0.586	0.622	6%	0.529	0.572	8%
Vanadium	µg/L	0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Zinc	µg/L	3	5	5.7	-	<3	<3	-	<3	<3	-	5	4.6	-	<3	<3	-
Zirconium	µg/L	0.2	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-
Dissolved Metals																	
Aluminum	µg/L	1	1.4	<1	-	4	3.9	-	4.4	4.2	-	1.3	1.6	-	2.2	1.7	-
Antimony	µg/L	0.1	1.16	1.17	1%	1.23	1.2	2%	1.2	1.14	5%	1.33	1.21	9%	1.22	1.26	3%
Arsenic	µg/L	0.1	71.7	71.8	0%	65.5	61.7	6%	75.1	76.4	2%	71.6	65.3	9%	72.5	72.9	1%
Barium	µg/L	0.1	30.2	30.1	0%	31.6	29.3	8%	30.1	31.2	4%	34.4	33.2	4%	31.7	31	2%
Beryllium	µg/L	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Bismuth	µg/L	0.05	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-
Boron	µg/L	10	28	28	-	28	28	-	27	28	-	31	30	-	27	28	-
Cadmium	µg/L	0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-
Cesium	µg/L	0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Chromium	µg/L	0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Cobalt	µg/L	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Copper	µg/L	0.2	1.07	1.08	1%	1.85	1.82	2%	1.36	1.37	1%	1.74	1.69	3%	1.45	1.58	9%
Iron	µg/L	10	<10	<10	-	10	10	-	<10	<10	-	<10	<10	-	<10	<10	-
Lead	µg/L	0.05	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-

Table 4-2: Quality Control Duplicate Sample Results, September 2021 to August 2022

		Station	Northwest Bay - N									Near Outflow - In lake					
		Sample Depth	4 m		RPD	4 m		RPD	4 m		RPD	4.8 m		RPD	5 m		RPD
		Sample Date	30-Sep-21			25-May-22			25-Aug-22			25-Mar-22			6-Jul-22		
		Sample Type	Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate		Sample	Duplicate	
		ALS Sample ID	YL2101440-002	YL2101440-003		YL2200527-001	YL2200527-009		YL2201326-001	YL2201326-011		YL2200265-005	YL2200265-007		YL2200852-007	YL2200852-009	
Parameter	**Unit**	**Detection Limit**															
Lithium	µg/L	1	6.4	6.4	0%	5.6	5.5	2%	6.2	6	3%	7.1	6.5	9%	6.1	6.3	3%
Manganese	µg/L	0.1	1.73	1.7	2%	55.9	53.8	4%	1.44	1.97	**31%**	1.31	1.34	2%	65.6	40.8	**47%**
Mercury	µg/L	0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-
Molybdenum	µg/L	0.05	0.177	0.173	-	0.191	0.221	-	0.168	0.173	-	0.199	0.197	-	0.185	0.205	-
Nickel	µg/L	0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Rubidium	µg/L	0.2	2.57	2.42	6%	2.79	2.55	9%	2.68	2.71	1%	2.82	2.64	7%	2.68	2.66	1%
Selenium	µg/L	0.05	<0.05	<0.05	-	0.053	<0.05	-	<0.05	<0.05	-	0.054	<0.05	-	<0.05	<0.05	-
Silicon	µg/L	50	6420	6440	0%	6010	5960	1%	6480	6490	0%	7260	6880	5%	6300	6350	1%
Silver	µg/L	0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Strontium	µg/L	0.2	91	90	1%	90.8	92.1	1%	91	84.3	8%	103	101	2%	92	92.2	0%
Sulphur	µg/L	500	9390	9590	2%	9020	8990	0%	9680	9630	1%	10200	10200	0%	8470	8960	6%
Tellurium	µg/L	0.2	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-
Thallium	µg/L	0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Thorium	µg/L	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Tin	µg/L	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Titanium	µg/L	0.3	<0.3	<0.3	-	<0.3	<0.3	-	<0.3	<0.3	-	<0.3	<0.3	-	<0.3	<0.3	-
Tungsten	µg/L	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Uranium	µg/L	0.01	0.48	0.485	1%	0.568	0.572	1%	0.558	0.545	2%	0.579	0.592	2%	0.504	0.516	2%
Vanadium	µg/L	0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Zinc	µg/L	1	4.7	4.8	-	<1	<1	-	<1	<1	-	5.1	4.9	4%	<1	<1	-
Zirconium	µg/L	0.2	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-
Volatile Organics																	
Benzene	µg/L	0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Ethylbenzene	µg/L	0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Toluene	µg/L	0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Xylenes	µg/L	0.5 to 0.75	<0.75	<0.75	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
m,p-Xylenes	µg/L	0.4 to 0.5	<0.5	<0.5	-	<0.4	<0.4	-	<0.4	<0.4	-	<0.4	<0.4	-	<0.4	<0.4	-
o-Xylene	µg/L	0.3 to 0.5	<0.5	<0.5	-	<0.3	<0.3	-	<0.3	<0.3	-	<0.3	<0.3	-	<0.3	<0.3	-
Styrene	µg/L	0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Methyl tert-butyl ether	µg/L	0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
F1 (C6-C10)-BTEX	µg/L	100	<100	<100	-	<100	<100	-	<100	<100	-	<100	<100	-	<100	<100	-
F1 (C6-C10)	µg/L	100	<100	<100	-	<100	<100	-	<100	<100	-	<100	<100	-	<100	<100	-
F2 (C10-C16)	µg/L	300	<300	<300	-	<300	<300	-	<300	<300	-	<300	<300	-	<300	<300	-
F3 (C16-C34)	µg/L	300	<300	<300	-	<300	<300	-	<300	<300	-	<300	<300	-	<300	<300	-
F4 (C34-C50)	µg/L	300	<300	<300	-	<300	<300	-	<300	<300	-	<300	<300	-	<300	<300	-
Summary																	
Total number of parameters	n	-	-	-	120	-	-	120	-	-	120	-	-	120	-	-	120
RPD values over 20%	n	-	-	-	2	-	-	0	-	-	2	-	-	1	-	-	4
	%	-	-	-	1.7	-	-	0	-	-	1.7	-	-	0.8	-	-	3.3

Notes:

Bolded values represent notable relative percent differences (i.e., RPD exceeding 20%).

The RPD was calculated when at least one parameter concentration was equal to or greater than five times the detection limit.

ID = identification; RPD = relative percent difference; µS/cm = microsiemens per centimetre; NTU = nephelometric turbidity units; n = number; $CaCO_3$ = calcium carbonate; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; µg/L = micrograms per litre; ICPMS = inductively coupled plasma mass spectrometry; BTEX = benzene, toluene, ethylbenzene, and xylenes; - = not applicable or no data.

4.3.11 Blank Samples

Notable concentrations in the field, travel, and equipment blanks (i.e., concentrations greater than five times the DL) were detected for the following parameters (Table 4-3):

- nitrate and nitrate + nitrite on 5 July 2022 in the equipment blank
- total barium on 24 August 2022 in the equipment blank
- dissolved zinc on 30 September 2021 and 22 March 2022 in the equipment blank

These results in the equipment blanks were confirmed by the laboratory via data recheck or re-analysis. Notable concentrations in equipment blanks indicate a potential contamination. Concentrations in the field and travel blanks were non-detectable or below five times the DL.

The number of parameters with notable concentrations in the blank samples were typically low (0.4% of total parameters analyzed), indicating an overall low potential for contamination in the samples.

Table 4-3: Quality Control Blank Sample Results, September 2021 to August 2022

		Sample Type	Equipment Blank					Field Blank		Travel Blank		
		Sample Date	30-Sep-21	22-Mar-22	24-May-22	5-Jul-22	24-Aug-22	24-Mar-22	6-Jul-22	1-Oct-21	26-May-22	25-Aug-22
ALS Sample ID			YL2101440-008	YL2200260-005	YL2200516-004	YL2200829-005	YL2201326-012	YL2200265-008	YL2200852-010	YL2101444-001	YL2200533-002	YL2201326-013
Parameter	Unit	Detection Limit										
Conventional Parameters												
pH	-	0.1	5.06	5.25	5.74	4.95	5.45	5.35	5.51	5.19	5.27	5.44
Specific conductivity	µS/cm	2	<2	<2	<2	5.2	<2	<2	<2	2.1	<2	<2
Hardness, as $CaCO_3$	mg/L	0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Total alkalinity, as $CaCO_3$	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Alkalinity, Phenolphthalein as $CaCO_3$	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total dissolved solids	mg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total dissolved solids (calculated)	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total suspended solids	mg/L	3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Dissolved organic carbon	mg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Turbidity	NTU	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.23	<0.1
Major Ions												
Bicarbonate, as $CaCO_3$	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Calcium	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Carbonate, as $CaCO_3$	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloride	mg/L	0.10 - 0.50	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1
Fluoride	mg/L	0.010 - 0.020	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01
Hydroxide, as $CaCO_3$	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Magnesium	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Potassium	mg/L	0.05	<0.05	0.093	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sodium	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	mg/L	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Reactive silica	mg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nutrients												
Nitrate	mg-N/L	0.005	<0.005	<0.005	<0.005	**0.206**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrite	mg-N/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate + nitrite	mg-N/L	0.0051	<0.0051	<0.0051	<0.0051	**0.206**	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
Total ammonia	mg-N/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total nitrogen	mg-N/L	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Total phosphorus (colorimetric)	mg-P/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total phosphorus (ICPMS)	mg-P/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dissolved phosphorus (colorimetric)	mg-P/L	0.002	0.0029	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Dissolved phosphorus (ICPMS)	mg-P/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
General Organics												
Total oil and grease	mg/L	5	<5	<5	<5	<5	<5	-	-	-	-	-
Volatile hydrocarbons (C6-C10)	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
Volatile petroleum hydrocarbons (C6-C10)	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
Total Metals												
Aluminum	µg/L	3	<3	<3	<3	<3	4.4	<3	<3	<3	<3	<3
Antimony	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	µg/L	0.1	0.16	0.12	<0.1	<0.1	**0.69**	0.1	<0.1	<0.1	<0.1	<0.1
Beryllium	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium	µg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	µg/L	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Cesium	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 4-3: Quality Control Blank Sample Results, September 2021 to August 2022

		Sample Type	Equipment Blank					Field Blank		Travel Blank		
		Sample Date	30-Sep-21	22-Mar-22	24-May-22	5-Jul-22	24-Aug-22	24-Mar-22	6-Jul-22	1-Oct-21	26-May-22	25-Aug-22
ALS Sample ID			YL2101440-008	YL2200260-005	YL2200516-004	YL2200829-005	YL2201326-012	YL2200265-008	YL2200852-010	YL2101444-001	YL2200533-002	YL2201326-013
Parameter	Unit	Detection Limit										
Chromium	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Iron	µg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Lead	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Magnesium	µg/L	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Manganese	µg/L	0.1	0.12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mercury	µg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Potassium	µg/L	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rubidium	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Silicon	µg/L	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Silver	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	µg/L	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Strontium	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sulphur	µg/L	500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500
Tellurium	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tungsten	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	3	4.9	5.4	<3	<3	<3	4.8	<3	<3	<3	<3
Zirconium	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dissolved Metals												
Aluminum	µg/L	1	<1	<1	<1	<1	1.9	<1	<1	<1	<1	<1
Antimony	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	µg/L	0.1	0.18	0.13	<0.1	<0.1	0.41	0.12	<0.1	<0.1	<0.1	<0.1
Beryllium	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium	µg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Iron	µg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Lead	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	µg/L	0.1	0.26	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mercury	µg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Table 4-3: Quality Control Blank Sample Results, September 2021 to August 2022

		Sample Type	Equipment Blank					Field Blank		Travel Blank		
		Sample Date	30-Sep-21	22-Mar-22	24-May-22	5-Jul-22	24-Aug-22	24-Mar-22	6-Jul-22	1-Oct-21	26-May-22	25-Aug-22
ALS Sample ID			YL2101440-008	YL2200260-005	YL2200516-004	YL2200829-005	YL2201326-012	YL2200265-008	YL2200852-010	YL2101444-001	YL2200533-002	YL2201326-013
Parameter	Unit	Detection Limit										
Nickel	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Rubidium	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Silicon	µg/L	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Silver	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sulphur	µg/L	500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500
Tellurium	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	0.1	<0.1	0.25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tungsten	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	1	**6.8**	**5.7**	<1	<1	<1	4.3	<1	<1	<1	4.9
Zirconium	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Volatile Organics												
Benzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-
Ethylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-
Toluene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-
Xylenes	µg/L	0.50 to 0.75	<0.75	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-
m,p-Xylenes	µg/L	0.40 to 0.50	<0.5	<0.4	<0.4	<0.4	<0.4	-	-	-	-	-
o-Xylene	µg/L	0.30 to 0.50	<0.5	<0.3	<0.3	<0.3	<0.3	-	-	-	-	-
Styrene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-
Methyl tert-butyl ether	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-
F1 (C6-C10)-BTEX	µg/L	100	<100	<100	<100	<100	<100	-	-	-	-	-
F1 (C6-C10)	µg/L	100	<100	<100	<100	<100	<100	-	-	-	-	-
F2 (C10-C16)	µg/L	300	<300	<300	<300	<300	<300	-	-	-	-	-
F3 (C16-C34)	µg/L	300	<300	<300	<300	<300	<300	-	-	-	-	-
F4 (C34-C50)	µg/L	300	<300	<300	<300	<300	<300	-	-	-	-	-

Note:

Bolded values were greater than five times the detection limit.

µS/cm = microsiemens per centimetre; NTU = nephelometric turbidity units; $CaCO_3$ = calcium carbonate; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; µg/L = micrograms per litre; ICPMS = inductively coupled plasma mass spectrometry; BTEX = benzene, toluene, ethylbenzene, and xylenes; - = no data.

4.3.12 Review of Individual Data Points

Field Data

In situ field measurements were within expected ranges (e.g., historical ranges; Golder 2019), except for six specific conductivity measurements (106, 106, 125, 203, 401, and 400 µS/cm) at the Southwest Bay station on 22 March 2022. The historical range of field specific conductivity in 2018 was 405 to 564 µS/cm (Golder 2019); other field specific conductivity measurements collected during the March 2022 field program were between 465 and 512 µS/cm (Appendices F.1 and F.2); notable differences (i.e., values with RPDs greater than 20%) between field and laboratory specific conductivity values were observed for both mid-depth and bottom samples associated with these six field conductivity measurements (Section 4.3.1). Consequently, the six field specific conductivity values were invalidated and excluded from further assessment.

The unexpected low specific conductivity measurements at this station were likely due to a field error; no issues were identified in the calibration of the AquaTROLL, and specific conductivity data collected at other stations in March 2022 were within expected ranges. The potential cause was that specific conductivity readings were taken before stabilization of the probe was complete. The Southwest Bay station was the first station monitored on 22 March 2022 and field specific conductivity values increased (i.e., became more similar to other conductivity measurements collected on this day) with depth and time at this station.

Laboratory Data

During the review of the laboratory data, unexpectedly high total or dissolved molybdenum (1.3 to 2.2 micrograms per litre [µg/L]) concentrations were identified in seven samples at the EMD Discharge — In lake, Mid Lake 1, Near Outflow — In lake, and Southwest Bay stations in May 2022; concentrations of molybdenum were higher than concentrations in other months during the thermal plume study (0.15 to 0.66 µg/L for total molybdenum and 0.12 to 0.60 µg/L for dissolved molybdenum; Appendix F.2) and were outside of historical ranges (0.20 to 0.28 µg/L for total molybdenum; Golder 2019). ALS was contacted to verify these results, and the high molybdenum concentrations were confirmed via reanalysis. Due to insufficient evidence of field contamination and laboratory error, these data points were qualified but retained for use in the assessment.

One dissolved copper concentration of 29 µg/L at the Inflow to NW Bay 2 station on 30 September 2021 was 18 times higher than the total concentration (1.6 µg/L). ALS confirmed both total and dissolved copper concentrations via reanalysis. The Inflow to NW Bay 2 station was not monitored historically for water quality; therefore, copper concentrations in the other samples of the thermal plume study were used for comparisons. Total copper concentrations were 1.4 and 1.2 µg/L, and dissolved copper were 1.4 and 1.3 µg/L on 26 May 2022 and 6 July 2022, respectively. The dissolved copper concentration of 29 µg/L was outside of the total and dissolved copper ranges from September 2021 to August 2022, and therefore invalidated from further analysis.

4.4 Conclusions

The QA/QC assessment results indicated that:

- Most of the parameters were analyzed at the target DLs.
- Due to travel time constraints to the laboratories, hold times were frequently exceeded for parameters with short hold times (3 days or less): pH, turbidity, nitrate, and nitrite. However, no results were invalidated due to lengthy hold time exceedances.

- Dissolved concentrations were notably above total concentrations in samples occasionally (in 1% of data points).
- Contamination in all three types of blank samples (i.e., equipment, field, and travel) were typically low (0.4% of total parameters analyzed), indicating an overall low level of contamination in the samples.
- Based on the duplicate results, the within-site variability and field sampling precision were rated as low and high, respectively.
- Six field specific conductivity measurements at the Southwest Bay station on 22 March 2022 were outside of expected range and invalidated; all the other field measurements were retained in the database.
- Unexpectedly high molybdenum (total or dissolved) concentrations were identified in seven samples in May 2022. Due to insufficient evidence of field contamination and laboratory error, these data points were qualified and retained for further assessment.
- One dissolved copper concentration of 29 µg/L at the Inflow to NW Bay 2 station on 30 September 2021 was invalidated because it was 18 times higher than the total concentration (1.6 µg/L) and outside of the expected range from September 2021 to August 2022.

Overall, the water chemistry data collected during the thermal plume study are considered to be of acceptable quality and adequate to address the objectives of the Thermal Plume Study Report.

5.0 FISH AND FISH HABITAT

5.1 Procedures

5.1.1 Field Quality Assurance and Quality Control Procedures

Field Methods

Field staff were knowledgeable of fish habitat requirements, data recording, and sonar equipment operations. Specific work instructions outlining each field task in detail were provided to the field personnel by the task manager and reviewed prior to the start of the field program. Data were checked at the end of each field day for completeness and accuracy. Data recorded digitally were downloaded and backed up as a specific QA/QC measure. Tables containing summary data were reviewed and values verified by a second person.

Equipment

Sonar equipment was configured and tested as part of routine QA/QC for field operations, following specific work instructions developed for the field program.

5.1.2 Office Quality Assurance and Quality Control Procedures

Office QA/QC requirements consist of procedures to validate field data, as well as the results of the data analyses. The office data management system provides an organized and consistent system of data control and analysis. This management system has procedures for tracking data entry, validation, and modifications.

5.1.3 Data Management

Data were checked on an ongoing basis for accuracy and consistency with expected values and, where appropriate, data were plotted to visually confirm significant statistical results for temporal trends. Data or statistical results observed to be inconsistent with expected concentrations or results were investigated further. Sonar data processing outputs were corroborated against field notes taken during field collections. Data were copied directly from the software output files for analysis to avoid transcription errors.

5.2 Results and Discussion

The equipment was configured in the field to provide the best possible imagery for analysis. The equipment records data internally that was validated after the survey was completed. No deviations from the study design occurred. The sonar recorded some mid-lake depths as zero, but these data were omitted because the depth at the mid-lake locations was greater than zero. Data surrounding these points were interpolated to fill the gaps. No other QA/QC issues were identified when completing the bathymetry and fish habitat analysis.

5.3 Conclusions

The QA/QC assessment results indicated that:

- The sonar data from the 2021 survey, evaluated through the QA/QC process, was sufficient for evaluating the objectives of the study.
- Sonar survey data were consistent with field observations

Overall, the fish and fish habitat data collected during the thermal plume study are considered to be of good quality and adequate for addressing the objectives of the study.

6.0 REFERENCES

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APPENDIX C

Water Level and Flow (Excel)

This appendix is submitted electronically

APPENDIX D

Water Temperature (Excel)

This appendix is submitted electronically

APPENDIX E

Water Quality

Appendix E.1: Profiles of Field Water Quality Parameters in Jackfish Lake, September 2021 to August 2022

Station	Date	Snow Depth (m)	Ice Thickness (m)	Total Depth (m)[a]	Secchi Depth (m)	Monitored Depth (m)[b]	Temperature (°C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	pH	Turbidity (NTU)[c]	Sample Collected
Northwest Bay - N	30-Sep-21	-	-	5.3	0.3	0.3	10.4	438	92	10.0	8.1	-	-
						1.0	10.3	438	91	9.9	8.1	-	-
						2.0	10.4	438	91	9.9	8.1	22	Y
						3.0	10.3	438	90	9.8	8.0	-	-
						4.0	10.3	438	89	9.7	8.0	22	Y
						5.0	10.3	440	86	9.4	8.0	-	-
	24-Mar-22	0.5	0.7	5.5	-	0.3	0.1	511	50	7.6	7.5	-	-
						0.8	0.2	509	50	7.2	7.1	-	-
						1.3	0.5	505	51	7.2	7.5	-	-
						1.8	0.7	502	52	7.4	7.5	-	-
						2.3	0.9	499	53	7.4	7.4	1.6	Y
						2.8	0.9	499	53	7.5	7.5	-	-
						3.3	1.0	498	53	7.5	7.4	-	-
						3.8	1.0	498	53	7.4	7.5	-	-
						4.3	1.0	498	52	7.4	7.5	0.96	Y
						4.8	1.0	498	51	7.2	7.5	-	-
						5.3	1.0	499	51	7.2	7.5	-	-
	25-May-22	-	-	5.3	1.2	0.3	6.2	436	75	9.2	7.4	-	-
						1.0	6.1	436	75	9.1	7.4	-	-
						2.0	6.0	436	75	9.1	7.3	5.3	Y
						3.0	6.0	436	75	9.1	7.3	-	-
						4.0	6.0	436	74	9.1	7.3	4.8	Y
						5.0	5.8	437	73	8.9	7.3	-	-
	6-Jul-22	-	-	5.3	0.6	0.3	20.7	407	138	12.1	9.4	-	-
						1.0	20.7	407	138	12.1	9.4	-	-
						2.0	20.7	407	138	12.1	9.4	13	Y
						3.0	20.6	407	137	12.1	9.4	-	-
						4.0	15.6	412	43	4.3	8.1	14	Y
						5.0	10.6	407	3	0.3	7.2	-	-
	25-Aug-22	-	-	5.4	0.8	0.3	19.8	446	105	9.4	9.1	-	-
						1.0	19.5	445	106	9.5	9.1	-	-
						2.0	19.3	445	107	9.7	9.1	11	Y
						3.0	19.3	444	107	9.7	9.1	-	-
						4.0	18.9	445	100	9.1	9.1	12	Y
						5.0	18.6	446	94	8.6	9.0	-	-
Mid Lake 1	1-Oct-21	-	-	7.7	0.3	0.3	10.1	442	83	9.1	7.7	-	-
						1.0	10.1	442	83	9.1	7.7	-	-
						2.0	10.2	442	83	9.1	7.8	-	-
						3.0	10.2	442	83	9.0	7.9	21	Y
						4.0	10.2	442	83	9.0	8.0	-	-
						5.0	10.1	442	82	9.0	8.1	-	-
						6.0	10.2	442	82	9.0	8.2	20	Y
						7.0	10.1	442	82	9.0	8.2	-	-
	24-Mar-22	0.3	0.8	7.9	-	0.3	0.4	512	52	7.5	7.6	-	-
						1.0	0.8	500	53	7.5	7.6	-	-
						2.0	0.9	491	53	7.4	7.6	-	-
						3.0	1.0	492	53	7.5	7.6	0.93	Y
						4.0	1.1	490	54	7.6	7.6	-	-
						5.0	1.1	493	54	7.7	7.6	-	-
						6.0	1.2	493	55	7.7	7.7	0.75	Y
						7.0	1.5	493	49	6.9	7.6	-	-
	25-May-22	-	-	7.7	1.1	0.3	5.5	438	74	9.1	7.6	-	-
						1.0	5.4	437	73	9.1	7.5	-	-
						2.0	5.4	437	73	9.0	7.4	-	-
						3.0	5.3	436	72	9.0	7.3	5.2	Y
						4.0	5.2	436	72	8.9	7.3	-	-
						5.0	5.2	436	71	8.9	7.3	-	-
						6.0	5.0	437	70	8.7	7.3	4.9	Y
						7.0	4.9	437	68	8.5	7.2	-	-
	6-Jul-22	-	-	7.9	0.6	0.3	20.5	420	138	12.2	9.5	-	-
						1.0	19.9	420	138	12.4	9.5	-	-
						2.0	19.8	420	135	12.2	9.5	-	-
						3.0	19.0	419	131	11.9	9.4	-	-
						4.0	16.5	426	76	7.3	8.7	14	Y
						5.0	11.5	422	11	1.2	7.7	-	-
						6.0	8.1	423	4	0.4	7.2	7.2	Y
						7.0	6.3	442	1	0.1	6.8	-	-
	25-Aug-22	-	-	7.7	0.8	0.3	19.1	444	104	9.4	9.1	-	-
						1.0	18.9	444	104	9.4	9.1	-	-
						2.0	18.7	443	102	9.3	9.1	-	-
						3.0	18.6	444	101	9.2	9.1	-	-
						4.0	18.6	444	100	9.2	9.1	9.6	Y
						5.0	18.5	444	99	9.0	9.1	-	-
						6.0	11.3	446	1	0.1	7.0	4.9	Y
						7.0	8.6	468	1	0.1	6.9	-	-
Mid Lake 2	24-Mar-22	0.4	0.8	7.2	-	0.3	0.4	501	53	7.6	7.7	-	-
						1.0	0.8	498	53	7.5	7.7	-	-
						2.0	0.9	497	53	7.5	7.7	-	-
						3.0	1.0	496	53	7.4	7.7	-	-
						4.0	1.0	496	53	7.4	7.7	-	-
						5.0	1.0	495	53	7.4	7.7	-	-
						6.0	1.1	495	54	7.6	7.7	-	-
						7.0	1.4	495	53	7.5	7.7	-	-
	26-May-22	-	-	7.9	1.1	0.3	6.5	432	77	9.2	7.2	-	-
						1.0	6.1	432	76	9.2	7.2	-	-
						2.0	6.1	432	76	9.2	7.2	-	-
						3.0	6.0	432	75	9.1	7.2	-	-
						4.0	5.9	432	74	9.0	7.1	-	-
						5.0	5.7	432	72	8.9	7.1	-	-
						6.0	5.4	432	71	8.7	7.1	-	-
						7.0	5.0	432	68	8.4	7.1	-	-
	6-Jul-22	-	-	7.9	0.6	0.3	20.4	426	137	12.2	9.3	-	-
						1.0	20.0	425	137	12.3	9.3	-	-
						2.0	19.6	425	138	12.4	9.3	-	-
						3.0	18.9	424	130	11.9	9.3	-	-
						4.0	17.0	429	85	8.5	8.7	-	-
						5.0	11.5	428	7	0.7	7.5	-	-
						6.0	7.8	426	3	0.3	7.3	-	-
						7.0	6.2	442	1	0.1	6.9	-	-
	24-Aug-22	-	-	7.6	0.8	0.3	18.9	444	102	9.3	9.2	-	-
						1.0	18.9	445	102	9.3	9.1	-	-
						2.0	18.7	445	100	9.1	9.1	-	-
						3.0	18.7	445	99	9.0	9.1	-	-
						4.0	18.7	445	98	9.0	9.1	-	-
						5.0	18.4	445	95	8.7	9.1	-	-
						6.0	12.0	446	3	0.3	7.0	-	-
						7.0	8.3	484	1	0.1	6.9	-	-
	30-Sep-21	-	-	7.7	0.5	0.3	10.4	437	86	9.3	8.2	-	-
						1.0	10.4	437	86	9.3	8.2	-	-
						2.0	10.4	437	85	9.3	8.1	-	-
						3.0	10.3	437	85	9.3	8.0	-	-
						4.0	10.3	437	85	9.3	8.0	-	-
						5.0	10.3	437	85	9.2	7.9	-	-
						6.0	10.3	437	85	9.2	7.9	-	-
						7.0	10.3	437	84	9.1	8.1	-	-

Appendix E.1: Profiles of Field Water Quality Parameters in Jackfish Lake, September 2021 to August 2022

Station	Date	Snow Depth (m)	Ice Thickness (m)	Total Depth (m)[a]	Secchi Depth (m)	Monitored Depth (m)[b]	Temperature (°C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	pH	Turbidity (NTU)[c]	Sample Collected
Mid Lake 3	24-Mar-22	0.3	0.8	7.1	-	0.3	0.6	503	53	7.6	7.7	-	-
						1.0	0.8	498	53	7.5	7.7	-	-
						2.0	0.9	497	53	7.4	7.7	-	-
						3.0	0.9	496	52	7.4	7.7	-	-
						4.0	1.0	497	53	7.4	7.7	-	-
						5.0	1.1	495	54	7.6	7.7	-	-
						6.0	1.1	495	54	7.6	7.7	-	-
						7.0	1.3	495	53	7.5	7.7	-	-
	26-May-22	-	-	7.9	1.2	0.3	6.6	431	77	9.2	7.2	-	-
						1.0	6.4	430	77	9.2	7.2	-	-
						2.0	6.0	431	76	9.2	7.1	-	-
						3.0	5.9	430	74	9.1	7.1	-	-
						4.0	5.9	430	73	9.0	7.1	-	-
						5.0	5.8	431	73	8.9	7.0	-	-
						6.0	5.5	431	71	8.8	7.0	-	-
						7.0	5.0	431	69	8.6	7.0	-	-
	5-Jul-22	-	-	7.9	0.6	0.3	20.4	449	142	12.5	9.5	-	-
						1.0	20.2	449	141	12.6	9.5	-	-
						2.0	20.1	450	141	12.6	9.5	-	-
						3.0	18.6	451	123	11.4	9.4	-	-
						4.0	17.4	454	84	7.9	9.0	-	-
						5.0	11.3	448	29	3.2	8.1	-	-
						6.0	7.8	452	4	0.5	7.5	-	-
						7.0	6.1	474	1	0.1	6.9	-	-
	25-Aug-22	-	-	7.7	0.7	0.3	18.9	445	103	9.4	9.1	-	-
						1.0	18.8	445	104	9.4	9.1	-	-
						2.0	18.7	444	103	9.4	9.1	-	-
						3.0	18.6	444	101	9.3	9.1	-	-
						4.0	18.5	444	100	9.1	9.1	-	-
						5.0	18.3	446	83	7.6	9.0	-	-
						6.0	11.6	448	6	0.6	6.9	-	-
						7.0	8.4	472	1	0.1	6.8	-	-
	30-Sep-21	-	-	7.8	0.3	0.3	10.4	437	86	9.4	8.2	-	-
						1.0	10.4	437	86	9.3	8.2	-	-
						2.0	10.4	437	85	9.3	8.1	-	-
						3.0	10.4	437	85	9.2	8.0	-	-
						4.0	10.4	437	85	9.2	8.0	-	-
						5.0	10.3	437	85	9.2	8.0	-	-
						6.0	10.3	437	84	9.2	7.9	-	-
						7.0	10.3	437	84	9.2	7.9	-	-
K Discharge - In lake	1-Oct-21	-	-	1.1	0.3	0.3	10.2	441	85	9.8	8.2	-	-
						0.4	10.3	441	88	9.7	8.2	-	-
						0.5	10.3	441	88	9.6	8.2	-	-
						0.6	10.2	441	88	9.6	8.2	-	-
						0.7	10.3	441	88	9.6	8.2	-	-
						0.8	10.3	441	88	9.6	8.2	-	-
						0.9	10.3	441	88	9.5	8.2	-	-
						1.0	10.3	441	87	9.5	8.2	-	-
	23-Mar-22	-	-	1.3	-	0.3	0.9	465	49	6.9	7.5	-	-
						0.4	0.8	465	49	6.8	7.6	-	-
						0.5	0.8	465	49	6.8	7.5	-	-
						0.6	0.9	465	49	6.8	7.6	-	-
						0.7	0.9	465	49	6.8	7.6	-	-
						0.8	0.9	465	49	6.8	7.6	-	-
						0.9	0.9	465	49	6.8	7.6	-	-
						1.0	0.9	466	49	6.8	7.6	-	-
						1.1	0.9	466	49	6.8	7.6	-	-
						1.2	0.9	465	49	6.8	7.5	-	-
	24-May-22	-	-	1.6	1.0	0.3	5.2	435	72	9.0	7.2	-	-
						0.5	5.2	435	72	9.0	7.2	-	-
						1.0	5.2	435	72	9.0	7.2	-	-
						1.5	5.2	435	74	9.2	7.2	-	-
	5-Jul-22	-	-	1.7	0.6	0.3	21.2	457	139	12.1	9.4	-	-
						0.5	20.8	456	139	12.2	9.4	-	-
						1.0	20.5	456	140	12.4	9.5	-	-
	24-Aug-22	-	-	2.6	0.8	0.3	18.9	453	102	9.4	9.1	-	-
						0.5	18.9	453	103	9.4	9.1	-	-
						1.0	18.8	453	102	9.4	9.1	-	-
						1.5	18.7	452	103	9.4	9.1	-	-
						2.0	18.7	452	98	9.0	9.1	-	-
EMD Discharge - In lake	1-Oct-21	-	-	6.2	0.3	0.3	10.2	438	83	9.2	8.0	-	-
						1.0	10.2	438	82	8.9	8.0	-	-
						2.0	10.2	438	81	8.9	8.0	-	-
						3.0	10.2	438	81	8.9	7.9	16	Y
						4.0	10.2	438	81	8.9	7.9	-	-
						5.0	10.2	438	81	8.9	7.8	17	Y
						6.0	10.2	438	82	8.9	7.9	-	-
	23-Mar-22	-	-	5.8	-	0.3	0.9	466	49	6.8	7.5	-	-
						1.0	0.9	465	49	6.8	7.5	-	-
						2.0	1.0	466	49	6.8	7.5	0.90	Y
						3.0	1.0	468	49	6.8	7.4	-	-
						4.0	1.0	468	49	6.7	7.3	0.88	Y
						5.0	1.0	467	48	6.7	7.3	-	-
	24-May-22	-	-	6.5	1.1	0.3	5.2	434	74	9.2	7.3	-	-
						1.0	5.2	434	73	9.1	7.3	-	-
						2.0	5.1	435	72	9.0	7.3	-	-
						3.0	5.1	435	72	9.0	7.3	4.7	Y
						4.0	5.1	435	72	9.0	7.2	-	-
						5.0	5.1	435	72	9.0	7.2	5.9	Y
						6.0	5.1	435	72	8.9	7.2	-	-
	5-Jul-22	-	-	6.6	0.6	0.3	20.0	445	133	11.9	9.3	-	-
						1.0	20.1	445	135	12.0	9.3	-	-
						2.0	19.2	443	134	12.2	9.4	-	-
						3.0	18.9	443	129	11.8	9.3	14	Y
						4.0	17.9	447	103	9.7	9.1	-	-
						5.0	10.6	442	30	3.9	8.2	12	Y
						6.0	7.6	451	9	1.1	7.6	-	-
	24-Aug-22	-	-	6.4	0.8	0.3	18.6	454	95	8.7	9.1	-	-
						1.0	18.6	454	95	8.7	9.1	-	-
						2.0	18.6	454	94	8.7	9.1	-	-
						3.0	18.5	454	93	8.5	9.1	9.0	Y
						4.0	18.5	454	90	8.3	9.1	-	-
						5.0	18.1	456	77	7.1	8.9	7.7	Y
						6.0	12.1	458	8	0.9	7.0	-	-

Appendix E.1: Profiles of Field Water Quality Parameters in Jackfish Lake, September 2021 to August 2022

Station	Date	Snow Depth (m)	Ice Thickness (m)	Total Depth (m)[a]	Secchi Depth (m)	Monitored Depth (m)[b]	Temperature (°C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	pH	Turbidity (NTU)[c]	Sample Collected
CAT Discharge - In lake	1-Oct-21	-	-	2.0	0.3	0.3	10.3	441	83	9.1	8.1	-	-
						0.4	10.3	441	84	9.2	8.1	-	-
						0.5	10.3	441	83	9.1	8.1	-	-
						0.6	10.3	441	83	9.1	8.1	-	-
						0.7	10.3	441	83	9.0	8.1	-	-
						0.8	10.3	441	84	9.1	8.1	-	-
						0.9	10.2	441	83	9.1	8.1	-	-
						1.0	10.3	441	83	9.1	8.1	-	-
						1.1	10.3	441	84	9.1	8.1	-	-
						1.2	10.3	441	83	9.1	8.0	-	-
						1.3	10.3	441	84	9.2	8.0	-	-
						1.4	10.3	441	84	9.2	8.0	-	-
						1.5	10.3	441	84	9.2	8.0	-	-
						1.6	10.3	441	84	9.2	7.8	-	-
						1.7	10.2	441	84	9.1	7.9	-	-
						1.8	10.3	441	84	9.2	7.9	-	-
						1.9	10.2	441	84	9.1	7.9	-	-
	23-Mar-22	-	-	3.4	-	0.3	1.0	471	49	6.8	7.3	-	-
						0.8	1.0	470	49	6.8	7.4	-	-
						1.3	1.0	470	49	6.8	7.4	-	-
						1.8	1.0	469	49	6.8	7.4	-	-
						2.3	1.0	469	49	6.8	7.4	-	-
						2.8	1.0	469	49	6.8	7.3	-	-
						3.3	1.0	469	49	6.7	7.3	-	-
	24-May-22	-	-	2.8	1.1	0.3	5.6	436	75	9.3	7.5	-	-
						0.5	5.6	436	75	9.3	7.5	-	-
						1.0	5.6	435	75	9.3	7.5	-	-
						1.5	5.6	435	76	9.3	7.4	-	-
						2.0	5.6	435	75	9.3	7.4	-	-
						2.5	5.6	435	75	9.2	7.4	-	-
	5-Jul-22	-	-	3.6	0.6	0.3	20.5	449	136	12.1	9.4	-	-
						0.5	20.5	451	136	12.1	9.4	-	-
						1.0	20.4	451	136	12.1	9.4	-	-
						1.5	20.4	451	136	12.1	9.4	-	-
						2.0	19.2	450	134	12.2	9.4	-	-
						2.5	19.2	450	133	12.1	9.4	-	-
						3.0	18.9	450	127	11.7	9.4	-	-
	24-Aug-22	-	-	3.4	0.8	0.3	19.4	454	98	8.8	9.1	-	-
						0.5	19.3	455	98	8.9	9.1	-	-
						1.0	19.1	454	98	8.9	9.1	-	-
						1.5	19.1	455	99	9.0	9.1	-	-
						2.0	18.5	454	95	8.7	9.1	-	-
						2.5	18.6	455	93	8.5	9.1	-	-
Near Outflow - In lake	1-Oct-21	-	-	6.0	0.3	0.3	10.2	441	81	8.9	8.1	-	-
						1.0	10.2	442	80	8.8	8.1	-	-
						2.0	10.2	442	80	8.8	8.0	-	-
						3.0	10.2	442	80	8.8	7.9	20	Y
						4.0	10.2	442	80	8.8	7.9	-	-
						5.0	10.2	442	80	8.8	7.8	17	Y
	25-Mar-22	0.4	0.4	6.2	-	0.3	0.9	477	53	7.5	7.2	-	-
						0.8	0.8	485	51	7.3	7.2	-	-
						1.3	0.9	481	50	7.2	7.1	-	-
						1.8	1.0	485	50	7.2	7.1	-	-
						2.3	1.0	486	50	7.1	7.1	-	-
						2.8	1.0	486	50	7.1	7.1	0.76	Y
						3.3	1.1	487	50	7.1	7.1	-	-
						3.8	1.1	487	50	7.1	7.1	-	-
						4.3	1.0	487	50	7.1	7.1	-	-
						4.8	1.1	487	50	7.1	7.1	1.1	Y
						5.3	1.0	487	49	6.9	7.1	-	-
						5.8	1.1	488	49	7.0	7.1	-	-
	25-May-22	-	-	6.4	1.1	0.3	5.4	438	73	9.0	7.2	-	-
						1.0	5.2	438	71	8.9	7.2	-	-
						2.0	5.2	437	70	8.8	7.0	-	-
						3.0	5.2	437	70	8.7	7.0	4.2	Y
						4.0	5.1	437	70	8.7	7.0	-	-
						5.0	5.1	437	69	8.6	7.1	4.8	Y
						6.0	5.1	438	67	8.3	7.1	-	-
	6-Jul-22	-	-	6.3	0.5	0.3	19.8	425	134	12.0	9.4	-	-
						1.0	19.7	425	133	11.9	9.4	-	-
						2.0	19.5	425	129	11.6	9.4	-	-
						3.0	18.9	424	127	11.6	9.4	12	Y
						4.0	15.4	432	36	3.6	8.0	-	-
						5.0	13.6	429	10	1.0	7.7	12	Y
						6.0	8.1	430	1	0.2	7.2	-	-
	25-Aug-22	-	-	6.0	0.7	0.3	19.8	446	107	9.5	9.1	-	-
						1.0	18.9	443	105	9.5	9.1	-	-
						2.0	18.5	444	99	9.1	9.1	-	-
						3.0	18.5	445	97	8.9	9.1	8.2	Y
						4.0	18.5	445	98	9.0	9.1	-	-
						5.0	18.1	446	81	7.5	9.0	4.7	Y
Southwest Bay	30-Sep-21	-	-	5.2	0.3	0.3	10.3	437	86	9.4	8.2	-	-
						1.0	10.3	437	86	9.4	8.2	-	-
						2.0	10.3	437	86	9.3	8.1	20	Y
						3.0	10.3	437	86	9.3	8.0	-	-
						4.0	10.3	437	86	9.3	8.0	19	Y
						5.0	10.3	437	85	9.2	7.9	-	-
	22-Mar-22	0.5	0.7	5.8	-	0.3	2.7	X 106[d]	66	8.9	7.6	-	-
						1.0	2.7	X 106[d]	50	6.8	7.6	-	-
						2.0	2.8	X 125[d]	51	6.8	7.7	0.91	Y
						3.0	3.1	X 203[d]	52	6.9	7.7	-	-
						4.0	3.8	X 401[d]	51	6.7	7.6	0.55	Y
						5.0	3.9	X 400[d]	51	6.7	7.6	-	-
	25-May-22	-	-	5.2	1.2	0.3	5.2	437	70	8.8	7.3	-	-
						1.0	5.2	436	70	8.8	7.4	-	-
						2.0	5.2	436	70	8.7	7.3	4.2	Y
						3.0	5.1	436	70	8.7	7.3	-	-
						4.0	5.1	436	70	8.7	7.3	6.0	Y
						5.0	5.0	438	69	8.6	7.3	-	-
	5-Jul-22	-	-	5.7	0.6	0.3	20.0	456	142	12.7	9.5	-	-
						1.0	19.4	456	141	12.8	9.5	-	-
						2.0	18.9	456	134	12.3	9.4	-	-
						3.0	17.7	458	97	9.1	9.1	16	Y
						4.0	17.0	460	77	7.3	8.9	-	-
						5.0	12.9	461	4	0.5	7.6	12	Y
	25-Aug-22	-	-	5.3	0.8	0.3	18.8	447	102	9.3	9.1	-	-
						1.0	18.7	446	101	9.3	9.1	-	-
						2.0	18.7	447	100	9.1	9.1	-	-
						3.0	18.7	446	95	8.7	9.1	11	Y
						4.0	18.7	446	98	8.9	9.1	11	Y
						5.0	18.4	423	77	6.9	8.9	-	-

Note:
a) Total depth does not include snow depth or ice thickness for samples collected in March 2022.
b) Monitored depth is depth below ice cover for samples collected in March 2022.
c) Field turbidity is the average of three readings.
d) Field specific conductivity measurements at Southwest Bay on 22 March 2022 were invalidated and excluded from further analysis (Section 5.3.12 in Appendix B).
m = metres; °C = degrees Celsius; µS/cm = microsiemens per centimetre; NTU = nephelc

Appendix E.2: Water Quality Data from an Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 202

			Station	Inflow to NW Bay 2			Northwest Bay - N										Mid Lake 1
			Sample Depth	0.3 m	0.3 m	0.3 m	2 m	4 m	2.3 m	4.3 m	2 m	4 m	2 m	4 m	2 m	4 m	3 m
			ALS Sample ID	YL2101440-005	YL2200533-001	YL2200852-002	YL2101440-001	YL2101440-002	YL2200265-002	YL2200265-001	YL2200527-002	YL2200527-001	YL2200852-004	YL2200852-003	YL2201326-002	YL2201326-001	YL2101444-006
Parameter	Unit	Acute Guideline	Chronic Guideline	30-Sep-21	26-May-22	6-Jul-22	30-Sep-21	30-Sep-21	24-Mar-22	24-Mar-22	25-May-22	25-May-22	6-Jul-22	6-Jul-22	25-Aug-22	25-Aug-22	1-Oct-21
Field Measured																	
Specific conductivity	µS/cm	-	-	711	414	532	438	438	499	498	436	436	407	412	445	445	442
Turbidity	NTU	-	-	0.94	-[b]	0.57	22	22	1.6	0.96	5.3	4.8	13	14	11	12	21
pH	-	-	6.5 - 9.0	7.4	7.0	7.4	8.1	8.0	7.4	7.5	7.3	7.3	**9.4[C]**	8.1	**9.1[C]**	**9.1[C]**	7.9
Temperature	°C	-	-	7.0	5.8	13.2	10.4	10.3	0.9	1.0	6.0	6.0	20.7	15.6	19.3	18.9	10.2
Dissolved oxygen	mg/L	-	6.5	10.0	10.7	8.0	9.9	9.7	7.4	7.4	9.1	9.1	12.1	**4.3[C]**	9.7	9.1	9.0
Dissolved oxygen	%	-	-	85	87	78	91	89	53	52	75	75	138	43	108	100	83
Conventional Parameters																	
pH	-	-	6.5 - 9.0	8.2	7.9	7.9	8.4	8.4	8.0	8.1	8.2	8.2	8.9	8.8	8.5	8.5	8.3
Specific conductivity	µS/cm	-	-	719	434	600	445	446	512	502	441	440	462	462	443	446	544
Hardness, as $CaCO_3$	mg/L	-	-	178	99	151	141	140	163	158	130	135	146	146	146	149	144
Total alkalinity, as $CaCO_3$	mg/L	-	-	133	56	136	118	118	123	122	108	108	113	113	112	113	117
Total dissolved solids	mg/L	-	-	419	272	308	271	285	318	307	292	278	262	232	267	290	257
Total dissolved solids (calculated)	mg/L	-	-	392	222	313	248	249	279	272	236	240	252	251	251	252	248
Total suspended solids	mg/L	-	-	<3.0	<3.0	<3.0	12	14	<3.0	<3.0	5.9	7.7	12	13	9.1	9.7	15
Dissolved organic carbon	mg/L	-	-	16	20	21	12	12	14	12	14	12	13	14	11	11	12
Turbidity	NTU	-	-	1.1	<0.1	0.42	23	21	2.2	1.4	6.5	7.2	14	16	9.0	9.1	21
Major Ions																	
Calcium	mg/L	-	-	48	27	39	37	36	43	42	36	37	37	37	37	38	39
Chloride	mg/L	640	120	110	79	103	59	60	69	68	59	59	62	62	62	62	59
Fluoride	mg/L	-	0.12	0.078	0.055	0.061	0.082	0.084	0.10	0.10	0.082	0.083	0.075	0.077	0.088	0.086	0.086
Magnesium	mg/L	-	-	14	7.8	13	12	12	14	13	9.5	10	13	13	13	13	12
Potassium	mg/L	-	-	3.6	3.3	3.4	4.0	4.0	4.6	4.5	4.0	4.3	4.3	4.3	4.2	4.1	4.2
Sodium	mg/L	-	-	71	44	62	32	32	35	33	29	31	34	34	34	34	31
Sulphate	mg/L	-	-	59	26	7.2	25	25	30	30	26	26	26	26	26	26	25
Reactive silica	mg/L	-	-	9.1	2.4	4.5	13	13	15	15	13	13	13	13	13	13	13
Nutrients																	
Nitrate	mg-N/L	124	2.9	0.059	0.039	<0.005	<0.005	<0.005	0.13	0.14	0.076	0.093	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrite	mg-N/L	-	0.06	<0.001	<0.001	<0.001	<0.001	<0.001	0.0031	0.0044	0.0061	0.0072	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate + nitrite	mg-N/L	-	-	0.059	0.039	<0.0051	<0.0051	<0.0051	0.13	0.14	0.082	0.100	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
Total ammonia	mg-N/L	-	0.031 - 14[c]	0.0097	0.0088	0.015	0.0082	0.0069	0.055	0.055	0.062	0.059	0.0092	0.0085	0.0074	0.0087	0.0081
Total nitrogen	mg-N/L	-	-	0.59	0.78	0.75	1.7	1.7	0.90	0.85	1.3	1.3	1.1	1.2	1.1	1.1	0.92
Total phosphorus	mg-P/L	-	-	0.0082	0.011	0.0097	0.10	0.11	0.027	0.037	0.087	0.088	0.078	0.094	0.030	0.044	0.043
Dissolved phosphorus	mg-P/L	-	-	0.0059	0.0092	0.0086	0.014	0.014	0.023	0.023	0.020	0.018	0.016	0.016	<0.02	0.013	0.012
Total Metals																	
Aluminum	µg/L	-	100[d, e]	17	16	17	7.9	6.5	4.0	5.3	11	11	3.6	4.8	8.2	13	4.4
Antimony	µg/L	-	-	0.79	2.1	0.98	1.2	1.2	1.3	1.4	1.2	1.2	1.4	1.3	1.2	1.3	1.2
Arsenic	µg/L	-	5.0	**34[C]**	**25[C]**	**36[C]**	**72[C]**	**71[C]**	**77[C]**	**75[C]**	**62[C]**	**60[C]**	**64[C]**	**66[C]**	**76[C]**	**74[C]**	**74[C]**
Barium	µg/L	-	-	25	14	18	32	31	37	37	32	30	27	28	32	31	31
Beryllium	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	µg/L	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	29,000	1,500	29	34	45	28	29	33	34	28	27	28	27	29	31	28
Cadmium	µg/L	2.1 - 3.8[f]	0.16 - 0.26[f]	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	µg/L	-	-	51,500	28,100	37,700	39,000	39,500	43,600	45,500	36,700	36,100	36,300	35,400	37,000	37,700	39,400
Cesium	µg/L	-	-	0.014	<0.01	0.018	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	µg/L	-	1.0[g]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	-	-	0.34	<0.1	0.18	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	µg/L	-	2.3 - 3.9[f]	1.6	1.4	1.2	1.4	1.4	1.9	2.0	1.9	1.8	**4.5[C]**	1.8	1.6	1.6	1.4
Iron	µg/L	-	300	238	36	117	20	16	<10	18	18	18	<10	15	<10	14	12
Lead	µg/L	-	3.1 - 6.6[f]	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.27	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	-	-	7.0	<5.0	4.8	6.0	6.2	6.9	7.4	5.9	5.9	5.6	5.3	8.2	8.9	6.0
Magnesium	µg/L	-	-	15,200	9,050	11,600	12,400	12,200	14,700	14,300	11,700	11,100	10,900	11,600	12,800	12,500	12,300
Manganese	µg/L	-	-	282	8.8	131	92	90	28	39	65	64	13	28	45	45	112
Mercury	µg/L	-	0.026	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	-	73	0.66	0.40	0.32	0.19	0.18	0.23	0.23	0.21	0.23	0.20	0.22	0.19	0.18	0.21
Nickel	µg/L	-	95 - 148[f]	1.9	1.3	2.2	0.58	<0.5	<0.5	<0.5	0.57	0.53	0.59	0.63	<0.5	<0.5	0.54
Potassium	µg/L	-	-	3,770	3,230	3,000	4,260	4,130	4,620	4,460	4,240	4,090	3,770	3,930	4,140	4,050	4,340
Rubidium	µg/L	-	-	3.5	3.2	2.9	2.5	2.5	2.9	2.8	2.5	2.4	2.4	2.3	2.9	2.7	2.6
Selenium	µg/L	-	1.0	0.067	<0.05	0.055	<0.05	<0.05	0.050	0.058	<0.05	<0.05	0.064	<0.05	<0.05	<0.05	<0.05
Silicon	µg/L	-	-	4,610	1,170	2,150	6,180	6,120	7,290	7,130	6,500	6,400	5,900	5,930	6,740	6,730	6,200
Silver	µg/L	-	0.25	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.011	<0.01	<0.01
Sodium	µg/L	-	-	73,000	45,100	55,300	32,000	32,400	37,400	37,000	31,200	29,800	29,600	29,200	35,200	34,400	31,400
Strontium	µg/L	-	-	112	62	102	86	88	103	105	85	85	94	90	91	91	91
Sulphur	µg/L	-	-	23,500	10,200	3,040	9,620	9,530	10,400	10,400	9,660	9,620	8,740	8,680	9,100	8,790	9,270
Tellurium	µg/L	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	-	0.80	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.19	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	-	-	0.40	<0.3	0.34	<0.3	<0.3	<0.3	<0.6	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tungsten	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	33	15	1.8	0.20	0.74	0.55	0.44	0.61	0.64	0.50	0.46	0.60	0.60	0.53	0.52	0.52
Vanadium	µg/L	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	-	-	7.7	3.3	4.1	5.2	5.0	4.8	4.9	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	5.0
Zirconium	µg/L	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dissolved Metals																	
Aluminum	µg/L	-	-	7.8	14	11	1.4	1.4	1.4	1.4	4.0	4.0	2.0	1.9	4.6	4.4	1.1
Antimony	µg/L	-	-	0.73	2.2	0.96	1.1	1.2	1.4	1.3	1.2	1.2	1.3	1.3	1.2	1.2	1.2
Arsenic	µg/L	-	-	28	25	40	72	72	74	72	60	66	74	75	75	75	73
Barium	µg/L	-	-	23	13	19	30	30	36	34	29	32	29	30	30	30	30
Beryllium	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	µg/L	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	-	-	28	35	46	28	28	31	34	27	28	27	28	28	27	26
Cadmium	µg/L	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium	µg/L	-	-	0.013	<0.01	0.017	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	µg/L	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	-	-	0.27	<0.1	0.16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	µg/L	-	-	X 29[a]	1.4	1.3	1.1	1.1	1.7	1.7	1.8	1.9	1.8	1.7	1.4	1.4	1.1
Iron	µg/L	-	-	112	32	101	<10	<10	<10	<10	<10	10	<10	<10	<10	<10	<10
Lead	µg/L	-	-	0.71	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	-	-	7.0	4.4	5.7	6.3	6.4	7.0	6.5	5.4	5.6	6.3	6.4	5.8	6.2	6.0
Manganese	µg/L	6,575 - 11,044[f]	120 - 710[h]	242	5.8	124	1.3	1.7	0.86	1.4	51	56	2.3	10	1.5	1.4	1.2
Mercury	µg/L	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	-	-	0.60	0.21	0.27	0.17	0.18	0.23	0.21	0.20	0.19	0.20	0.20	0.17	0.17	0.18
Nickel	µg/L	-	-	1.6	1.3	2.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Rubidium	µg/L	-	-	3.2	3.1	3.2	2.4	2.6	2.9	2.8	2.6	2.8	2.5	2.7	2.5	2.7	2.5
Selenium	µg/L	-	-	0.073	<0.05	0.062	<0.05	<0.05	<0.05	<0.05	0.056	0.053	<0.05	<0.05	<0.05	<0.05	<0.05
Silicon	µg/L	-	-	4,550	1,140	2,350	6,160	6,420	7,470	6,910	5,890	6,010	6,220	6,260	6,520	6,480	6,110
Silver	µg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01
Strontium	µg/L	-	-	114	57	100	86	91	104	101	88	91	90	89	91	91	89
Sulphur	µg/L	-	-	21,100	9,170	3,350	9,270	9,390	10,300	10,200	9,210	9,020	8,580	8,700	9,430	9,680	8,420
Tellurium	µg/L	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	-	-	0.37	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	-	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tungsten	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	-	-	1.6	0.19	0.68	0.49	0.48	0.60	0.59	0.55	0.57	0.52	0.52	0.56	0.56	0.47
Vanadium	µg/L	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	154 - 247[i]	40 - 110[j]	22	2.9	3.8	4.9	4.7	4.7	5.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.4
Zirconium	µg/L	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
General Organics																	
Total oil and grease	mg/L	-	-	-	-	-	-	<5.0	-	<5.0	-	<5.0	-	<5.0	-	<5.0	-
Volatile hydrocarbons (C6-C10)	mg/L	-	-	-	-	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
Volatile petroleum hydrocarbons (C6-C10)	mg/L	-	-	-	-	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-

Station	Mid Lake 1 (cont.)									EMD Discharge - In lake									
Sample Depth	6 m	3 m	6 m	3 m	6 m	4 m	6 m	4 m	6 m	3 m	5 m	2 m	4 m	3 m	5 m	3 m	5 m	3 m	5 m
ALS Sample ID	YL2101444-007	YL2200265-004	YL2200265-003	YL2200527-004	YL2200527-003	YL2200852-006	YL2200852-005	YL2201326-004	YL2201326-003	YL2101444-004	YL2101444-005	YL2200260-002	YL2200260-001	YL2200516-003	YL2200516-002	YL2200829-002	YL2200829-001	YL2201326-006	YL2201326-005
Parameter	1-Oct-21	24-Mar-22	24-Mar-22	25-May-22	25-May-22	6-Jul-22	6-Jul-22	25-Aug-22	25-Aug-22	1-Oct-21	1-Oct-21	23-Mar-22	23-Mar-22	24-May-22	24-May-22	5-Jul-22	5-Jul-22	24-Aug-22	24-Aug-22
Field Measured																			
Specific conductivity	442	492	493	436	437	426	423	444	446	438	438	466	468	435	435	443	442	454	456
Turbidity	20	0.93	0.75	5.2	4.9	14	7.2	9.6	4.9	16	17	0.90	0.88	4.7	5.9	14	12	9.0	7.7
pH	8.2	7.6	7.7	7.3	7.3	8.7	7.2	**9.1[C]**	7.0	7.9	7.8	7.5	7.3	7.3	7.2	**9.3[C]**	8.2	**9.1[C]**	8.9
Temperature	10.2	1.0	1.2	5.3	5.0	16.5	8.1	18.6	11.3	10.2	10.2	1.0	1.0	5.1	5.1	18.9	10.6	18.5	18.1
Dissolved oxygen (mg/L)	9.0	7.5	7.7	9.0	8.7	7.3	**0.4[C]**	9.2	**0.1[C]**	8.9	8.9	6.8	6.7	9.0	9.0	11.8	**3.9[C]**	8.5	7.1
Dissolved oxygen (%)	83	53	55	72	70	76	4	100	1	81	81	49	49	72	72	129	30	93	77
Conventional Parameters																			
pH	8.4	8.0	8.0	8.3	8.3	8.3	8.5	8.5	7.8	8.2	8.2	8.0	8.0	8.2	8.2	8.7	8.3	8.5	8.2
Specific conductivity	453	505	504	445	442	475	483	448	446	476	477	507	505	464	462	450	449	447	446
Hardness, as $CaCO_3$	148	161	159	128	138	145	140	148	146	145	146	171	171	149	144	143	141	151	148
Total alkalinity, as $CaCO_3$	112	123	122	108	110	110	112	113	114	116	114	124	122	109	109	112	112	113	112
Total dissolved solids	268	308	319	277	279	264	263	295	272	270	272	308	304	297	275	273	294	296	292
Total dissolved solids (calculated)	249	276	275	234	242	248	245	253	247	247	247	279	278	245	244	249	245	255	252
Total suspended solids	12	<3.0	<3.0	6.3	5.3	14	6.8	8.1	7.1	8.8	12	<3.0	<3.0	3.4	4.8	13	7.6	8.4	6.0
Dissolved organic carbon	12	13	13	14	13	13	13	12	13	12	12	13	12	13	13	13	13	12	12
Turbidity	30	1.5	1.0	6.7	7.0	16	9.1	8.8	6.0	21	22	1.2	1.2	6.9	6.5	15	7.6	8.2	8.0
Major Ions																			
Calcium	40	42	42	36	38	36	35	38	38	39	39	45	45	40	39	36	36	39	38
Chloride	61	68	68	59	59	61	60	62	60	59	59	67	67	60	61	61	60	62	62
Fluoride	0.088	0.10	0.098	0.083	0.084	0.077	0.070	0.084	0.086	0.086	0.085	0.088	0.091	0.078	0.092	0.081	0.080	0.086	0.084
Magnesium	12	14	13	9.4	11	13	13	13	12	12	12	14	14	12	12	13	13	13	13
Potassium	4.1	4.5	4.5	4.0	4.3	4.4	4.2	4.2	4.2	4.1	4.1	4.5	4.5	3.9	3.8	4.3	4.2	4.3	4.4
Sodium	31	34	35	28	31	34	33	35	32	31	31	35	35	31	30	34	33	35	34
Sulphate	25	30	30	26	26	25	25	26	24	25	25	29	29	25	25	26	24	26	25
Reactive silica	13	15	15	13	13	12	13	13	13	13	13	15	15	13	13	12	13	13	13
Nutrients																			
Nitrate	<0.005	0.13	0.13	0.089	0.089	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.12	0.12	0.14	0.14	<0.005	<0.005	<0.005	<0.005
Nitrite	<0.001	0.0029	0.0019	0.0065	0.0063	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0038	0.0039	0.0015	0.0016	<0.001	<0.001	<0.001	<0.001
Nitrate + nitrite	<0.0051	0.14	0.13	0.096	0.096	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	0.13	0.13	0.14	0.14	<0.0051	<0.0051	<0.0051	<0.0051
Total ammonia	0.0090	0.051	0.036	0.063	0.070	0.049	0.0069	0.0084	0.44	0.0083	0.0099	0.061	0.060	0.070	0.070	0.0099	0.021	0.0072	0.0084
Total nitrogen	0.86	0.85	0.82	1.3	1.3	1.7	1.1	1.2	1.4	0.82	1.2	0.87	0.88	1.2	1.3	1.3	1.1	1.2	1.2
Total phosphorus	0.039	0.032	0.030	0.090	0.085	0.12	0.089	0.041	0.076	0.041	0.071	0.033	0.032	0.085	0.090	0.085	0.083	0.047	0.050
Dissolved phosphorus	0.014	0.022	0.020	0.022	0.019	0.017	0.018	0.012	0.066	0.011	0.013	0.021	0.022	0.023	0.020	0.017	0.0076	0.013	0.013
Total Metals																			
Aluminum	5.2	4.7	4.0	11	8.5	4.1	<3.0	5.6	6.8	5.1	6.1	4.7	4.5	11	11	4.8	3.6	9.6	8.4
Antimony	1.3	1.3	1.2	1.2	1.2	1.3	1.3	1.2	0.97	1.2	1.2	1.3	1.3	1.2	1.2	1.2	1.1	1.3	1.2
Arsenic	**72[C]**	**74[C]**	**75[C]**	**61[C]**	**63[C]**	**64[C]**	**59[C]**	**75[C]**	**72[C]**	**73[C]**	**75[C]**	**71[C]**	**74[C]**	**62[C]**	**61[C]**	**72[C]**	**71[C]**	**75[C]**	**74[C]**
Barium	31	37	37	32	32	27	28	32	40	31	32	34	35	30	30	30	32	32	32
Beryllium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	28	32	32	28	28	29	26	28	28	29	28	31	32	28	28	30	29	28	28
Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	39,600	43,900	43,200	36,700	37,000	36,500	36,100	37,200	38,000	40,700	40,700	44,100	43,900	37,000	38,600	37,400	37,200	37,700	36,800
Cesium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	1.4	1.9	1.8	2.0	1.9	1.8	1.5	1.6	1.1	1.4	1.4	1.9	2.0	2.2	2.0	2.0	1.7	1.6	**4.6[C]**
Iron	12	<10	<10	19	15	<10	13	<10	67	12	14	<10	14	20	18	<10	27	14	16
Lead	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.066	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	6.2	6.8	6.7	5.9	6.0	5.6	5.1	7.5	7.7	6.4	6.3	6.6	6.6	6.6	6.8	6.7	6.5	7.2	7.3
Magnesium	12,200	14,300	14,100	11,500	11,700	11,700	10,800	12,600	12,400	12,000	12,300	14,600	15,300	12,300	12,200	12,400	12,400	12,600	12,500
Manganese	112	41	31	64	66	19	122	45	594	121	115	56	67	64	63	19	153	71	122
Mercury	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	0.21	0.19	0.20	1.9	1.8	0.24	0.21	0.19	0.15	0.19	0.20	0.22	0.22	1.3	0.22	0.21	0.20	0.19	0.18
Nickel	0.57	<0.5	<0.5	0.59	0.56	0.67	<0.5	<0.5	<0.5	0.52	0.56	<0.5	<0.5	0.73	0.68	0.58	0.60	<0.5	<0.5
Potassium	4,290	4,460	4,490	4,270	4,280	3,820	3,500	4,050	4,140	4,270	4,350	4,450	4,660	3,860	3,800	4,310	4,290	4,060	4,050
Rubidium	2.5	2.9	2.9	2.5	2.5	2.2	2.1	2.8	2.6	2.6	2.7	2.8	2.9	2.5	2.5	2.7	2.7	2.8	2.7
Selenium	<0.05	0.075	0.066	<0.05	<0.05	0.054	<0.05	<0.05	<0.05	0.053	0.064	0.060	<0.05	<0.05	<0.05	0.057	0.062	0.070	<0.05
Silicon	6,190	7,180	7,280	6,460	6,550	5,880	5,700	6,700	6,640	6,130	6,420	7,500	7,740	6,180	6,280	6,470	6,580	6,830	6,550
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	31,000	36,300	36,500	31,000	31,200	29,400	27,200	34,300	33,900	30,700	31,600	34,900	36,600	30,500	29,800	33,500	33,100	34,400	34,200
Strontium	89	99	100	87	85	94	94	90	92	90	90	104	103	85	84	91	90	91	90
Sulphur	8,960	10,100	10,200	9,690	9,530	8,980	8,280	9,200	7,540	9,180	9,540	10,600	10,700	8,730	8,620	9,280	8,730	9,250	8,700
Tellurium	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.26	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tungsten	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	0.53	0.60	0.59	0.55	0.48	0.62	0.53	0.51	0.42	0.50	0.53	0.57	0.56	0.58	0.61	0.59	0.58	0.53	0.50
Vanadium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	4.6	4.8	4.6	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	4.7	<3.0	4.8	5.8	3.2	<3.0	<3.0	<3.0	<3.0	<3.0
Zirconium	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dissolved Metals																			
Aluminum	1.7	1.8	1.7	2.9	4.5	1.2	1.4	4.7	4.5	1.9	8.7	<1.0	1.0	3.4	3.6	2.0	1.4	4.2	4.2
Antimony	1.2	1.4	1.3	1.2	1.2	1.3	1.2	1.2	0.67	1.1	1.2	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.2
Arsenic	73	72	73	60	65	74	69	76	68	71	72	74	73	60	58	73	73	76	76
Barium	30	34	35	29	31	31	32	31	39	29	29	34	35	32	31	30	33	31	33
Beryllium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	27	32	31	27	28	27	26	27	28	27	28	31	31	29	29	26	27	28	28
Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	1.1	1.7	1.5	1.8	1.9	1.7	1.3	1.5	0.66	1.2	1.1	2.1	1.7	1.8	1.8	1.8	1.4	1.4	1.2
Iron	<10	<10	<10	<10	11	<10	<10	<10	60	<10	<10	<10	<10	10	11	<10	<10	<10	<10
Lead	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	6.1	7.2	7.0	5.4	5.8	6.1	5.9	5.8	5.8	6.1	6.3	6.8	6.7	6.2	6.3	6.1	6.1	6.0	6.0
Manganese	1.8	1.4	0.46	47	52	5.9	88	0.87	547	2.0	1.7	3.4	5.2	48	47	2.6	102	29	85
Mercury	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0060	<0.005	<0.005	<0.005	<0.005
Molybdenum	0.18	0.21	0.20	0.25	0.24	0.20	0.18	0.17	0.12	0.17	0.17	0.21	0.22	0.20	1.5	0.21	0.19	0.18	0.17
Nickel	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Rubidium	2.7	2.9	2.9	2.5	2.6	2.7	2.5	2.7	2.5	2.6	2.7	2.8	2.8	2.5	2.5	2.7	2.6	2.7	2.7
Selenium	<0.05	<0.05	<0.05	<0.05	<0.05	0.050	<0.05	0.058	0.48	0.056	<0.05	<0.05	<0.05	<0.05	<0.05	0.056	<0.05	0.051	0.056
Silicon	6,150	7,330	7,320	5,840	6,160	6,290	6,300	6,740	6,630	6,150	6,240	7,530	7,390	6,350	6,180	6,270	6,390	6,590	6,450
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	88	103	101	91	93	90	91	90	85	87	92	103	103	89	88	91	92	92	90
Sulphur	8,360	10,200	10,700	8,920	9,380	8,850	8,690	9,800	16,400	8,110	8,440	9,970	10,700	9,490	9,230	8,820	8,520	9,410	9,340
Tellurium	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.12	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tungsten	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	0.49	0.60	0.58	0.56	0.59	0.51	0.49	0.57	0.47	0.48	0.51	0.56	0.56	0.57	0.55	0.55	0.49	0.56	0.56
Vanadium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	5.7	5.4	4.6	<1.0	1.4	<1.0	2.4	<1.0	<1.0	4.8	<1.0	4.6	4.7	<1.0	<1.0	1.2	<1.0	<1.0	<1.0
Zirconium	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	4.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
General Organics																			
Total oil and grease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Volatile hydrocarbons (C6-C10)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Volatile petroleum hydrocarbons (C6-C10)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix E.2: Water Quality Data from an Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 20

			Station	Inflow to NW Bay 2			Northwest Bay - N									
			Sample Depth	0.3 m	0.3 m	0.3 m	2 m	4 m	2.3 m	4.3 m	2 m	4 m	2 m	4 m	2 m	4 m
			ALS Sample ID	YL2101440-005	YL2200533-001	YL2200852-002	YL2101440-001	YL2101440-002	YL2200265-002	YL2200265-001	YL2200527-002	YL2200527-001	YL2200852-004	YL2200852-003	YL2201326-002	YL2201326-001
Parameter	Unit	Acute Guideline	Chronic Guideline	30-Sep-21	26-May-22	6-Jul-22	30-Sep-21	30-Sep-21	24-Mar-22	24-Mar-22	25-May-22	25-May-22	6-Jul-22	6-Jul-22	25-Aug-22	25-Aug-22
Volatile Organics																
Benzene	µg/L	-	370	-	-	-	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
Ethylbenzene	µg/L	-	90	-	-	-	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
Toluene	µg/L	-	2.0	-	-	-	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
Xylenes	µg/L	-	-	-	-	-	-	<0.75	-	<0.5	-	<0.5	-	<0.5	-	<0.5
m,p-Xylenes	µg/L	-	-	-	-	-	-	<0.5	-	<0.4	-	<0.4	-	<0.4	-	<0.4
o-Xylene	µg/L	-	-	-	-	-	-	<0.5	-	<0.3	-	<0.3	-	<0.3	-	<0.3
Styrene	µg/L	-	72	-	-	-	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
Methyl tert-butyl ethe	µg/L	-	10,000	-	-	-	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
F1 (C6-C10)-BTEX	µg/L	-	-	-	-	-	-	<100	-	<100	-	<100	-	<100	-	<100
F1 (C6-C10)	µg/L	-	-	-	-	-	-	<100	-	<100	-	<100	-	<100	-	<100
F2 (C10-C16)	µg/L	-	-	-	-	-	-	<300	-	<300	-	<300	-	<300	-	<300
F3 (C16-C34)	µg/L	-	-	-	-	-	-	<300	-	<300	-	<300	-	<300	-	<300
F4 (C34-C50)	µg/L	-	-	-	-	-	-	<300	-	<300	-	<300	-	<300	-	<300

			Station	Mid Lake 1										EMD Discharge - In lake									
			Sample Depth	3 m	6 m	3 m	6 m	3 m	6 m	4 m	6 m	4 m	6 m	3 m	5 m	2 m	4 m	3 m	5 m	3 m	5 m	3 m	5 m
			ALS Sample ID	YL2101444-006	YL2101444-007	YL2200265-004	YL2200265-003	YL2200527-004	YL2200527-003	YL2200852-006	YL2200852-005	YL2201326-004	YL2201326-003	YL2101444-004	YL2101444-005	YL2200260-002	YL2200260-001	YL2200516-003	YL2200516-002	YL2200829-002	YL2200829-001	YL2201326-006	YL2201326-005
Parameter	Unit	Acute Guideline	Chronic Guideline	1-Oct-21	1-Oct-21	24-Mar-22	24-Mar-22	25-May-22	25-May-22	6-Jul-22	6-Jul-22	25-Aug-22	25-Aug-22	1-Oct-21	1-Oct-21	23-Mar-22	23-Mar-22	24-May-22	24-May-22	5-Jul-22	5-Jul-22	24-Aug-22	24-Aug-22
Volatile Organics																							
Benzene	µg/L	-	370	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L	-	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
m,p-Xylenes	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
o-Xylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert-butyl ethe	µg/L	-	10,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F1 (C6-C10)-BTEX	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F1 (C6-C10)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F2 (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F3 (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F4 (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

a) Value was invalidated and excluded from further analysis. See details in Section 5.3.12 of Appendi
b) Field turbidity measurement was not collected due to a field crew oversig
c) The ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.031 mg-N/L) is based on the combination of field pH (9.4) and water temperature (21°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperat
The guideline is calculated based on the individual field pH and temperature measurements for each sample.
d) Guideline is pH dependent. The guideline range shown is based on the field pH range observed in the dataset (7.0 to 9.4). The guideline is calculated based on the individual pH for each sa
e) Guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.
f) Guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (99 to 178 mg/L). The guideline is calculated based on the individual hardness value for each s
g) Guideline is for chromium VI
h) The chronic guideline for dissolved manganese is pH and hardness dependent. The guideline that results in the minimum chronic manganese guideline (120 µg/L) is based on the combination of field pH (9.3), and hardness (143 mg/L). Guidelines calculated with pH and hardness values falling outside the defined range (i.e., pH 5.8 to 8.4 and hardness 25 to 670 mg/L) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and harndess extremes. The guideline is calculated based on the individual pH and hardness measurements for each sample.
i) The acute guideline for dissolved zinc is hardness and DOC dependent. The guideline that results in the minimum acute zinc guideline (154 µg/L) is based on the combination of hardness (99 mg/L) and DOC (20 mg/L). Guidelines calculated with hardness and DOC values falling outside the defined range (i.e., hardness 13.8 to 250.5 mg/L and DOC 0.3 to 17.3 mg/L) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high ha DOC extremes. The guideline is calculated based on the individual hardness and DOC measurements for each sample.
i) The chronic guideline for dissolved zinc is pH, hardness and DOC dependent. The guideline that results in the minimum chronic zinc guideline (40 µg/L) is based on the combination of field pH (9.1), hardness (146 mg/L) and DOC (11 mg/L). Guidelines calculated with pH, hardness, and DOC values falling outside the defined range (i.e., pH 6.5 to 8.13, hardness 23.4 to 399 mg/L and DOC 0.3 to 22.9 mg/L) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH, hardness and DOC extremes. The guideline is calculated based on the individual pH, hardness and DOC measurements for each sample.
C) Concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, or DO ran
Bolded concentrations are higher than water quality guideline
Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precis *after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as excee
Seven total and dissolved molybdenum concentrations (greater than 1 µg/L) at EMD Discharge - In lake, Mid Lake 1, Near Outflow - In lake, and Southwest Bay in May 2022 were outside of historical ranges. Due to insufficient evidence of field contamination and laboratory error, these data points were qualified. See details in Section 5.3.12 of A
X = invalidated data; - = no guideline or no data; µS/cm = microsiemens per centimetre; NTU = nephelometric turbidity units; $CaCO_3$ = calcium carbonate; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; µg/L = micrograms per litre; ICPMS = inductively coupled plasma mass spectrometry; BTEX = benzene, toluene, ethylbenzene, and xylenes; DOC = dissolved organic carbon.

Appendix E.2: Water Quality Data from an Inflow to Jackfish Lake, Jackfish Lake,

			Station	Near Outflow - In lake										Southwest Bay										Outflow of Jackfish Lake		
			Sample Depth	3 m	5 m	2.8 m	4.8 m	3 m	5 m	3 m	5 m	3 m	5 m	2 m	4 m	2 m	4 m	2 m	4 m	3 m	5 m	3 m	4 m	0.15 m	0.3 m	0.3 m
			ALS Sample ID	YL2101444-002	YL2101444-003	YL2200265-006	YL2200265-005	YL2200527-008	YL2200527-007	YL2200852-008	YL2200852-007	YL2201326-010	YL2201326-009	YL2101440-006	YL2101440-007	YL2200260-004	YL2200260-003	YL2200527-006	YL2200527-005	YL2200829-004	YL2200829-003	YL2201326-008	YL2201326-007	YL2101440-004	YL2200516-001	YL2200852-001
Parameter	Unit	Acute Guideline	Chronic Guideline	1-Oct-21	1-Oct-21	25-Mar-22	25-Mar-22	25-May-22	25-May-22	6-Jul-22	6-Jul-22	25-Aug-22	25-Aug-22	30-Sep-21	30-Sep-21	22-Mar-22	22-Mar-22	25-May-22	25-May-22	5-Jul-22	5-Jul-22	25-Aug-22	25-Aug-22	30-Sep-21	24-May-22	6-Jul-22
Field Measured																										
Specific conductivity	µS/cm	-	-	442	442	486	487	437	437	424	429	445	446	437	437	X 125[a]	X 401[a]	436	436	458	461	446	446	444	437	421
Turbidity	NTU	-	-	20	17	0.76	1.1	4.2	4.8	12	12	8.2	4.7	20	19	0.91	0.55	4.2	6.0	16	12	11	11	53	6.6	12
pH	-	-	6.5 - 9.0	7.9	7.8	7.1	7.1	7.0	7.1	**9.4**[c]	7.7	**9.1**[c]	9.0	8.1	8.0	7.7	7.6	7.3	7.3	**9.1**[c]	7.6	**9.1**[c]	**9.1**[c]	7.5	7.1	8.8
Temperature	°C	-	-	10.2	10.2	1.0	1.1	5.2	5.1	18.9	13.6	18.5	18.1	10.3	10.3	2.8	3.8	5.2	5.1	17.7	12.9	18.7	18.7	8.4	7.1	22.8
Dissolved oxygen	mg/L	-	6.5	8.8	8.8	7.1	7.1	8.7	8.6	11.6	**1.0**[c]	8.9	7.5	9.3	9.3	6.8	6.7	8.7	8.7	9.1	**0.5**[c]	8.7	8.9	**5.2**[c]	9.4	7.6
Dissolved oxygen	%	-	-	80	80	50	50	70	69	127	10	97	82	86	86	51	51	70	70	97	4	96	98	46	79	90
Conventional Parameters																										
pH	-	-	6.5 - 9.0	8.2	8.3	8.0	8.1	8.3	8.3	8.8	8.5	8.5	8.5	8.4	8.4	8.0	8.0	8.3	8.3	8.7	8.5	8.5	8.5	8.3	8.2	8.4
Specific conductivity	µS/cm	-	-	471	472	504	503	443	442	439	483	446	446	446	448	506	508	442	444	453	449	444	442	446	464	468
Hardness, as $CaCO_3$	mg/L	-	-	148	148	161	161	133	133	149	144	156	148	138	138	171	169	125	137	141	143	152	148	144	149	143
Total alkalinity, as $CaCO_3$	mg/L	-	-	108	116	123	122	108	108	111	110	112	112	118	120	124	122	108	107	114	113	113	112	120	110	110
Total dissolved solids	mg/L	-	-	271	273	312	315	294	298	259	262	297	274	270	271	298	288	272	263	292	281	280	300	257	285	236
Total dissolved solids (calculated	mg/L	-	-	245	249	276	275	236	237	253	247	256	253	246	247	280	277	233	240	248	248	255	252	250	247	248
Total suspended solids	mg/L	-	-	13	12	<3.0	<3.0	8.1	6.9	14	12	9.9	9.3	12	14	<3.0	<3.0	6.9	7.5	18	13	7.8	7.4	55	6.0	11
Dissolved organic carbon	mg/L	-	-	12	12	13	14	13	14	13	13	12	12	12	12	13	12	13	14	13	13	13	12	13	13	14
Turbidity	NTU	-	-	22	23	1.5	1.2	7.2	7.6	17	15	8.5	8.9	22	21	1.1	1.1	6.6	6.9	20	15	8.5	8.8	72	7.7	12
Major Ions																										
Calcium	mg/L	-	-	39	40	42	42	38	37	38	37	40	38	36	36	45	44	35	38	36	37	40	37	38	40	37
Chloride	mg/L	640	120	60	60	68	68	59	59	62	61	62	62	60	60	67	67	59	59	61	60	62	62	59	60	62
Fluoride	mg/L	-	0.12	0.091	0.089	0.10	0.10	0.083	0.083	0.082	0.077	0.085	0.082	0.084	0.085	0.090	0.092	0.083	0.083	0.083	0.084	0.086	0.081	0.086	0.091	0.088
Magnesium	mg/L	-	-	12	12	14	14	9.6	9.9	13	13	13	13	12	12	14	14	9.3	10	13	13	13	13	12	12	13
Potassium	mg/L	-	-	4.2	4.1	4.6	4.6	4.0	4.1	4.3	4.2	4.3	4.4	4.0	3.9	4.5	4.5	4.0	4.3	4.2	4.2	4.3	4.3	4.1	3.8	4.3
Sodium	mg/L	-	-	31	31	34	34	28	29	35	33	35	35	31	31	36	35	28	31	33	34	35	34	32	32	33
Sulphate	mg/L	-	-	25	25	30	30	26	26	26	25	26	26	25	25	29	29	26	26	25	25	26	26	24	25	25
Reactive silica	mg/L	-	-	13	14	15	15	13	13	12	13	13	13	13	13	15	15	13	13	12	13	13	13	13	13	13
Nutrients																										
Nitrate	mg-N/L	124	2.9	<0.005	<0.005	0.13	0.14	0.092	0.090	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.13	0.16	0.091	0.086	<0.005	<0.005	<0.005	<0.005	<0.005	0.13	<0.005
Nitrite	mg-N/L	-	0.06	<0.001	<0.001	0.0028	0.0049	0.0063	0.0067	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0023	0.0066	0.0063	<0.001	<0.001	<0.001	<0.001	<0.001	0.0016	<0.001
Nitrate + nitrite	mg-N/L	-	-	<0.0051	<0.0051	0.13	0.14	0.098	0.097	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	0.13	0.17	0.098	0.092	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	0.13	<0.0051
Total ammonia	mg-N/L	-	0.031 - 14[c]	0.012	0.0074	0.057	0.058	0.073	0.071	0.0098	0.011	0.0097	0.010	0.0070	0.011	0.053	0.047	0.065	0.067	0.0094	0.016	0.0089	0.0081	0.041	0.067	0.010
Total nitrogen	mg-N/L	-	-	1.1	0.86	0.84	0.85	1.3	1.3	1.2	1.2	1.2	1.2	1.7	1.7	0.88	0.87	1.3	1.3	1.4	1.3	1.1	1.1	4.4	1.3	0.77
Total phosphorus	mg-P/L	-	-	0.12	0.045	0.031	0.033	0.087	0.087	0.085	0.10	0.047	0.047	0.11	0.11	0.032	0.033	0.087	0.085	0.092	0.088	0.047	0.044	0.41	0.098	0.092
Dissolved phosphorus	mg-P/L	-	-	0.012	0.012	0.022	0.024	0.019	0.018	0.017	0.018	0.012	0.012	0.013	0.012	0.021	0.026	0.018	0.020	0.018	0.022	0.013	0.013	0.022	0.020	0.020
Total Metals																										
Aluminum	µg/L	-	100[d, e]	5.9	4.5	5.6	5.6	10	12	4.0	<3.0	8.3	8.4	5.2	6.2	4.8	3.5	10	8.8	4.6	5.5	9.1	11	16	29	9.4
Antimony	µg/L	-	-	1.2	1.2	1.3	1.3	1.2	1.2	1.3	1.3	1.2	1.3	1.2	1.2	1.3	1.3	1.2	1.2	1.2	1.2	1.3	1.3	1.1	1.2	1.3
Arsenic	µg/L	-	5.0	**73**[c]	**72**[c]	**74**[c]	**75**[c]	**62**[c]	**62**[c]	**65**[c]	**61**[c]	**75**[c]	**74**[c]	**71**[c]	**74**[c]	**72**[c]	**75**[c]	**62**[c]	**62**[c]	**71**[c]	**71**[c]	**74**[c]	**74**[c]	**73**[c]	**64**[c]	**62**[c]
Barium	µg/L	-	-	30	31	37	37	32	32	27	28	32	32	31	32	34	35	32	32	30	31	32	32	33	31	27
Beryllium	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	µg/L	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	29,000	1,500	28	28	32	32	28	28	27	27	27	29	29	29	32	32	28	28	30	30	29	28	28	29	28
Cadmium	µg/L	2.1 - 3.8[f]	0.16 - 0.26[f]	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	µg/L	-	-	39,200	38,800	41,900	42,600	36,600	36,800	37,100	35,300	36,300	37,500	38,400	38,100	44,900	44,800	37,000	36,900	37,700	37,200	37,900	37,900	39,300	38,600	34,800
Cesium	µg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	µg/L	-	1.0[g]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.20	0.10	<0.1
Copper	µg/L	-	2.3 - 3.9[f]	**9.7**[c]	1.4	1.9	2.0	1.9	1.9	1.8	1.5	1.6	1.5	1.4	1.8	1.9	1.9	2.0	1.9	2.0	1.8	1.6	1.6	1.7	2.1	1.7
Iron	µg/L	-	300	13	12	10	10	15	18	<10	14	<10	13	14	12	<10	<10	19	14	10	19	<10	12	48	46	21
Lead	µg/L	-	3.1 - 6.6[f]	0.22	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.071	0.056	<0.05
Lithium	µg/L	-	-	6.1	6.1	6.6	6.7	5.9	5.8	5.4	5.2	6.7	6.8	6.0	6.1	6.7	6.7	5.9	5.9	6.7	6.6	7.1	8.0	6.2	7.0	5.2
Magnesium	µg/L	-	-	11,800	12,100	14,300	14,300	11,800	11,800	12,000	10,600	12,700	12,700	12,100	12,400	15,100	15,400	11,600	11,600	12,400	12,500	12,400	12,800	12,900	12,300	11,000
Manganese	µg/L	-	-	127	125	49	53	66	75	17	72	56	76	98	101	26	32	69	68	19	87	44	45	186	61	32
Mercury	µg/L	-	0.026	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	-	73	0.18	0.18	0.22	0.19	0.21	0.19	0.22	0.22	0.18	0.20	0.20	0.19	0.21	0.22	1.5	0.18	0.21	0.22	0.20	0.20	0.19	0.21	0.23
Nickel	µg/L	-	95 - 148[f]	0.54	<0.5	<0.5	<0.5	0.52	0.57	0.54	<0.5	<0.5	0.50	0.56	0.58	0.51	<0.5	0.64	<0.5	0.66	0.60	<0.5	0.53	1.2	0.76	0.69
Potassium	µg/L	-	-	4,240	4,180	4,440	4,470	4,280	4,280	3,890	3,590	4,060	4,050	4,180	4,300	4,540	4,660	4,300	4,280	4,300	4,330	4,080	4,110	4,820	3,880	3,820
Rubidium	µg/L	-	-	2.6	2.7	2.9	2.9	2.6	2.5	2.4	2.2	2.8	2.6	2.5	2.5	2.9	3.0	2.5	2.5	2.6	2.8	2.8	2.8	2.8	2.6	2.4
Selenium	µg/L	-	1.0	0.073	0.079	0.060	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.059	<0.05	<0.05	<0.05	0.060	0.062	0.061	0.080	0.094	<0.05	<0.05	<0.05	0.056	0.064
Silicon	µg/L	-	-	6,350	6,260	7,040	7,180	6,470	6,460	5,850	5,630	6,400	6,560	6,080	6,200	7,520	7,790	6,460	6,350	6,450	6,460	6,410	6,730	6,180	6,330	5,750
Silver	µg/L	-	0.25	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	µg/L	-	-	30,400	30,700	36,500	36,800	31,100	31,200	30,100	27,300	34,500	34,400	32,600	32,800	35,900	36,800	31,300	30,800	33,000	33,600	33,800	34,400	33,500	31,500	30,100
Strontium	µg/L	-	-	89	89	100	100	88	87	95	93	87	92	90	87	105	105	86	87	91	89	92	93	86	83	95
Sulphur	µg/L	-	-	9,560	9,620	10,100	10,100	9,710	9,440	9,180	8,420	9,200	9,450	9,530	9,490	10,900	10,900	9,680	9,200	9,360	9,110	8,610	9,290	9,640	8,780	8,520
Tellurium	µg/L	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	-	0.80	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	-	-	<0.3	<0.3	0.31	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.62	0.90	<0.3
Tungsten	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	33	15	0.51	0.51	0.59	0.59	0.43	0.54	0.58	0.53	0.50	0.50	0.56	0.56	0.57	0.57	0.61	0.41	0.57	0.55	0.54	0.52	0.48	0.57	0.56
Vanadium	µg/L	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	-	-	9.6	4.7	5.0	5.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	5.4	5.5	4.7	4.7	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	6.1	<3.0	<3.0
Zirconium	µg/L	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dissolved Metals																										
Aluminum	µg/L	-	-	2.1	1.1	1.7	1.3	3.6	3.6	1.8	2.2	4.5	4.5	1.3	2.6	1.7	1.6	3.5	3.8	1.7	1.5	4.4	4.8	2.5	4.5	4.2
Antimony	µg/L	-	-	1.2	1.2	1.3	1.3	1.2	1.2	1.3	1.2	1.2	1.2	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.2	1.2	1.0	1.3	1.2
Arsenic	µg/L	-	-	72	72	71	72	60	60	76	73	76	76	71	71	73	73	60	65	72	74	76	75	71	61	72
Barium	µg/L	-	-	29	30	35	34	29	29	30	32	30	32	30	30	34	34	29	33	31	33	31	31	31	33	31
Beryllium	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	µg/L	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	-	-	28	27	31	31	28	28	28	27	29	27	27	27	31	31	27	29	27	28	28	27	28	29	28
Cadmium	µg/L	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium	µg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	µg/L	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	µg/L	-	-	1.2	1.1	1.7	1.7	1.8	1.8	1.8	1.5	1.4	1.4	1.2	1.1	1.7	1.7	1.7	1.9	1.7	1.4	1.5	1.4	0.99	1.8	1.7
Iron	µg/L	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	14	16
Lead	µg/L	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	-	-	6.3	6.2	7.1	7.1	5.7	5.5	6.5	6.1	6.2	6.0	6.1	6.1	6.8	18	5.4	5.9	6.1	6.2	6.1	19	6.4	6.2	6.4
Manganese	µg/L	6,575 - 11,044[f]	120 - 710[h]	2.1	1.6	1.4	1.3	49	53	2.5	66	1.4	16	1.0	1.4	0.63	3.9	51	55	2.5	78	1.5	1.5	125	48	30
Mercury	µg/L	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	-	-	0.18	0.17	0.21	0.20	0.21	1.7	0.20	0.19	0.17	0.18	0.16	0.17	0.20	0.21	0.21	2.2	0.19	0.18	0.17	0.18	0.16	0.21	0.19
Nickel	µg/L	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.51	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Rubidium	µg/L	-	-	2.6	2.7	2.9	2.8	2.5	2.4	2.6	2.7	2.6	2.7	2.4	2.4	2.8	2.6	2.4	2.7	2.8	2.6	2.7	2.7	2.6	2.5	2.6
Selenium	µg/L	-	-	<0.05	<0.05	<0.05	0.054	<0.05	0.051	<0.05	<0.05	<0.05	0.067	<0.05	0.050	<0.05	<0.05	<0.05	<0.05	0.057	0.051	0.050	0.055	0.075	0.056	<0.05
Silicon	µg/L	-	-	6,360	6,280	7,330	7,260	5,850	5,710	6,320	6,300	6,530	6,630	6,270	6,200	7,590	7,500	5,740	6,190	6,070	6,440	6,590	6,520	6,530	6,150	6,320
Silver	µg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	µg/L	-	-	87	87	102	103	90	91	88	92	86	90	86	87	102	103	88	94	91	92	90	90	90	89	89
Sulphur	µg/L	-	-	8,600	8,570	10,800	10,200	9,420	8,720	9,230	8,470	9,840	9,380	9,300	9,370	10,400	10,000	8,800	9,250	8,610	8,750	9,370	9,290	9,150	9,600	8,470
Tellurium	µg/L	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	0.23	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	-	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tungsten	µg/L	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	-	-	0.48	0.48	0.58	0.58	0.56	0.56	0.53	0.50	0.56	0.55	0.46	0.46	0.56	0.56	0.56	0.60	0.53	0.48	0.58	0.56	0.42	0.57	0.49
Vanadium	µg/L	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	154 - 247[i]	40 - 110[j]	6.2	4.6	5.3	5.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.9	6.2	4.9	5.1	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	6.3	<1.0	1.3
Zirconium	µg/L	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
General Organics																										
Total oil and grease	mg/L	-	-	-	<5.0	-	<5.0	-	<5.0	-	<5.0	-	<5.0	-	-	-	-	-	-	-	-	-	-	-	-	-
Volatile hydrocarbons (C6-C10	mg/L	-	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
Volatile petroleum hydrocarbons (C6-C10	mg/L	-	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix E.2: Water Quality Data from an Inflow to Jackfish Lake, Jackfish Lake,

			Station	Near Outflow - In lake										Southwest Bay										Outflow of Jackfish Lake		
			Sample Depth	3 m	5 m	2.8 m	4.8 m	3 m	5 m	3 m	5 m	3 m	5 m	2 m	4 m	2 m	4 m	2 m	4 m	3 m	5 m	3 m	4 m	0.15 m	0.3 m	0.3 m
			ALS Sample ID	YL2101444-002	YL2101444-003	YL2200265-006	YL2200265-005	YL2200527-008	YL2200527-007	YL2200852-008	YL2200852-007	YL2201326-010	YL2201326-009	YL2101440-006	YL2101440-007	YL2200260-004	YL2200260-003	YL2200527-006	YL2200527-005	YL2200829-004	YL2200829-003	YL2201326-008	YL2201326-007	YL2101440-004	YL2200516-001	YL2200852-001
Parameter	**Unit**	**Acute Guideline**	**Chronic Guideline**	**1-Oct-21**	**1-Oct-21**	**25-Mar-22**	**25-Mar-22**	**25-May-22**	**25-May-22**	**6-Jul-22**	**6-Jul-22**	**25-Aug-22**	**25-Aug-22**	**30-Sep-21**	**30-Sep-21**	**22-Mar-22**	**22-Mar-22**	**25-May-22**	**25-May-22**	**5-Jul-22**	**5-Jul-22**	**25-Aug-22**	**25-Aug-22**	**30-Sep-21**	**24-May-22**	**6-Jul-22**
Volatile Organics																										
Benzene	µg/L	-	370	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L	-	90	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	2.0	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes	µg/L	-	-	-	<0.75	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
m,p-Xylenes	µg/L	-	-	-	<0.5	-	<0.4	-	<0.4	-	<0.4	-	<0.4	-	-	-	-	-	-	-	-	-	-	-	-	-
o-Xylene	µg/L	-	-	-	<0.5	-	<0.3	-	<0.3	-	<0.3	-	<0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	72	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert-butyl ethe	µg/L	-	10,000	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
F1 (C6-C10)-BTEX	µg/L	-	-	-	<100	-	<100	-	<100	-	<100	-	<100	-	-	-	-	-	-	-	-	-	-	-	-	-
F1 (C6-C10)	µg/L	-	-	-	<100	-	<100	-	<100	-	<100	-	<100	-	-	-	-	-	-	-	-	-	-	-	-	-
F2 (C10-C16)	µg/L	-	-	-	<300	-	<300	-	<300	-	<300	-	<300	-	-	-	-	-	-	-	-	-	-	-	-	-
F3 (C16-C34)	µg/L	-	-	-	<300	-	<300	-	<300	-	<300	-	<300	-	-	-	-	-	-	-	-	-	-	-	-	-
F4 (C34-C50)	µg/L	-	-	-	<300	-	<300	-	<300	-	<300	-	<300	-	-	-	-	-	-	-	-	-	-	-	-	-

a) Value was invalidated and excluded from further analysis. See details in Section 5.3.12 of Appendix
b) Field turbidity measurement was not collected due to a field crew oversig
c) The ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline (0.031 mg-N/L) is based on the combination of field pH (9.4) and water temperature (21°C). Guidelines calculated with temperature and pH values falling outside the defined range (i.e., pH 6.0 to 10.0 and temperature 0°C to 30°C) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH and temperatu
The guideline is calculated based on the individual field pH and temperature measurements for each sample.
d) Guideline is pH dependent. The guideline range shown is based on the field pH range observed in the dataset (7.0 to 9.4). The guideline is calculated based on the individual pH for each sa
e) Guideline is pH dependent: 5 µg/L at pH < 6.5 and 100 µg/L at pH ≥ 6.5.
f) Guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (99 to 178 mg/L). The guideline is calculated based on the individual hardness value for each sa
g) Guideline is for chromium VI
h) The chronic guideline for dissolved manganese is pH and hardness dependent. The guideline that results in the minimum chronic manganese guideline (120 µg/L) is based on the combination of field pH (9.3), and hardness (143 mg/L). Guidelines calculated with pH and hardness values falling outside the defined range (i.e., pH 5.8 to 8.4 and hardness 25 to 670 mg/L) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and harndess extremes. The guideline is calculated based on the individual pH and hardness measurements for each sample.
i) The acute guideline for dissolved zinc is hardness and DOC dependent. The guideline that results in the minimum acute zinc guideline (154 µg/L) is based on the combination of hardness (99 mg/L) and DOC (20 mg/L). Guidelines calculated with hardness and DOC values falling outside the defined range (i.e., hardness 13.8 to 250.5 mg/L and DOC 0.3 to 17.3 mg/L) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high ha DOC extremes. The guideline is calculated based on the individual hardness and DOC measurements for each sample.
i) The chronic guideline for dissolved zinc is pH, hardness and DOC dependent. The guideline that results in the minimum chronic zinc guideline (40 µg/L) is based on the combination of field pH (9.1), hardness (146 mg/L) and DOC (11 mg/L). Guidelines calculated with pH, hardness, and DOC values falling outside the defined range (i.e., pH 6.5 to 8.13, hardness 23.4 to 399 mg/L and DOC 0.3 to 22.9 mg/L) should be used with caution, as the WQG does not necessarily accurately reflect toxic effects at the low and high pH, hardness and DOC extremes. The guideline is calculated based on the individual pH, hardness and DOC measurements for each sample.
C) Concentration is higher than the chronic aquatic life CCME guideline or outside the recommended pH, or DO ran
Bolded concentrations are higher than water quality guideline
Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precis*after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as excee
Seven total and dissolved molybdenum concentrations (greater than 1 µg/L) at EMD Discharge - In lake, Mid Lake 1, Near Outflow - In lake, and Southwest Bay in May 2022 were outside of historical ranges. Due to insufficient evidence of field contamination and laboratory error, these data points were qualified. See details in Section 5.3.12 of A
X = invalidated data; - = no guideline or no data; µS/cm = microsiemens per centimetre; NTU = nephelometric turbidity units; $CaCO_3$ = calcium carbonate; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; µg/L = micrograms per litre; ICPMS = inductively coupled plasma mass spectrometry; BTEX = benzene, toluene, ethylbenzene, and xylenes; DOC = dissolved organic carbon.

Appendix E.3 Table 1: Results Notably Higher in Inflows to Jackfish Lake Compared to Southwest Bay in Jackfish Lake, September 2021 to July 2022

	Sampling Event	September/October (late fall)			May (spring freshet)			July (early summer)		
	Station	Inflow to NW Bay 2	Southwest Bay	Southwest Bay	Inflow to NW Bay 2	Southwest Bay	Southwest Bay	Inflow to NW Bay 2	Southwest Bay	Southwest Bay
	Sample Depth	0.3 m	2 m	4 m	0.3 m	2 m	4 m	0.3 m	3 m	5 m
	ALS Sample ID	YL2101440-005	YL2101440-006	YL2101440-007	YL2200533-001	YL2200527-006	YL2200527-005	YL2200852-002	YL2200829-004	YL2200829-003
Parameter	**Unit**	2021-09-30	2021-09-30	2021-09-30	2022-05-26	2022-05-25	2022-05-25	2022-07-06	2022-07-05	2022-07-05
Field Measured										
Specific conductivity	µS/cm	711	437	437	414	436	436	532	458	461
Dissolved oxygen	mg/L	10.0	9.3	9.3	10.7	8.7	8.7	8.0	9.1	0.5
Dissolved oxygen	%	85	86	86	87	70	70	78	97	4
Conventional Parameters										
Specific conductivity	µS/cm	719	446	448	434	442	444	600	453	449
Hardness, as $CaCO_3$	mg/L	178	138	138	99	125	137	151	141	143
Total alkalinity, as $CaCO_3$	mg/L	133	118	120	56	108	107	136	114	113
Total dissolved solids	mg/L	419	270	271	272	272	263	308	292	281
Total dissolved solids (calculated)	mg/L	392	246	247	222	233	240	313	248	248
Dissolved organic carbon	mg/L	16	12	12	20	13	14	21	13	13
Major Ions										
Calcium	mg/L	48	36	36	27	35	38	39	36	37
Chloride	mg/L	110	60	60	79	59	59	103	61	60
Magnesium	mg/L	14	12	12	7.8	9.3	10	13	13	13
Sodium	mg/L	71	31	31	44	28	31	62	33	34
Sulphate	mg/L	59	25	25	26	26	26	7.2	25	25
Nutrients										
Nitrate	mg-N/L	0.059	<0.0050	<0.0050	0.039	0.091	0.086	<0.0050	<0.0050	<0.0050
Nitrate + nitrite	mg-N/L	0.059	<0.0051	<0.0051	0.039	0.098	0.092	<0.0051	<0.0051	<0.0051
Total ammonia	mg-N/L	0.0097	0.0070	0.011	0.0088	0.065	0.067	0.015	0.0094	0.016
Total Metals										
Aluminum	µg/L	17	5.2	6.2	16	10	8.8	17	4.6	5.5
Antimony	µg/L	0.79	1.2	1.2	2.1	1.2	1.2	0.98	1.2	1.2
Boron	µg/L	29	29	29	34	28	28	45	30	30
Calcium	µg/L	51,500	38,400	38,100	28,100	37,000	36,900	37,700	37,700	37,200
Cesium	µg/L	0.014	<0.010	<0.010	<0.010	<0.010	<0.010	0.018	<0.010	<0.010
Cobalt	µg/L	0.34	<0.10	<0.10	<0.10	<0.10	<0.10	0.18	<0.10	<0.10
Iron	µg/L	238	14	12	36	19	14	117	10	19
Lead	µg/L	0.11	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Magnesium	µg/L	15,200	12,100	12,400	9,050	11,600	11,600	11,600	12,400	12,500
Manganese	µg/L	282	98	101	8.8	69	68	131	19	87
Molybdenum	µg/L	0.66	0.20	0.19	0.40	1.5	0.18	0.32	0.21	0.22
Nickel	µg/L	1.9	0.56	0.58	1.3	0.64	<0.50	2.2	0.66	0.60
Rubidium	µg/L	3.5	2.5	2.5	3.2	2.5	2.5	2.9	2.6	2.8
Selenium	µg/L	0.067	<0.050	<0.050	<0.050	0.062	0.061	0.055	0.080	0.094
Sodium	µg/L	73,000	32,600	32,800	45,100	31,300	30,800	55,300	33,000	33,600
Strontium	µg/L	112	90	87	62	86	87	102	91	89
Sulphur	µg/L	23,500	9,530	9,490	10,200	9,680	9,200	3,040	9,360	9,110
Titanium	µg/L	0.40	<0.30	<0.30	<0.30	<0.30	<0.30	0.34	<0.30	<0.30
Uranium	µg/L	1.8	0.56	0.56	0.20	0.61	0.41	0.74	0.57	0.55
Zinc	µg/L	7.7	5.4	5.5	3.3	<3.0	<3.0	4.1	<3.0	<3.0
Dissolved Metals										
Aluminum	µg/L	7.8	1.3	2.6	14	3.5	3.8	11	1.7	1.5
Antimony	µg/L	0.73	1.1	1.1	2.2	1.2	1.3	0.96	1.3	1.3
Boron	µg/L	28	27	27	35	27	29	46	27	28
Cesium	µg/L	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	0.017	<0.010	<0.010
Cobalt	µg/L	0.27	<0.10	<0.10	<0.10	<0.10	<0.10	0.16	<0.10	<0.10
Copper	µg/L	29	1.2	1.1	1.4	1.7	1.9	1.3	1.7	1.4
Iron	µg/L	112	<10	<10	32	<10	<10	101	<10	<10
Lead	µg/L	0.71	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Manganese	µg/L	242	1.0	1.4	5.8	51	55	124	2.5	78
Molybdenum	µg/L	0.60	0.16	0.17	0.21	0.21	2.2	0.27	0.19	0.18
Nickel	µg/L	1.6	<0.50	<0.50	1.3	<0.50	0.51	2.3	<0.50	<0.50
Rubidium	µg/L	3.2	2.4	2.4	3.1	2.4	2.7	3.2	2.8	2.6
Selenium	µg/L	0.073	<0.050	0.050	<0.050	<0.050	<0.050	0.062	0.057	0.051
Strontium	µg/L	114	86	87	57	88	94	100	91	92
Sulphur	µg/L	21,100	9,300	9,370	9,170	8,800	9,250	3,350	8,610	8,750
Tin	µg/L	0.37	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Uranium	µg/L	1.6	0.46	0.46	0.19	0.56	0.60	0.68	0.53	0.48
Zinc	µg/L	22	4.9	6.2	2.9	<1.0	<1.0	3.8	<1.0	1.4

Notes:
Shaded concentrations at Inflow to NW Bay 2 were 20% higher relative to Southwest Bay (located farthest from the inflows).
Concentrations reported as below detection limits were assumed to be at the detection limit for the purpose of the comparison.
- = no data; µS/cm = microsiemens per centimetre; NTU = nephelometric turbidity units; $CaCO_3$ = calcium carbonate; mg-N/L = milligrams nitrogen per litre; µg/L = micrograms per litre.

Appendix E.3 Table 2: Results Notably Higher at Northwest Bay - N Compared to Other Stations in Jackfish Lake, September 2021 to July 202

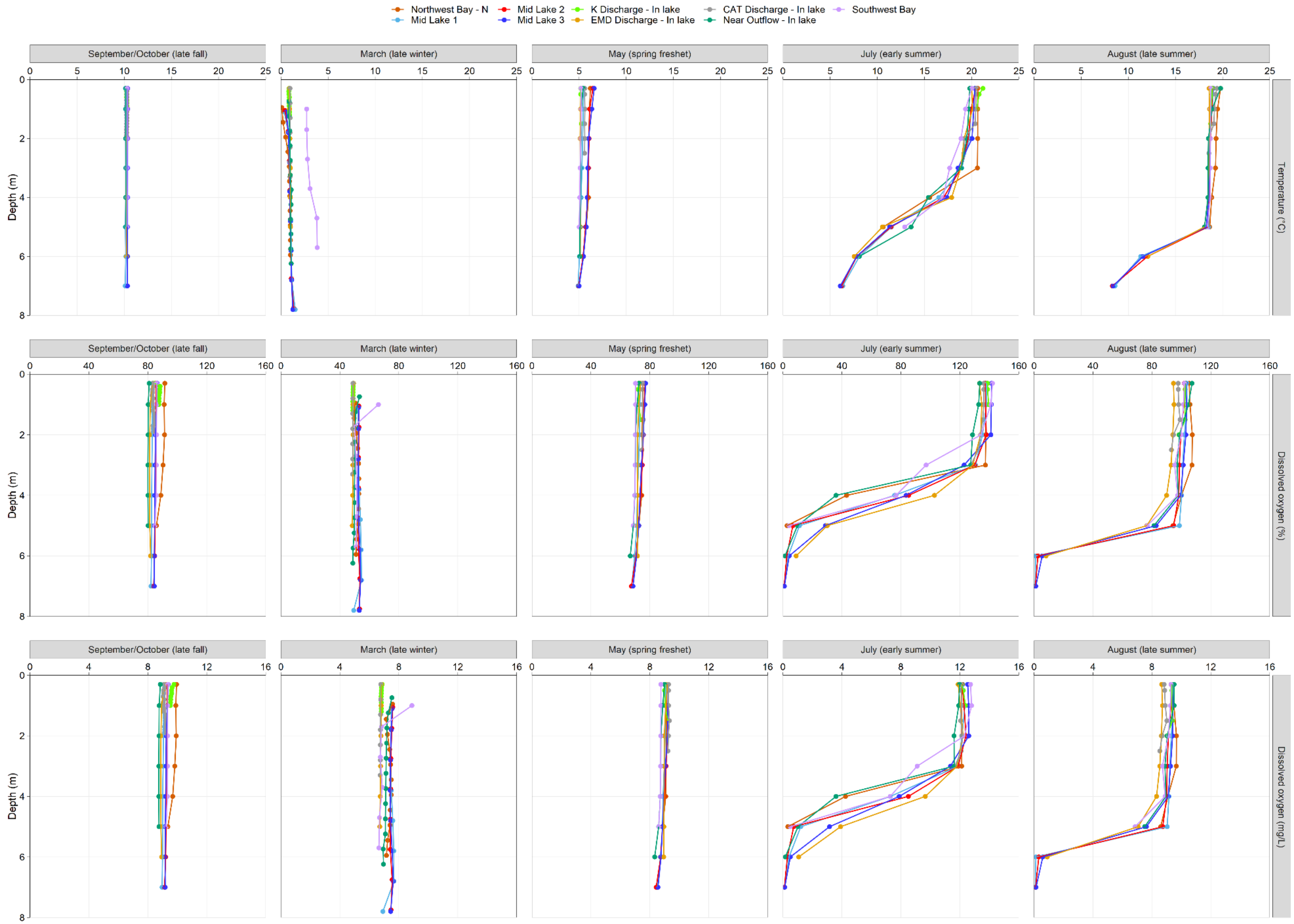
Sampling Event		September/October (late fall)									
Depth		mid-depth					bottom				
Station		Northwest Bay - N	Mid Lake 1	EMD Discharge - In lake	Near Outflow - In lake	Southwest Bay	Northwest Bay - N	Mid Lake 1	EMD Discharge - In lake	Near Outflow - In lake	Southwest Bay
Sample Depth		2 m	3 m	3 m	3 m	2 m	4 m	6 m	5 m	5 m	4 m
ALS Sample ID		YL2101440-001	YL2101444-006	YL2101444-004	YL2101444-002	YL2101440-006	YL2101440-002	YL2101444-007	YL2101444-005	YL2101444-003	YL2101440-007
Parameter	Unit	2021-09-30	2021-10-01	2021-10-01	2021-10-01	2021-09-30	2021-09-30	2021-10-01	2021-10-01	2021-10-01	2021-09-30
Field Measured											
Temperature	°C	10	10	10	10	10	10	10	10	10	10
Dissolved oxygen	mg/L	9.9	9.0	8.9	8.8	9.3	9.7	9.0	8.9	8.8	9.3
Dissolved oxygen	%	91	83	81	80	86	89	82	81	80	86
Turbidity	NTU	22	21	16	20	20	22	20	17	17	19
Conventional Parameters											
Total suspended solids	mg/L	12	15	8.8	13	12	14	12	12	12	14
Turbidity	NTU	23	21	21	22	22	21	30	22	23	21
Nutrients											
Nitrite	mg-N/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total ammonia	mg-N/L	0.0082	0.0081	0.0083	0.012	0.0070	0.0069	0.0090	0.0099	0.0074	0.011
Total nitrogen	mg-N/L	1.7	0.92	0.82	1.1	1.7	1.7	0.86	1.2	0.86	1.7
Total phosphorus	mg-P/L	0.10	0.043	0.041	0.12	0.11	0.11	0.039	0.071	0.045	0.11
Dissolved phosphorus	mg-P/L	0.014	0.012	0.011	0.012	0.013	0.014	0.014	0.013	0.012	0.012
Total Metals											
Aluminum	µg/L	7.9	4.4	5.1	5.9	5.2	6.5	5.2	6.1	4.5	6.2
Copper	µg/L	1.4	1.4	1.4	9.7	1.4	1.4	1.4	1.4	1.4	1.8
Iron	µg/L	20	12	12	13	14	16	12	14	12	12
Lead	µg/L	<0.050	<0.050	<0.050	0.22	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Molybdenum	µg/L	0.19	0.21	0.19	0.18	0.20	0.18	0.21	0.20	0.18	0.19
Nickel	µg/L	0.58	0.54	0.52	0.54	0.56	<0.50	0.57	0.56	<0.50	0.58
Selenium	µg/L	<0.050	<0.050	0.053	0.073	<0.050	<0.050	<0.050	0.064	0.079	<0.050
Tin	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	µg/L	5.2	5.0	4.7	9.6	5.4	5.0	4.6	<3.0	4.7	5.5
Dissolved Metals											
Aluminum	µg/L	1.4	1.1	1.9	2.1	1.3	1.4	1.7	8.7	1.1	2.6
Copper	µg/L	1.1	1.1	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1
Manganese	µg/L	1.3	1.2	2.0	2.1	1.0	1.7	1.8	1.7	1.6	1.4
Zinc	µg/L	4.9	5.4	4.8	6.2	4.9	4.7	5.7	<1.0	4.6	6.2

Sampling Event		May (spring freshet)									
Depth		mid-depth					bottom				
Station		Northwest Bay - N	Mid Lake 1	EMD Discharge - In lake	Near Outflow - In lake	Southwest Bay	Northwest Bay - N	Mid Lake 1	EMD Discharge - In lake	Near Outflow - In lake	Southwest Bay
Sample Depth		2 m	3 m	3 m	3 m	2 m	4 m	6 m	5 m	5 m	4 m
ALS Sample ID		YL2200527-002	YL2200527-004	YL2200516-003	YL2200527-008	YL2200527-006	YL2200527-001	YL2200527-003	YL2200516-002	YL2200527-007	YL2200527-005
Parameter	Unit	2022-05-25	2022-05-25	2022-05-24	2022-05-25	2022-05-25	2022-05-25	2022-05-25	2022-05-24	2022-05-25	2022-05-25
Field Measured											
Temperature	°C	6.0	5.3	5.1	5.2	5.2	6.0	5.0	5.1	5.1	5.1
Dissolved oxygen	mg/L	9.1	9.0	9.0	8.7	8.7	9.1	8.7	9.0	8.6	8.7
Dissolved oxygen	%	75	72	72	70	70	74	70	72	69	70
Turbidity	NTU	5.3	5.2	4.7	4.2	4.2	4.8	4.9	5.9	4.8	6.0
Conventional Parameters											
Total suspended solids	mg/L	5.9	6.3	3.4	8.1	6.9	7.7	5.3	4.8	6.9	7.5
Turbidity	NTU	6.5	6.7	6.9	7.2	6.6	7.2	7.0	6.5	7.6	6.9
Nutrients											
Nitrite	mg-N/L	0.0061	0.0065	0.0015	0.0063	0.0066	0.0072	0.0063	0.0016	0.0067	0.0063
Total ammonia	mg-N/L	0.062	0.063	0.070	0.073	0.065	0.059	0.070	0.070	0.071	0.067
Total nitrogen	mg-N/L	1.3	1.3	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total phosphorus	mg-P/L	0.087	0.090	0.085	0.087	0.087	0.088	0.085	0.090	0.087	0.085
Dissolved phosphorus	mg-P/L	0.020	0.022	0.023	0.019	0.018	0.018	0.019	0.020	0.018	0.020
Total Metals											
Aluminum	µg/L	11	11	11	10	10	11	8.5	11	12	8.8
Copper	µg/L	1.9	2.0	2.2	1.9	2.0	1.8	1.9	2.0	1.9	1.9
Iron	µg/L	18	19	20	15	19	18	15	18	18	14
Lead	µg/L	<0.050	<0.050	0.066	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Molybdenum	µg/L	0.21	1.9	1.3	0.21	1.5	0.23	1.8	0.22	0.19	0.18
Nickel	µg/L	0.57	0.59	0.73	0.52	0.64	0.53	0.56	0.68	0.57	<0.50
Selenium	µg/L	<0.050	<0.050	<0.050	<0.050	0.062	<0.050	<0.050	<0.050	<0.050	0.061
Tin	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	µg/L	<3.0	<3.0	3.2	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Dissolved Metals											
Aluminum	µg/L	4.0	2.9	3.4	3.6	3.5	4.0	4.5	3.6	3.6	3.8
Copper	µg/L	1.8	1.8	1.8	1.8	1.7	1.9	1.9	1.8	1.8	1.9
Manganese	µg/L	51	47	48	49	51	56	52	47	53	55
Zinc	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	<1.0

Sampling Event		July (early summer)									
Depth		mid-depth					bottom				
Station		Northwest Bay - N	Mid Lake 1	EMD Discharge - In lake	Near Outflow - In lake	Southwest Bay	Northwest Bay - N	Mid Lake 1	EMD Discharge - In lake	Near Outflow - In lake	Southwest Bay
Sample Depth		2 m	4 m	3 m	3 m	3 m	4 m	6 m	5 m	5 m	5 m
ALS Sample ID		YL2200852-004	YL2200852-006	YL2200829-002	YL2200852-008	YL2200829-004	YL2200852-003	YL2200852-005	YL2200829-001	YL2200852-007	YL2200829-003
Parameter	Unit	2022-07-06	2022-07-06	2022-07-05	2022-07-06	2022-07-05	2022-07-06	2022-07-06	2022-07-05	2022-07-06	2022-07-05
Field Measured											
Temperature	°C	21	17	19	19	18	16	8.1	11	14	13
Dissolved oxygen	mg/L	12	7.3	12	12	9.1	4.3	0.41	3.9	1.0	0.50
Dissolved oxygen	%	138	76	129	127	97	43	3.6	30	9.8	4.2
Turbidity	NTU	13	14	14	12	16	14	7.2	12	12	12
Conventional Parameters											
Total suspended solids	mg/L	12	14	13	14	18	13	6.8	7.6	12	13
Turbidity	NTU	14	16	15	17	20	16	9.1	7.6	15	15
Nutrients											
Nitrite	mg-N/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total ammonia	mg-N/L	0.0092	0.049	0.0099	0.0098	0.0094	0.0085	0.0069	0.021	0.011	0.016
Total nitrogen	mg-N/L	1.1	1.7	1.3	1.2	1.4	1.2	1.1	1.1	1.2	1.3
Total phosphorus	mg-P/L	0.078	0.12	0.085	0.085	0.092	0.094	0.089	0.083	0.10	0.088
Dissolved phosphorus	mg-P/L	0.016	0.017	0.017	0.017	0.018	0.016	0.018	0.0076	0.018	0.022
Total Metals											
Aluminum	µg/L	3.6	4.1	4.8	4.0	4.6	4.8	<3.0	3.6	<3.0	5.5
Copper	µg/L	4.5	1.8	2.0	1.8	2.0	1.8	1.5	1.7	1.5	1.8
Iron	µg/L	<10	<10	<10	<10	10	15	13	27	14	19
Lead	µg/L	0.27	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Molybdenum	µg/L	0.20	0.24	0.21	0.22	0.21	0.22	0.21	0.20	0.22	0.22
Nickel	µg/L	0.59	0.67	0.58	0.54	0.66	0.63	<0.50	0.60	<0.50	0.60
Selenium	µg/L	0.064	0.054	0.057	<0.050	0.080	<0.050	<0.050	0.062	<0.050	0.094
Tin	µg/L	0.19	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	µg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Dissolved Metals											
Aluminum	µg/L	2.0	1.2	2.0	1.8	1.7	1.9	1.4	1.4	2.2	1.5
Copper	µg/L	1.8	1.7	1.8	1.8	1.7	1.7	1.3	1.4	1.5	1.4
Manganese	µg/L	2.3	5.9	2.6	2.5	2.5	10	88	102	66	78
Zinc	µg/L	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	2.4	<1.0	<1.0	1.4

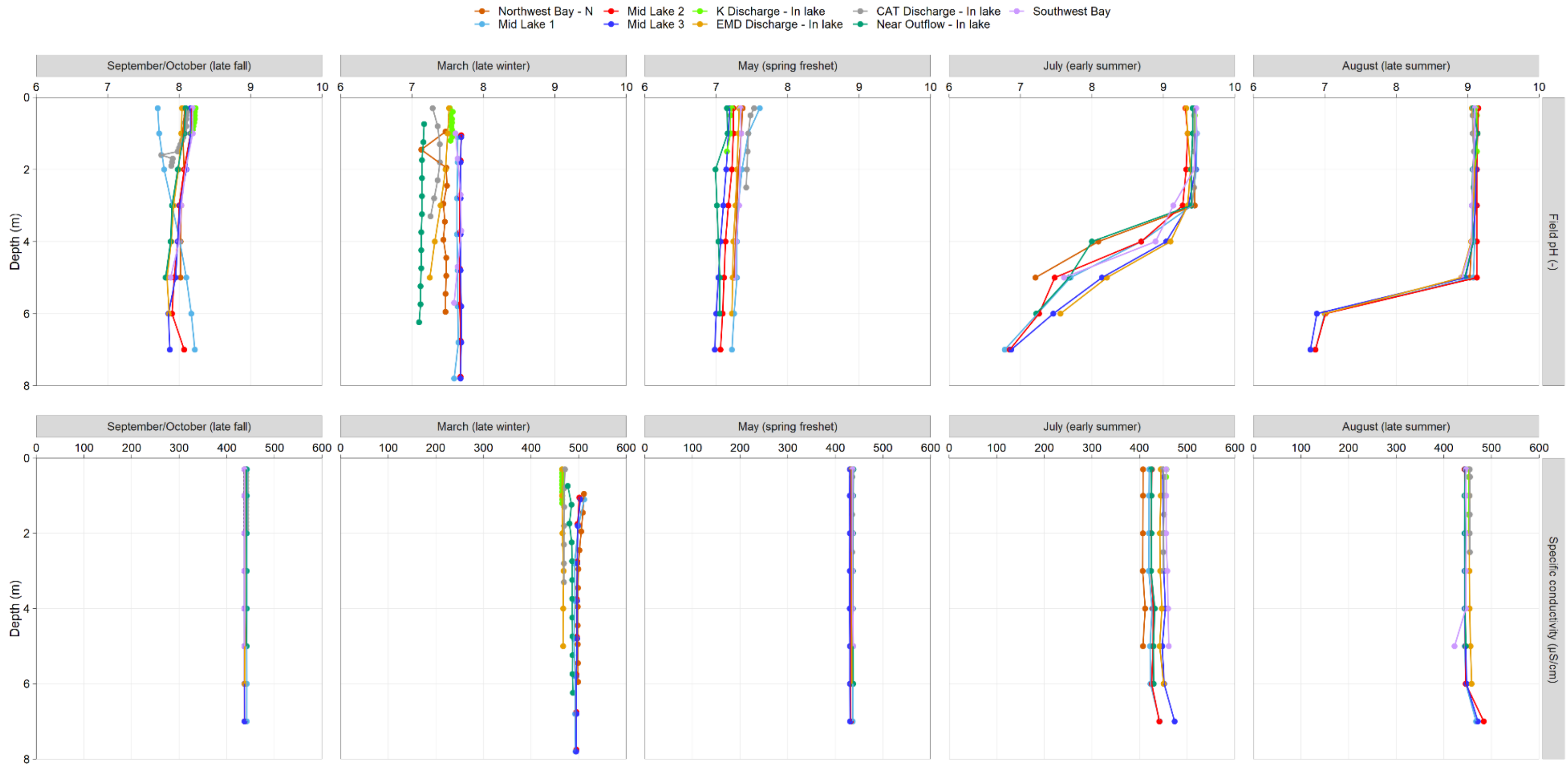
Notes:
Shaded concentrations at Northwest Bay - N (located closest to the inflows) were 20% higher relative to other stations in Jackfish La
Concentrations reported as below detection limits were assumed to be at the detection limit for the purpose of the comparis
- = no data; µS/cm = microsiemens per centimetre; NTU = nephelometric turbidity units; $CaCO_3$ = calcium carbonate; mg-N/L = milligrams nitrogen per litre; mg-P/L = milligrams phosphorus per litre; µg/L = micrograms per litre.

Figure E.4-1: Field Profiles of Temperature, Dissolved Oxygen Percent Saturation and Concentration in Jackfish Lake, September 2021 to August 2022



Note:
Depth included ice thickness for samples collected in March 2022.

Figure E.4-2: Field Profiles of pH and Specific Conductivity in Jackfish Lake, September 2021 to August 2022



Notes:
Depth included ice thickness for samples collected in March 2022.
Field specific conductivity measurements at Southwest Bay on 22 March 2022 were invalidated and excluded from the assessment (Section 4.3.12 in Appendix B).
µS/cm = microsiemens per centimetre.

Figure E.5-1: Percent Saturation of Dissolved Oxygen in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

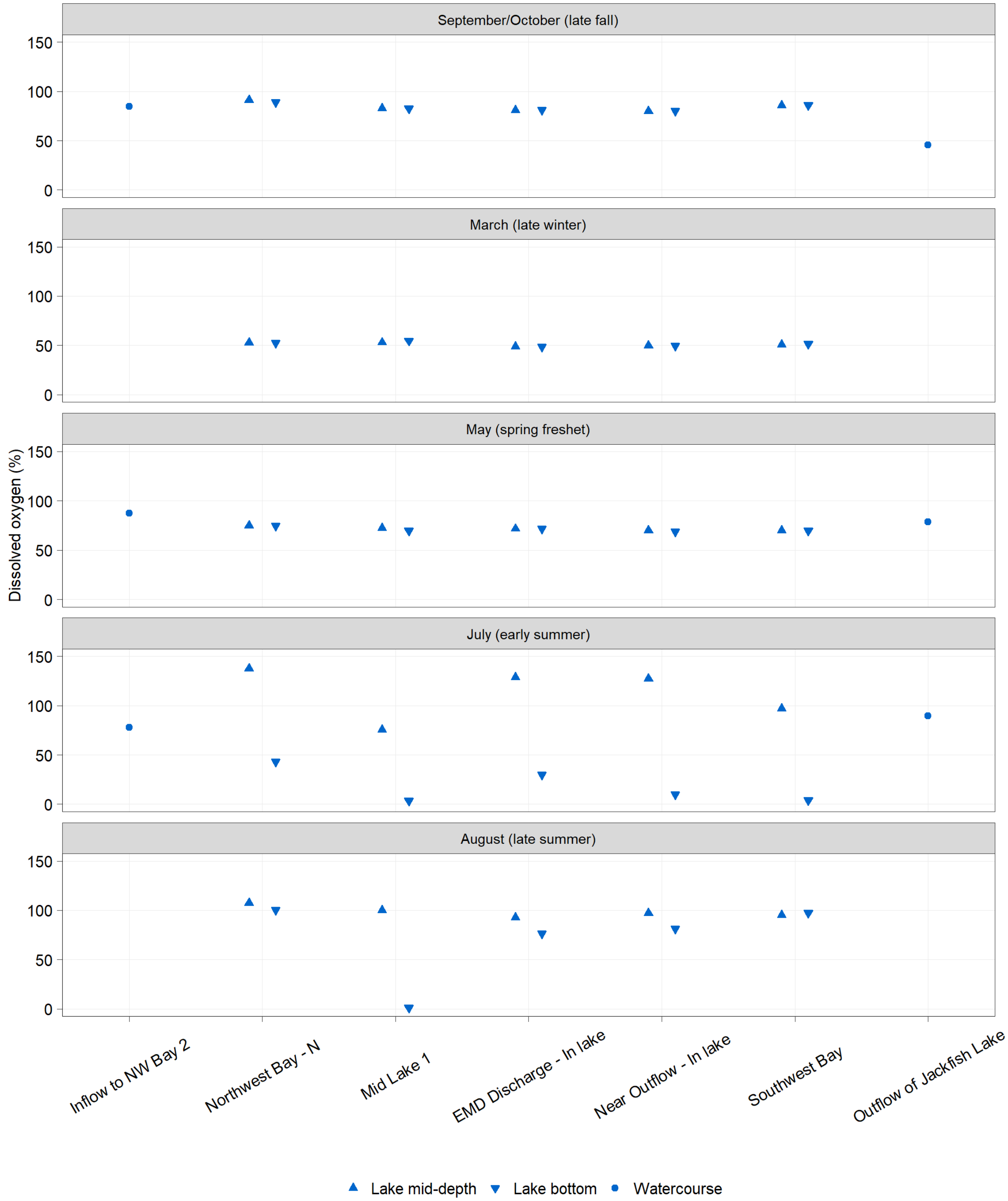
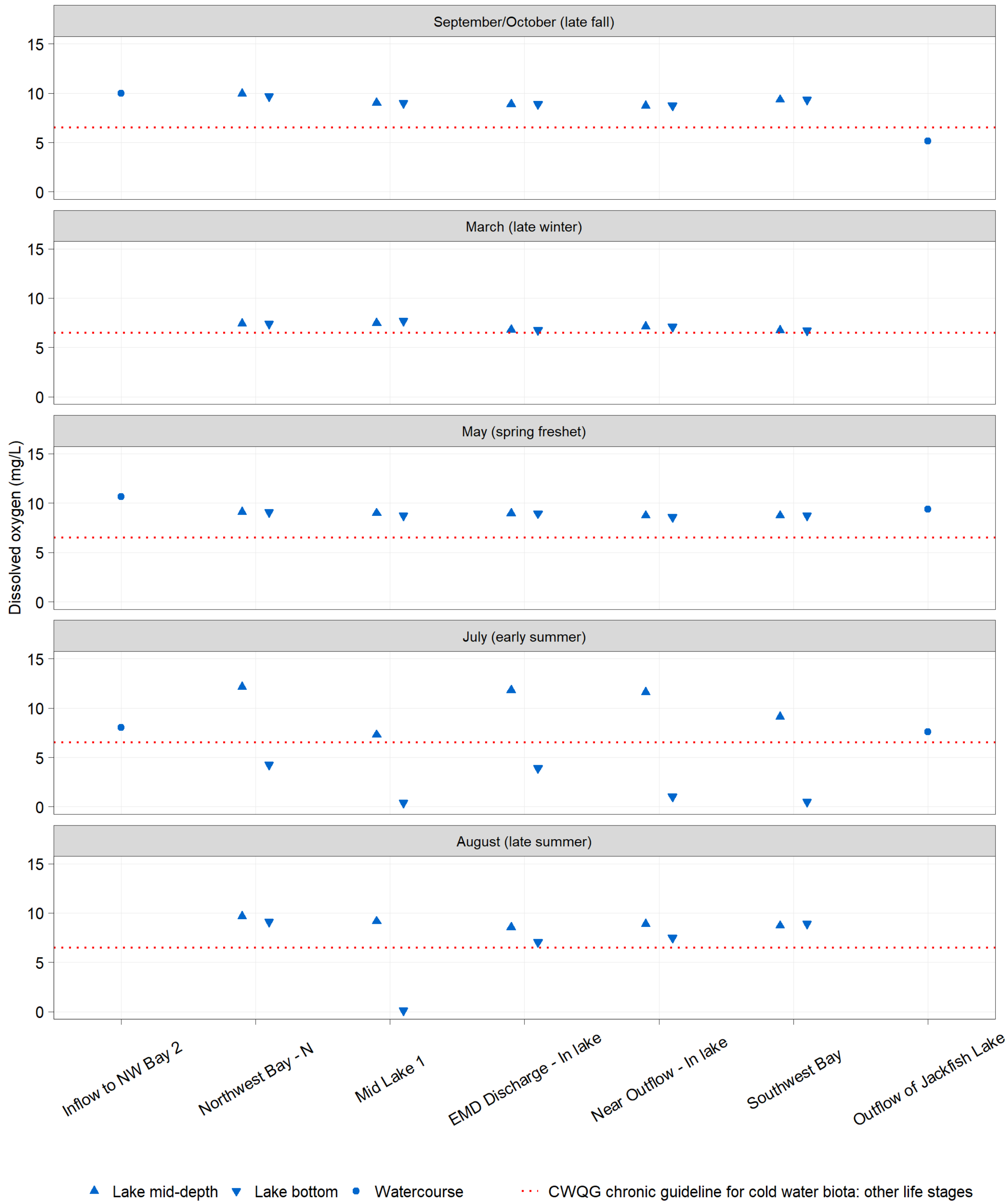


Figure E.5-2: Dissolved Oxygen Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
The CWQG guideline for cold water biota is the minimum guideline.
CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-3: Field pH in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

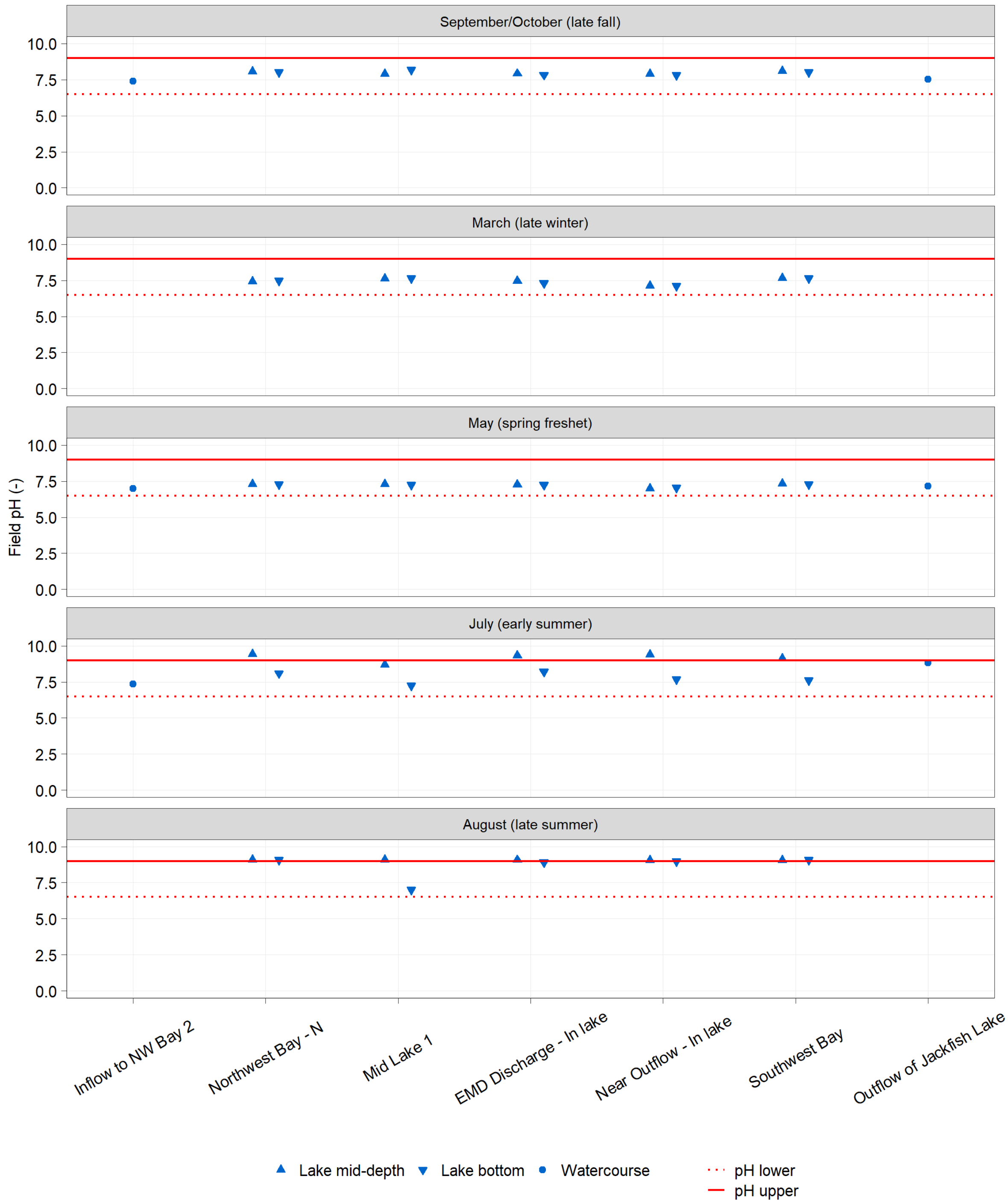
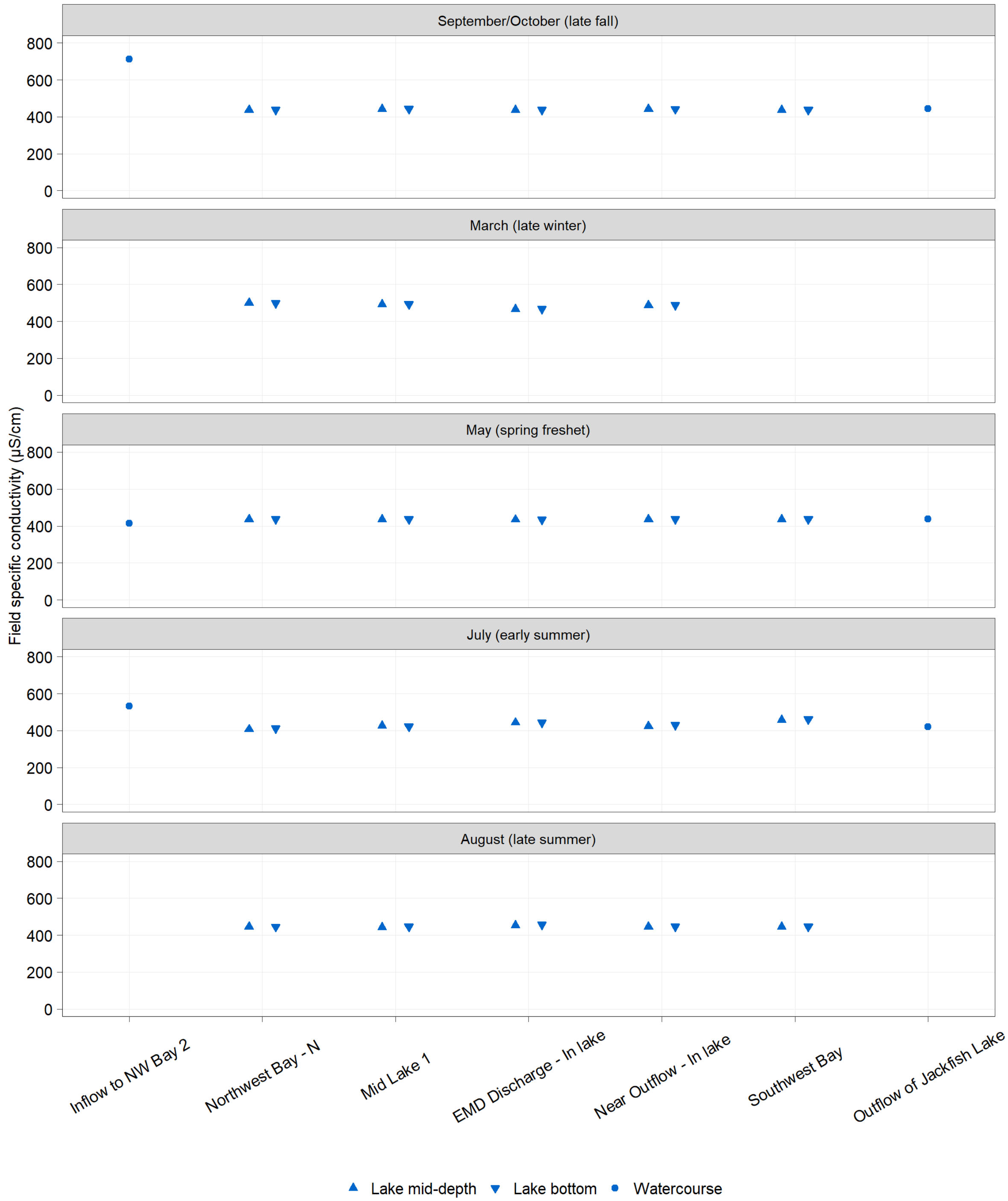


Figure E.5-4: Field Specific Conductivity in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:

Field specific conductivity measurements at Southwest Bay on 22 March 2022 were invalidated and excluded from further analysis. See details in Section 4.3.12 of Appendix B.

µS/cm = microsiemens per centimetre.

Figure E.5-5: Temperatures in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

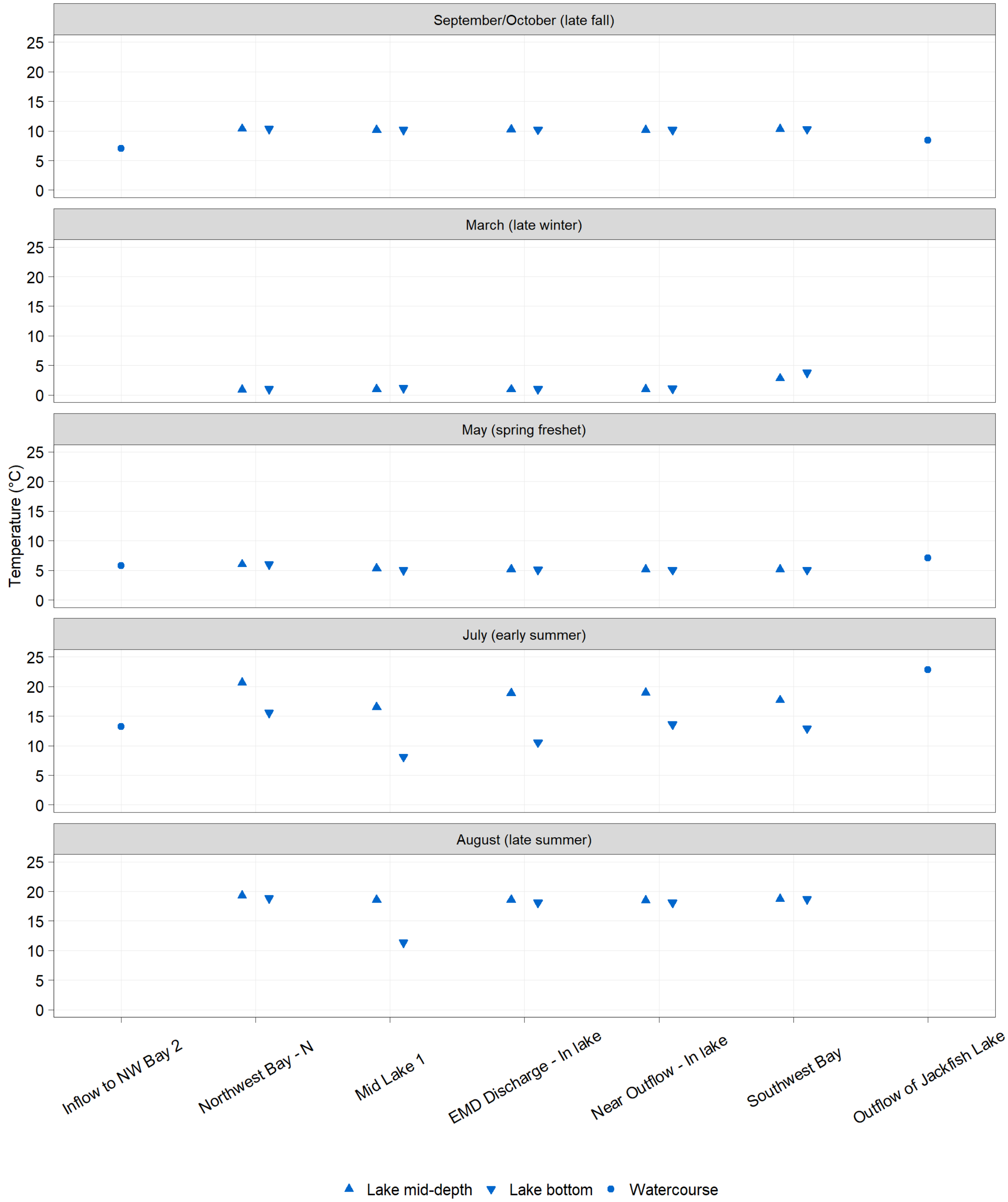
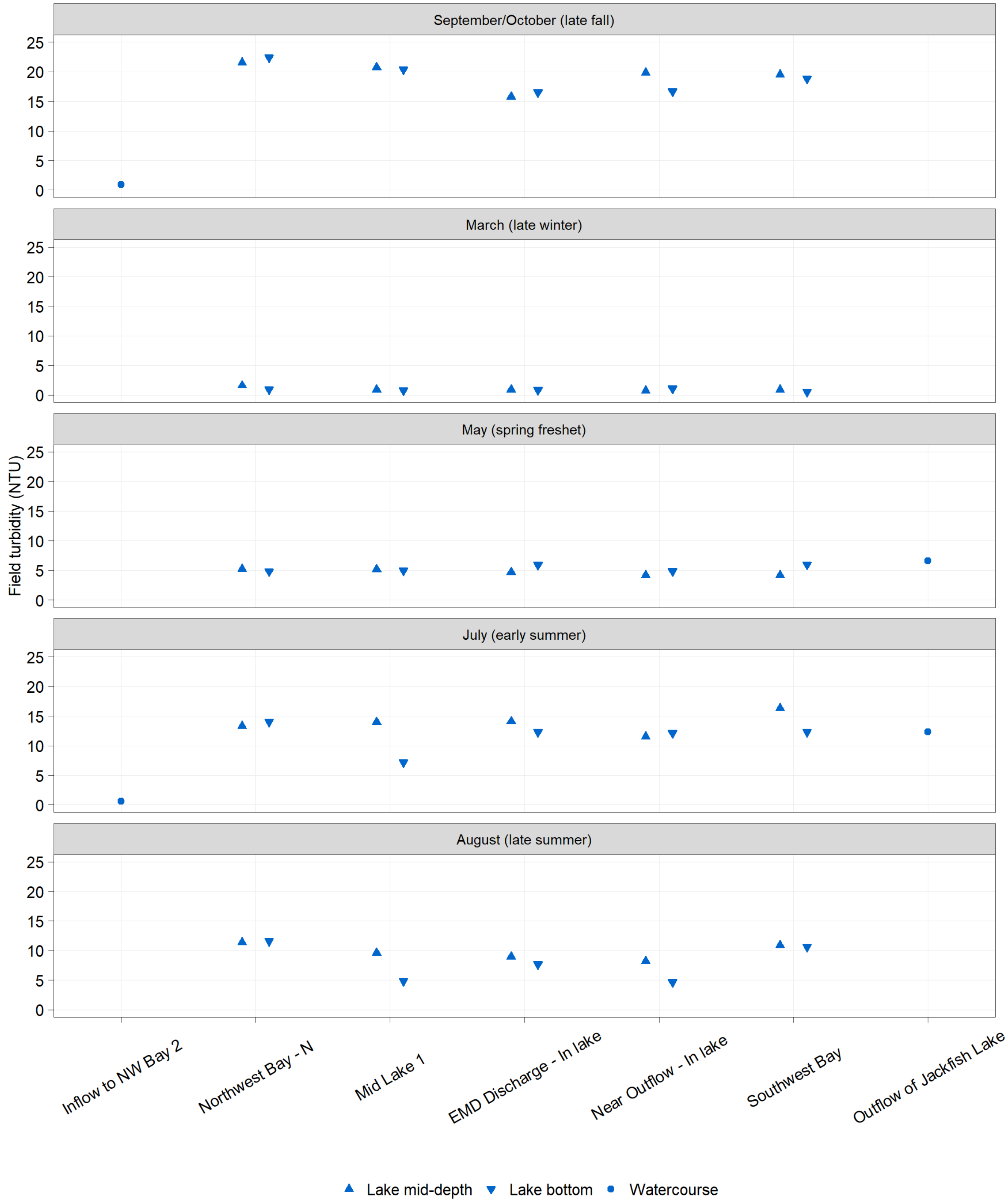


Figure E.5-6: Field Turbidity in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
An elevated field turbidity value of 53 NTU at the Outflow of Jackfish Lake station was removed from the September/October (late fall) plot to help identify seasonal and spatial patterns.
NTU = nephelometric turbidity units.

Figure E.5-7: Dissolved Organic Carbon Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

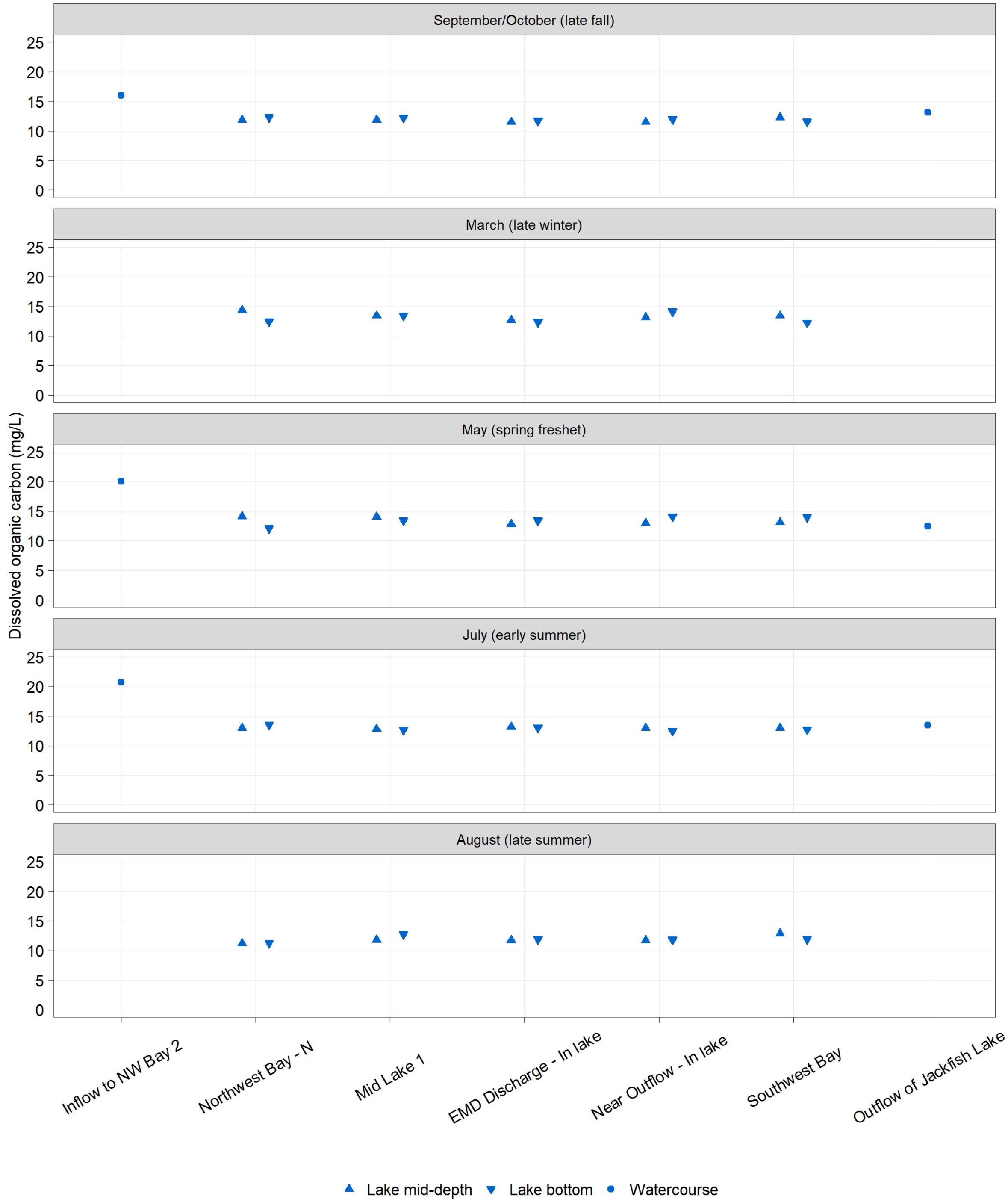
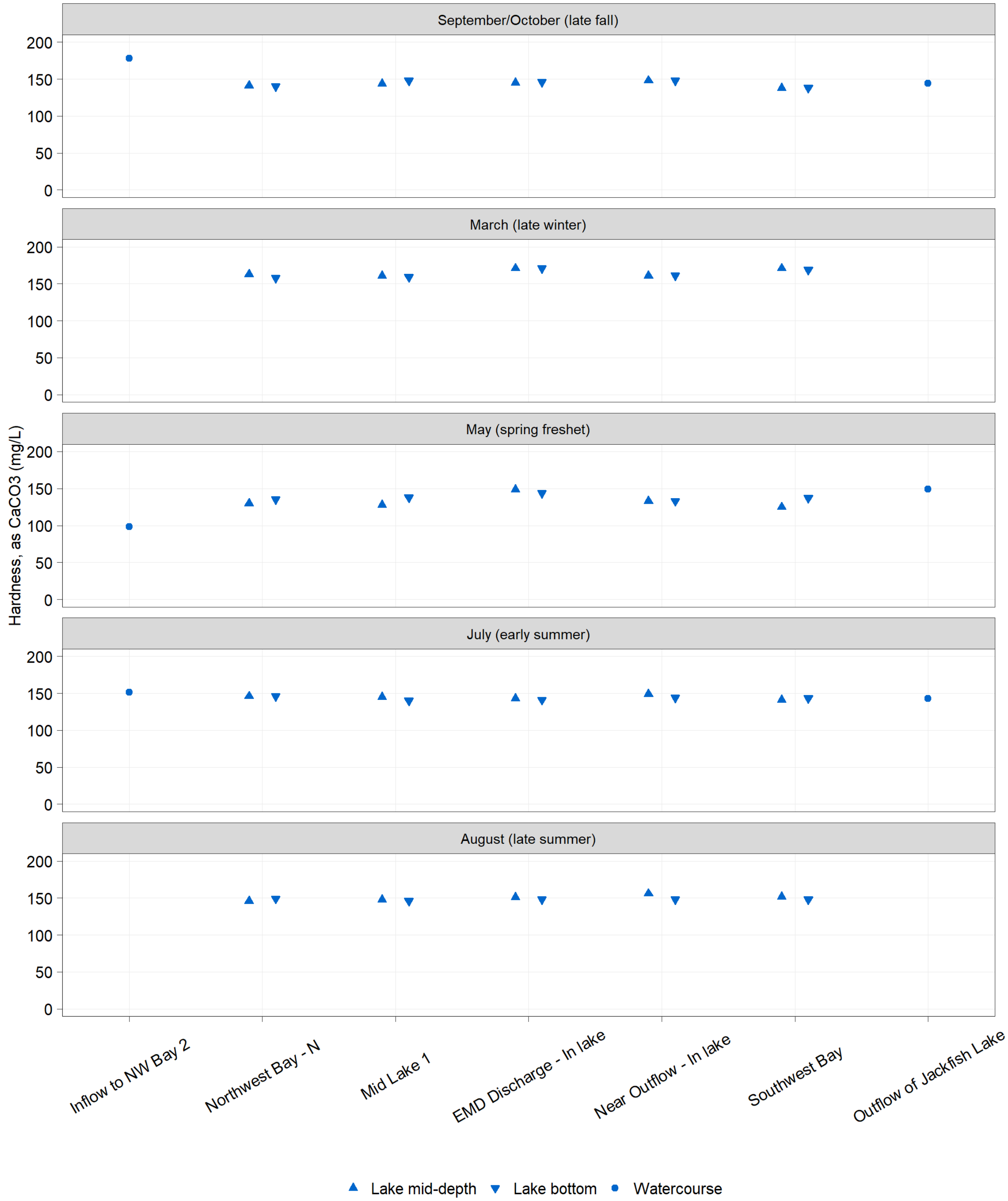


Figure E.5-8: Hardness, as $CaCO_3$ in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



$CaCO_3$ = calcium carbonate.

Figure E.5-9: Laboratory pH in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

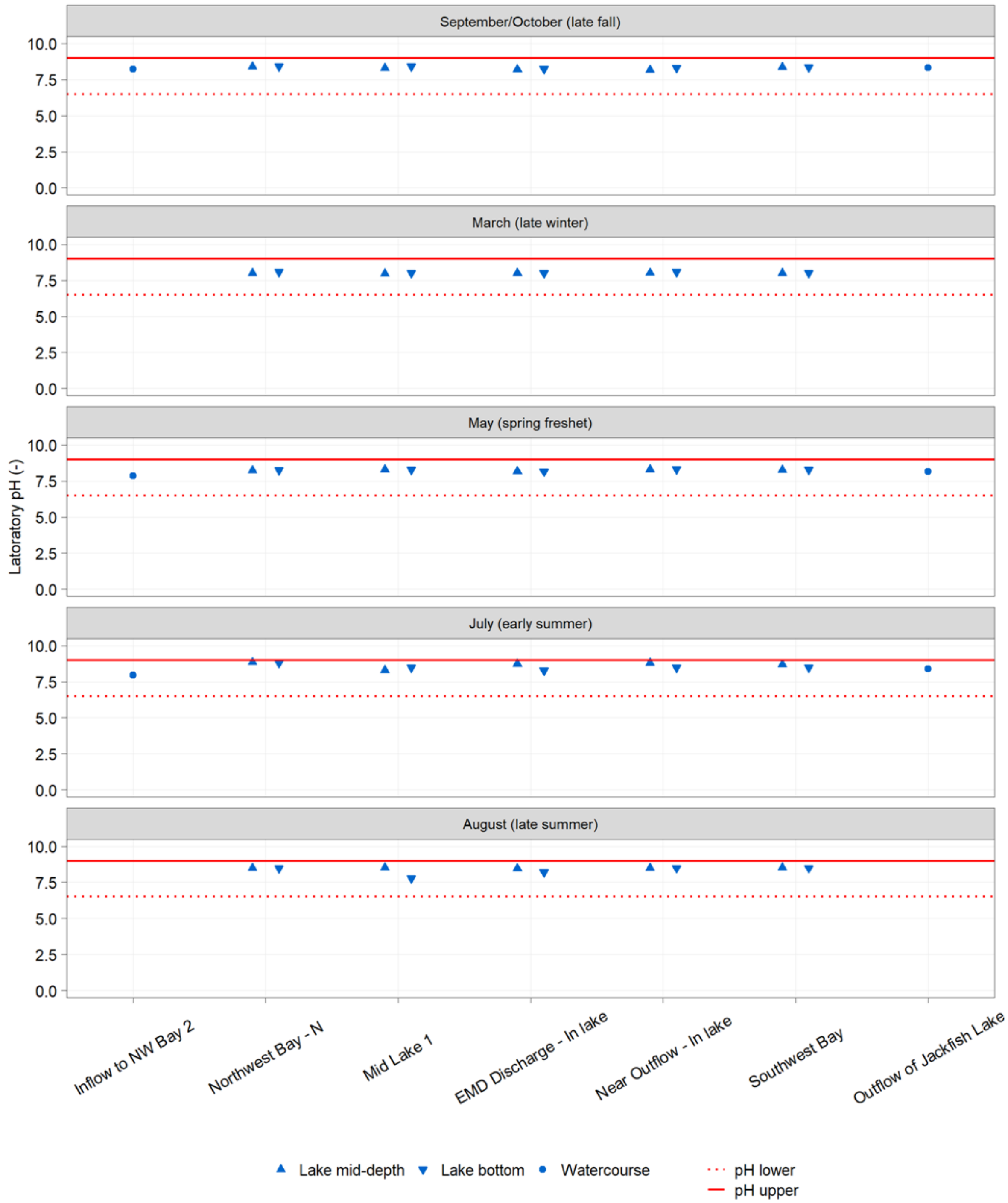
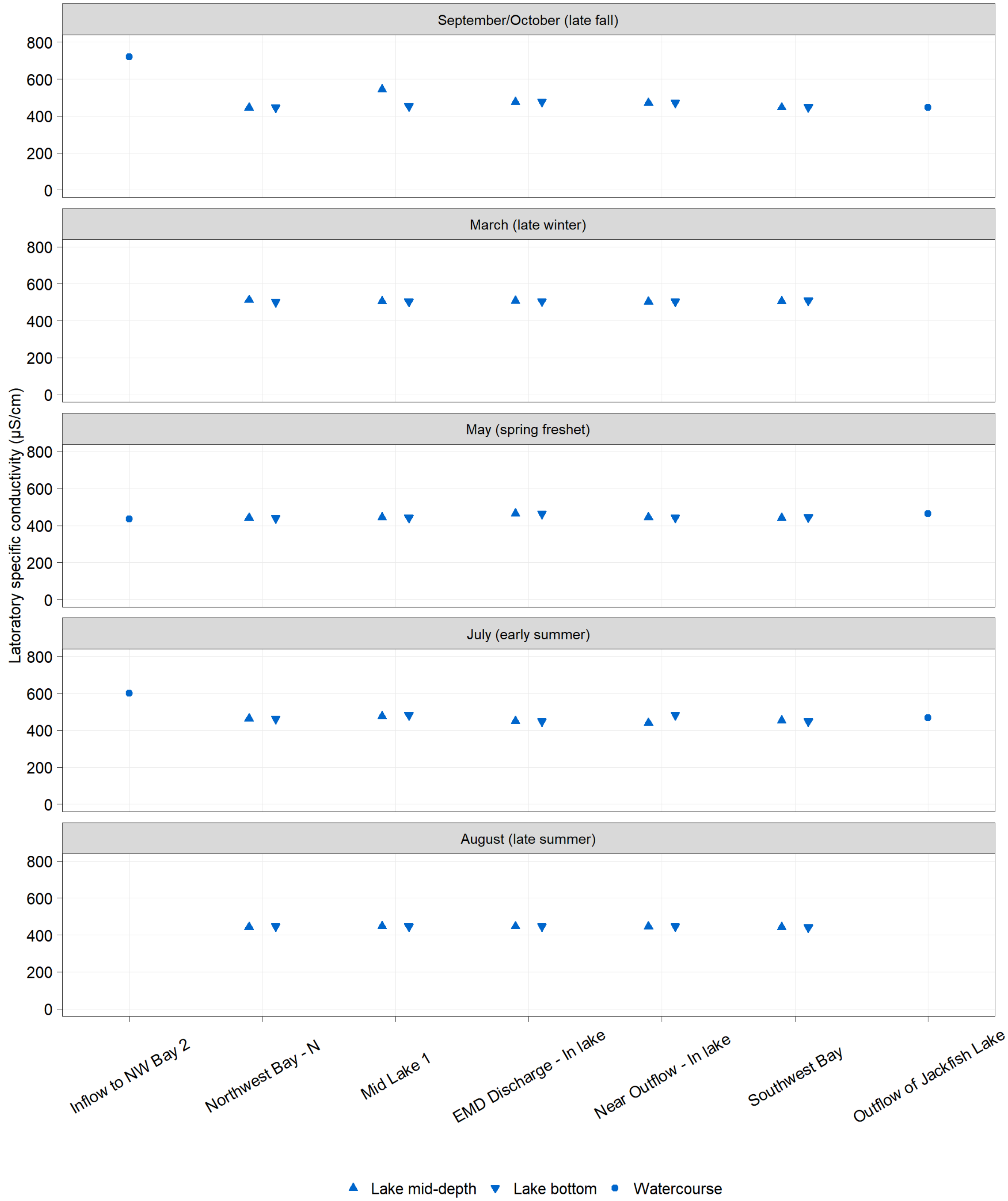
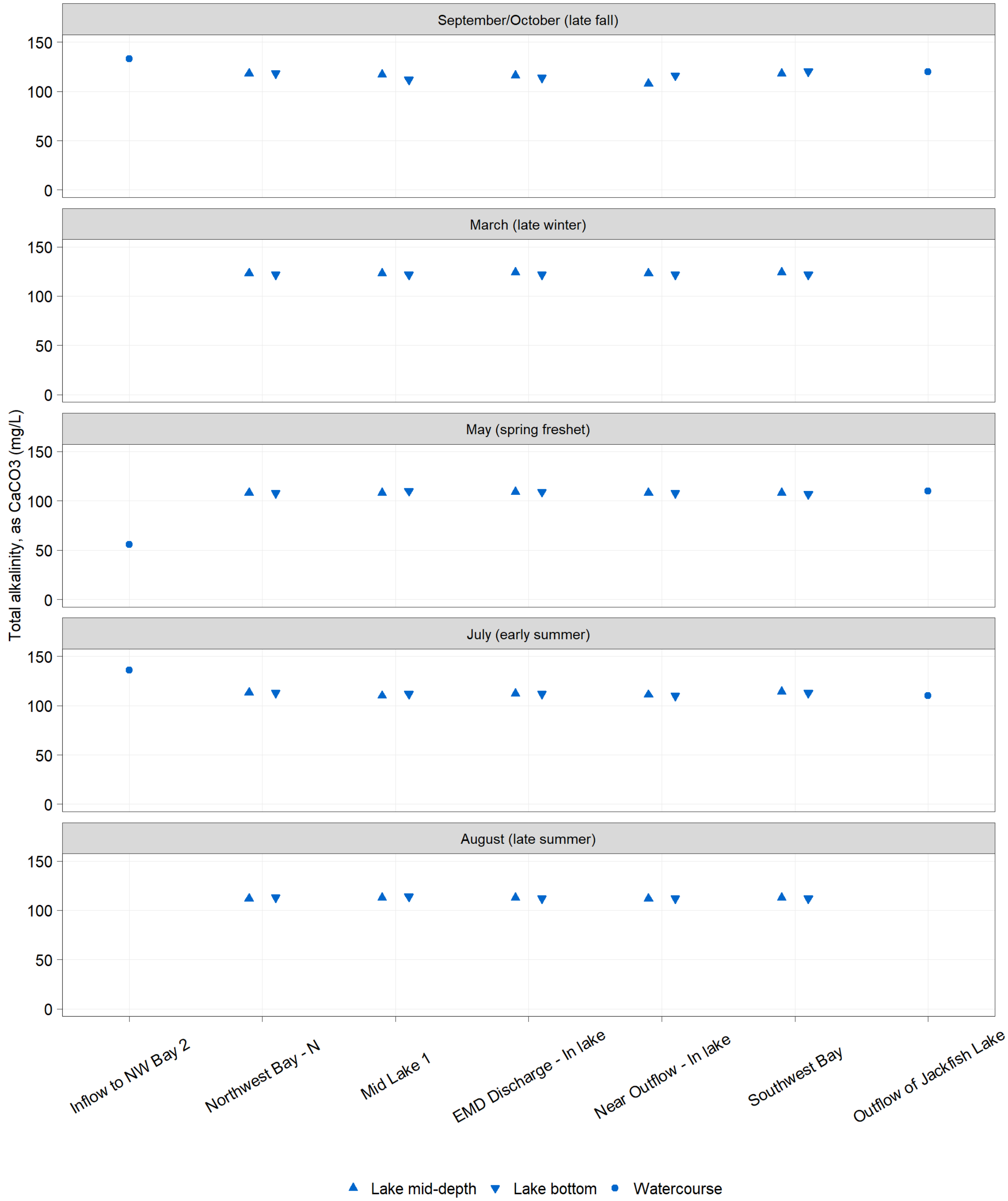


Figure E.5-10: Laboratory Specific Conductivity in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



µS/cm = microsiemens per centimetre.

Figure E.5-11: Total Alkalinity, as $CaCO_3$ in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



$CaCO_3$ = calcium carbonate.

Figure E.5-12: Calculated Total Dissolved Solids Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

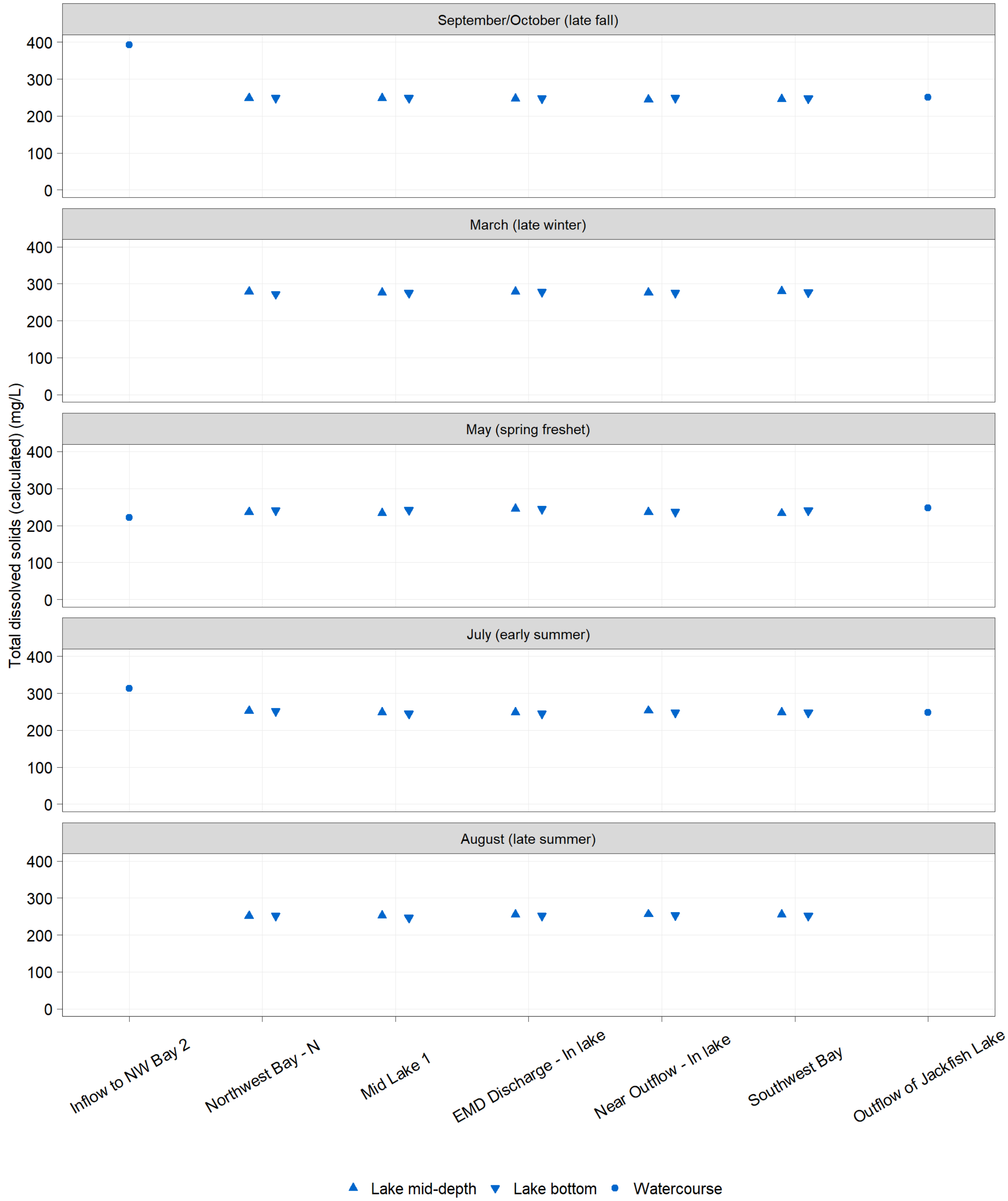


Figure E.5-13: Measured Total Dissolved Solids Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

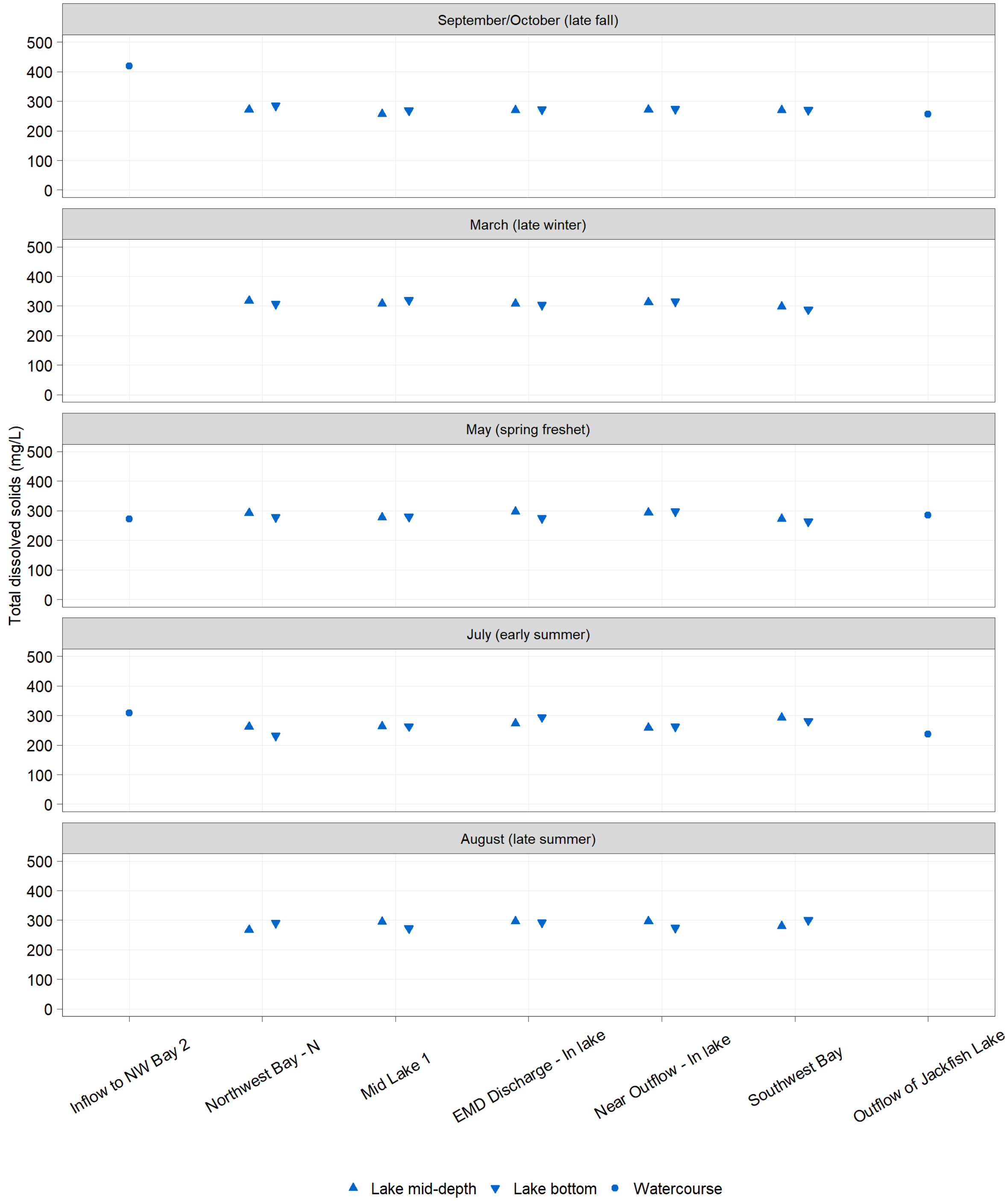
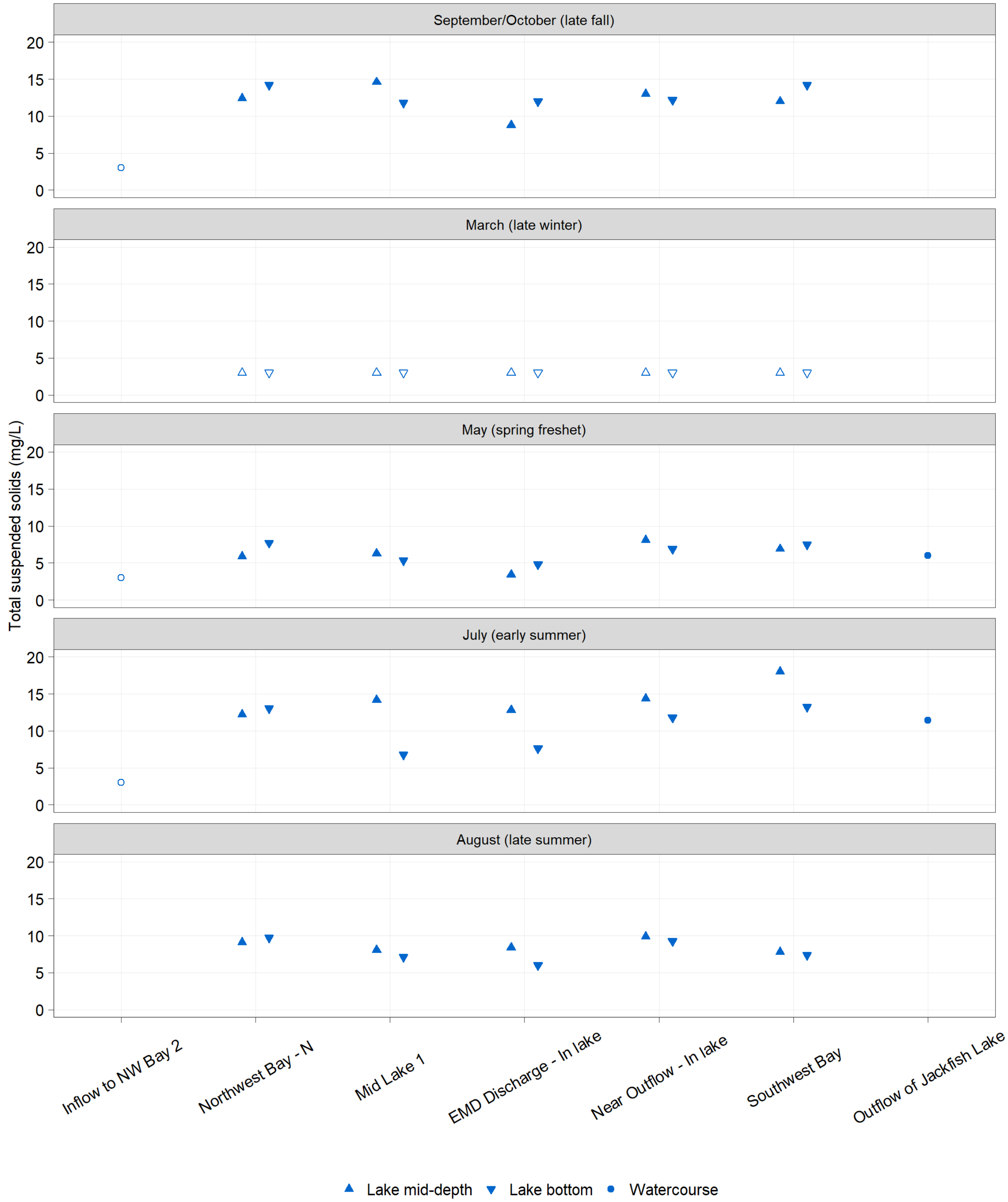
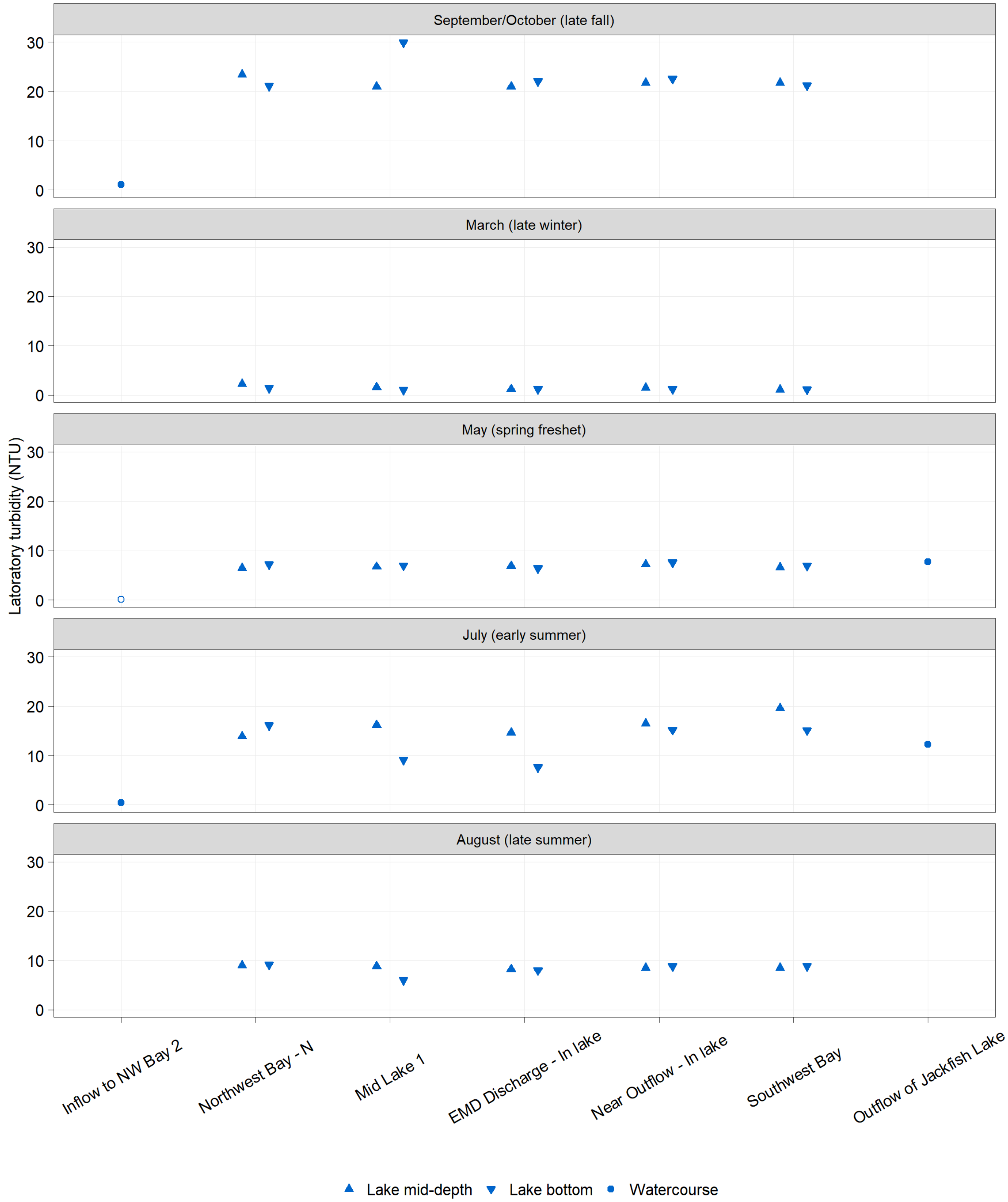


Figure E.5-14: Total Suspended Solids Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Notes:
Concentrations below the detection limit are shown at the detection limit as open markers.
An elevated total suspended solids value of 55 mg/L at the Outflow of Jackfish Lake station was not shown on the September/October (late fall) plot to help identify seasonal and spatial patterns.

Figure E.5-15: Laboratory Turbidity in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Notes:
Concentrations below the detection limit are shown at the detection limit as open markers.
An elevated laboratory turbidity value of 72 NTU at the Outflow of Jackfish Lake station was not shown on the September/October (late fall) plot to help identify seasonal and spatial patterns.
NTU = nephelometric turbidity units.

Figure E.5-16: Calcium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

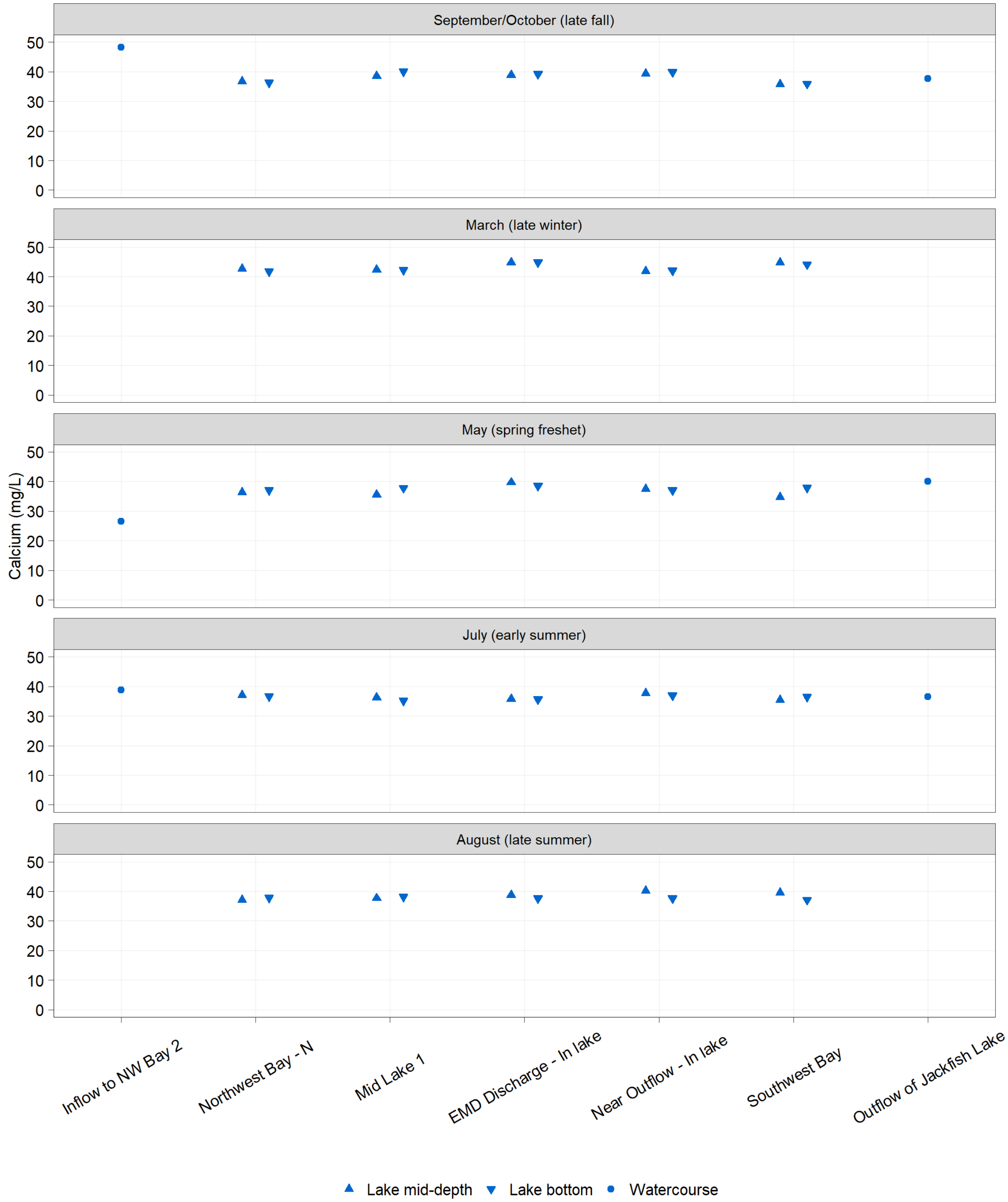
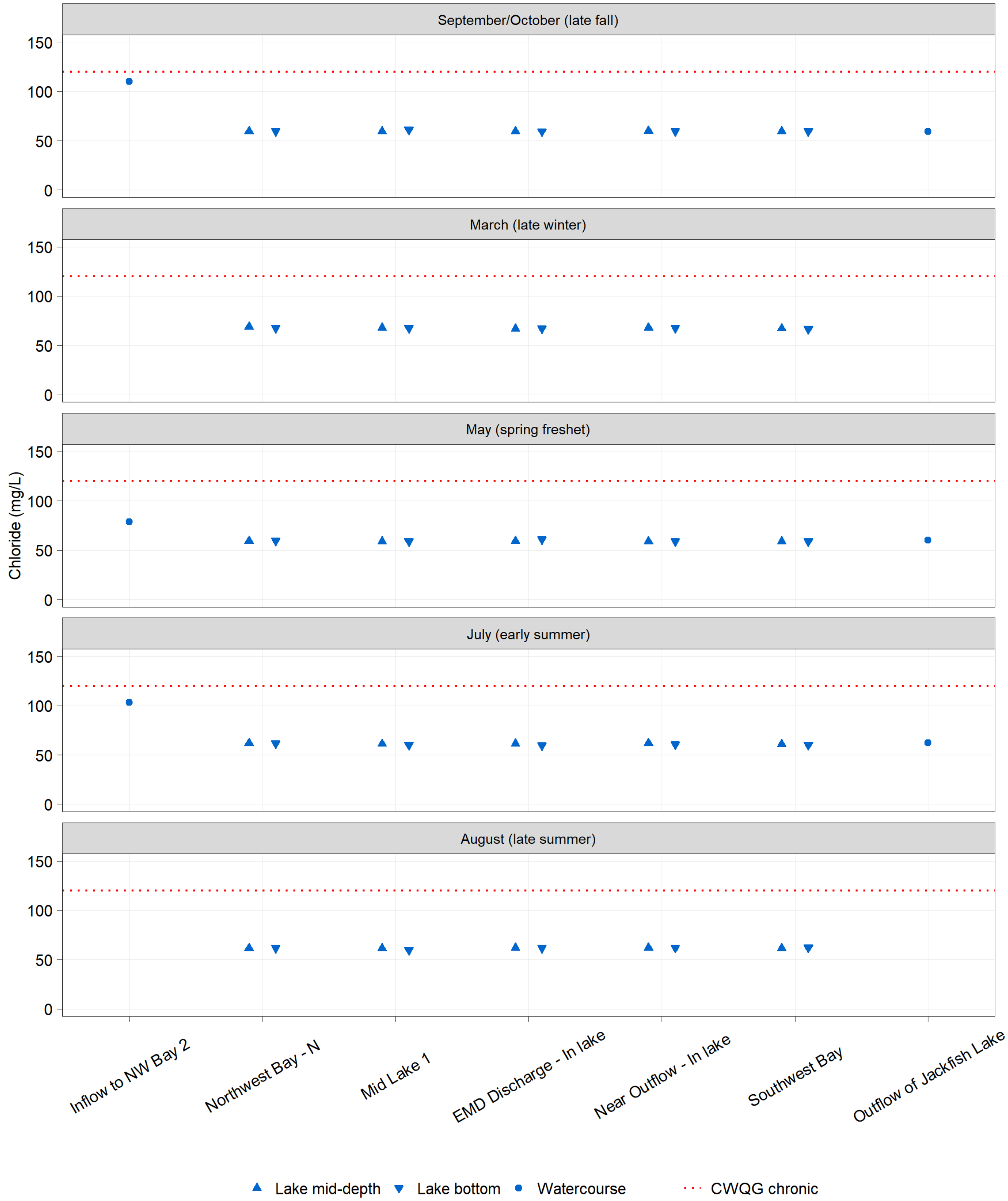
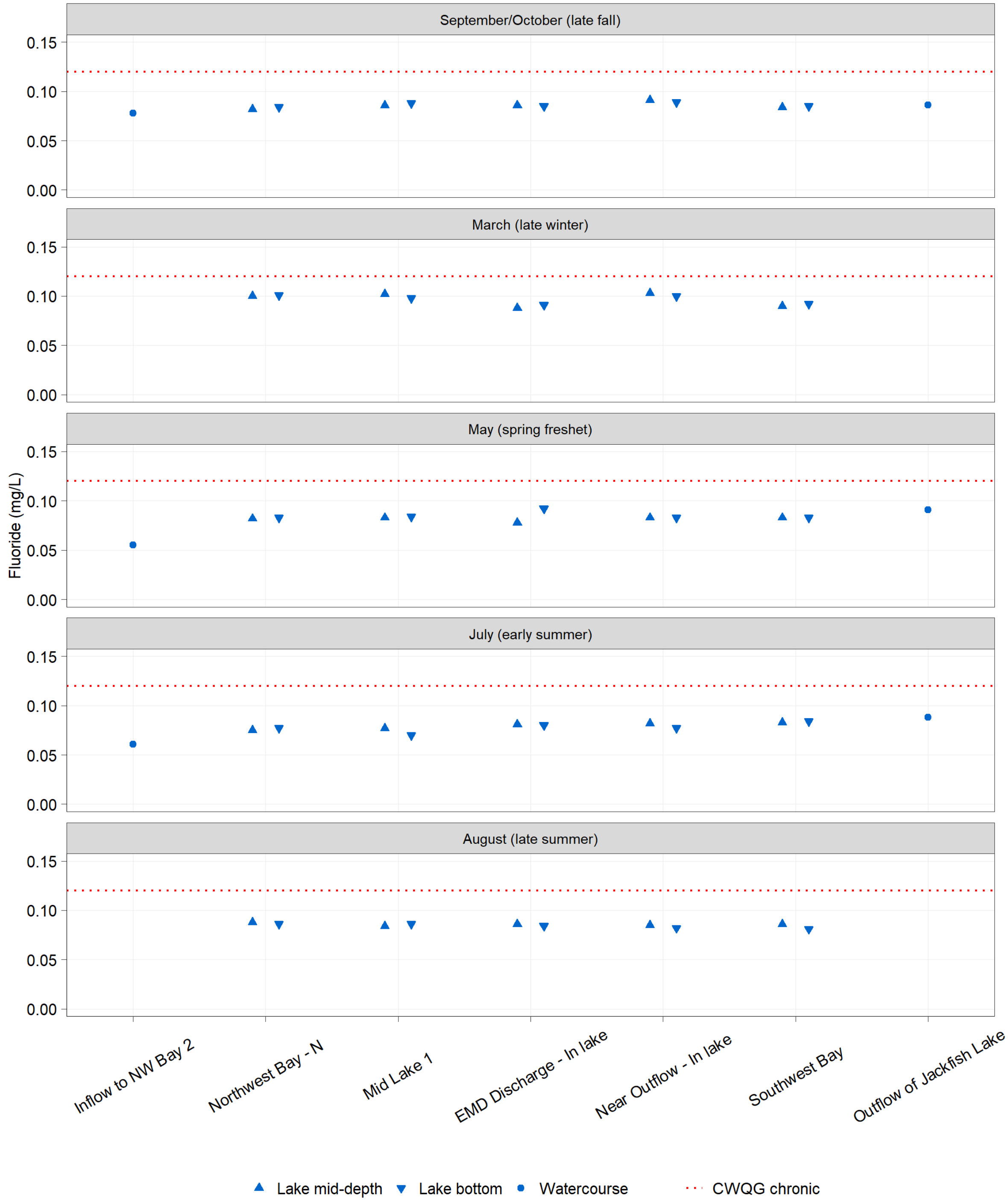


Figure E.5-17: Chloride Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
The acute CWQG for chloride is 640 mg/L.
CWQG = Canadian water quality guideline for the protection of freshwater aquatic life.

Figure E.5-18: Fluoride Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-19: Magnesium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

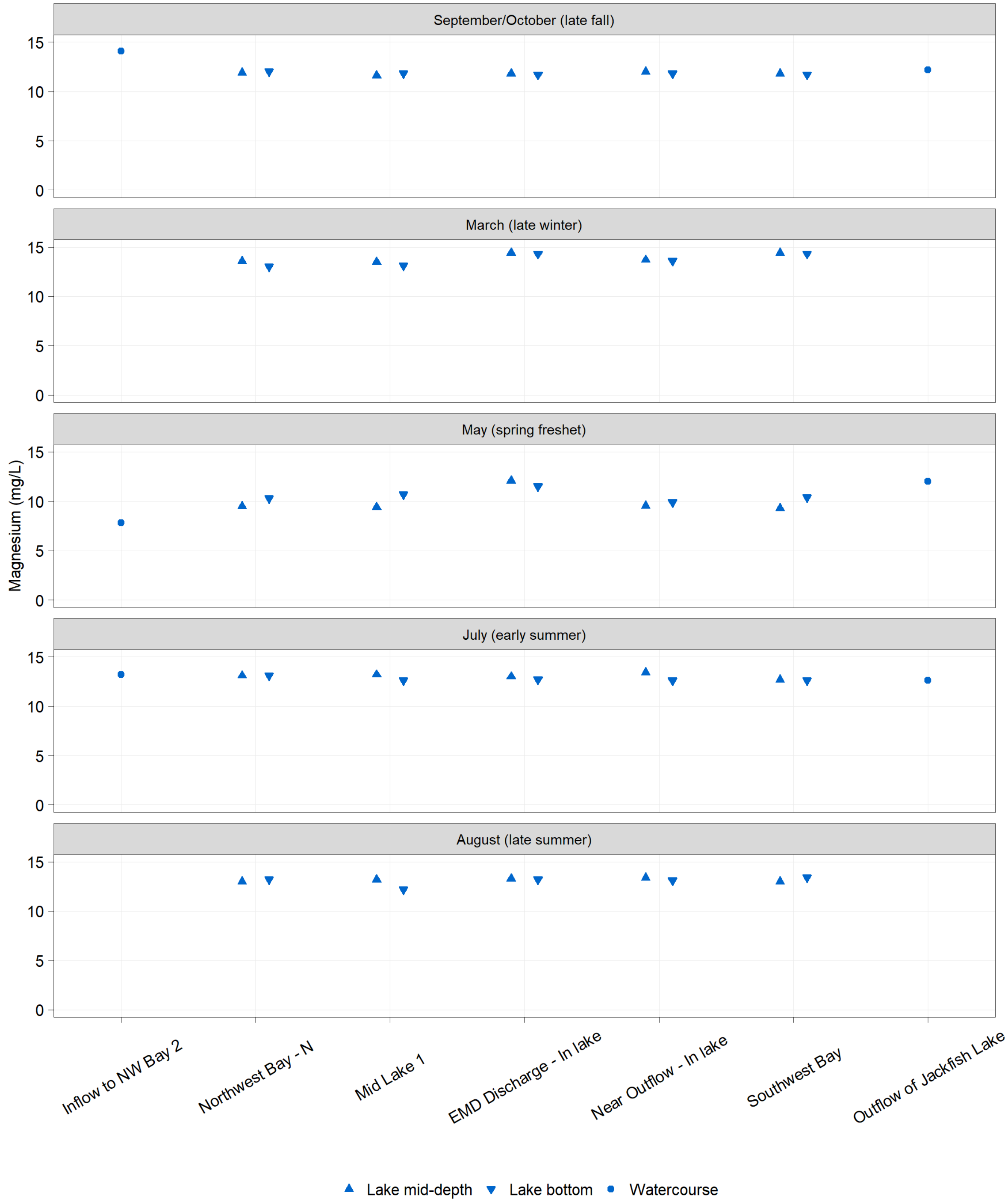


Figure E.5-20: Potassium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

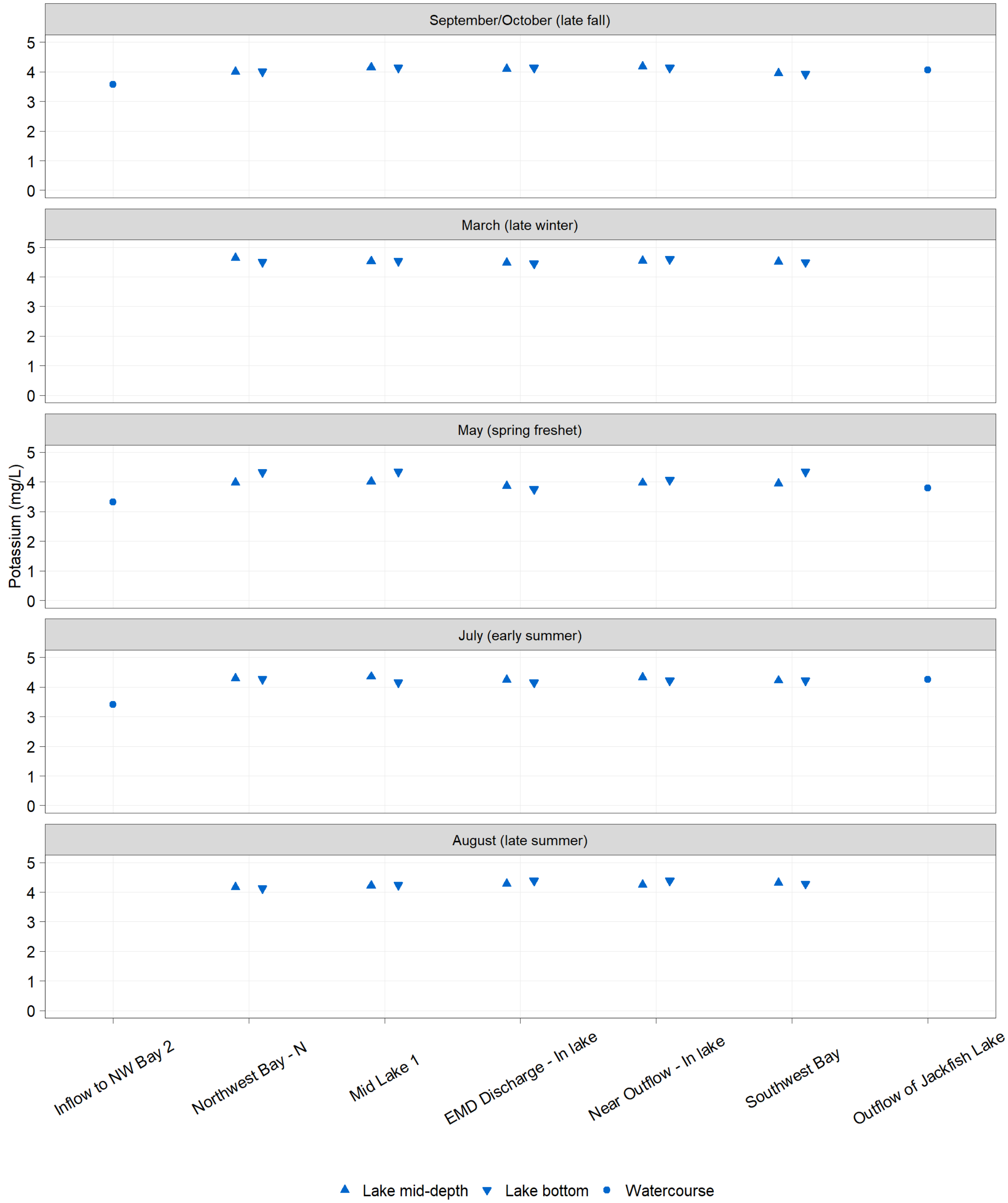


Figure E.5-21: Silica Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

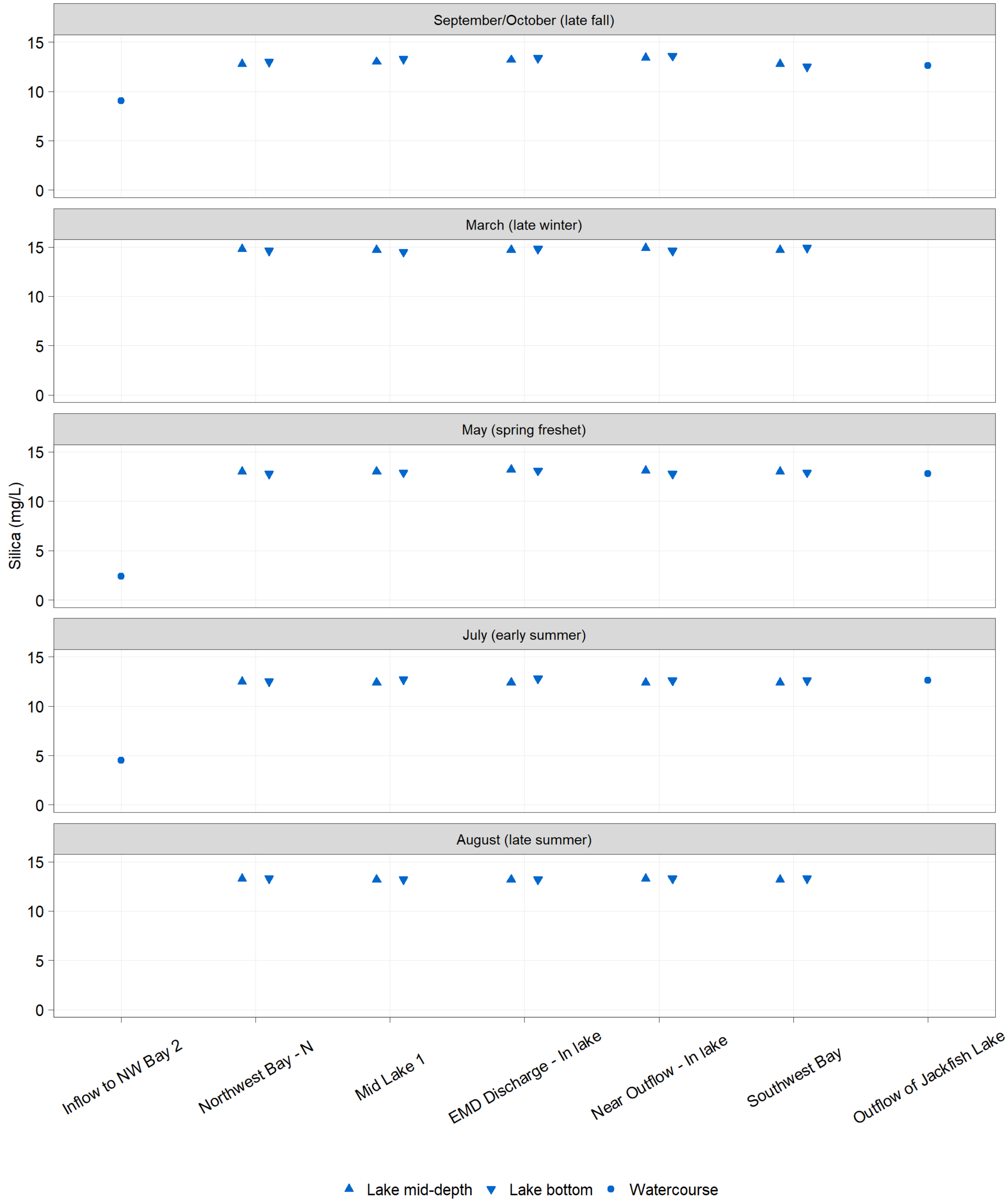


Figure E.5-22: Sodium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

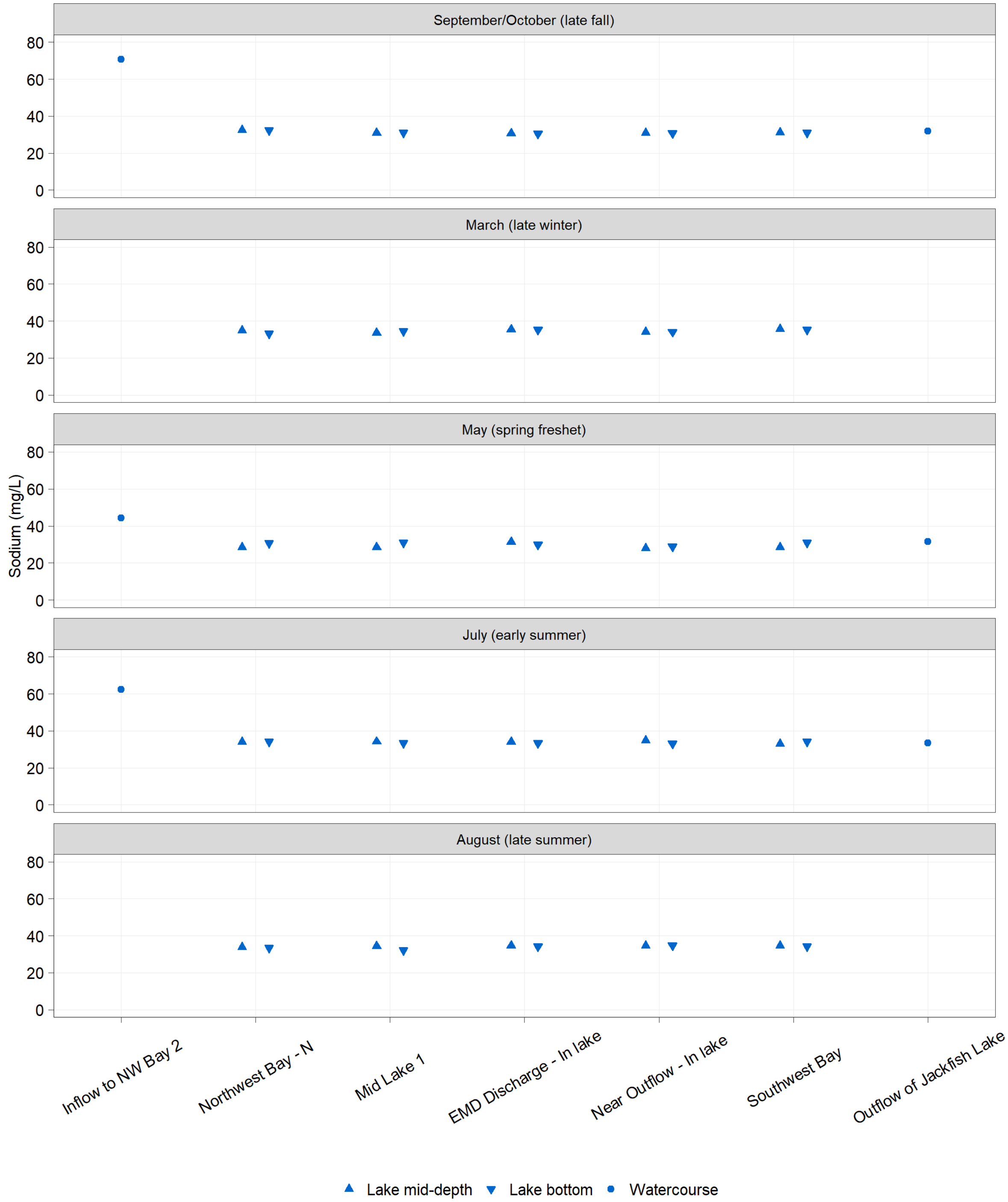


Figure E.5-23: Sulphate Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

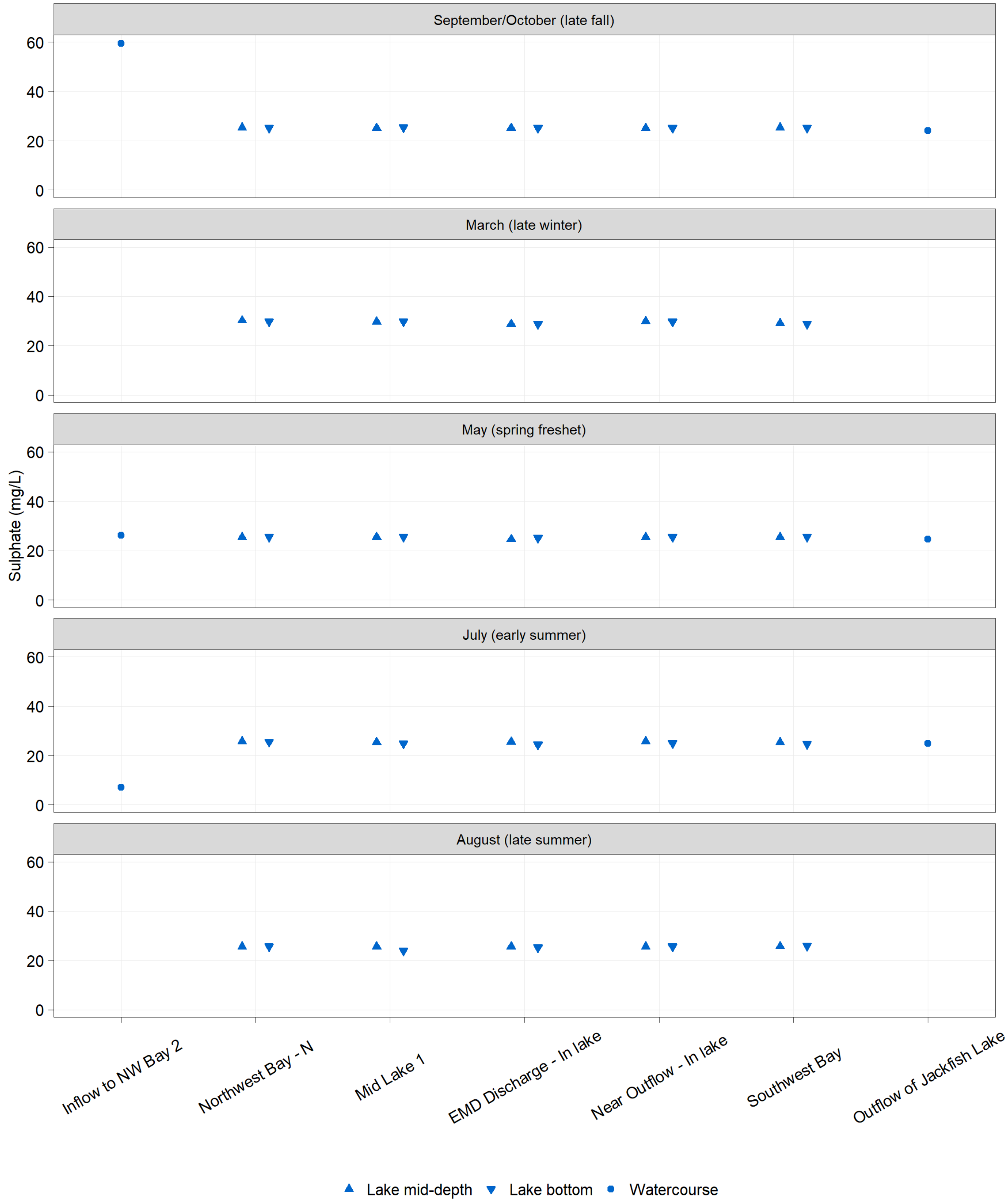
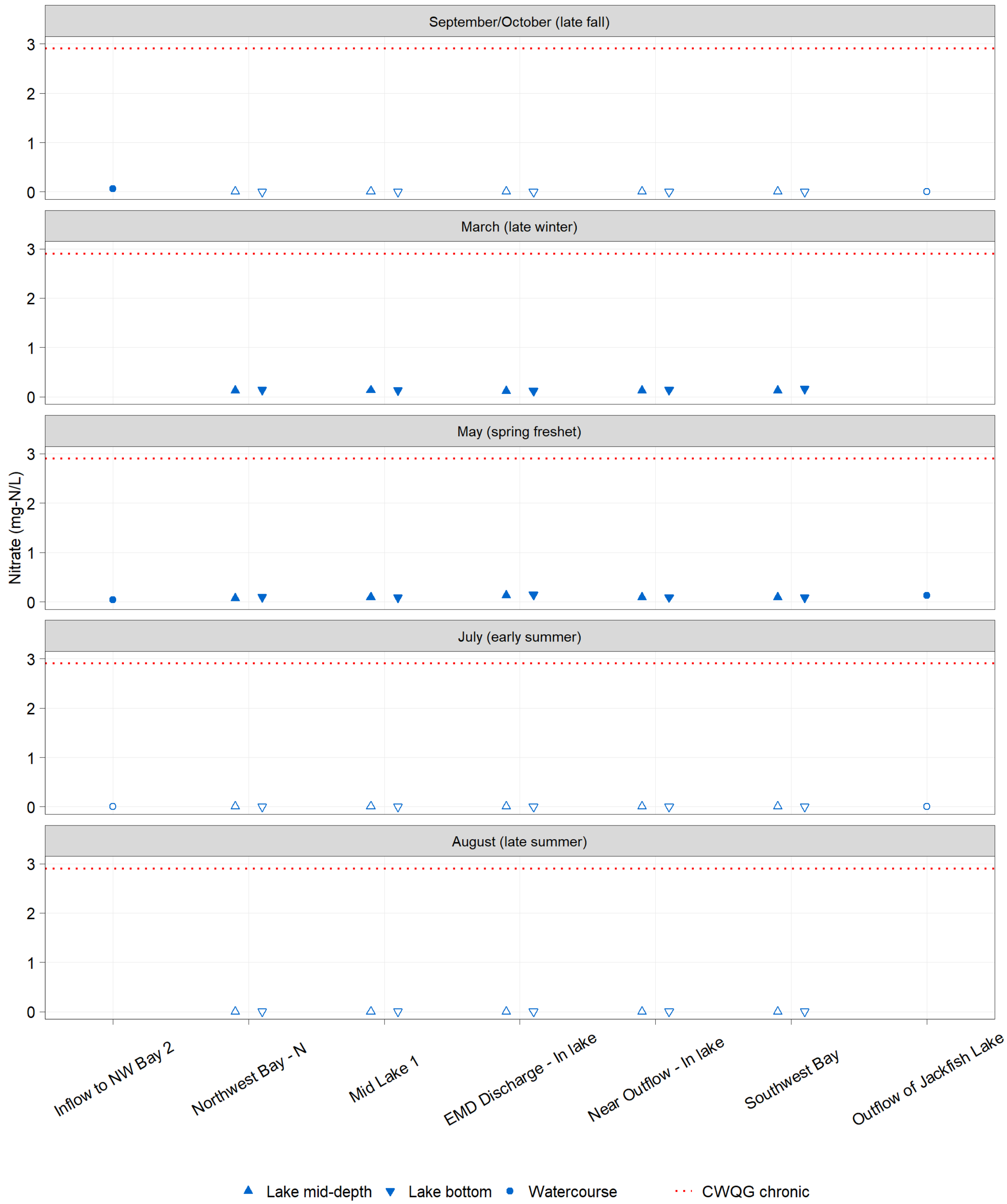
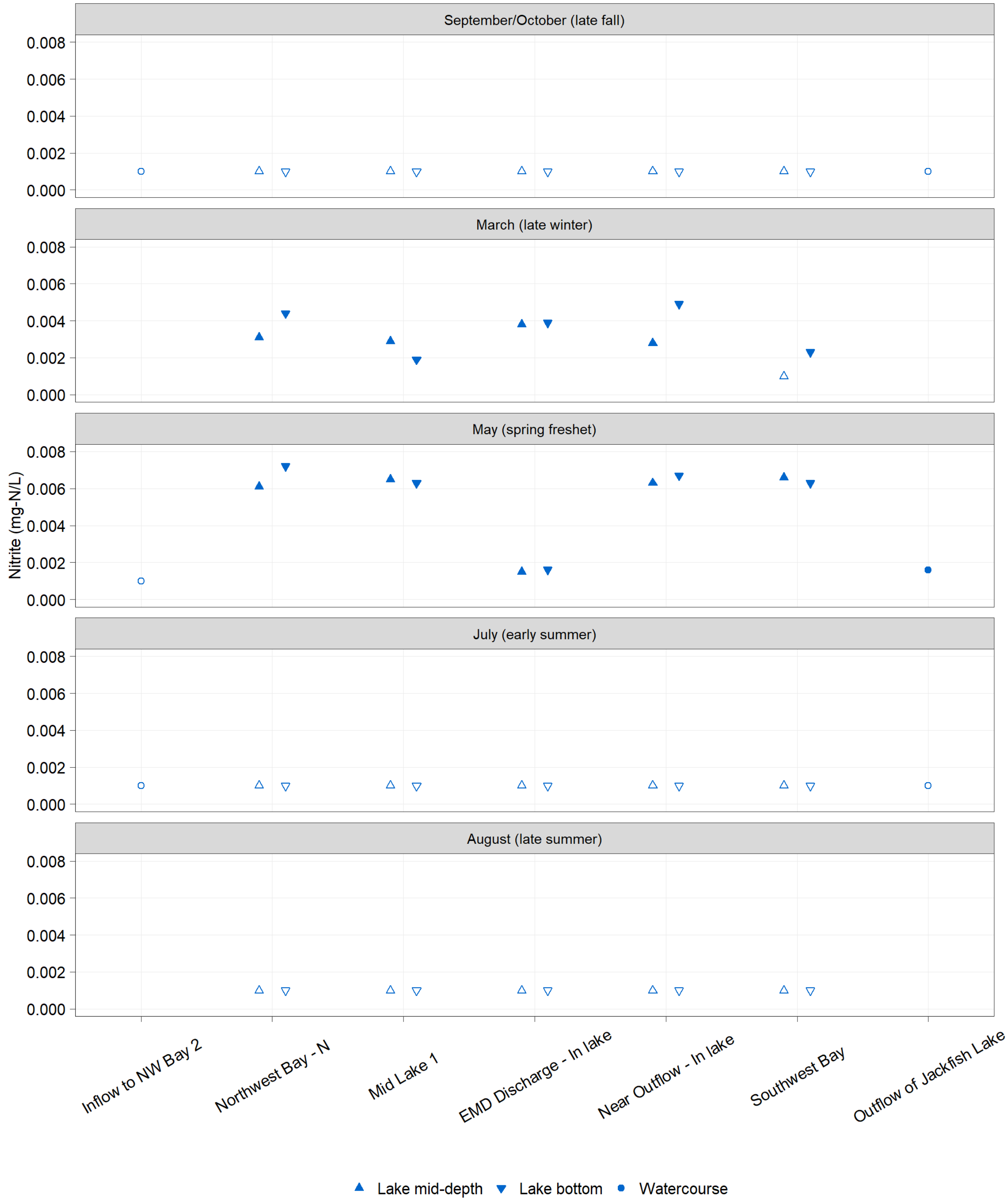


Figure E.5-24: Nitrate Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



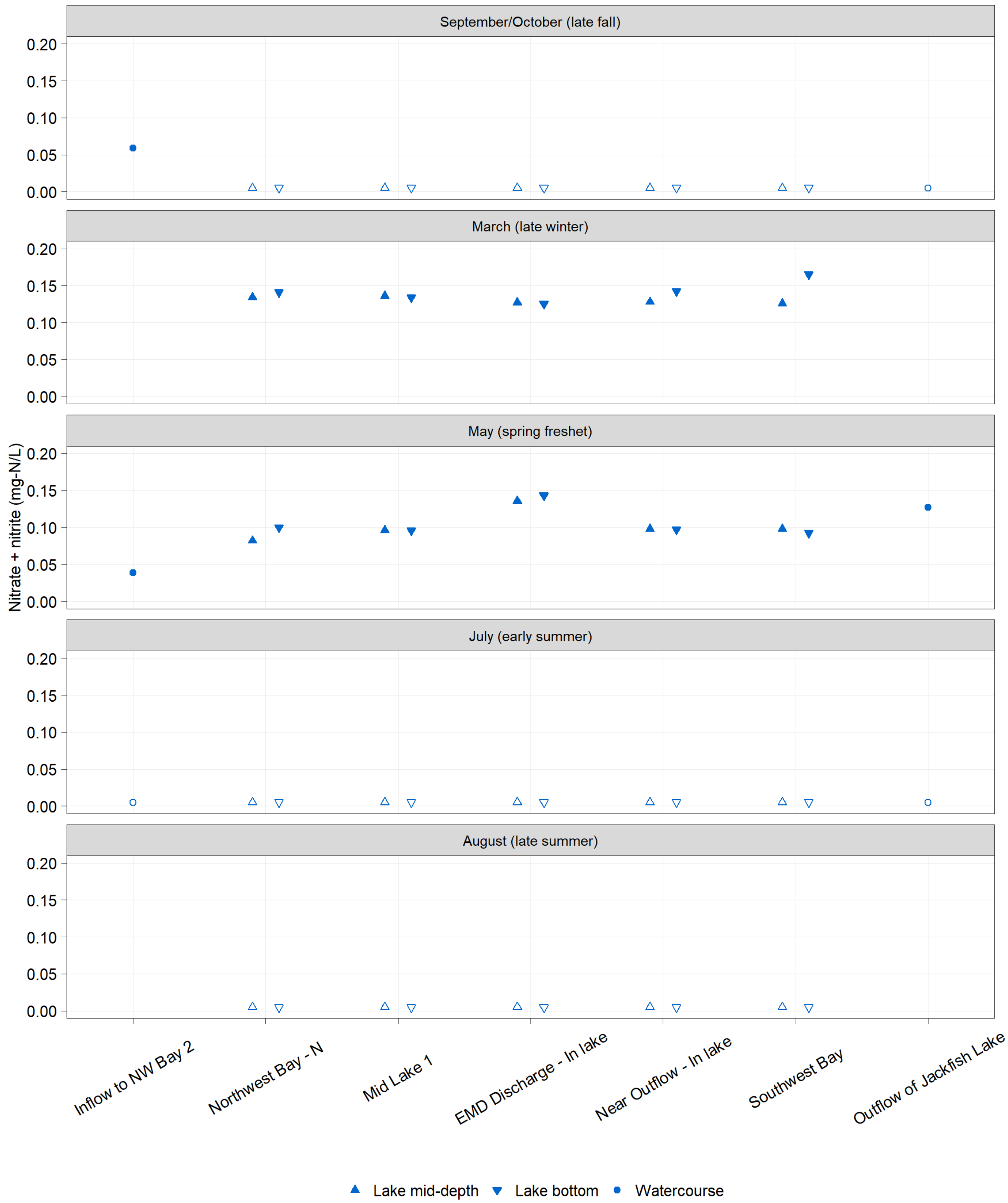
Notes:
Concentrations below the detection limit are shown at the detection limit as open markers.
The acute CWQG for nitrate is 124 mg/L.
mg-N/L = milligrams nitrogen per litre; CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-25: Nitrite Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



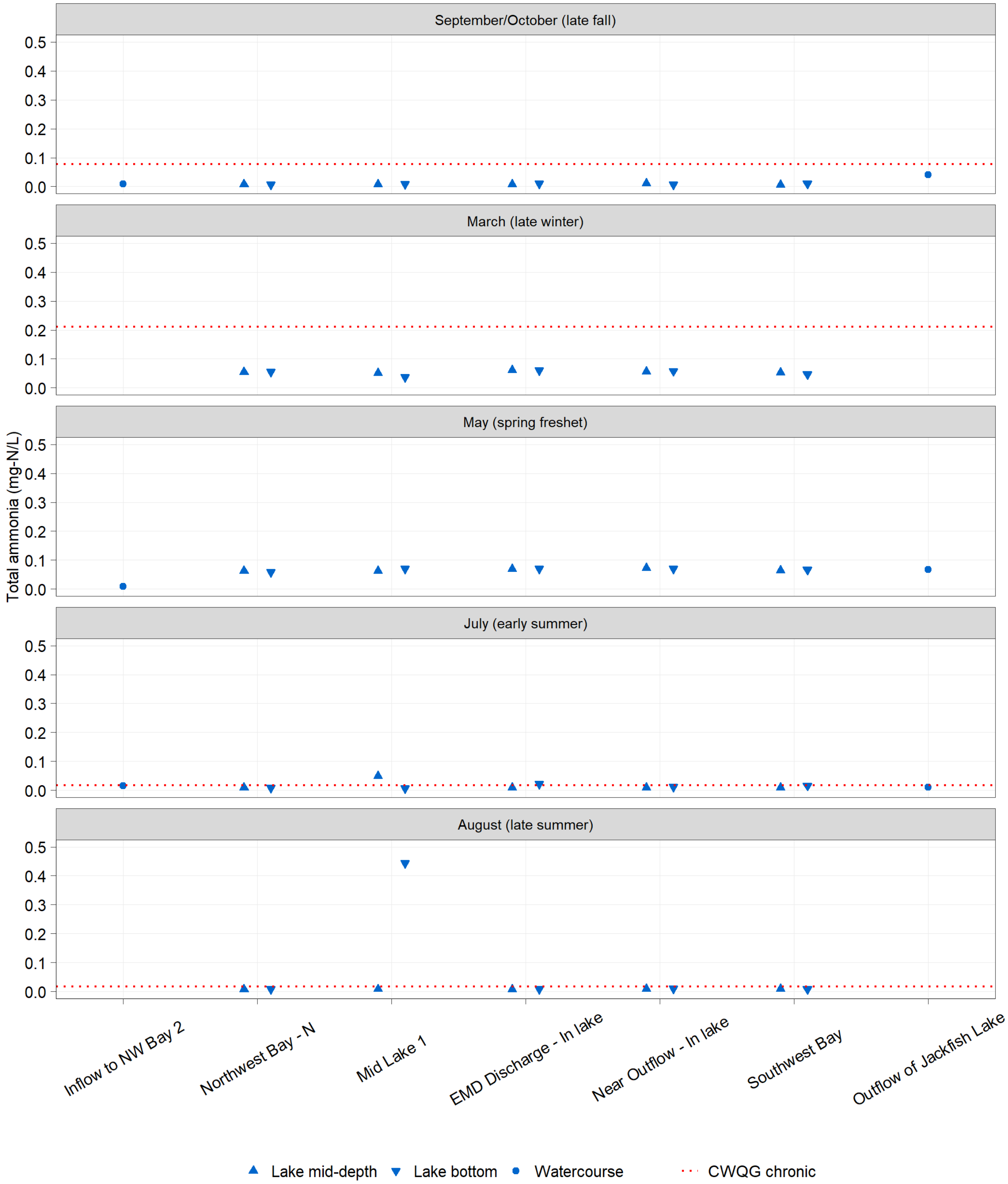
Notes:
Concentrations below the detection limit are shown at the detection limit as open markers.
The CWQG for nitrite is 0.06 mg/L.
mg-N/L = milligrams nitrogen per litre; CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-26: Nitrate + Nitrite Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



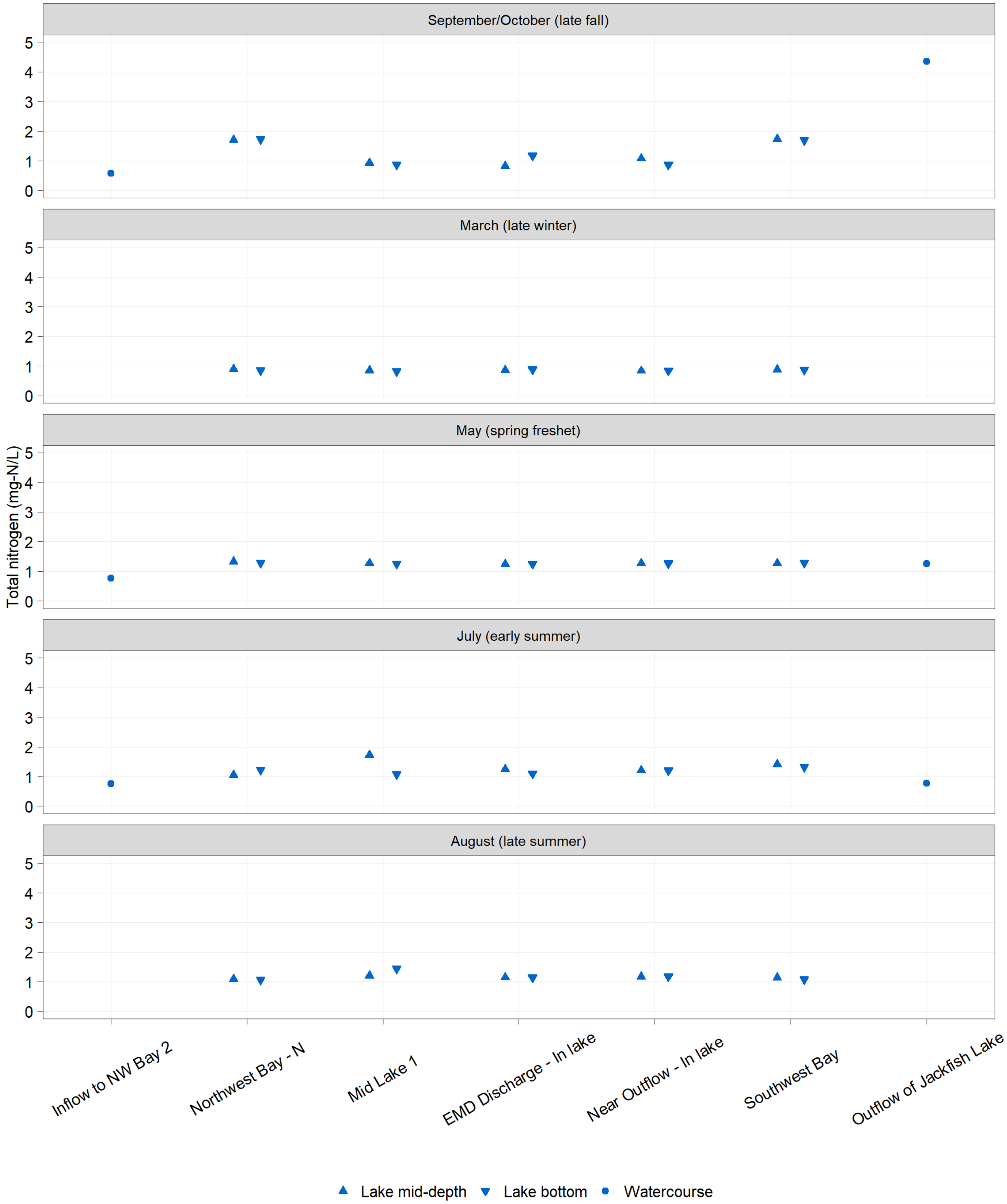
Note:
Concentrations below the detection limit are shown at the detection limit as open markers.
mg-N/L = milligrams nitrogen per litre.

Figure E.5-27: Total Ammonia Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



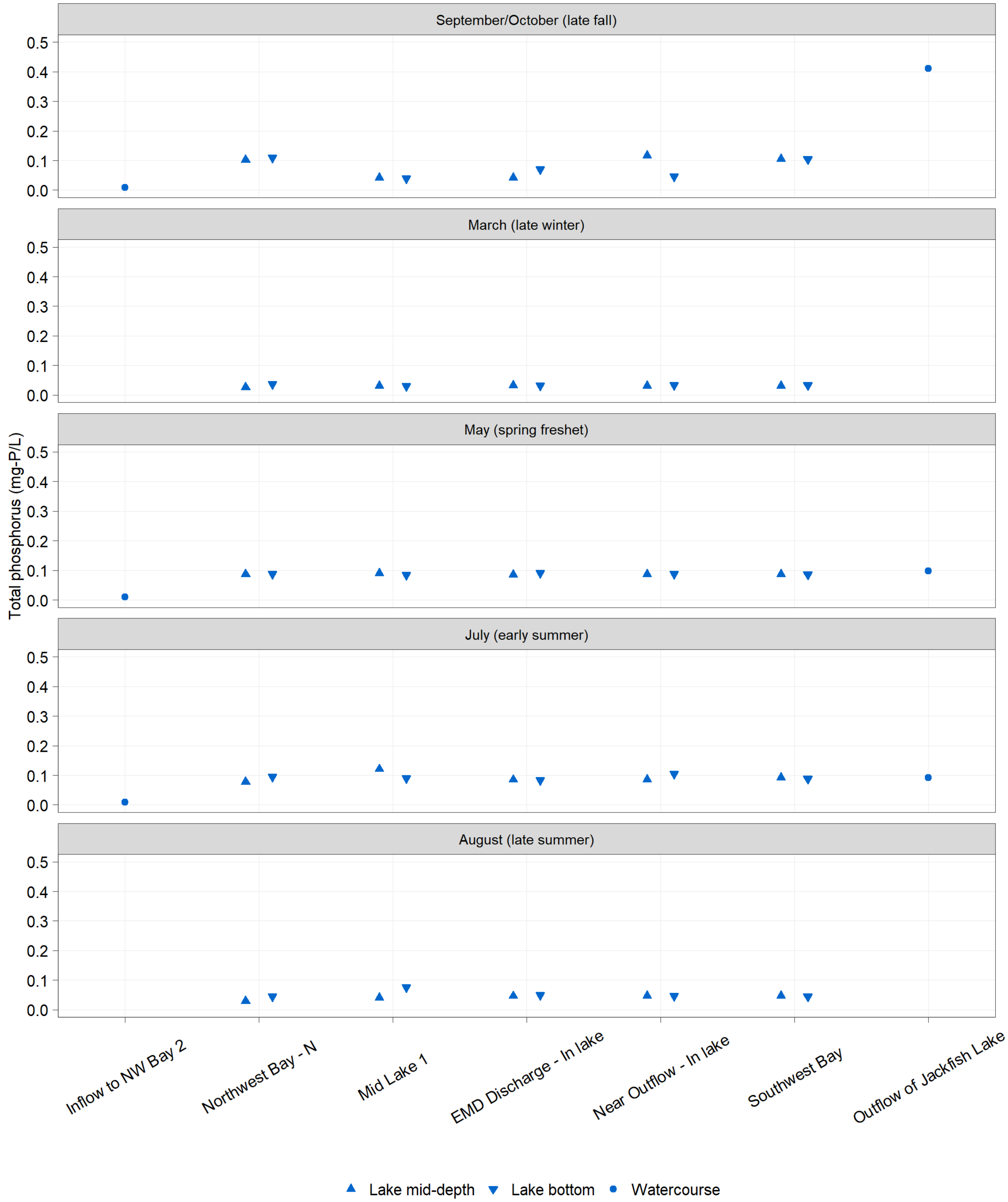
Notes:
The CWQG for ammonia is temperature and pH dependent; the minimum applicable CWQGs for each season were plotted.
The minimum CWQG for total ammonia in May (spring freshet) is 0.63 mg/L.
mg-N/L = milligrams nitrogen per litre; CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-28: Total Nitrogen Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



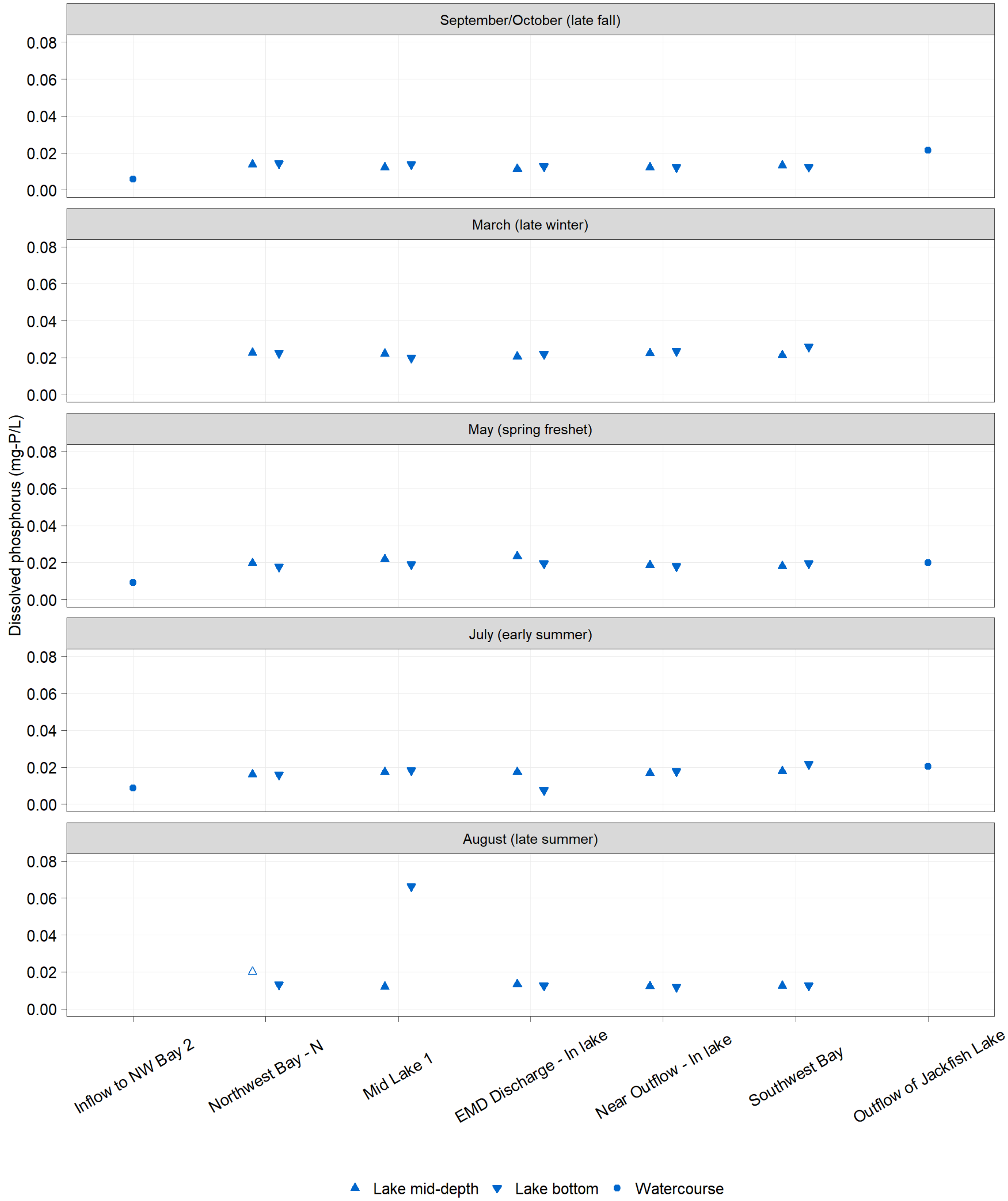
mg-N/L = milligrams nitrogen per litre.

Figure E.5-29: Total Phosphorus Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



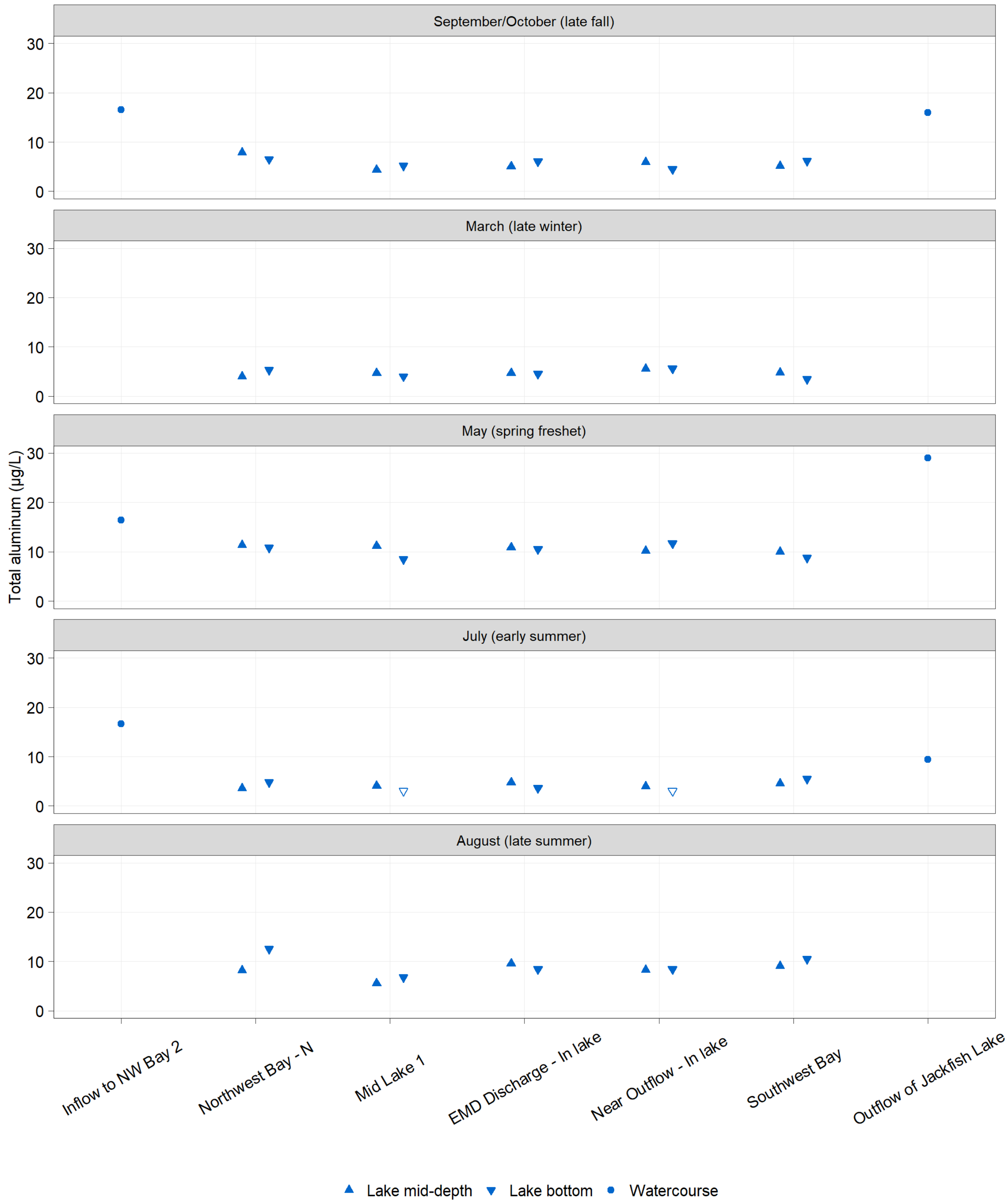
mg-P/L = milligrams phosphorus per litre.

Figure E.5-30: Dissolved Phosphorus Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
Concentrations below the detection limit are shown at the detection limit as open markers.
mg-P/L = milligrams phosphorus per litre.

Figure E.5-31: Total Aluminum Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Notes:
Concentrations below the detection limit are shown at the detection limit as open markers.
The CWQG for total aluminum is pH dependent. The minimum CWQG for total aluminum is 100 µg/L.
CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-32: Total Antimony Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

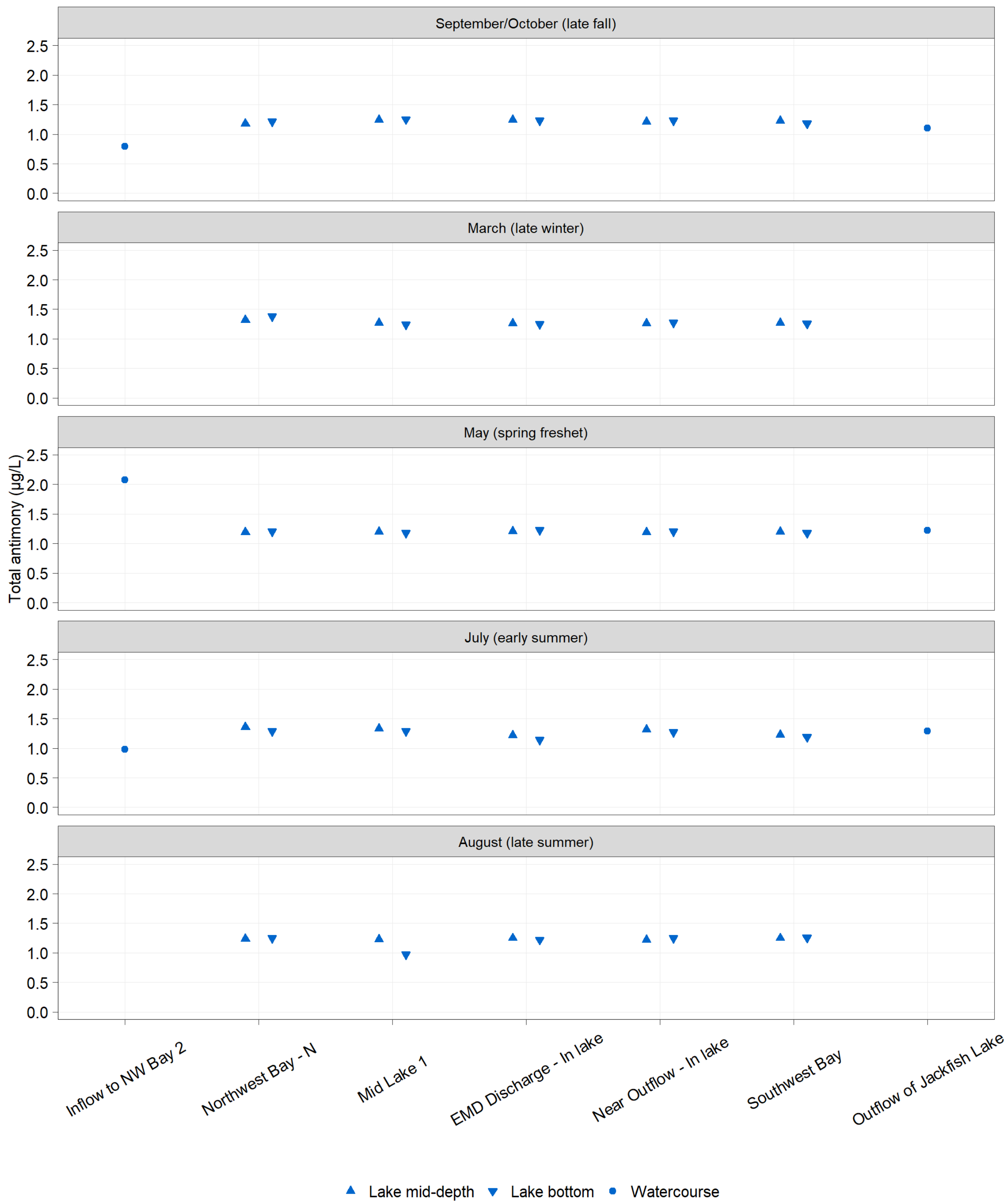
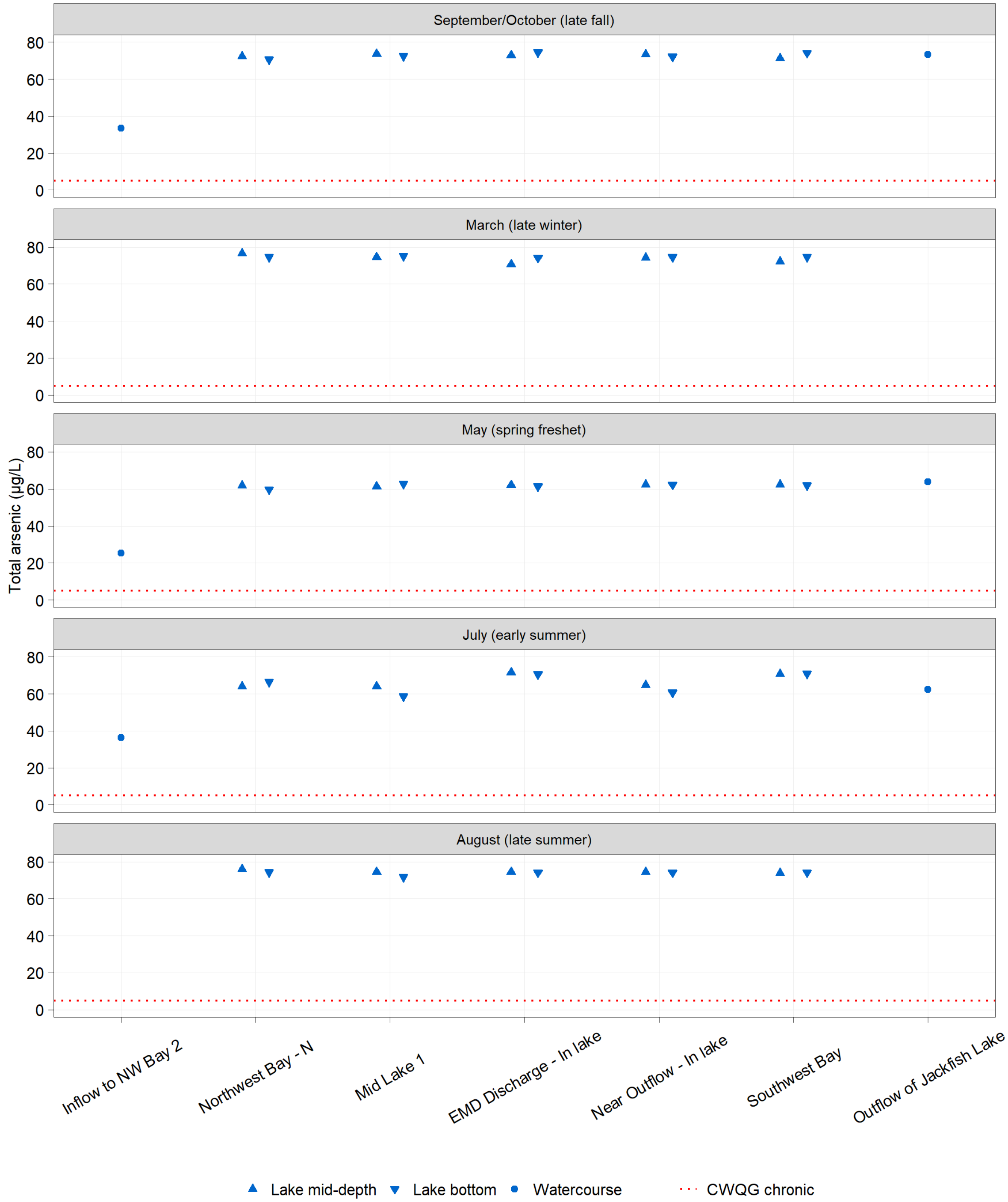


Figure E.5-33: Total Arsenic Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-34: Total Barium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

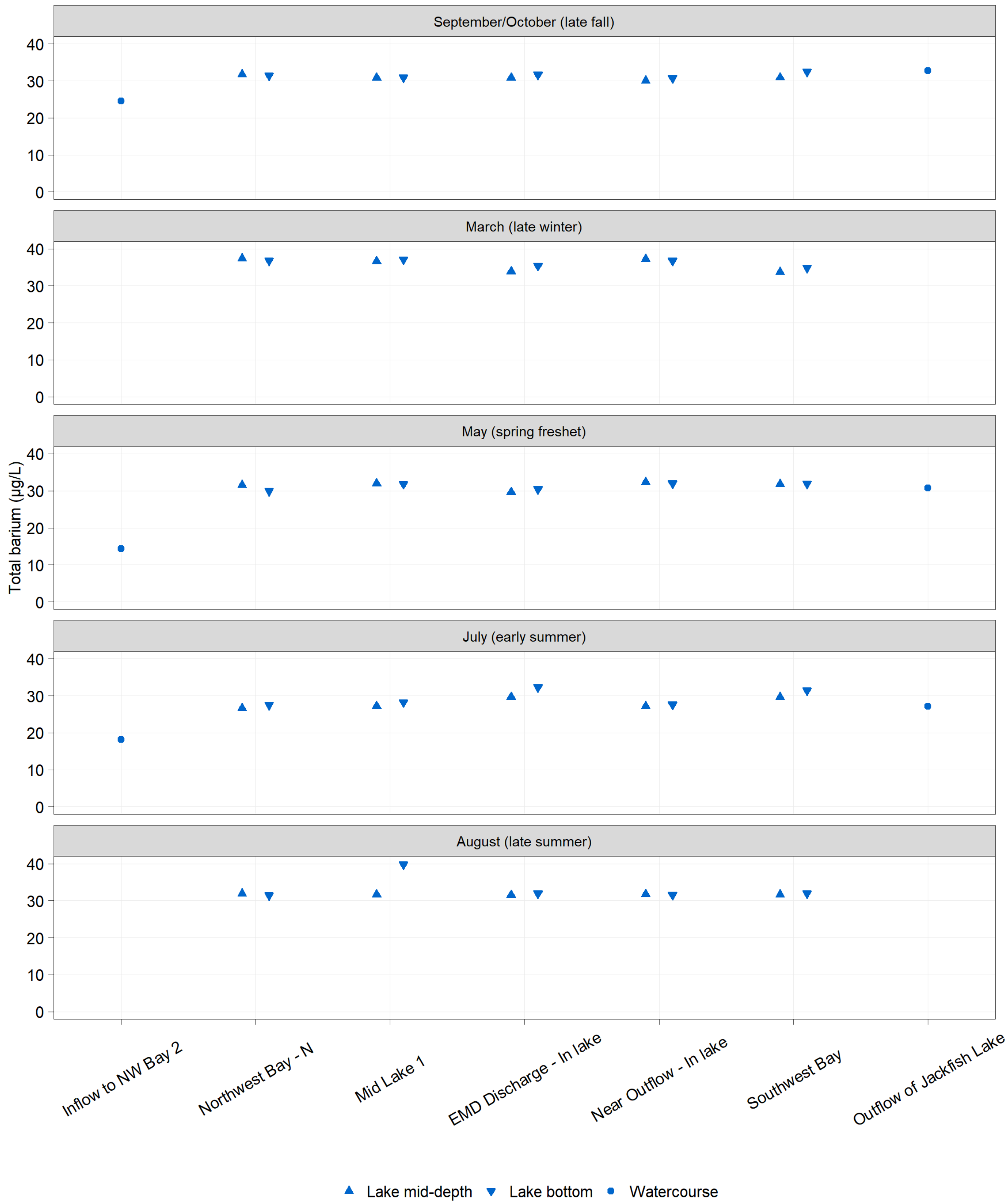
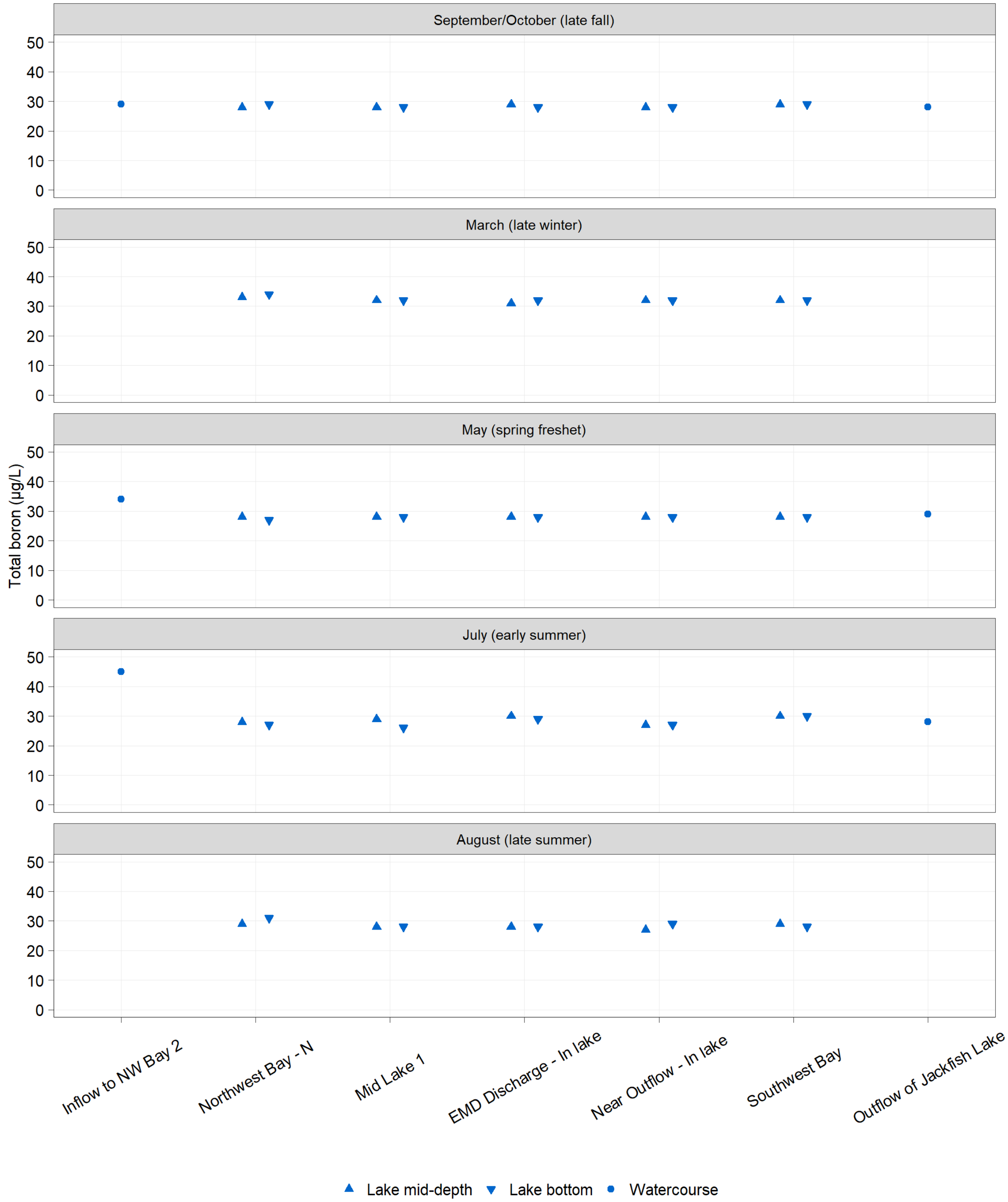
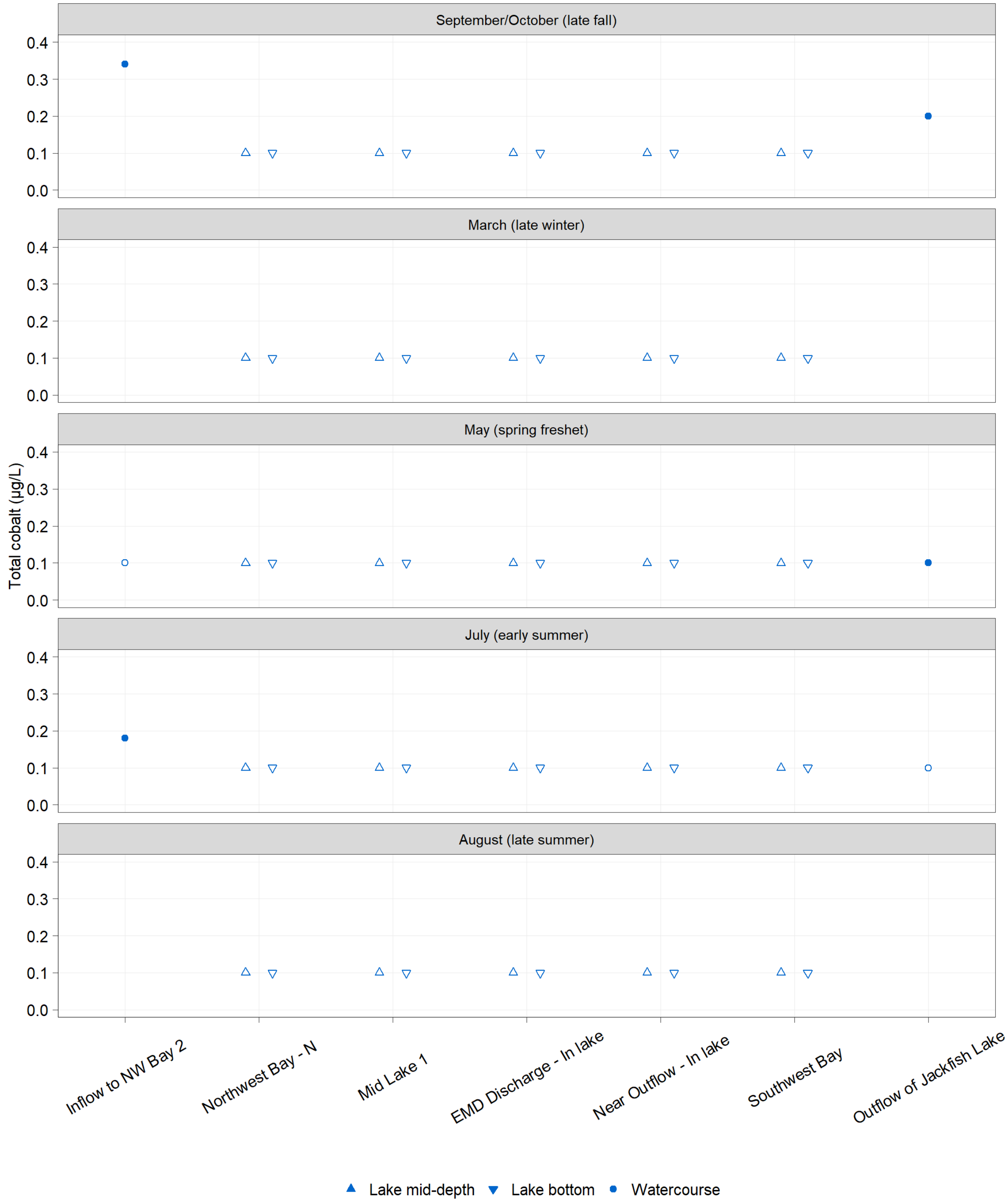


Figure E.5-35: Total Boron Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



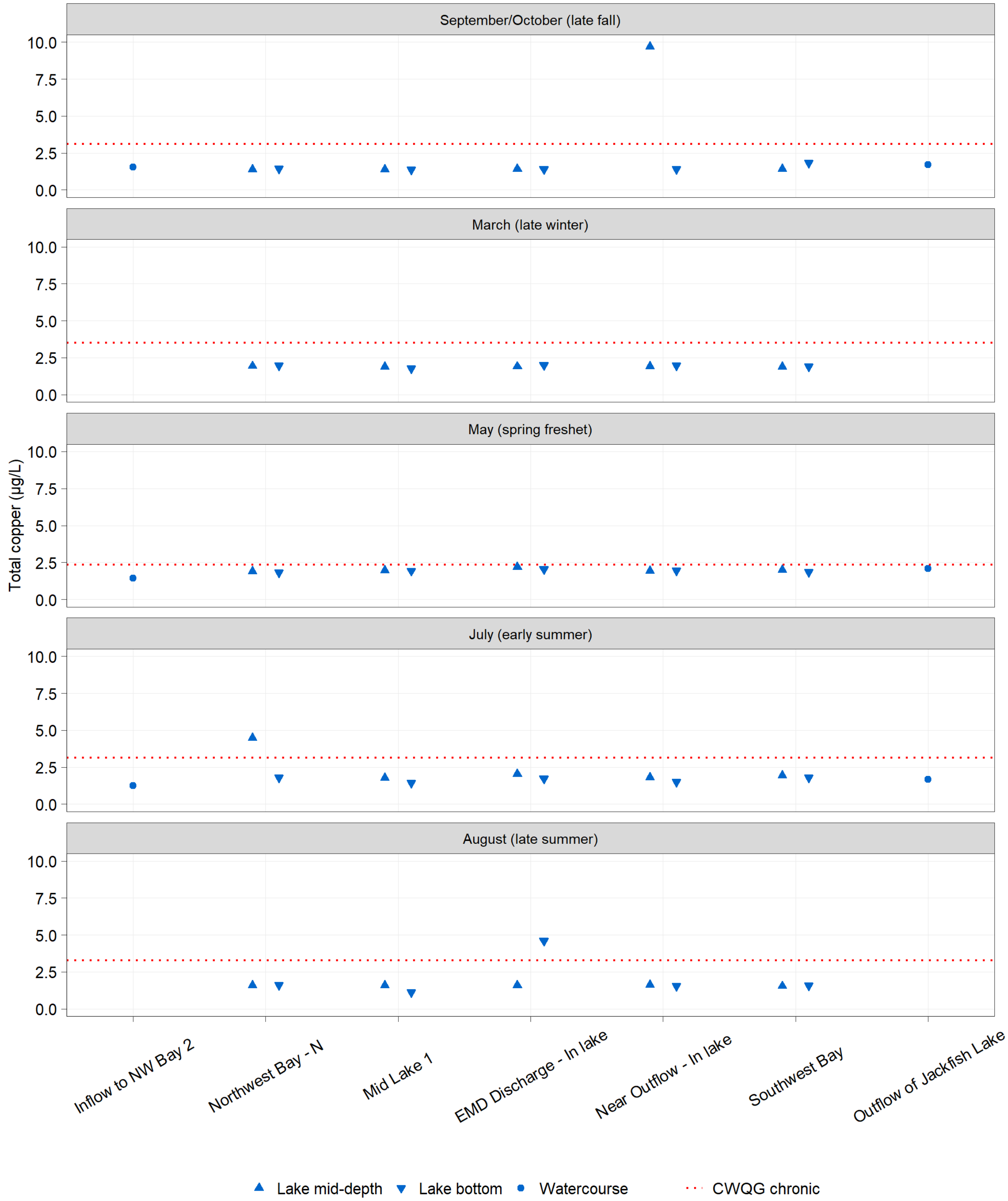
Notes:
The acute CWQG for total boron is 29,000 µg/L.
The chronic CWQG for total boron is 1,500 µg/L.
CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-36: Total Cobalt Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



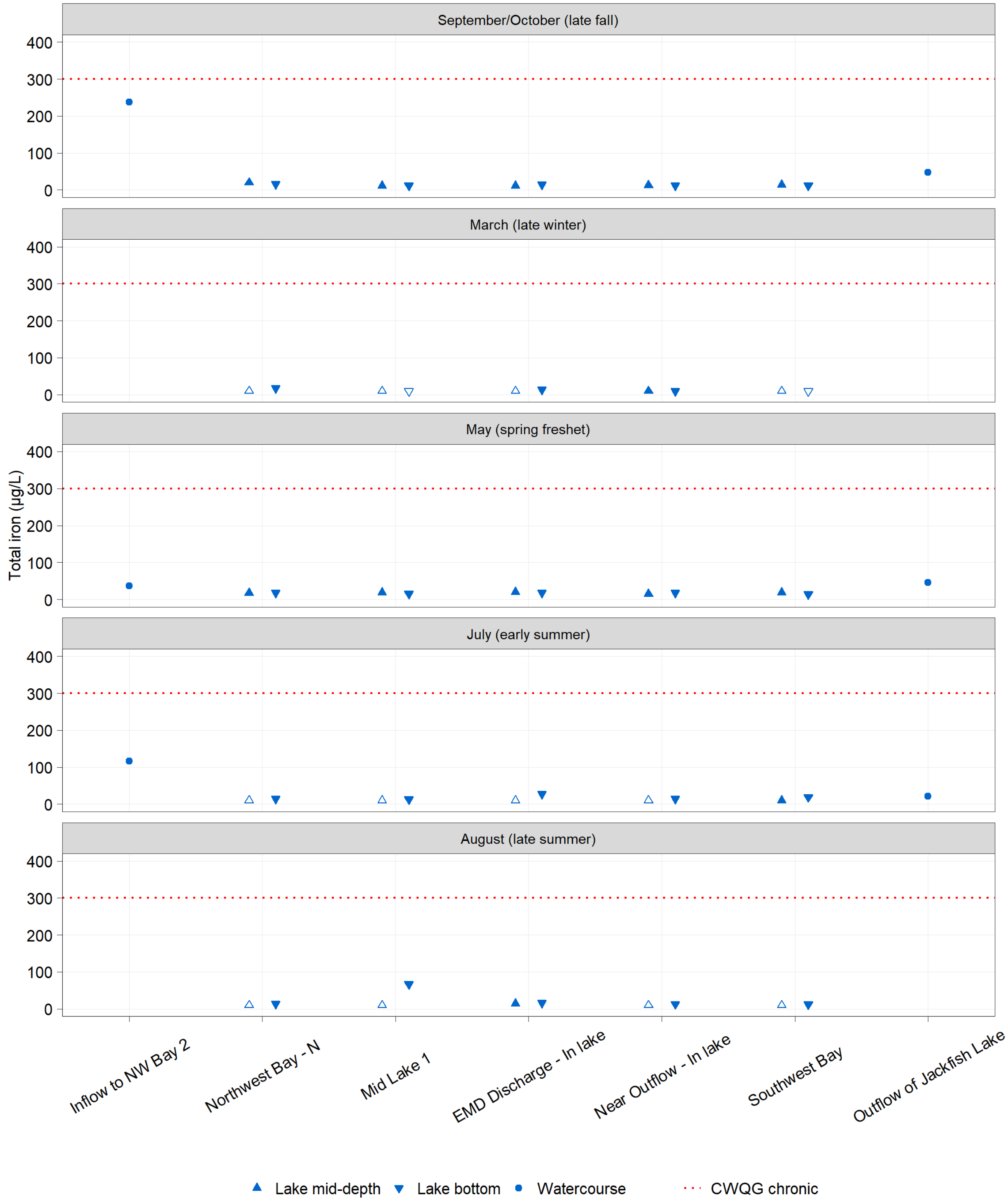
Note:
Concentrations below the detection limit are shown at the detection limit as open markers.

Figure E.5-37: Total Copper Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



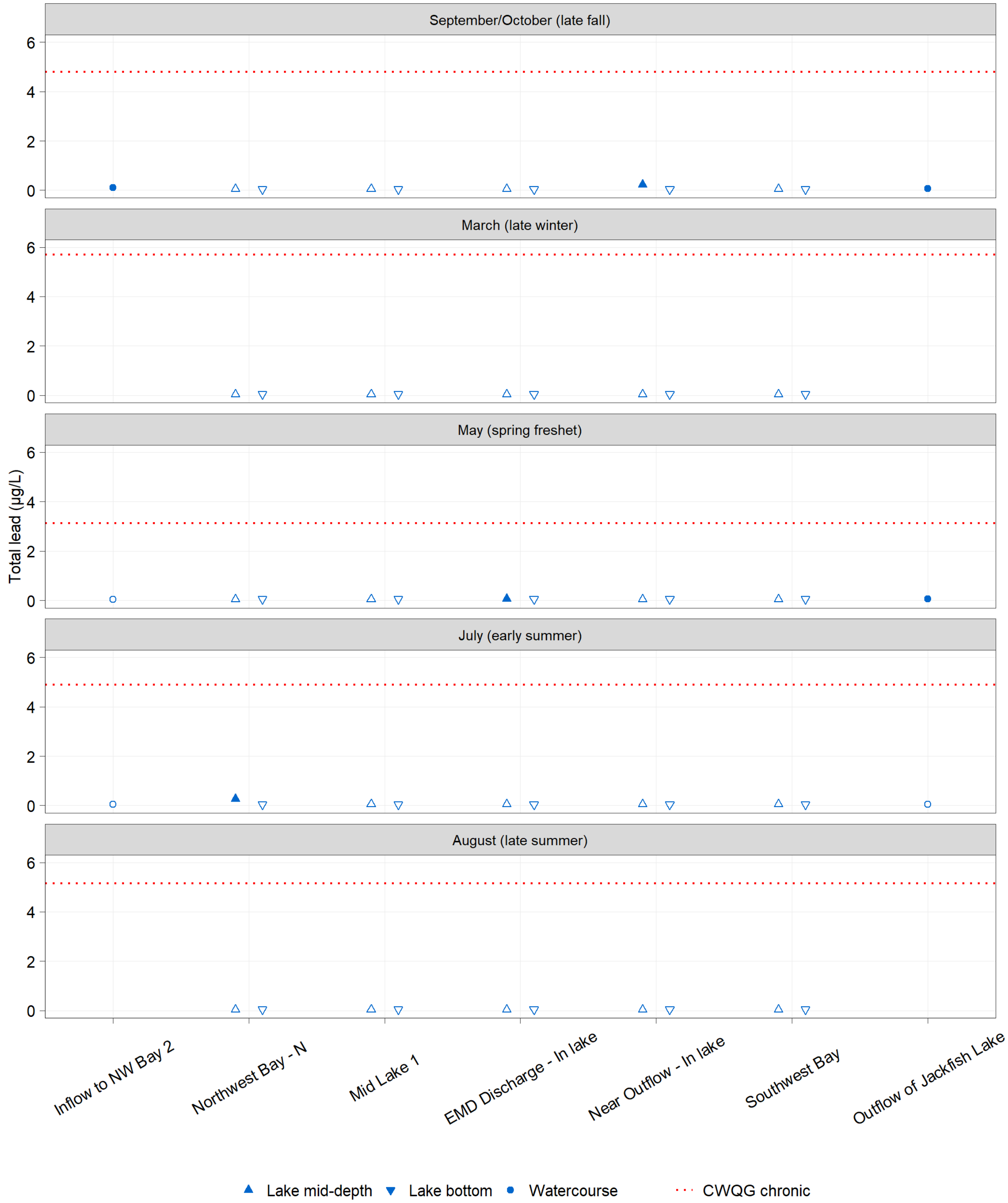
Note:
The CWQG for total copper is hardness dependent; the minimum applicable CWQGs for each season were plotted.
CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-38: Total Iron Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



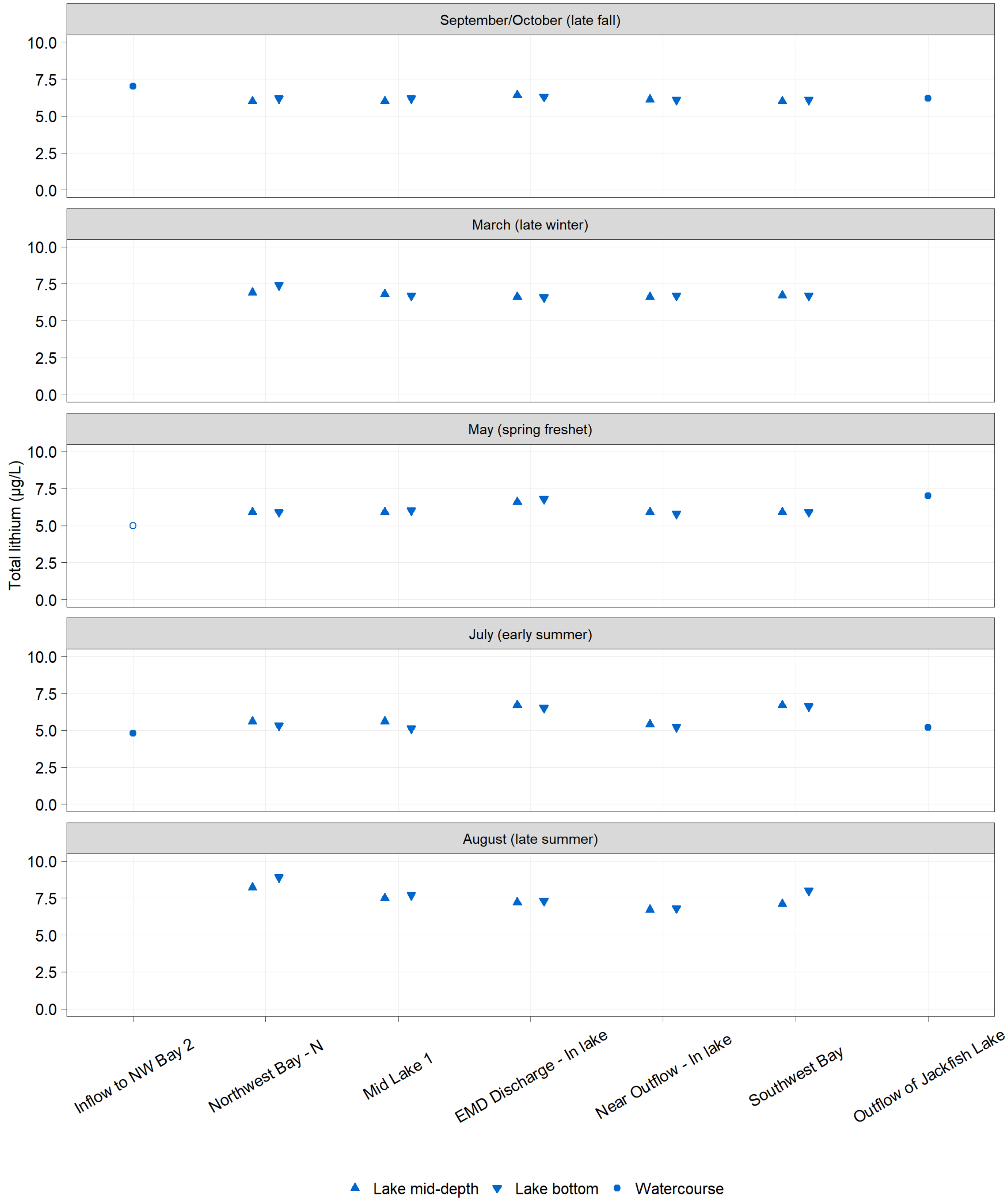
Note:
Concentrations below the detection limit are shown at the detection limit as open markers.
CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-39: Total Lead Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Notes:
Concentrations below the detection limit are shown at the detection limit as open markers.
The CWQG for total lead is hardness dependent; the minimum applicable CWQGs for each season were plotted.
CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-40: Total Lithium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
Concentrations below the detection limit are shown at the detection limit as open markers.

Figure E.5-41: Total Manganese Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

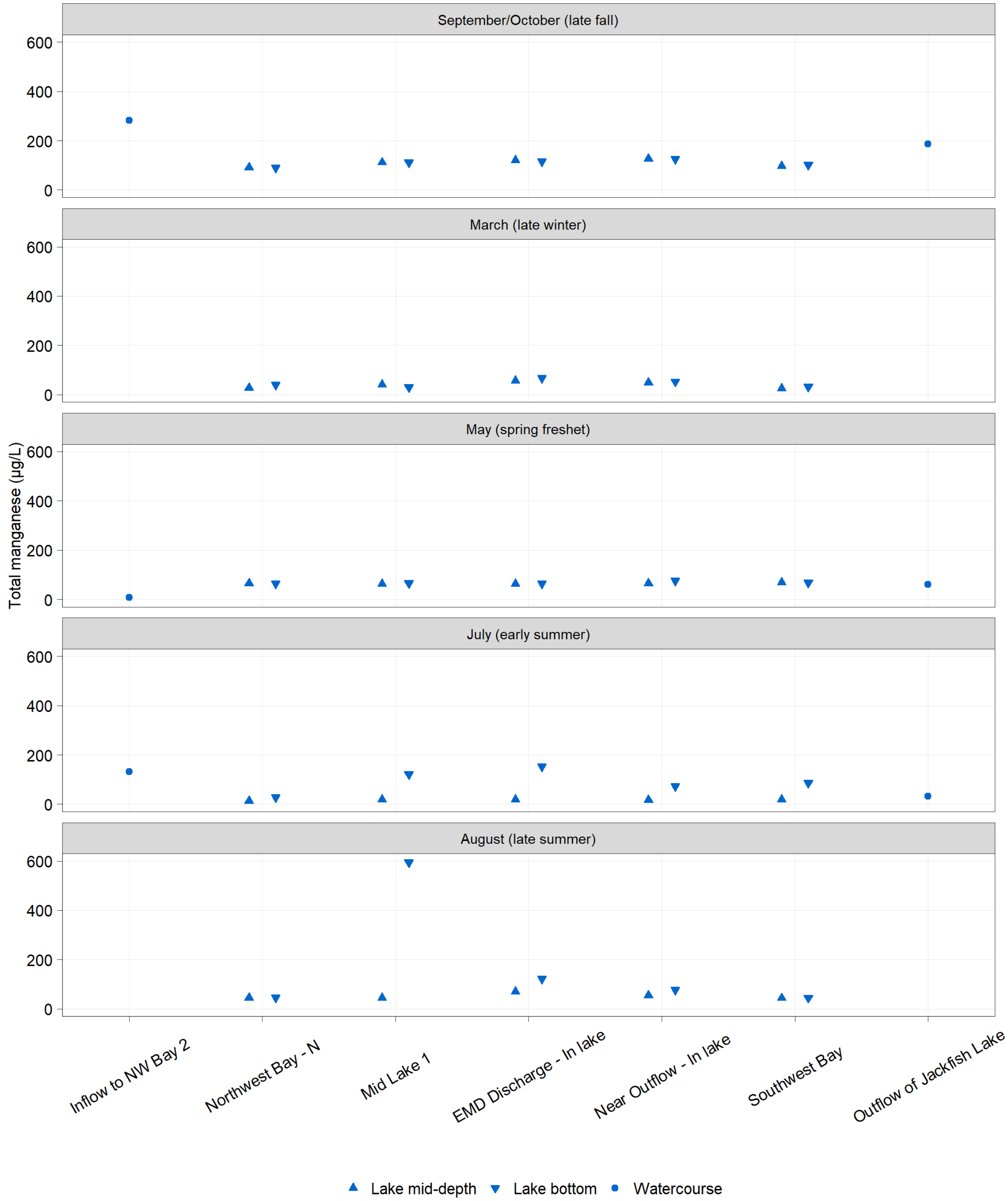
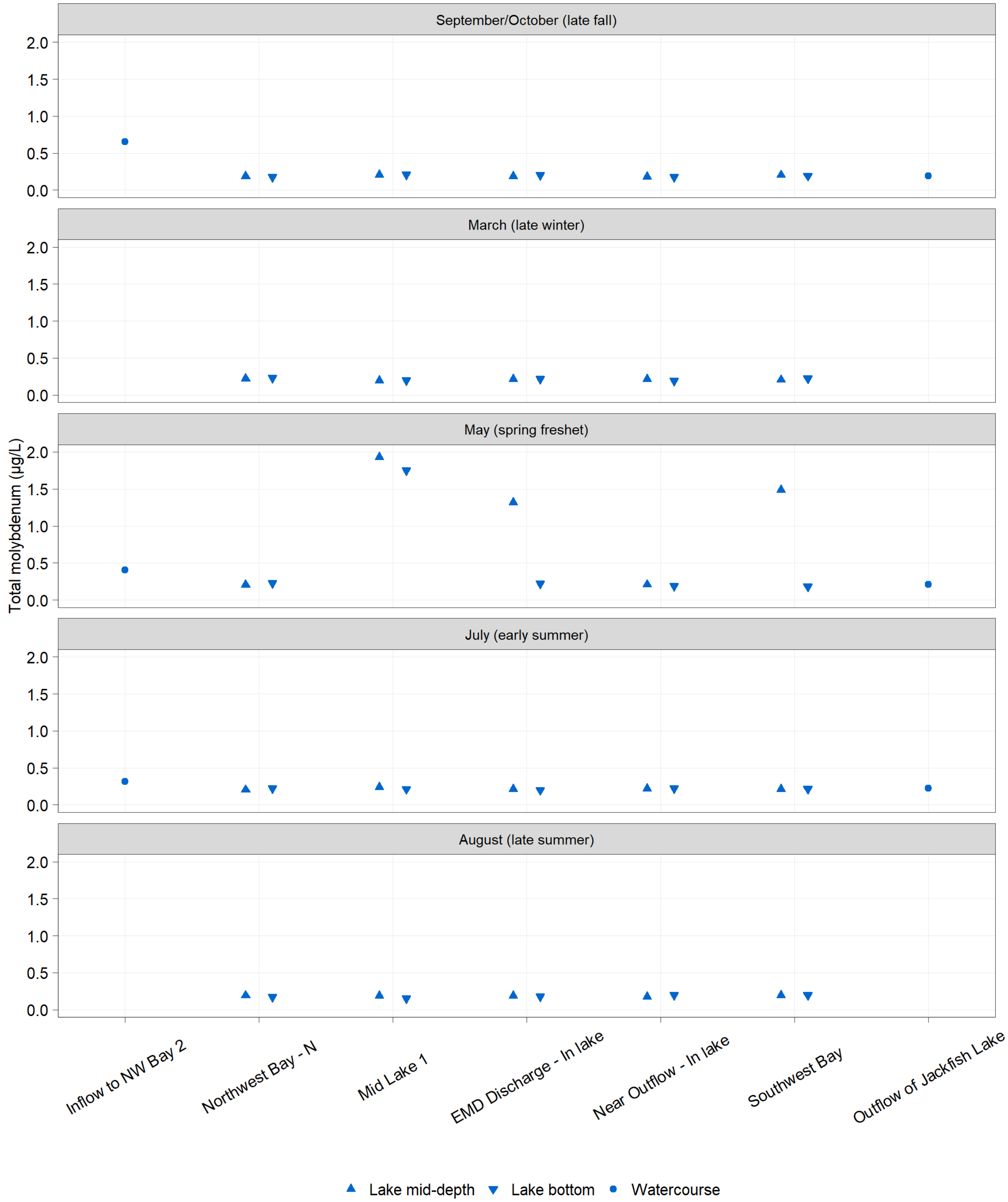
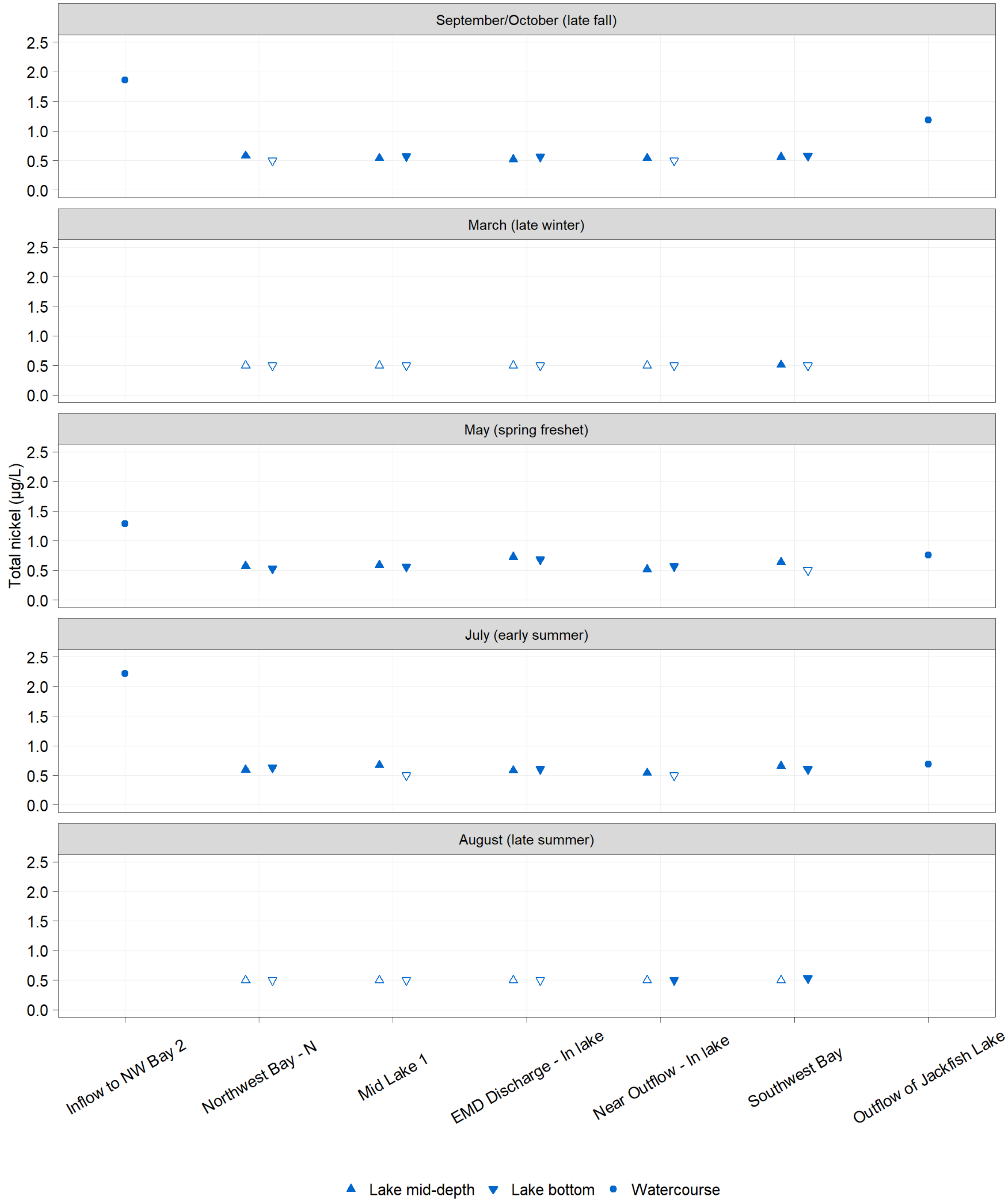


Figure E.5-42: Total Molybdenum Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
The chronic CWQG for total molybdenum is 73 µg/L.
Four total molybdenum concentrations (greater than 1 µg/L) at Mid Lake 1, EMD Discharge - In lake, and Southwest Bay in May 2022 were outside of historical ranges. Due to insufficient evidence of field contamination and laboratory error, these data points were qualified.
CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-43: Total Nickel Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Notes:

Concentrations below the detection limit are shown at the detection limit as open markers.

The CWQG for total nickel is hardness dependent. The minimum CWQG for total nickel is 95 µg/L.

CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-44: Total Rubidium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

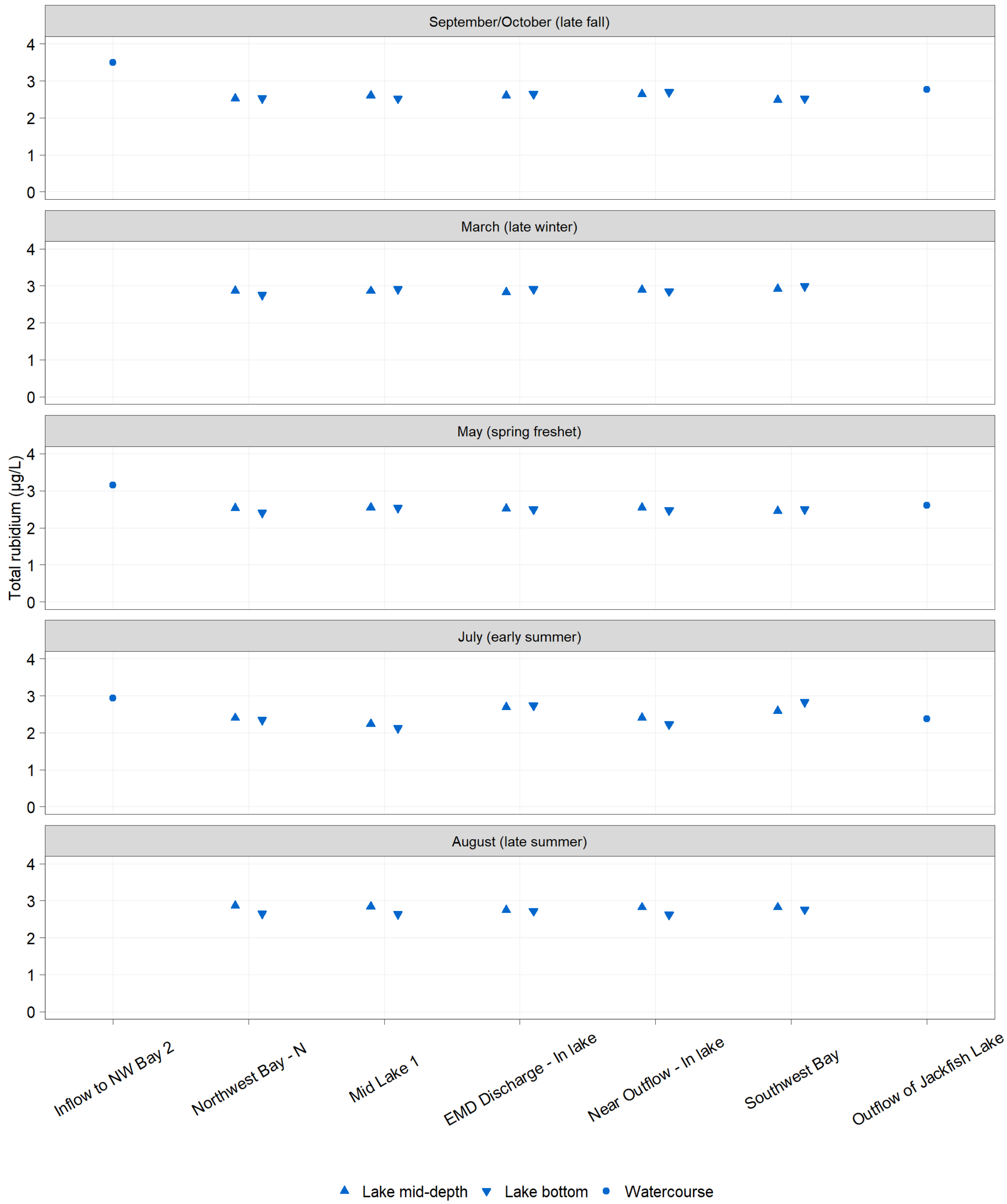
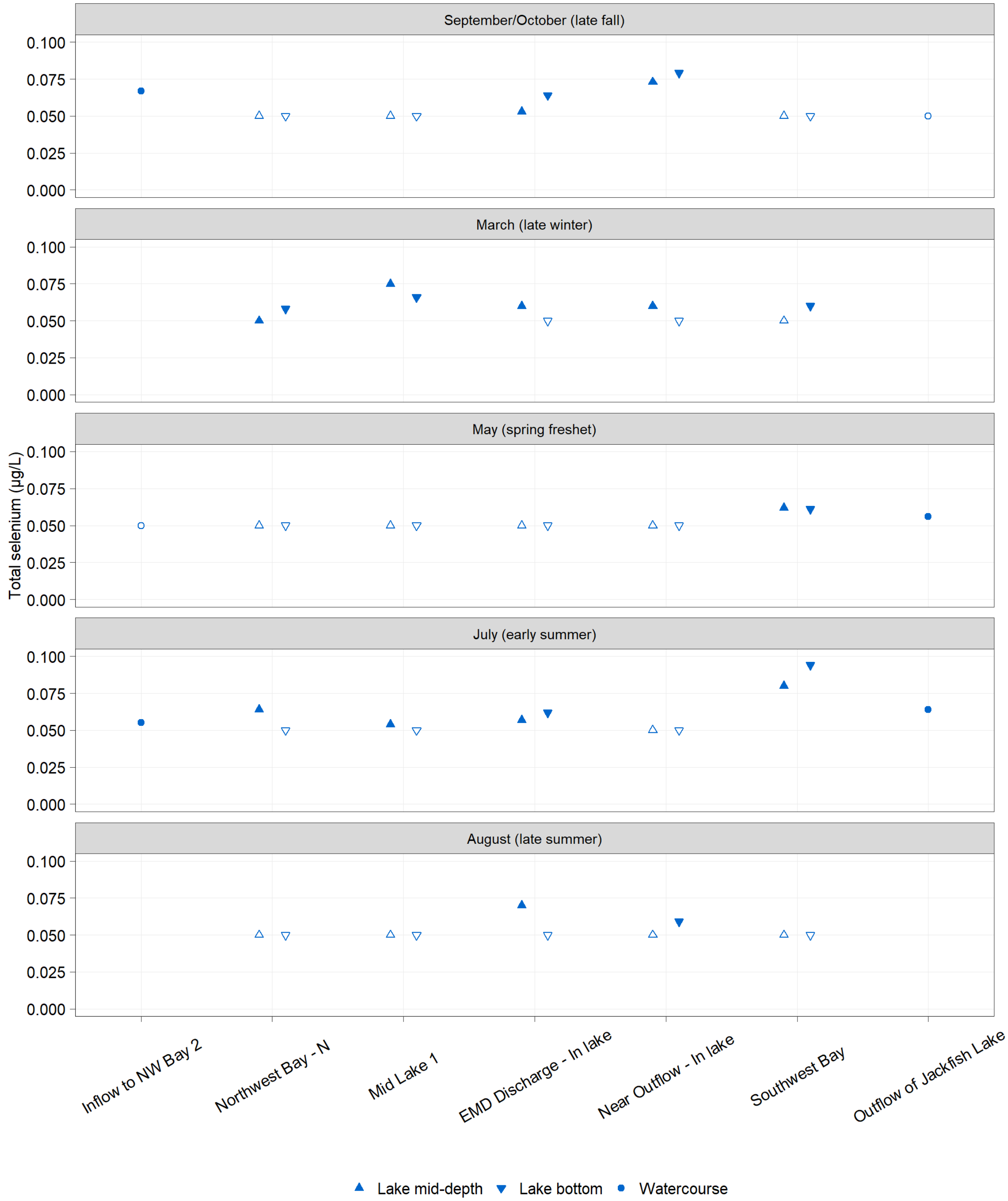


Figure E.5-45: Total Selenium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Notes:
Concentrations below the detection limit are shown at the detection limit as open markers.
The chronic CWQG for total selenium is 1 µg/L.
CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-46: Total Silicon Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

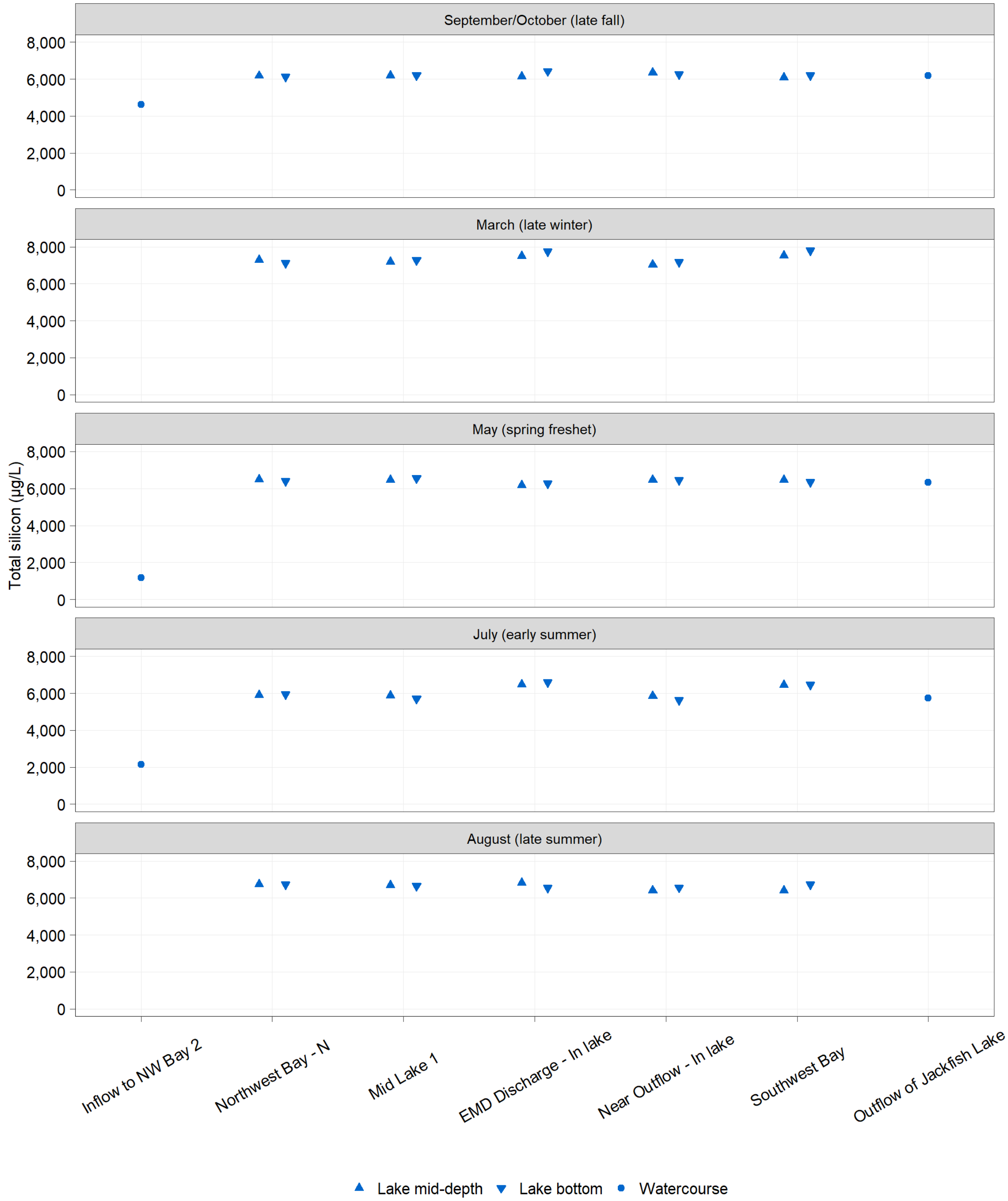


Figure E.5-47: Total Strontium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

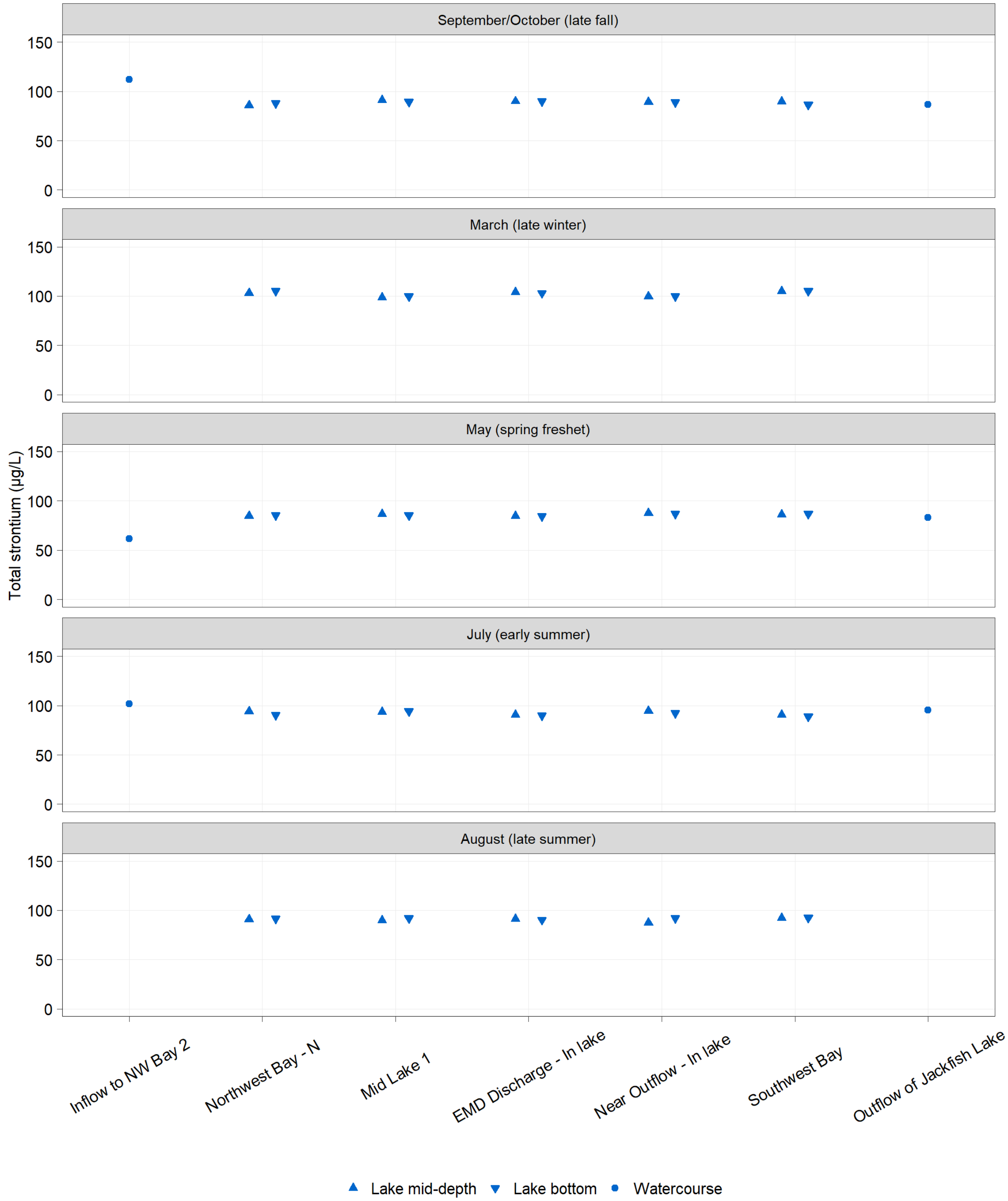


Figure E.5-48: Total Sulphur Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

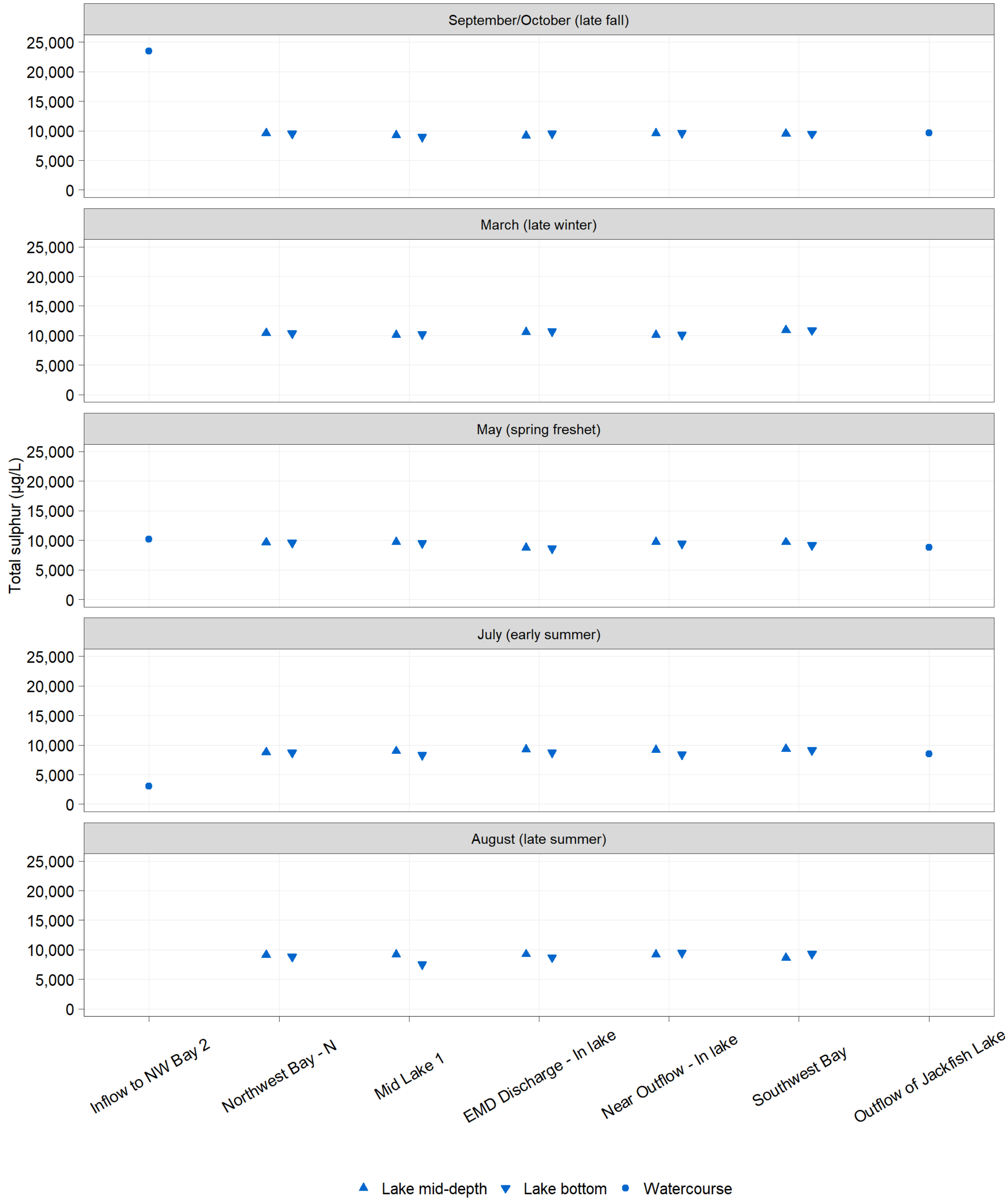
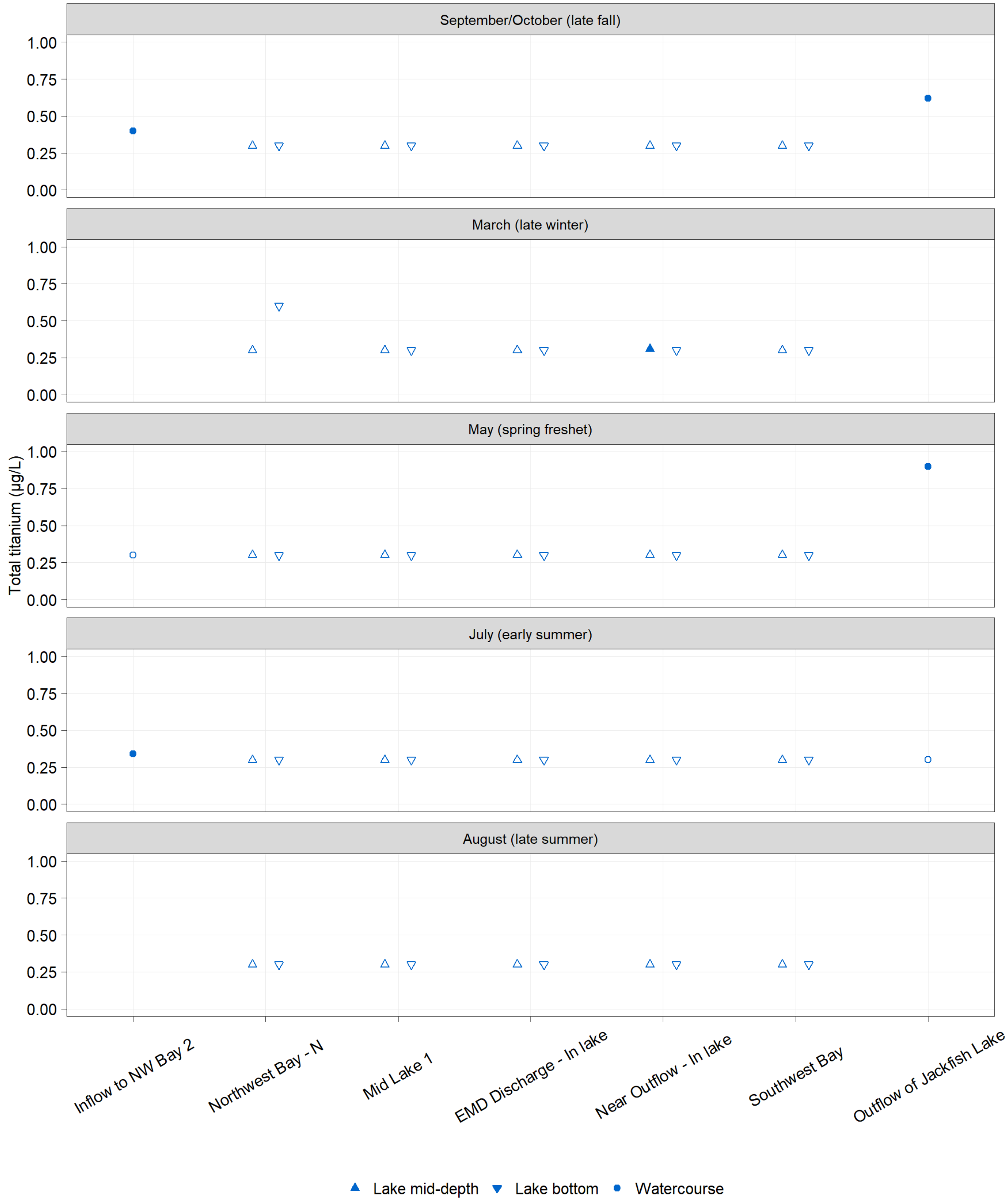
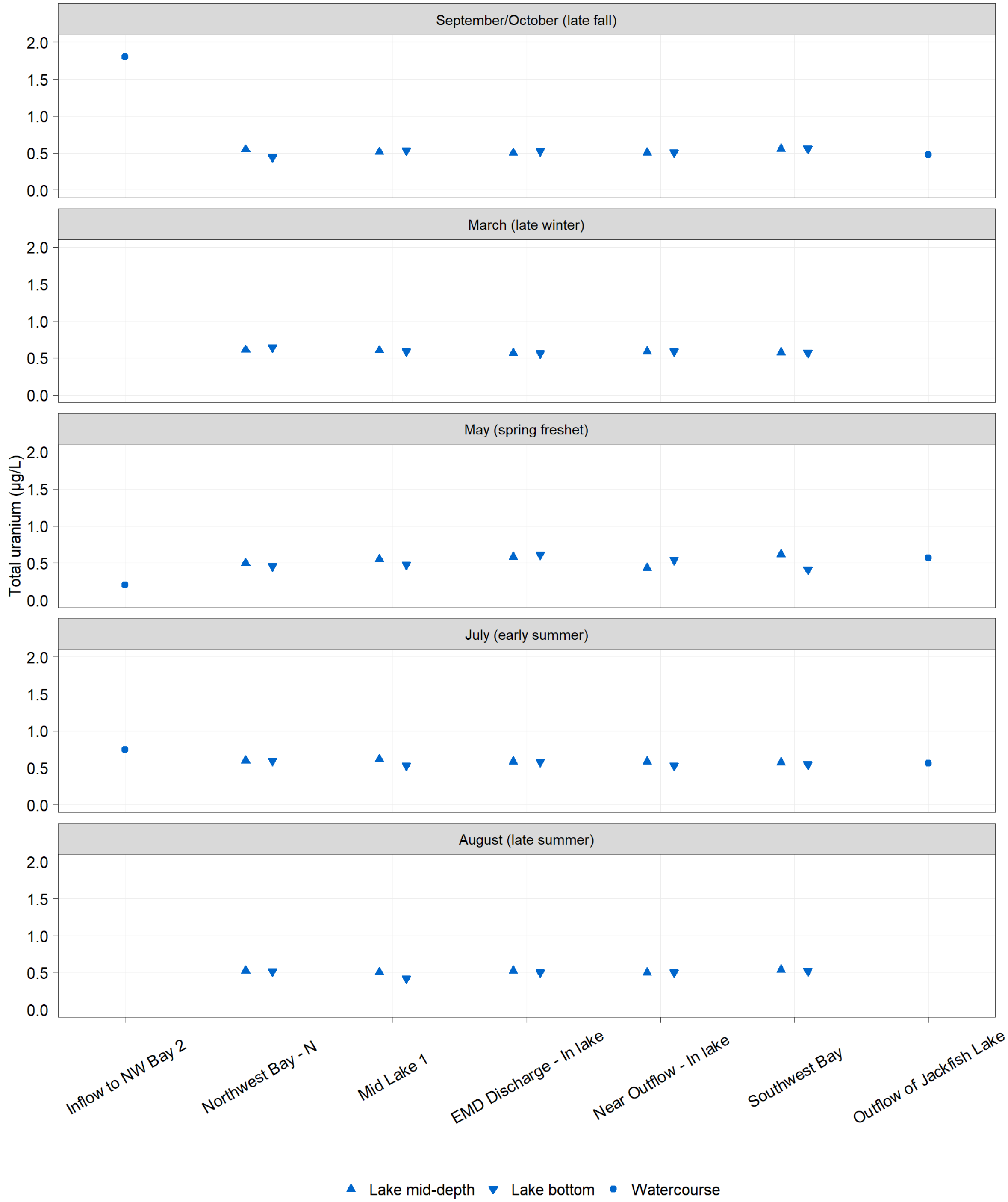


Figure E.5-49: Total Titanium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



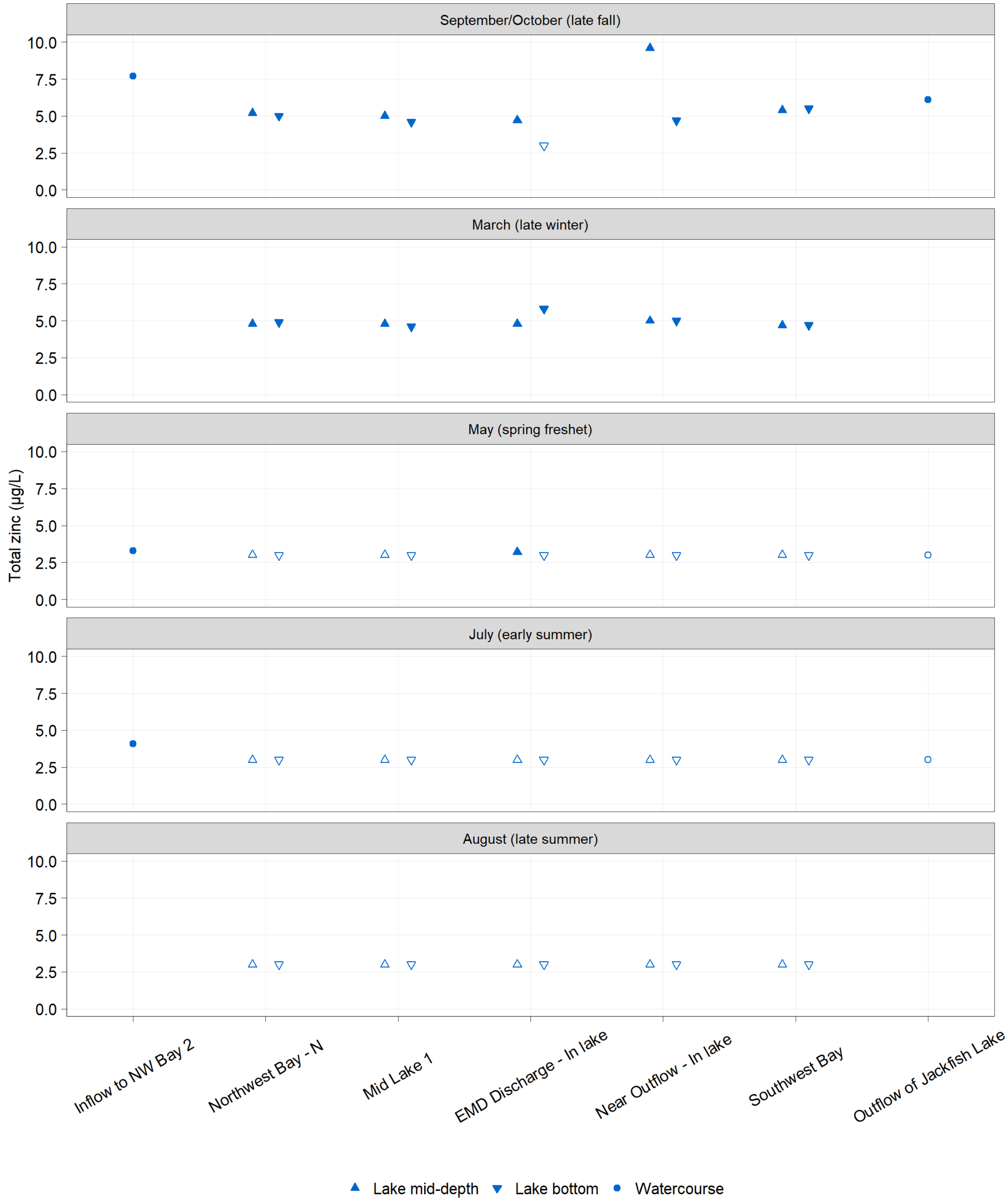
Note:
Concentrations below the detection limit are shown at the detection limit as open markers.

Figure E.5-50: Total Uranium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



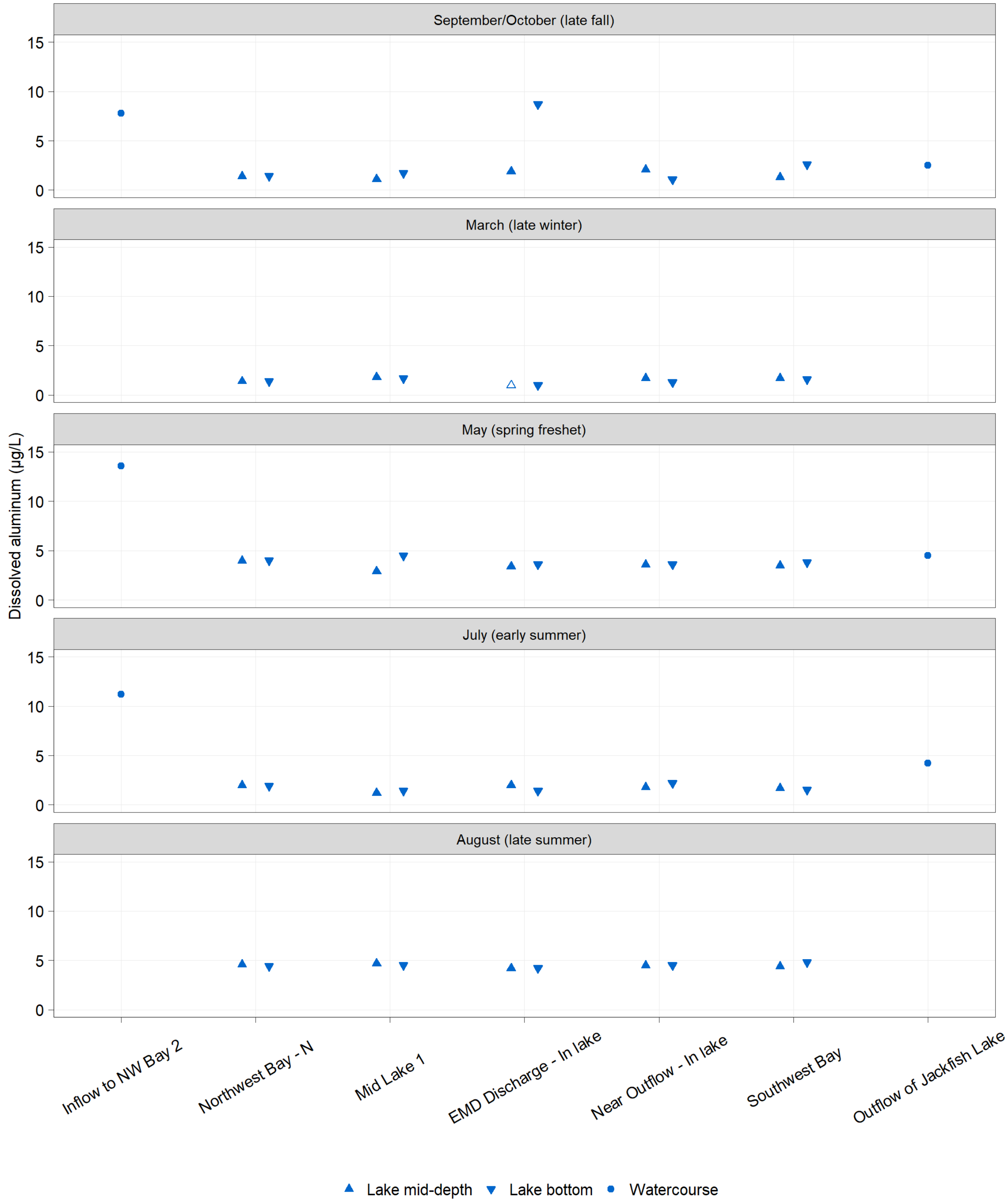
Note:
The acute CWQG for total uranium is 33 µg/L, and the chronic CWQG is 15 µg/L.
CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-51: Total Zinc Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
Concentrations below the detection limit are shown at the detection limit as open markers.

Figure E.5-52: Dissolved Aluminum Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
Concentrations below the detection limit are shown at the detection limit as open markers.

Figure E.5-53: Dissolved Antimony Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

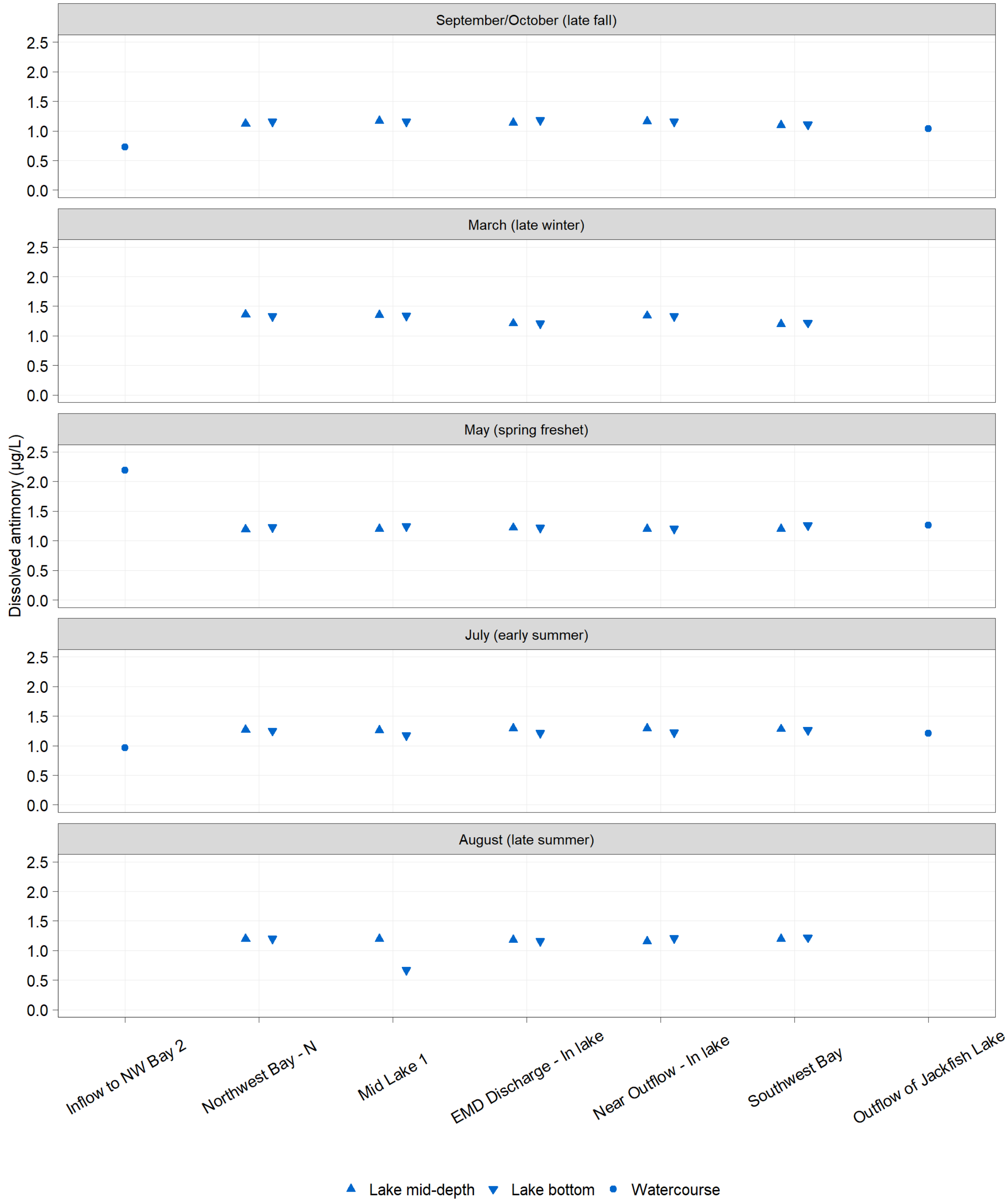


Figure E.5-54: Dissolved Arsenic Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

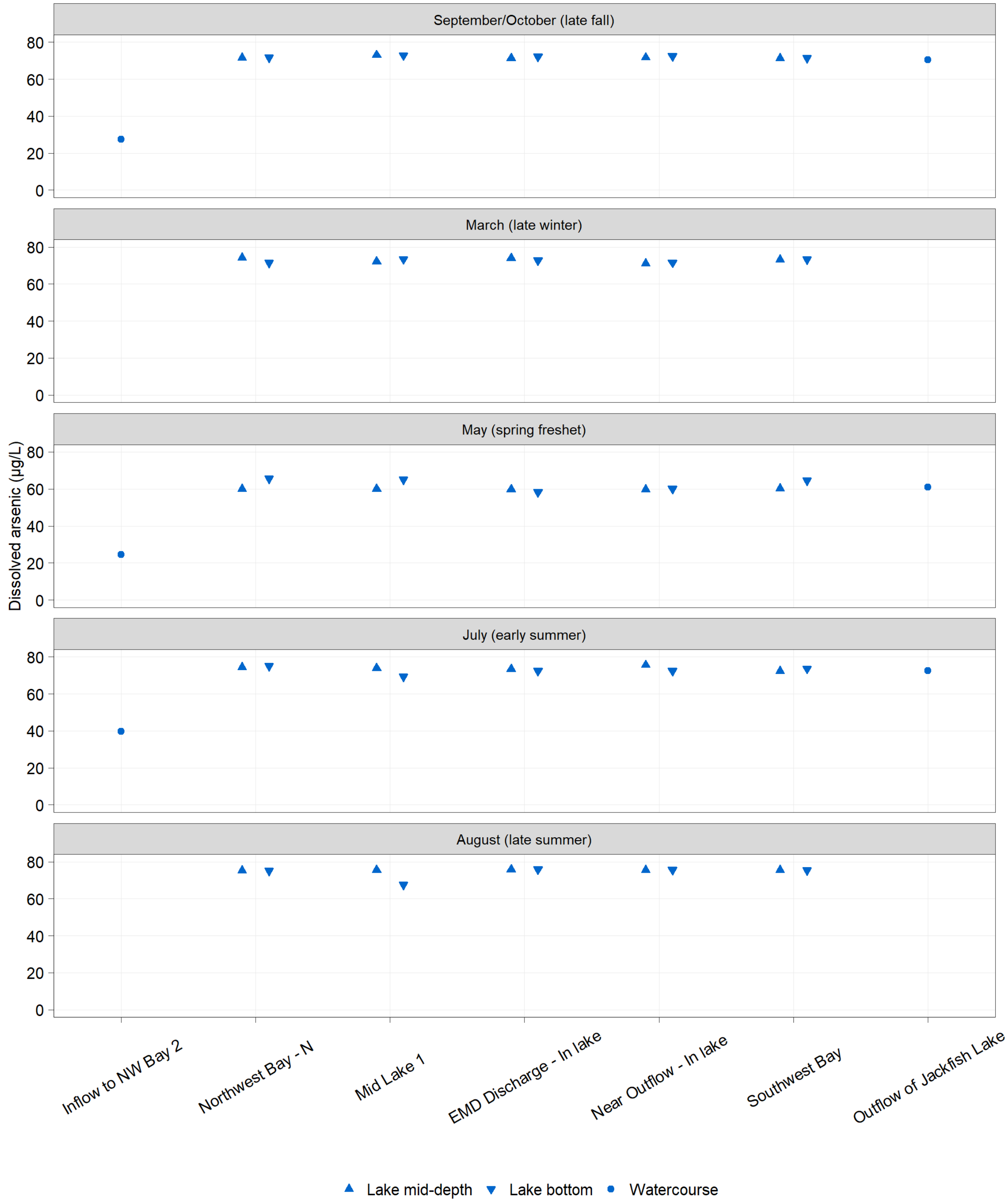


Figure E.5-55: Dissolved Barium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

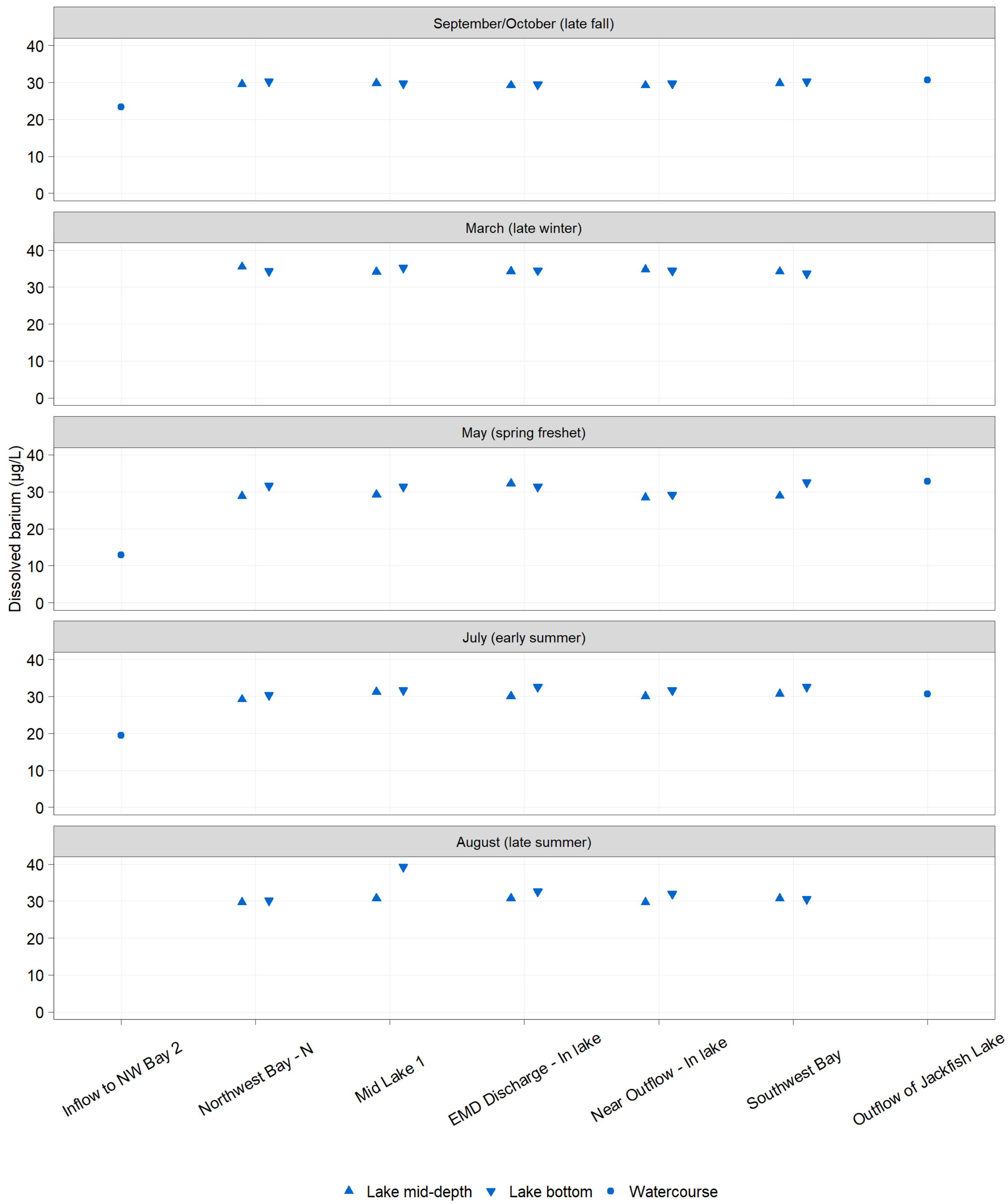


Figure E.5-56: Dissolved Boron Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

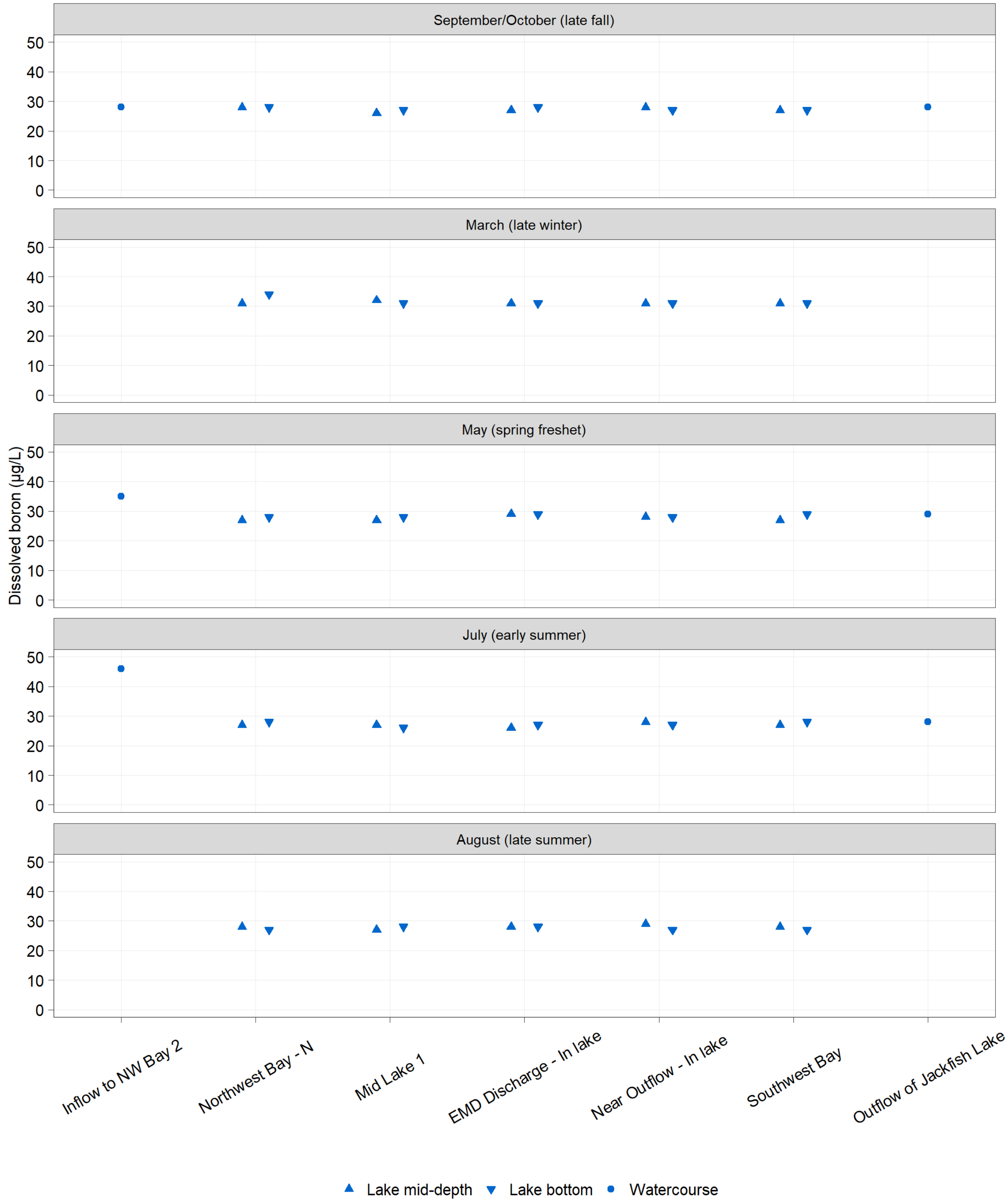
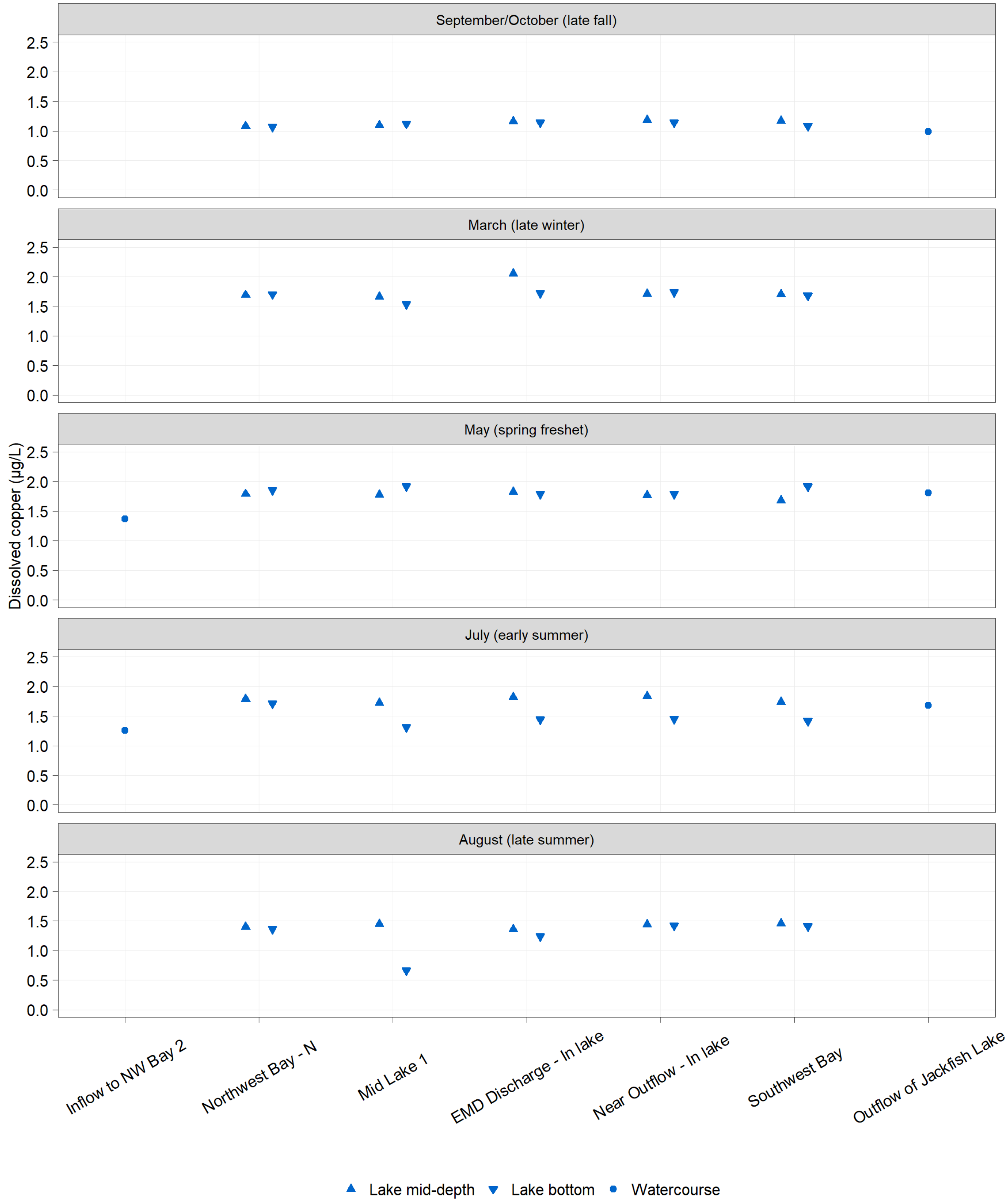
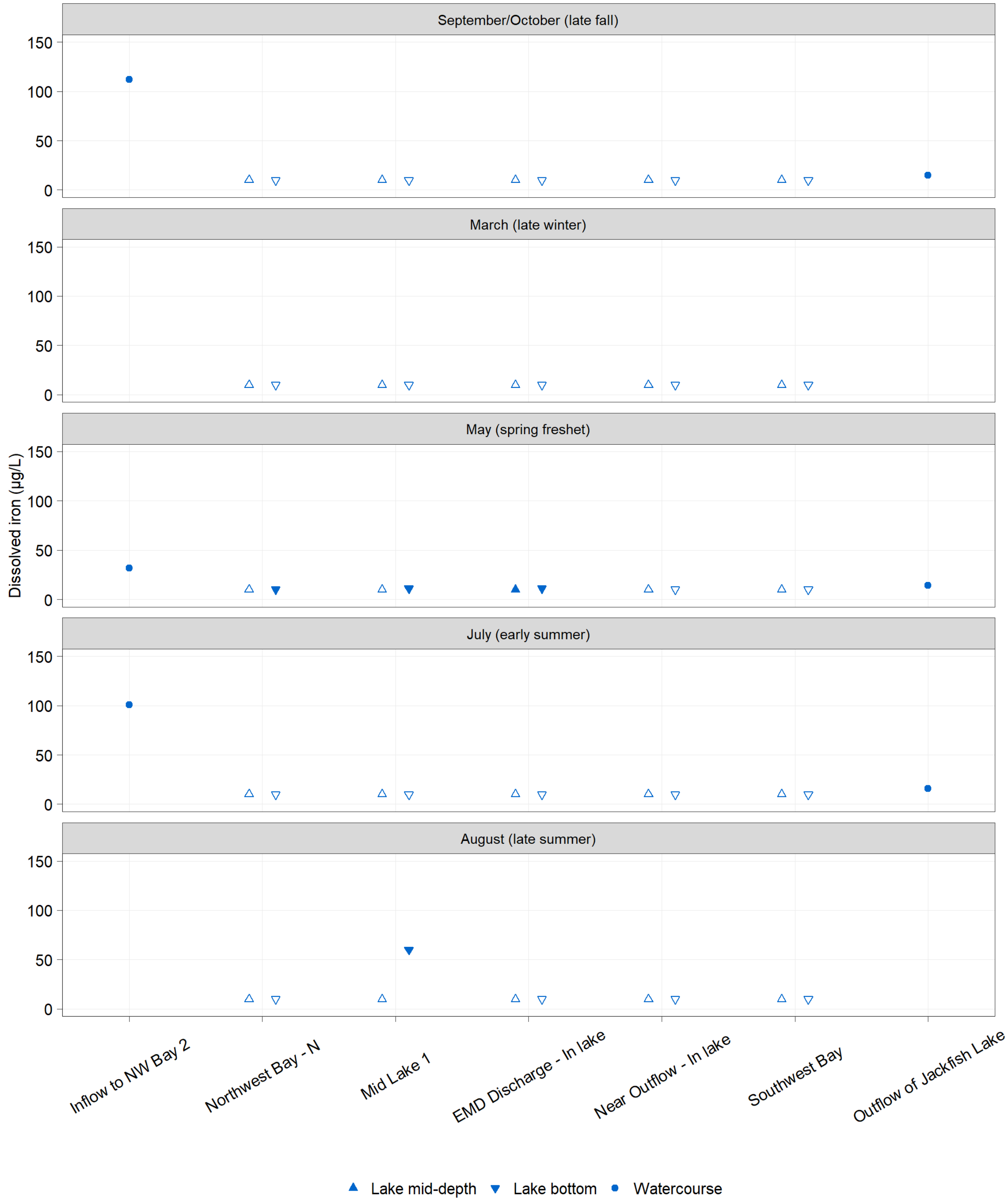


Figure E.5-57: Dissolved Copper Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022 Note:



Note:
An elevated dissolved copper value of 29 µg/L at the Inflow to NW Bay 2 station was invalidated and excluded from further analysis. See details in Section 4.3.12 of Appendix B.

Figure E.5-58: Dissolved Iron Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
Concentrations below the detection limit are shown at the detection limit as open markers.

Figure E.5-59: Dissolved Lithium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

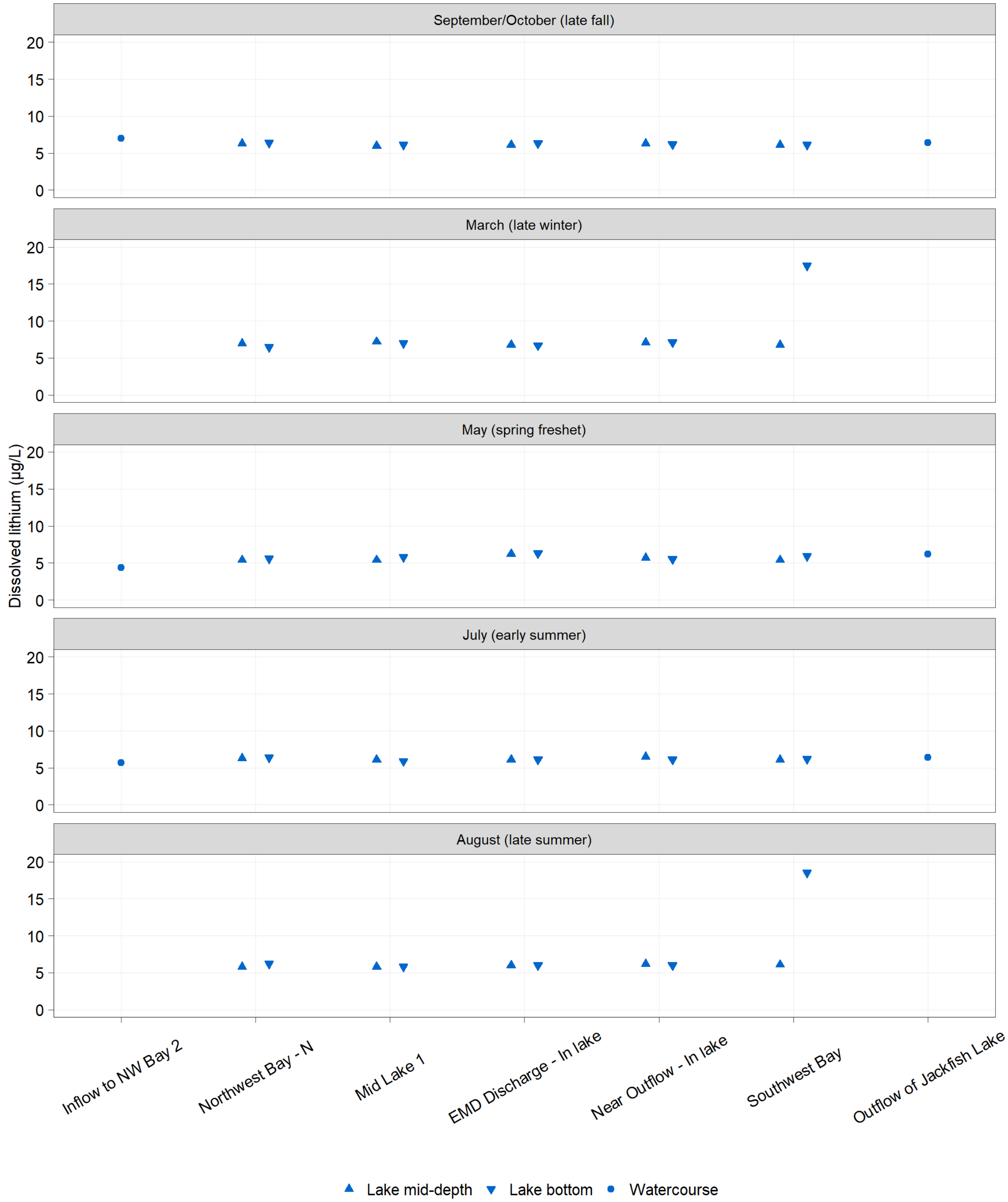
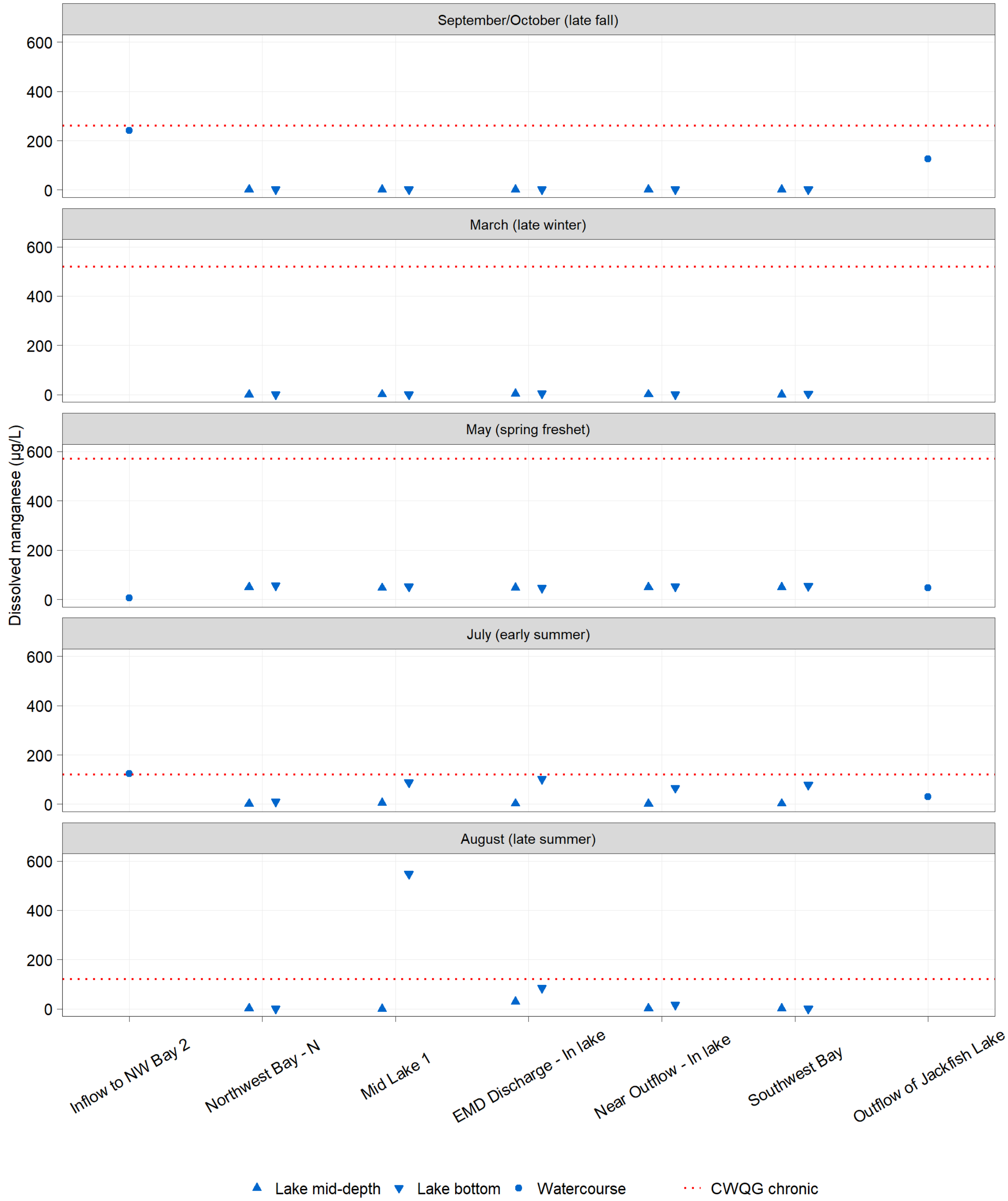
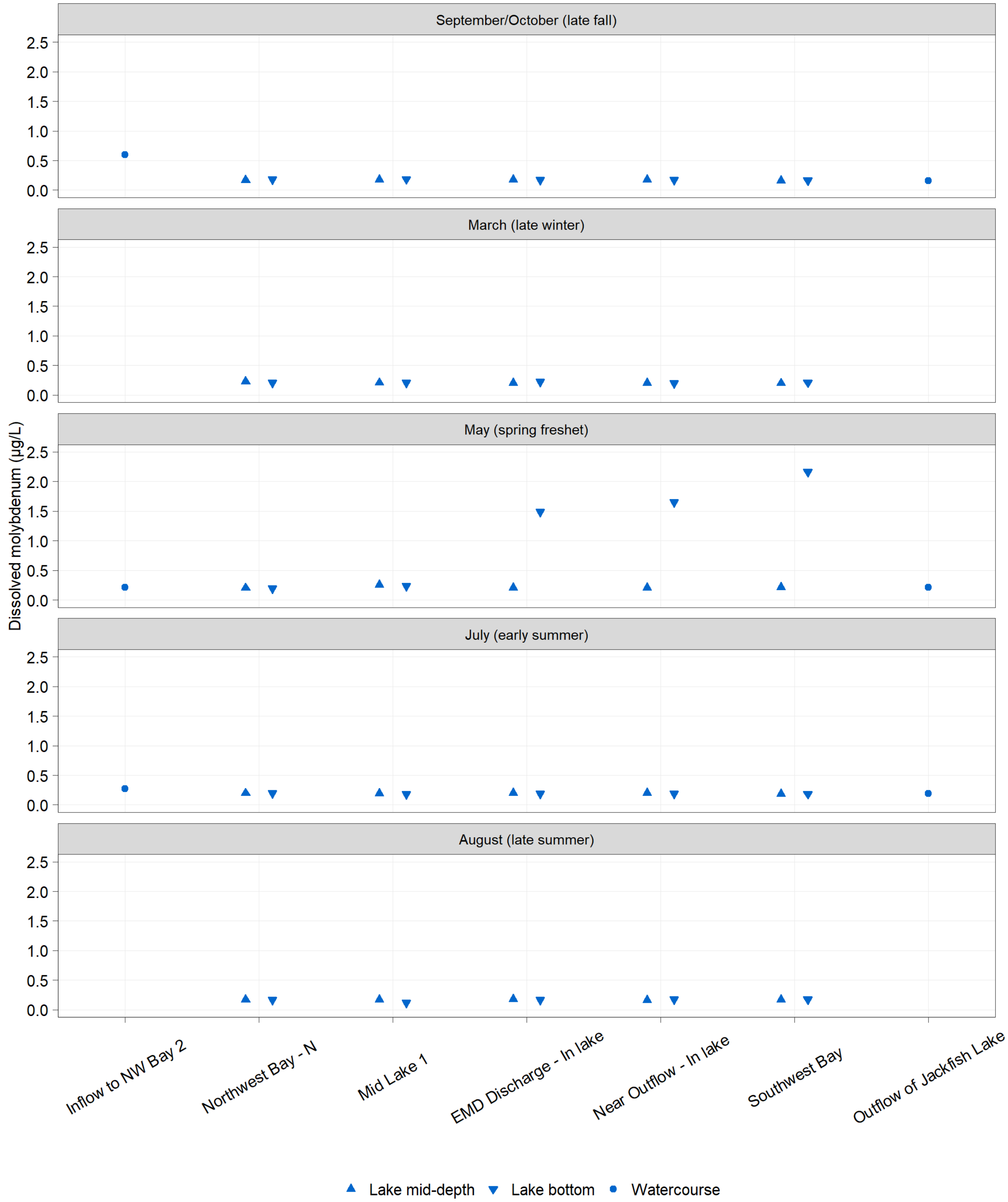


Figure E.5-60: Dissolved Manganese Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



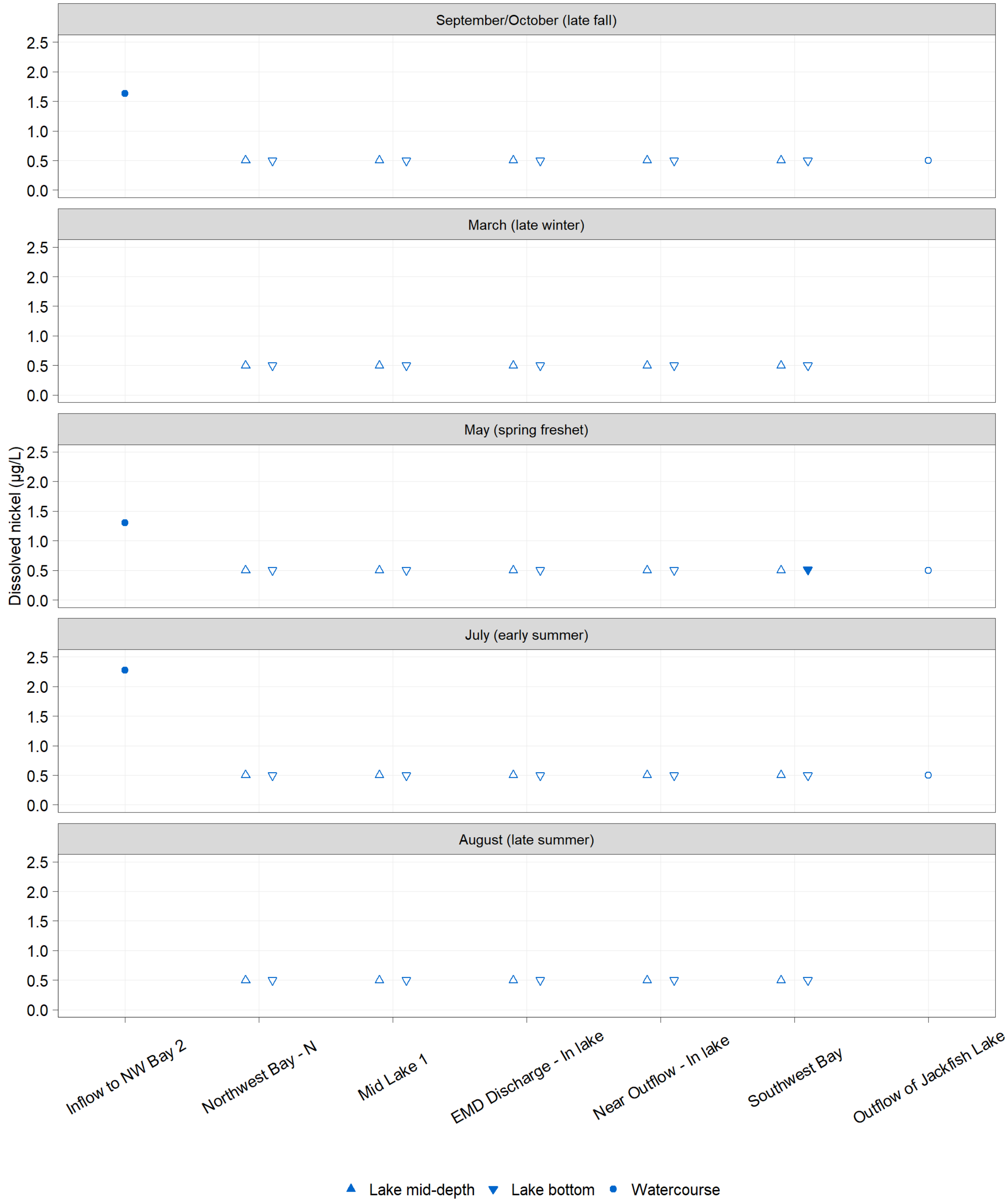
Notes:
The acute CWQG for dissolved manganese is hardness dependent. The minimum acute CWQG for dissolved manganese is 6,575 µg/L.
The chronic CWQG for dissolved manganese is pH and hardness dependent. The minimum applicable chronic CWQGs for each season were plotted.
CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life.

Figure E.5-61: Dissolved Molybdenum Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
Three total molybdenum concentrations (greater than 1 µg/L) at EMD Discharge - In lake, Near Outflow - In lake, and Southwest Bay in May 2022 were outside of historical ranges. Due to insufficient evidence of field contamination and laboratory error, these data points were qualified.

Figure E.5-62: Dissolved Nickel Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
Concentrations below the detection limit are shown at the detection limit as open markers.

Figure E.5-63: Dissolved Rubidium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

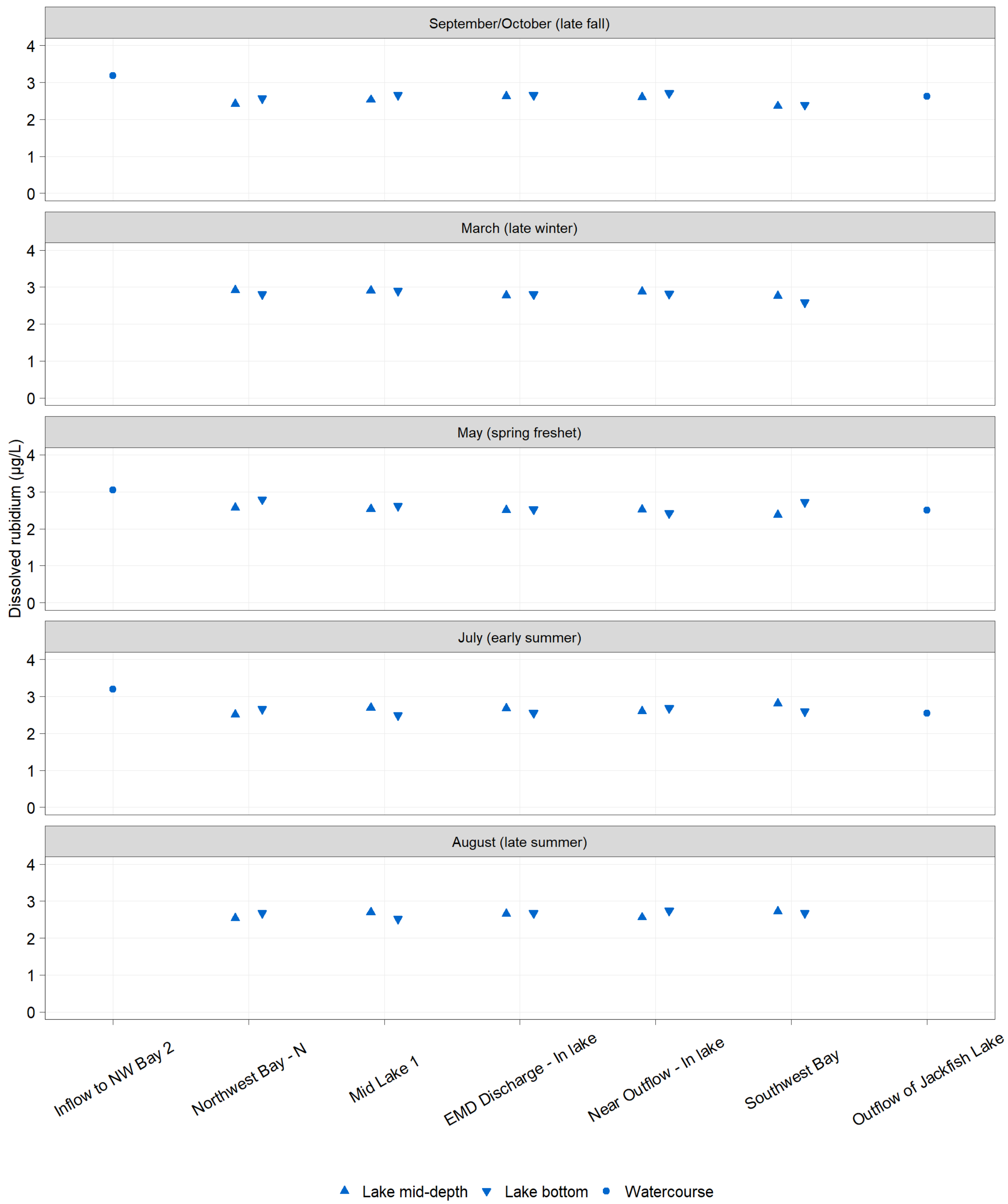
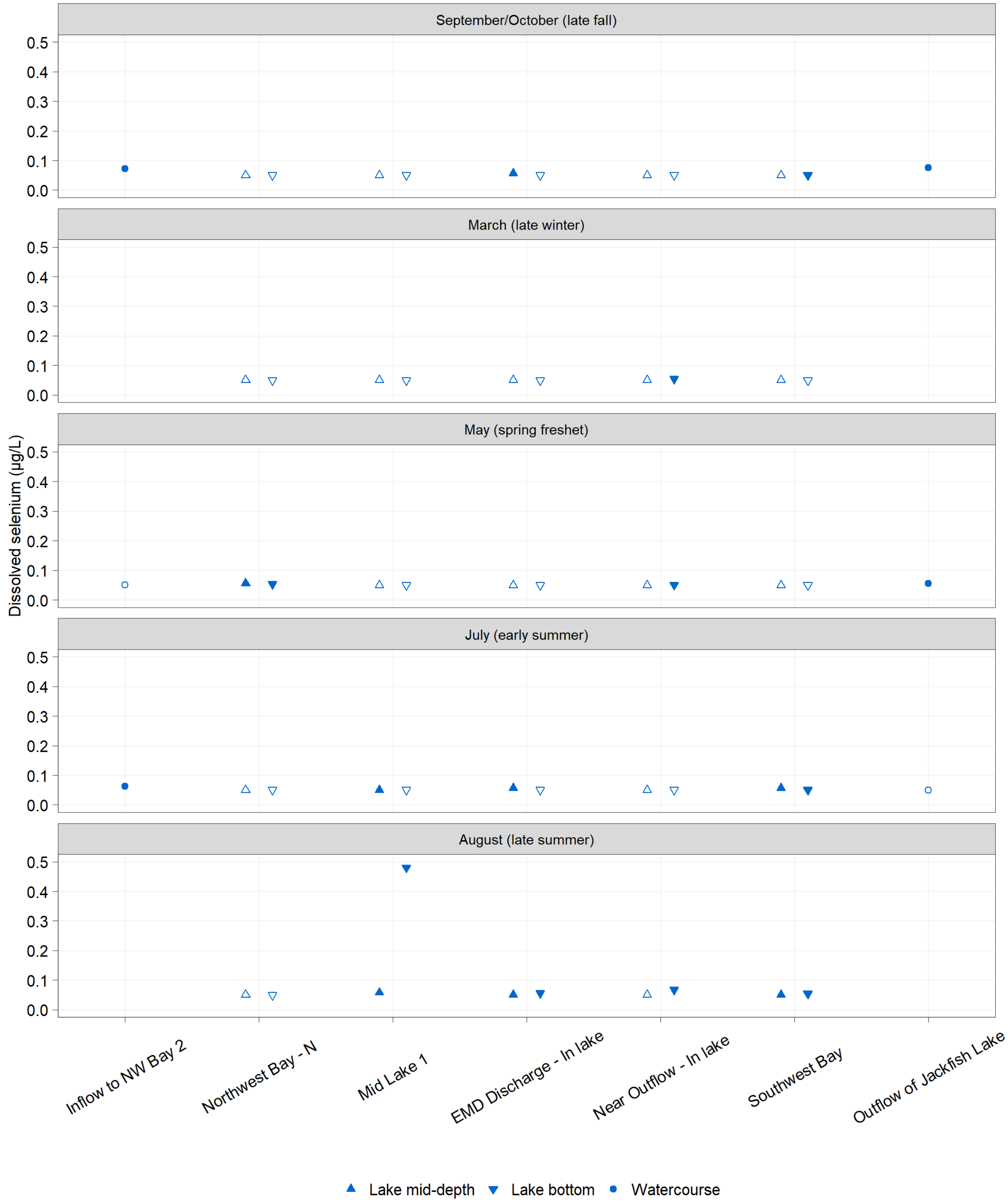


Figure E.5-64: Dissolved Selenium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
Concentrations below the detection limit are shown at the detection limit as open markers.

Figure E.5-65: Dissolved Silicon Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

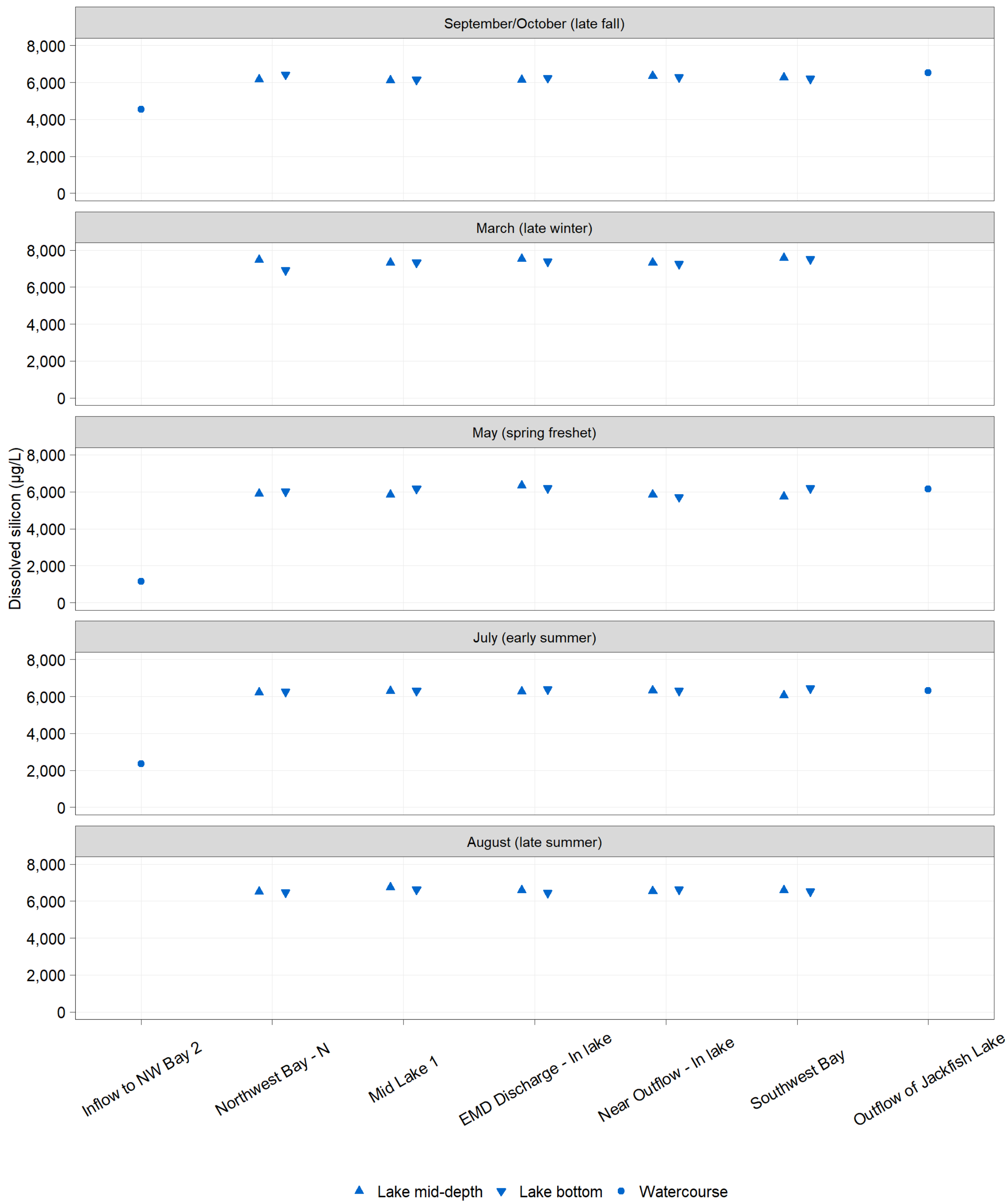


Figure E.5-66: Dissolved Strontium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

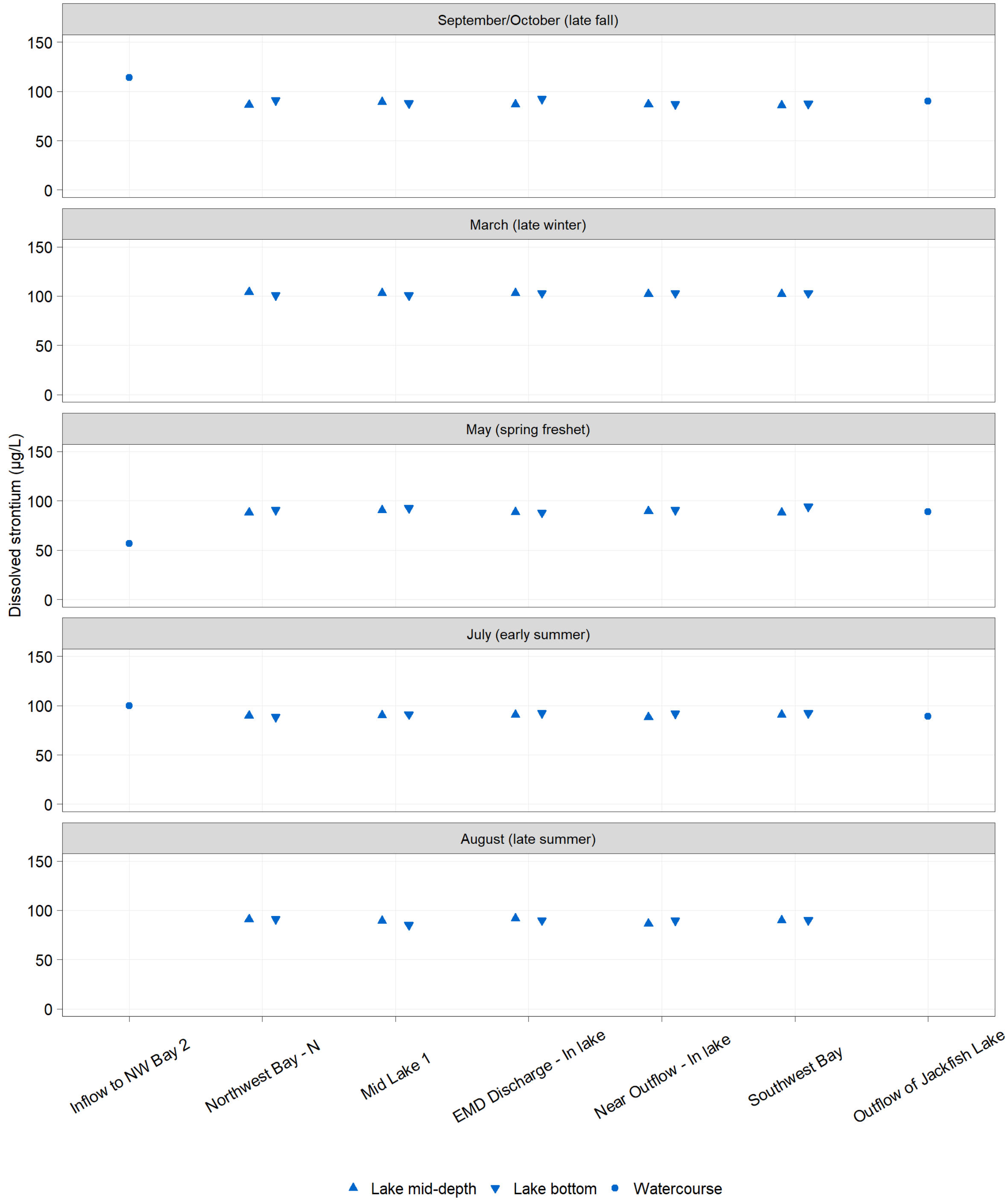


Figure E.5-67: Dissolved Sulphur Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

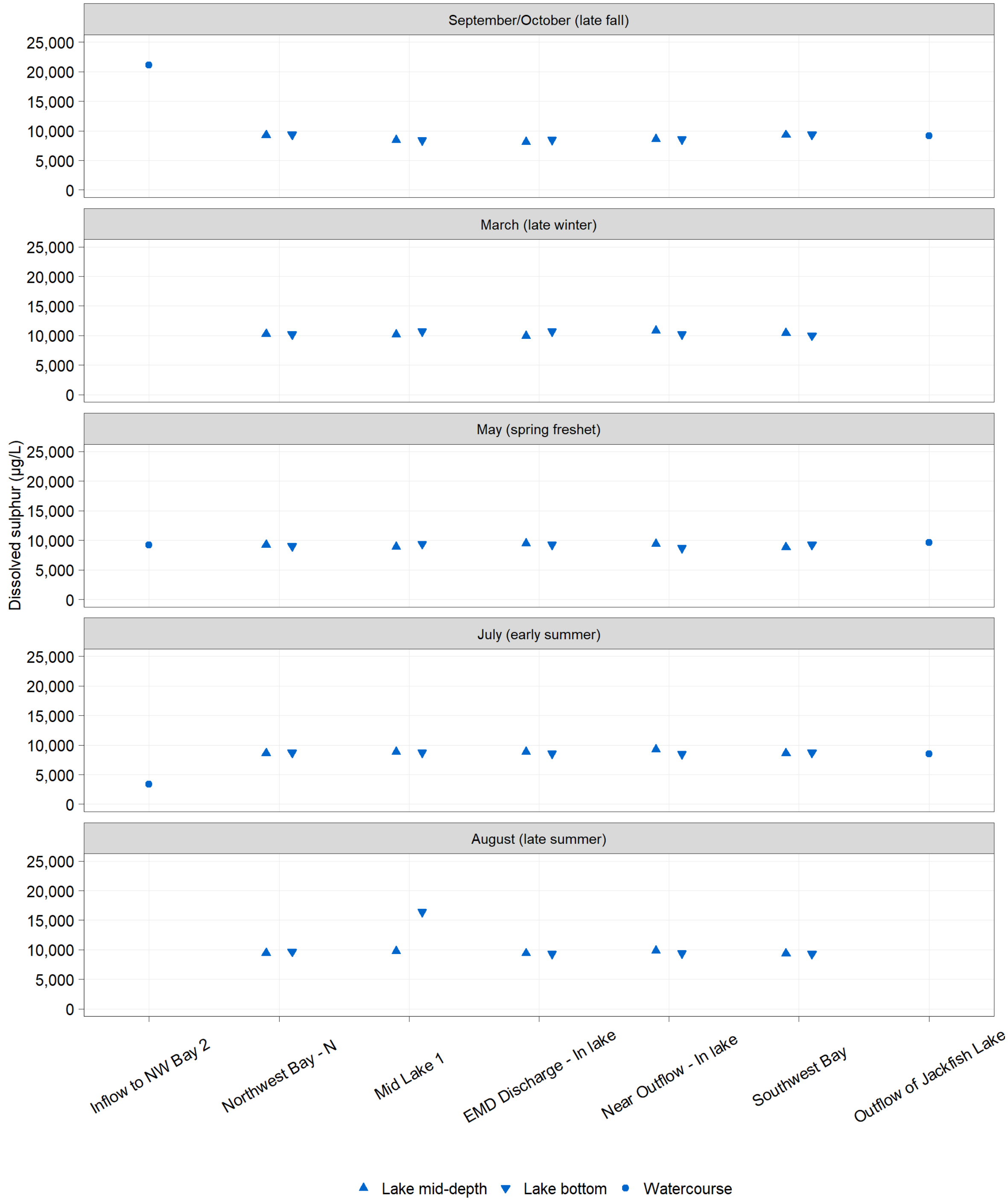
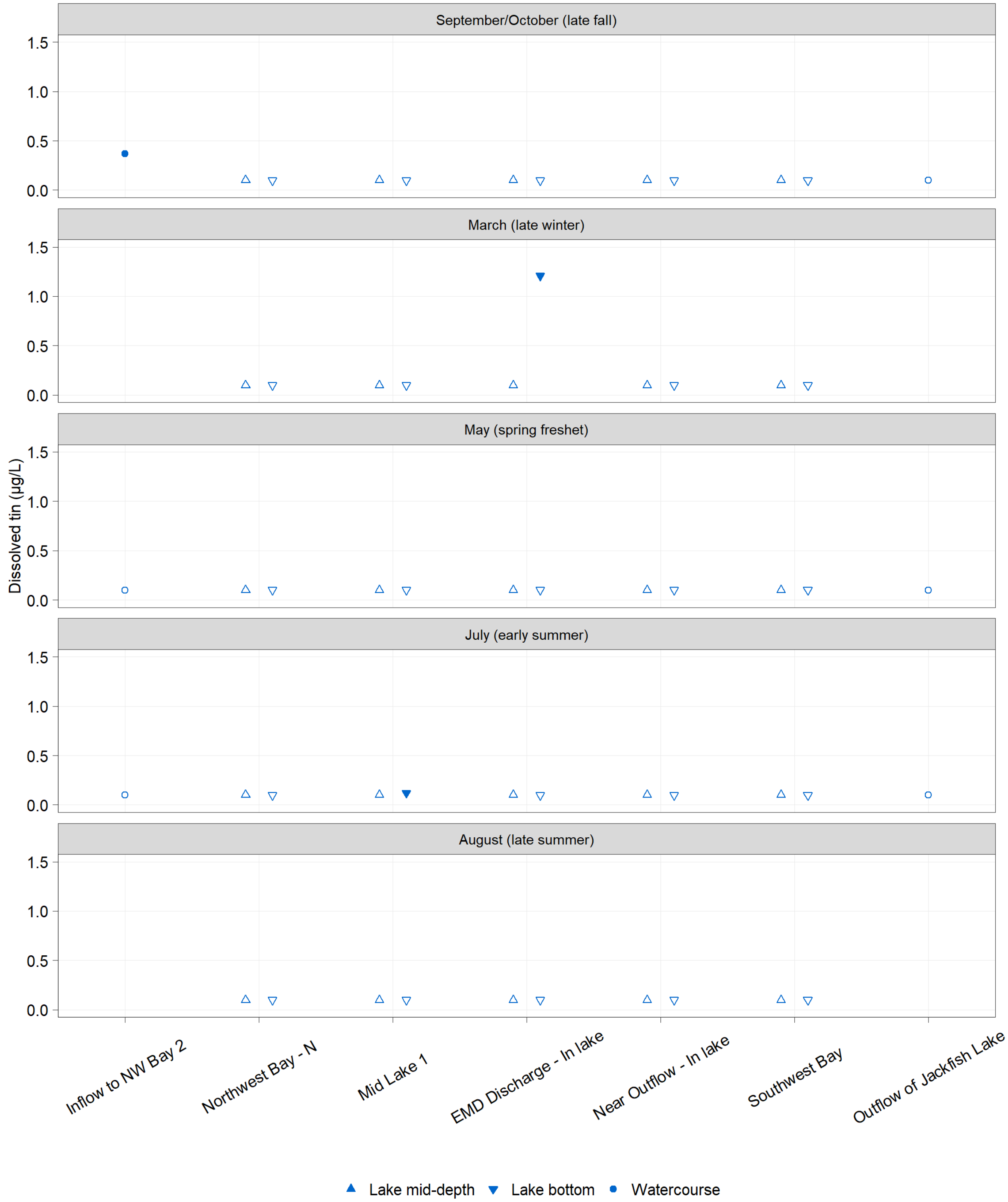


Figure E.5-68: Dissolved Tin Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



Note:
Concentrations below the detection limit are shown at the detection limit as open markers.

Figure E.5-69: Dissolved Uranium Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022

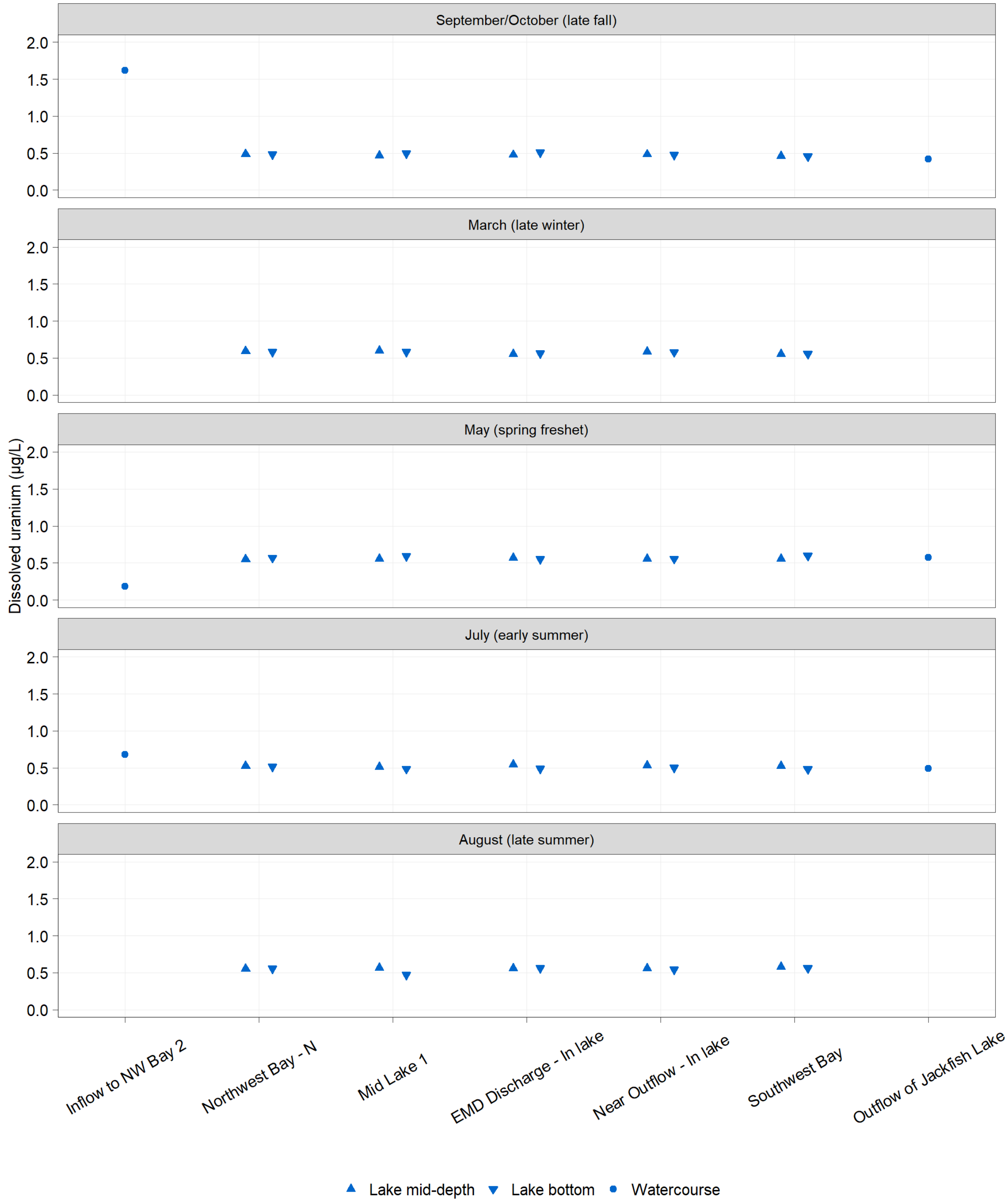
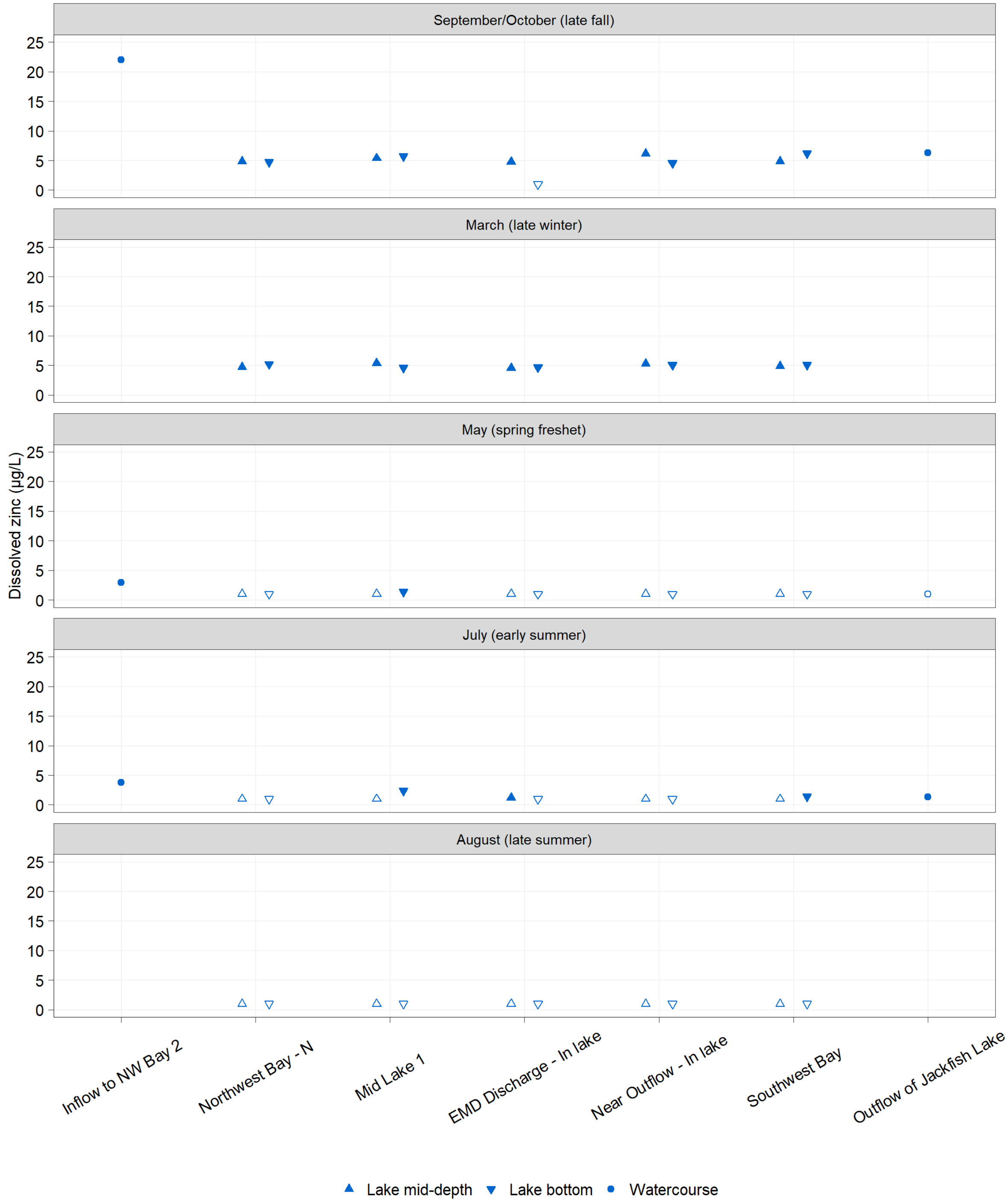
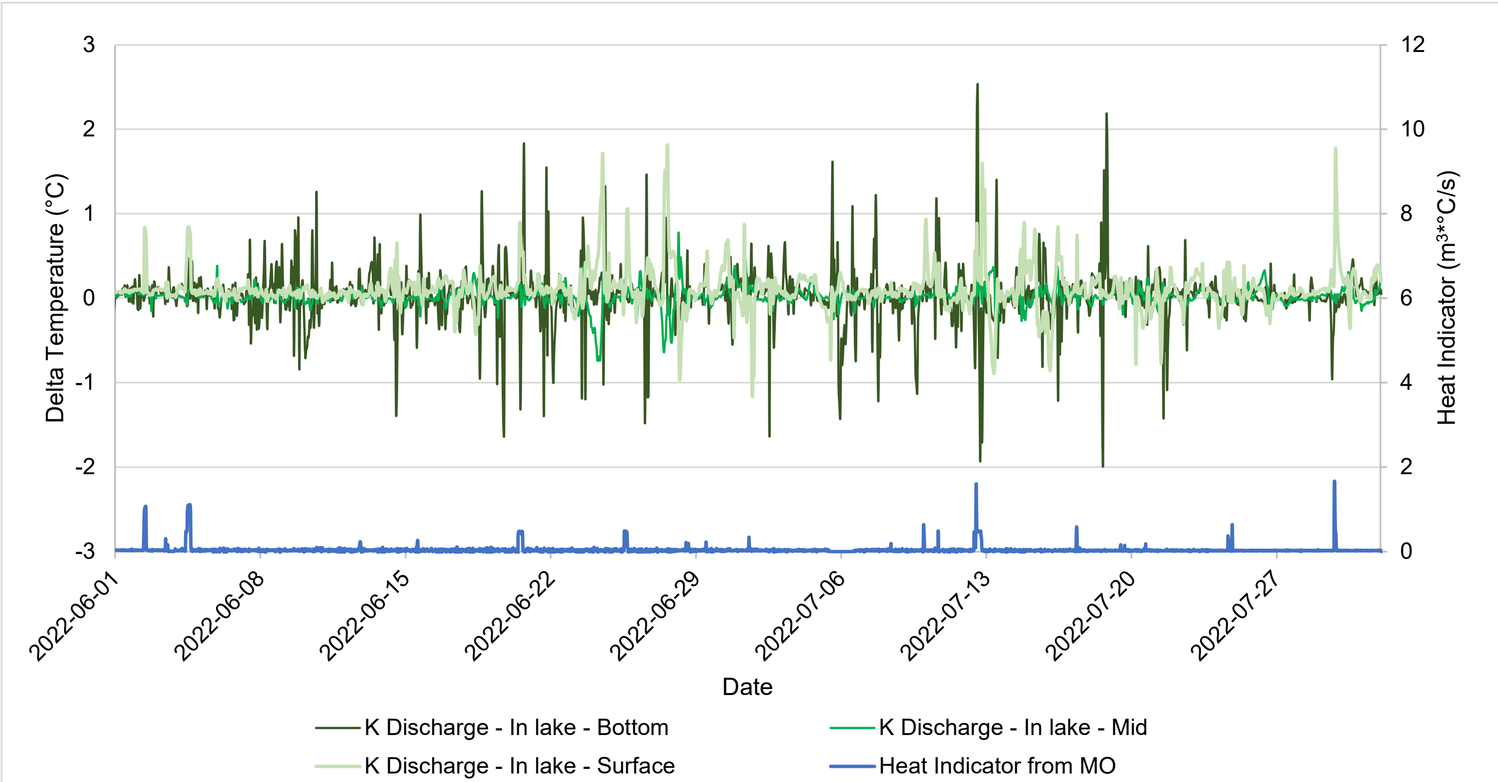


Figure E.5-70: Dissolved Zinc Concentrations in the Inflow to Jackfish Lake, Jackfish Lake, and the Outflow of Jackfish Lake, September 2021 to August 2022



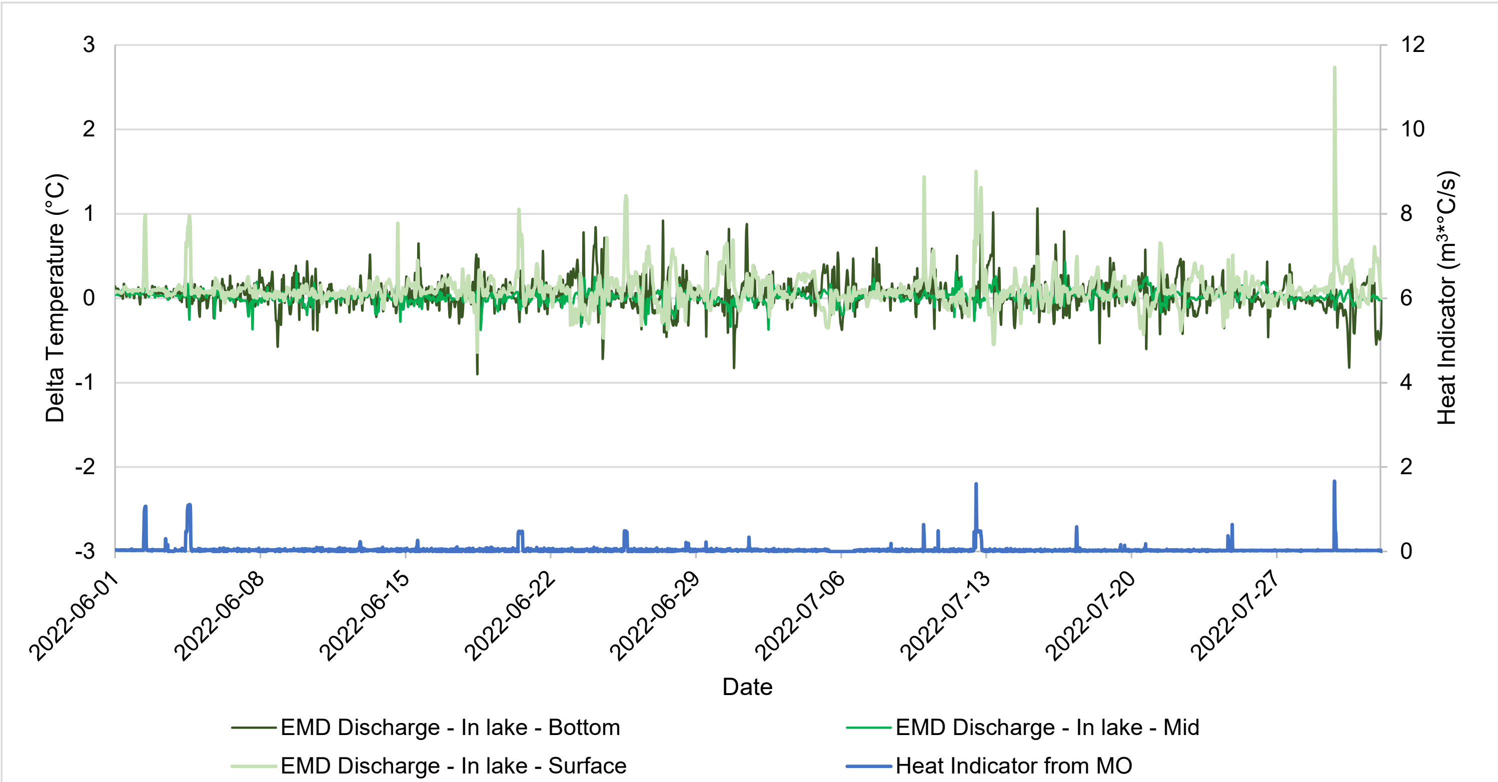
Notes:
Concentrations below the detection limit are shown at the detection limit as open markers.
The acute CWQG for dissolved zinc is hardness and DOC dependent. The minimum acute CWQG for dissolved zinc is 154 µg/L.
The chronic CWQG for dissolved zinc is pH, hardness, and DOC dependent. The minimum chronic CWQG for dissolved zinc is 40 µg/L.
CWQG = Canadian Water Quality Guideline for the protection of freshwater aquatic life; DOC = dissolved organic carbon.

Figure E.6-1: Modelled Temperature Differences between Non-Operational and Measured Operational Scenarios at K Discharge - In Lake, 1 June to 1 August 2022



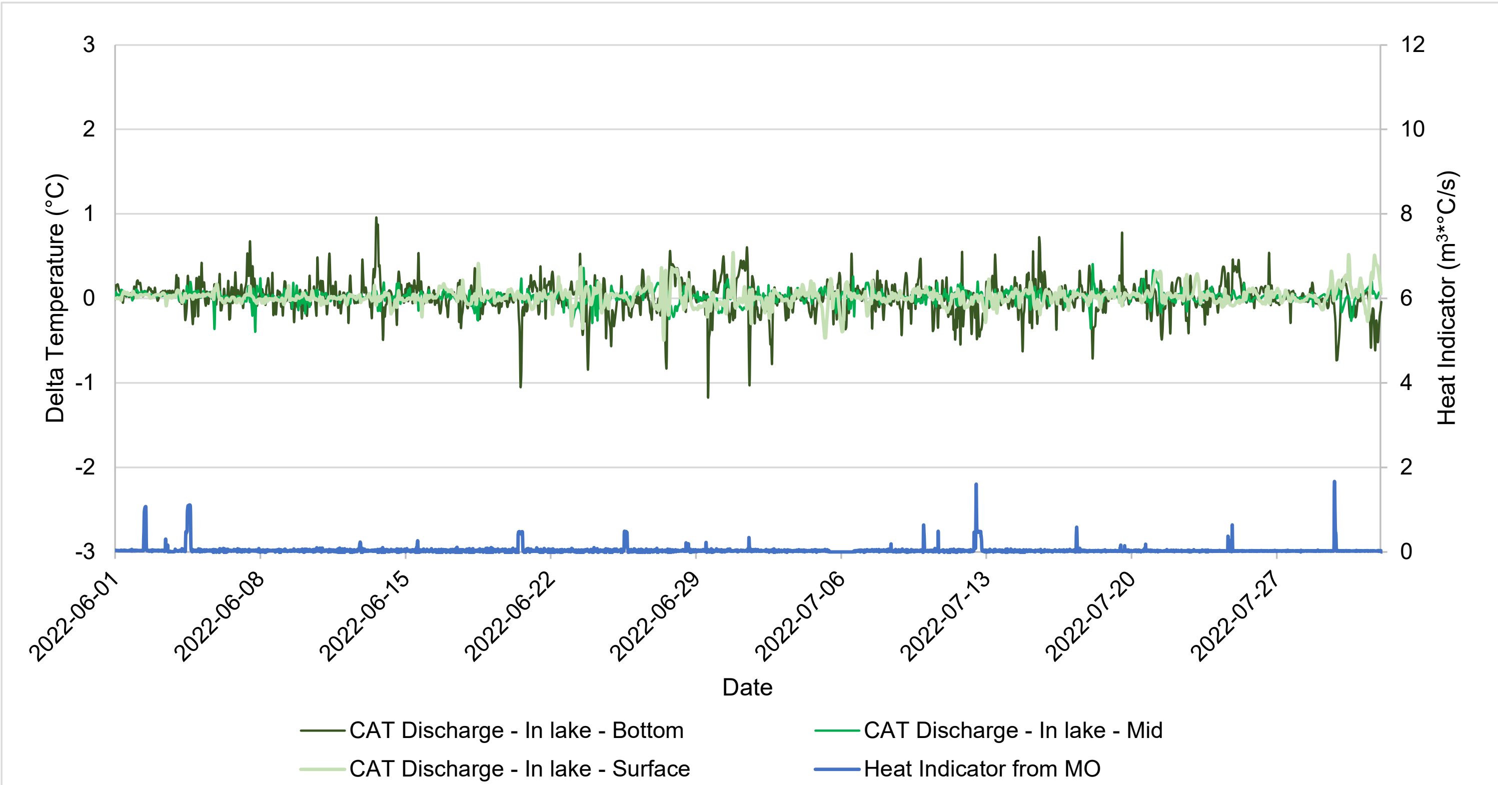
Note:
Delta temperature was calculated by subtracting the modelled temperature of the non-operational scenario from the modelled temperature of the measured operational scenario.
MO = measured operational scenario.

Figure E.6-2: Modelled Temperature Differences between Non-Operational and Measured Operational Scenarios at EMD Discharge - In Lake, 1 June to 1 August 2022



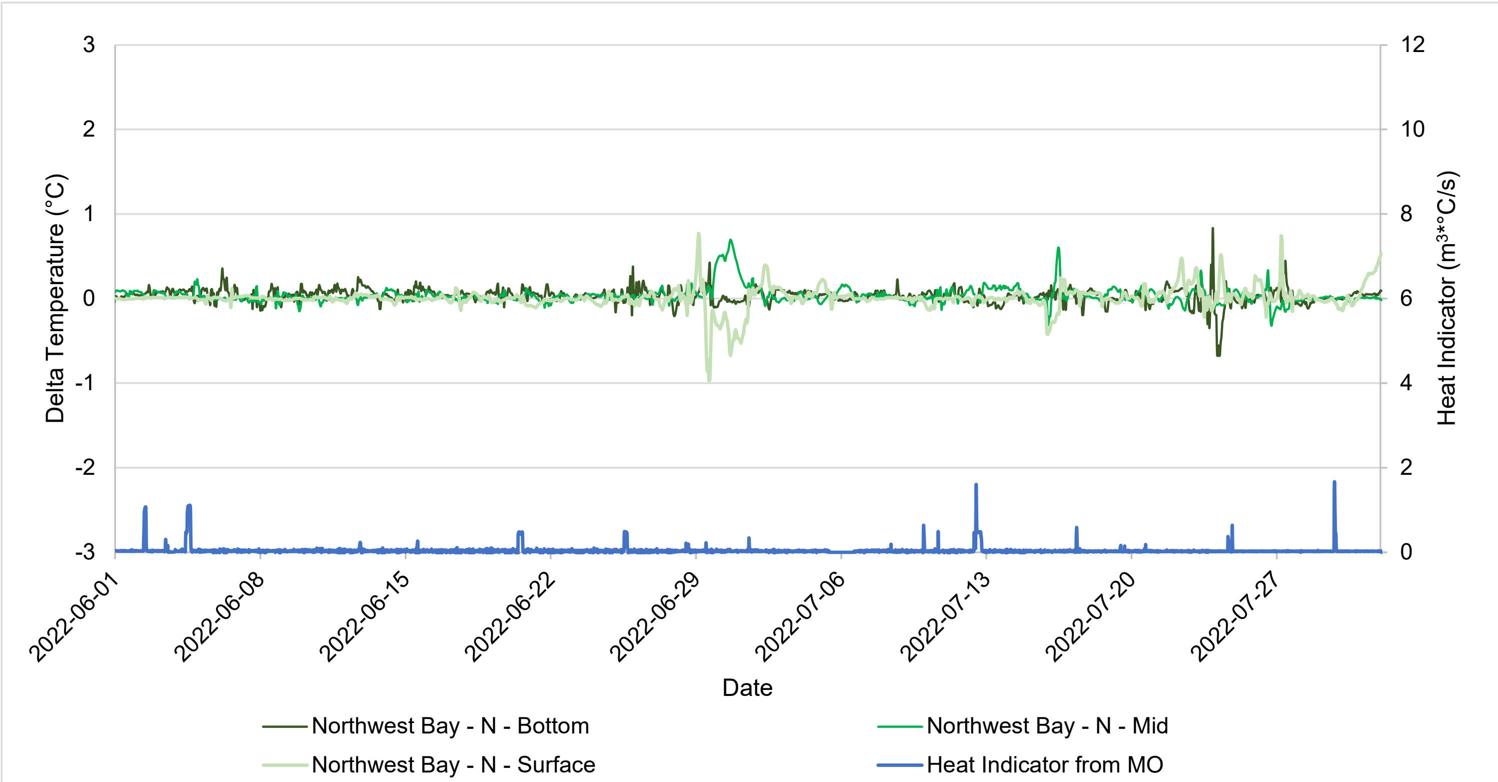
Note:
Delta temperature was calculated by subtracting the modelled temperature of the non-operational scenario from the modelled temperature of the measured operational scenario.
MO = measured operational scenario.

Figure E.6-3: Modelled Temperature Differences between Non-Operational and Measured Operational Scenarios at CAT Discharge - In Lake, 1 June to 1 August 2022



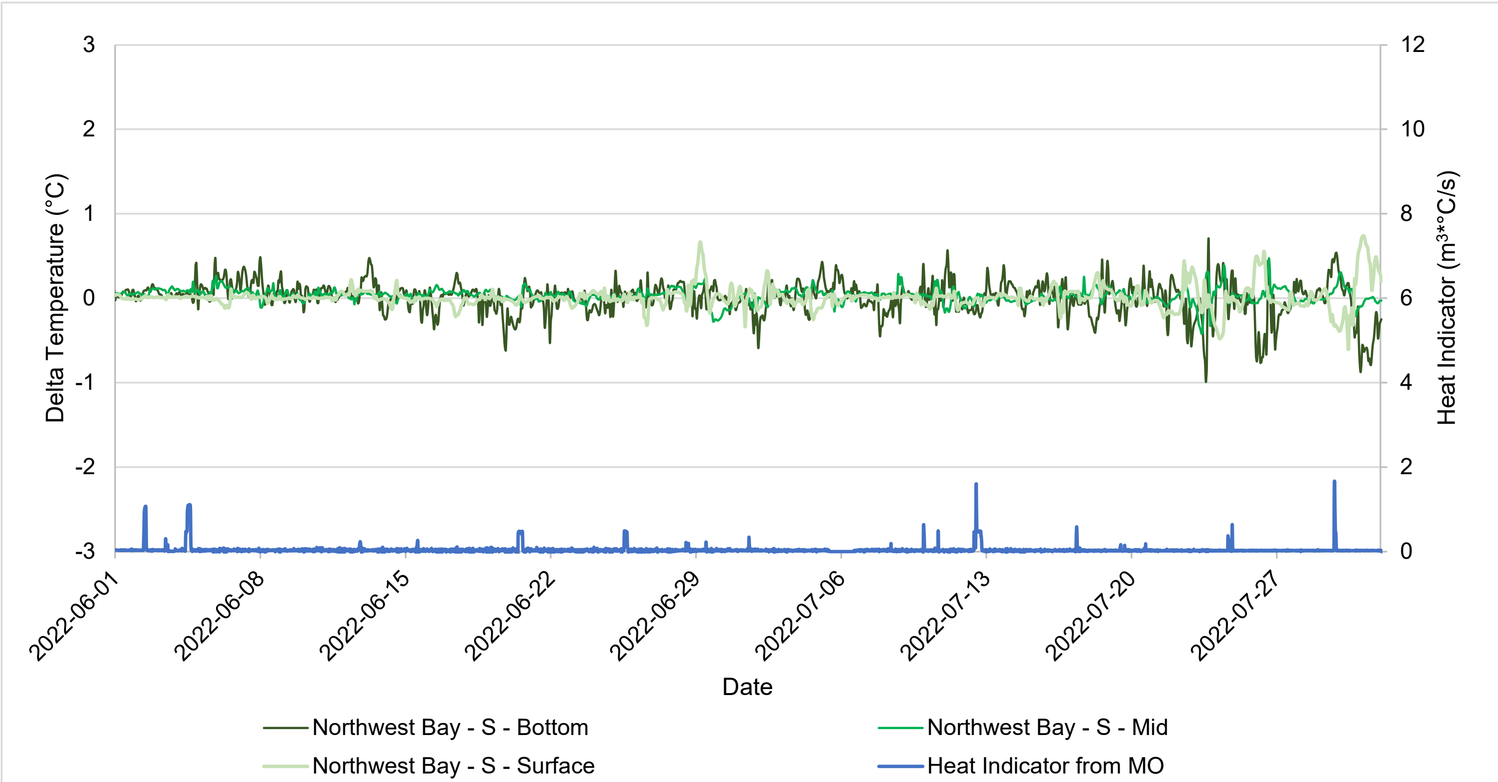
Note:
Delta temperature was calculated by subtracting the modelled temperature of the non-operational scenario from the modelled temperature of the measured operational scenario.
MO = measured operational scenario.

Figure E.6-4: Modelled Temperature Differences between Non-Operational and Measured Operational Scenarios at Northwest Bay - N, 1 June to 1 August 2022



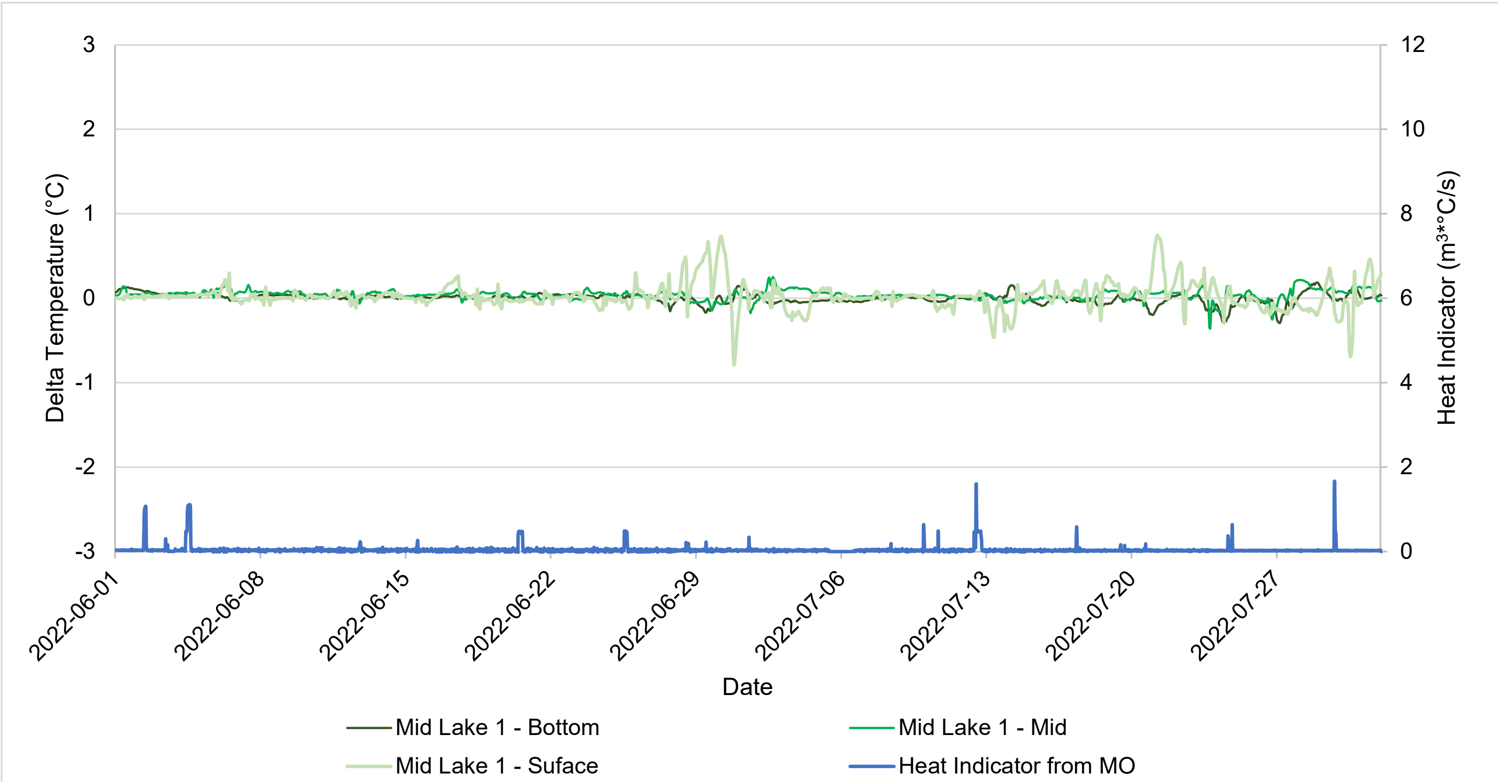
Note:
Delta temperature was calculated by subtracting the modelled temperature of the non-operational scenario from the modelled temperature of the measured operational scenario.
MO = measured operational scenario.

Figure E.6-5: Modelled Temperature Differences between Non-Operational and Measured Operational Scenarios at Northwest Bay - S, 1 June to 1 August 2022



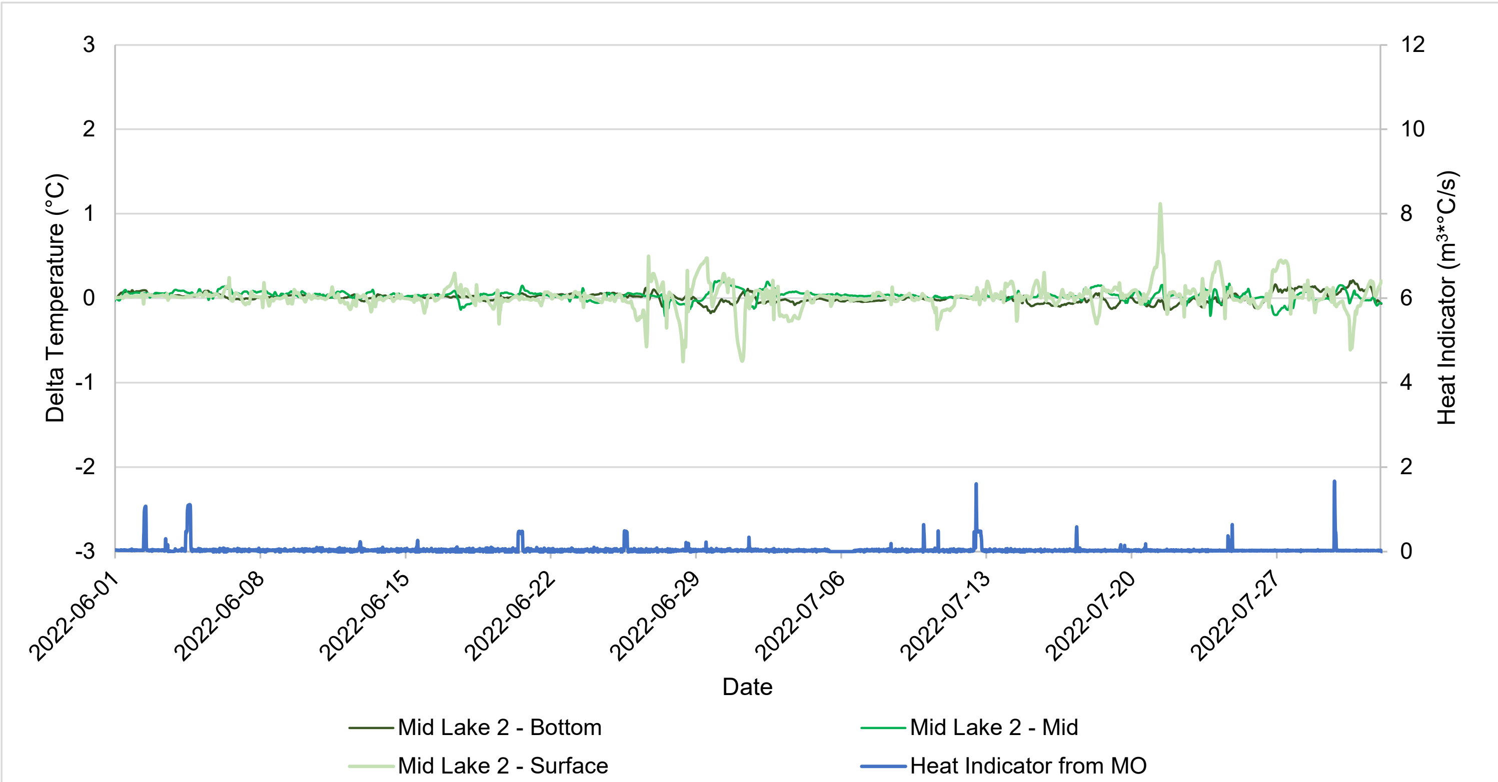
Note:
Delta temperature was calculated by subtracting the modelled temperature of the non-operational scenario from the modelled temperature of the measured operational scenario.
MO = measured operational scenario.

Figure E.6-6: Modelled Temperature Differences between Non-Operational and Measured Operational Scenarios at Mid Lake 1, 1 June to 1 August 2022



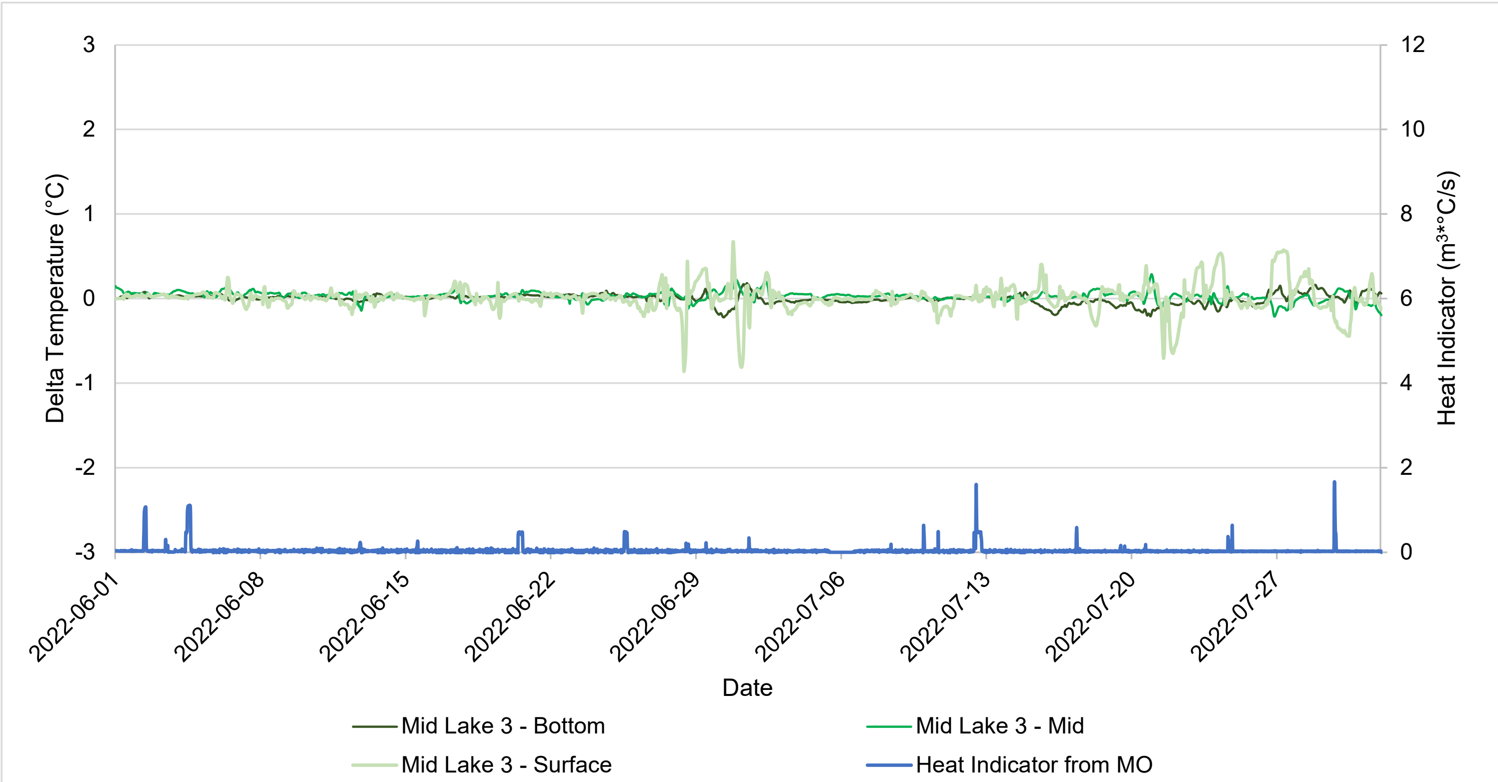
Note:
Delta temperature was calculated by subtracting the modelled temperature of the non-operational scenario from the modelled temperature of the measured operational scenario.
MO = measured operational scenario.

Figure E.6-7: Modelled Temperature Differences between Non-Operational and Measured Operational Scenarios at Mid Lake 2, 1 June to 1 August 2022



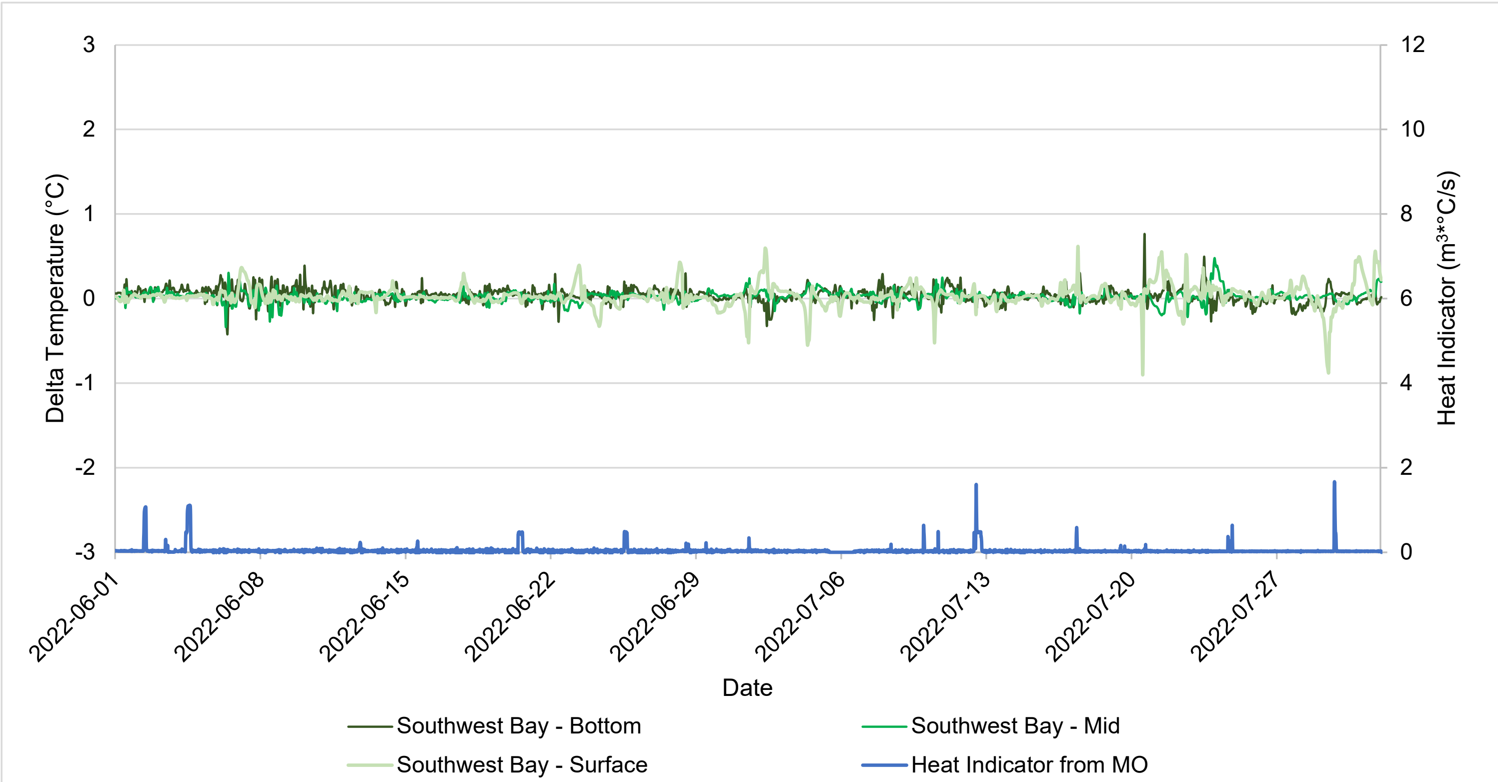
Note:
Delta temperature was calculated by subtracting the modelled temperature of the non-operational scenario from the modelled temperature of the measured operational scenario.
MO = measured operational scenario.

Figure E.6-8: Modelled Temperature Differences between Non-Operational and Measured Operational Scenarios at Mid Lake 3, 1 June to 1 August 2022



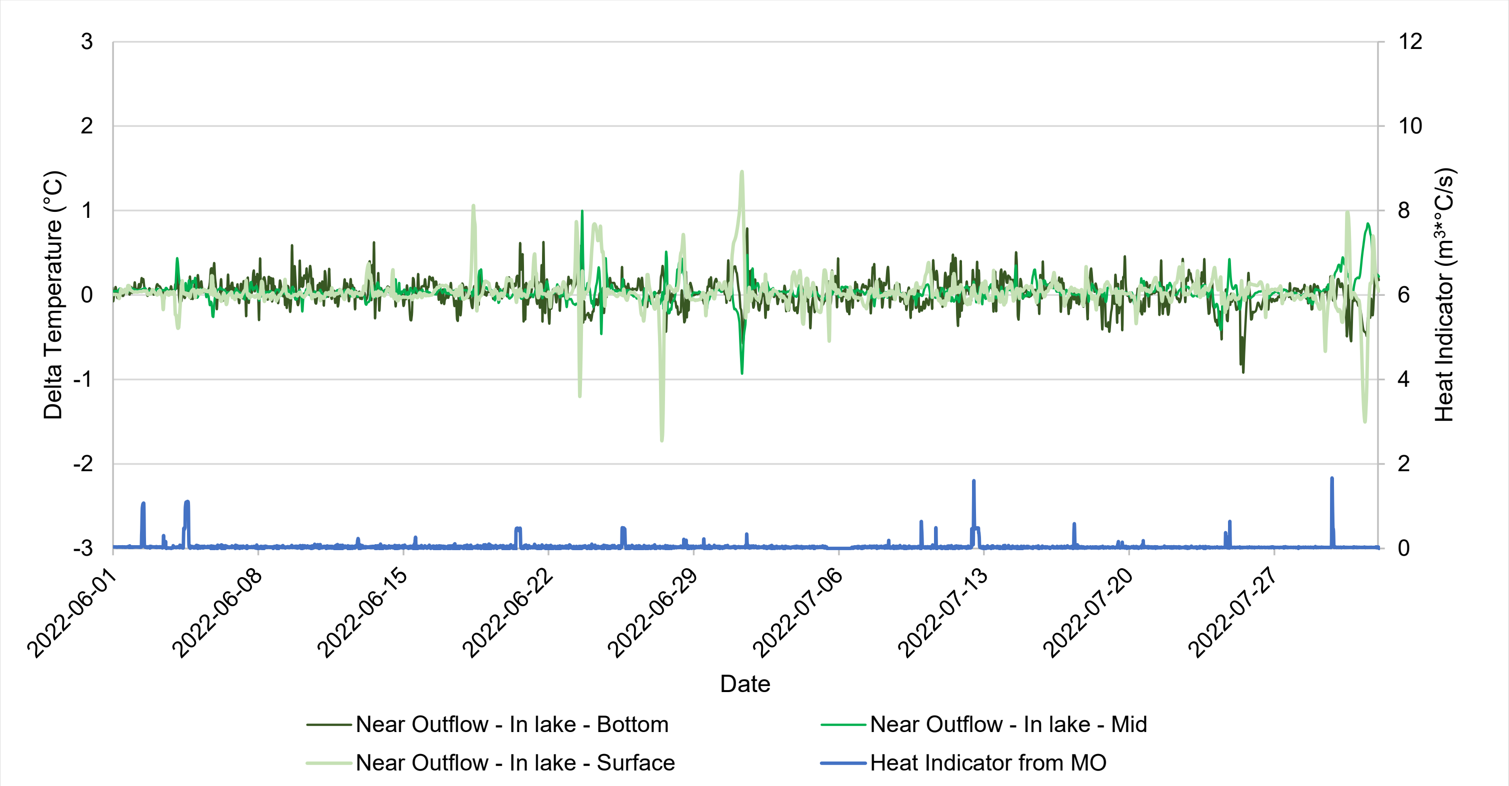
Note:
Delta temperature was calculated by subtracting the modelled temperature of the non-operational scenario from the modelled temperature of the measured operational scenario.
MO = measured operational scenario.

Figure E.6-9: Modelled Temperature Differences between Non-Operational and Measured Operational Scenarios at Southwest Bay, 1 June to 1 August 2022



Note:
Delta temperature was calculated by subtracting the modelled temperature of the non-operational scenario from the modelled temperature of the measured operational scenario.
MO = measured operational scenario.

Figure E.6-10: Modelled Temperature Differences between Non-Operational and Measured Operational Scenarios at Near Outflow - In Lake, 1 June to 1 August 2022



Note:

Delta temperature was calculated by subtracting the modelled temperature of the non-operational scenario from the modelled temperature of the measured operational scenario.

MO = measured operational scenario.

Figure E.6-11: Modelled Temperature Isopleths at K Discharge - In Lake, 1 June to 31 August

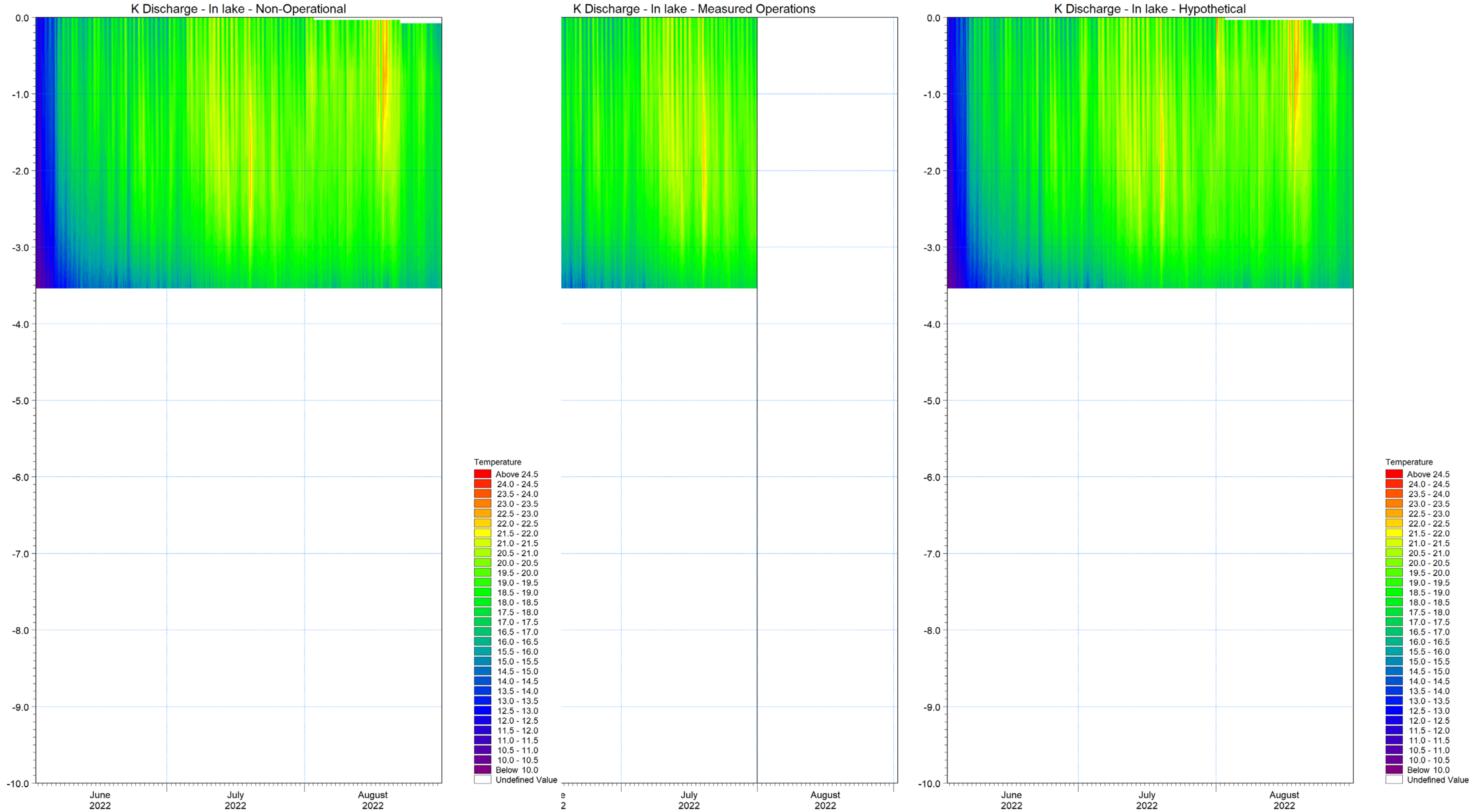


Figure E.6-12: Modelled Temperature Isopleths at EMD Discharge - In Lake, 1 June to 31 August

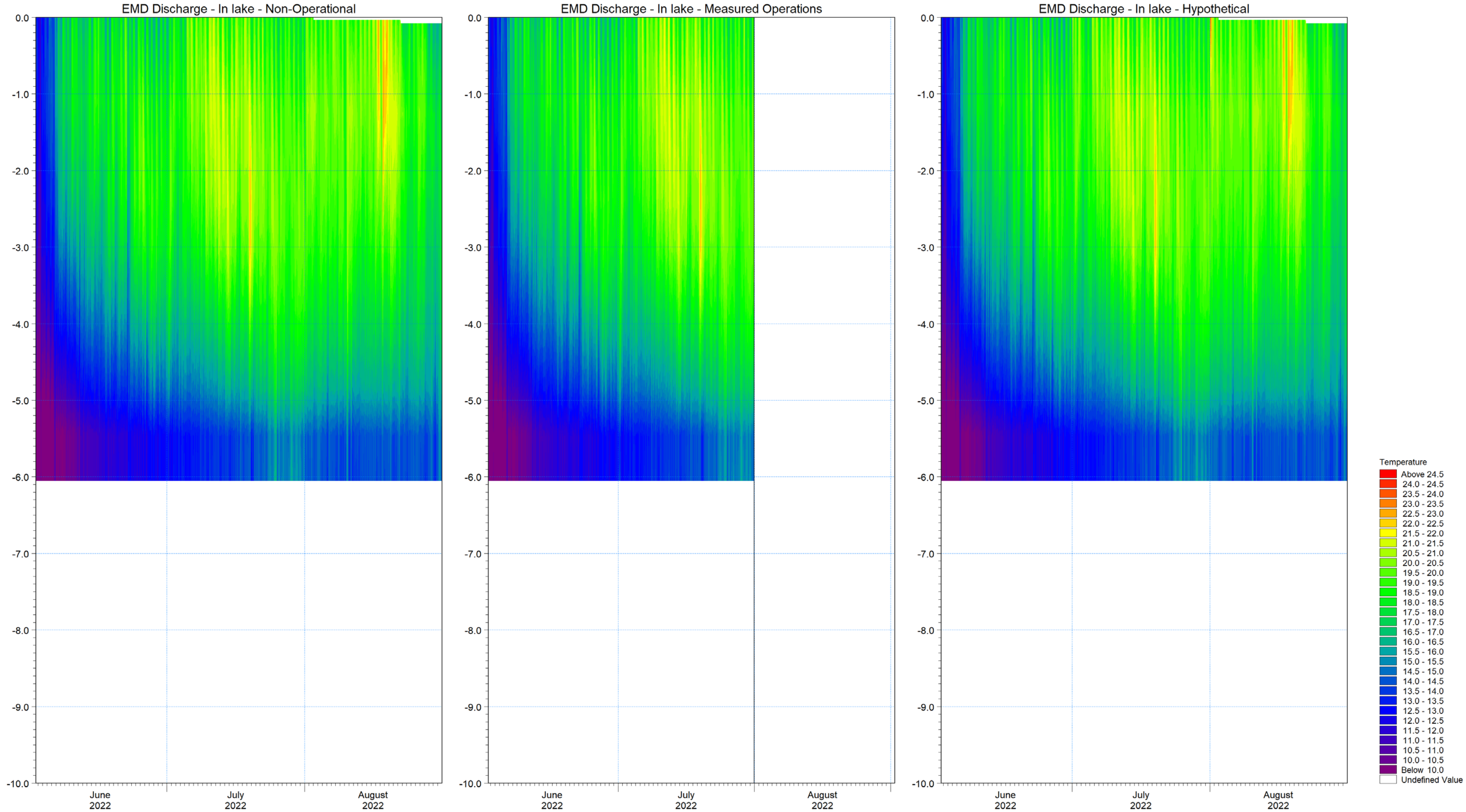


Figure E.6-13: Modelled Temperature Isopleths at CAT Discharge - In Lake, 1 June to 31 August

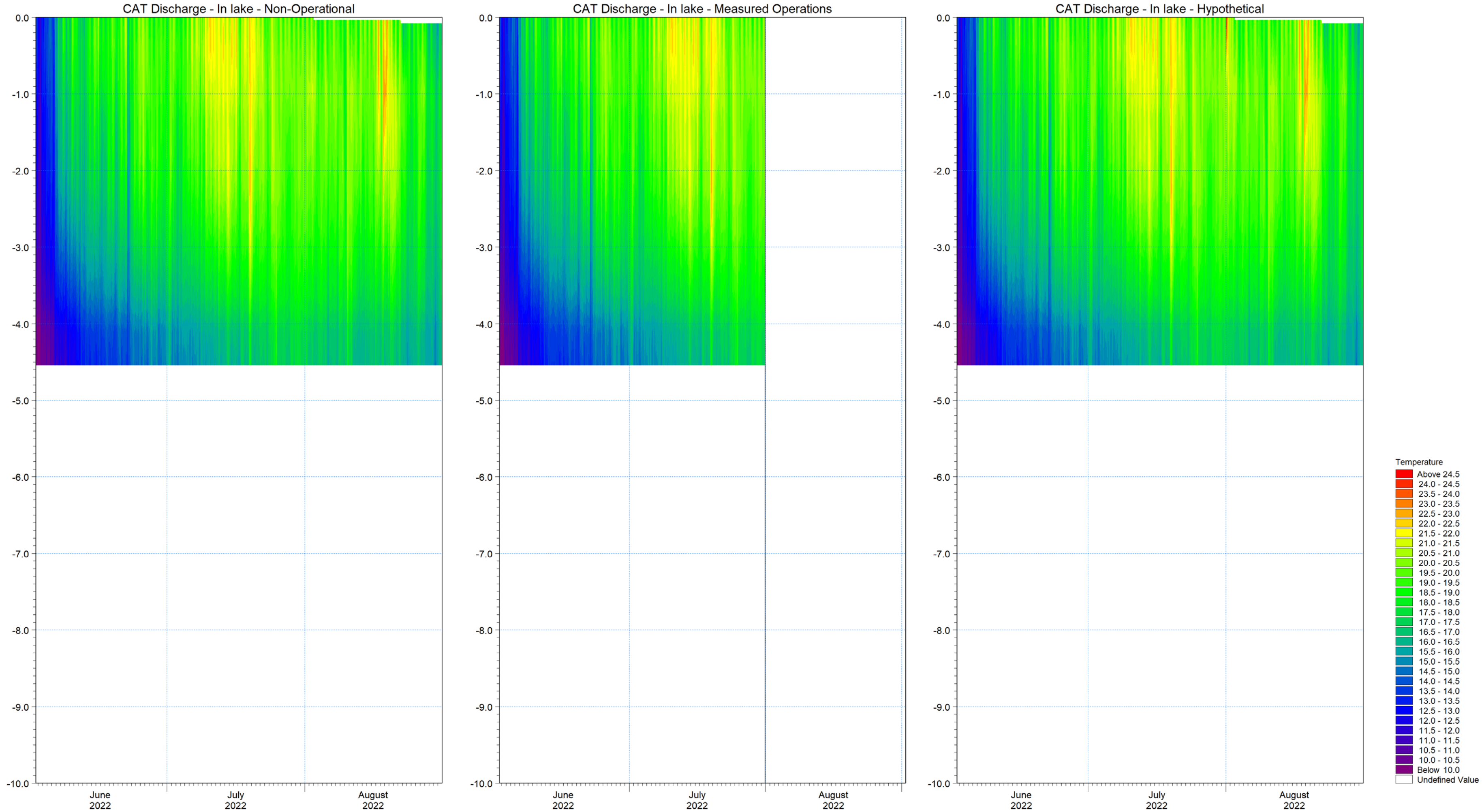


Figure E.6-14: Modelled Temperature Isopleths at Northwest Bay - N, 1 June to 31 August

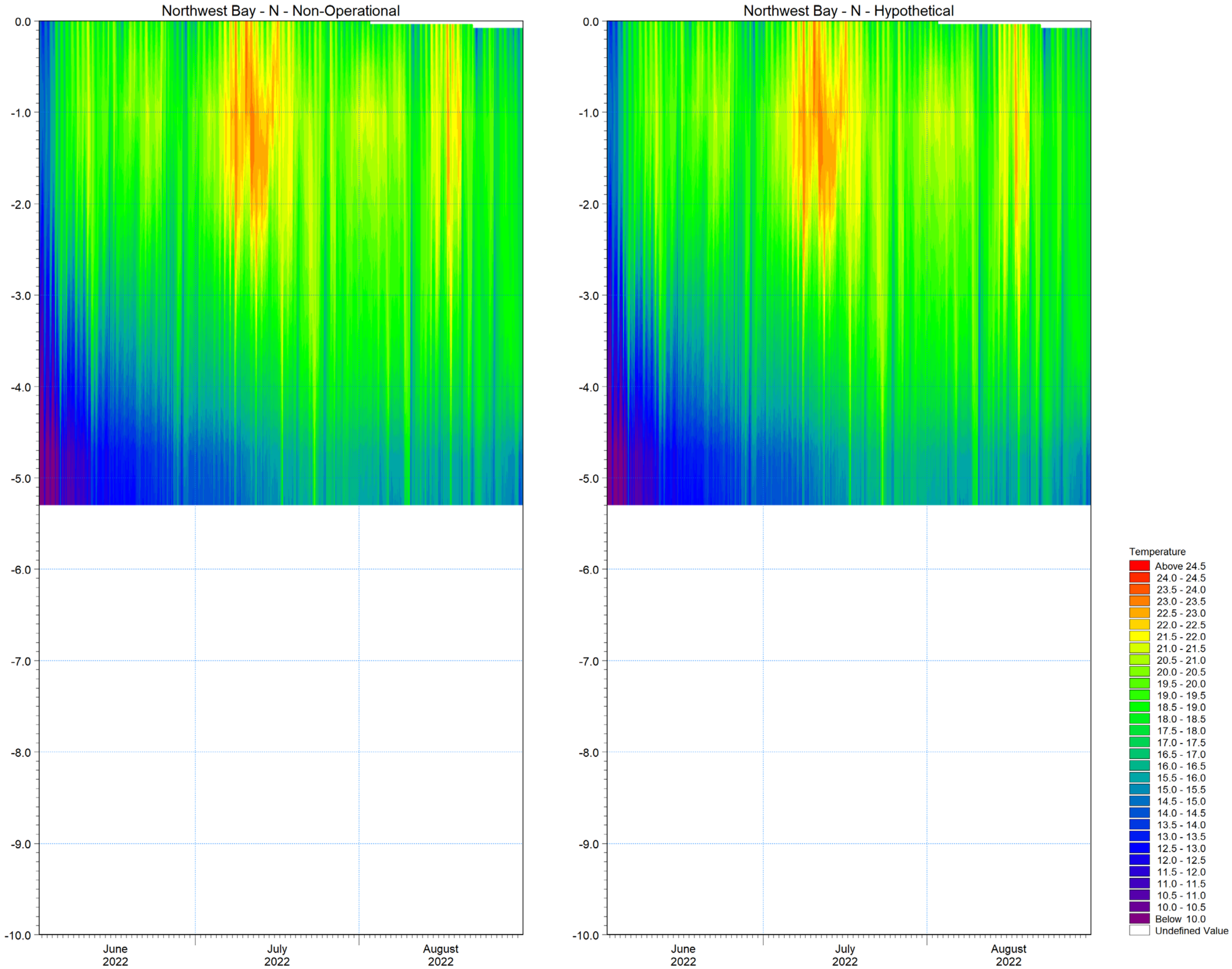


Figure E.6-15: Modelled Temperature Isopleths at Northwest Bay - S, 1 June to 31 August

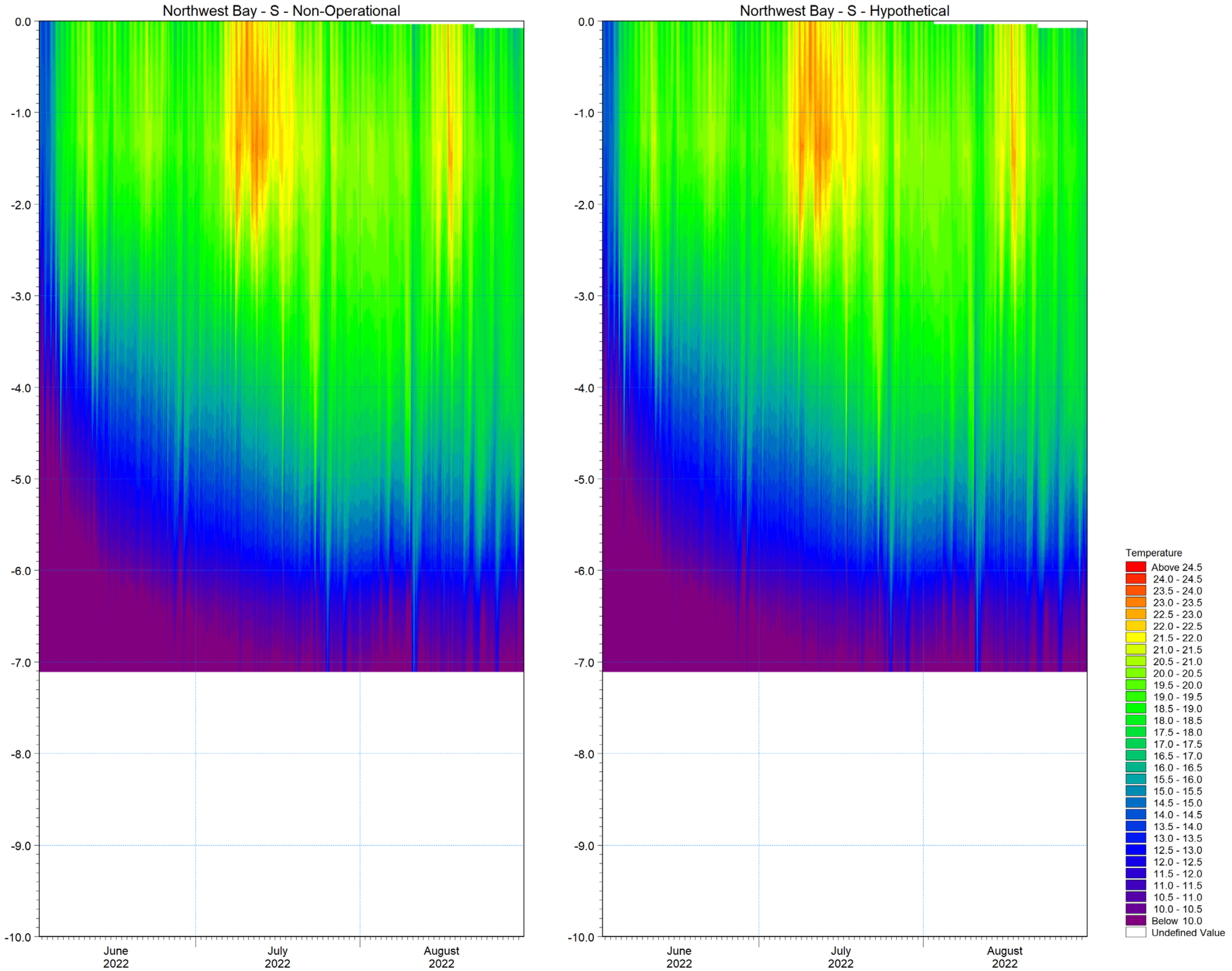


Figure E.6-16: Modelled Temperature Isopleths at Mid Lake 1, 1 June to 31 August

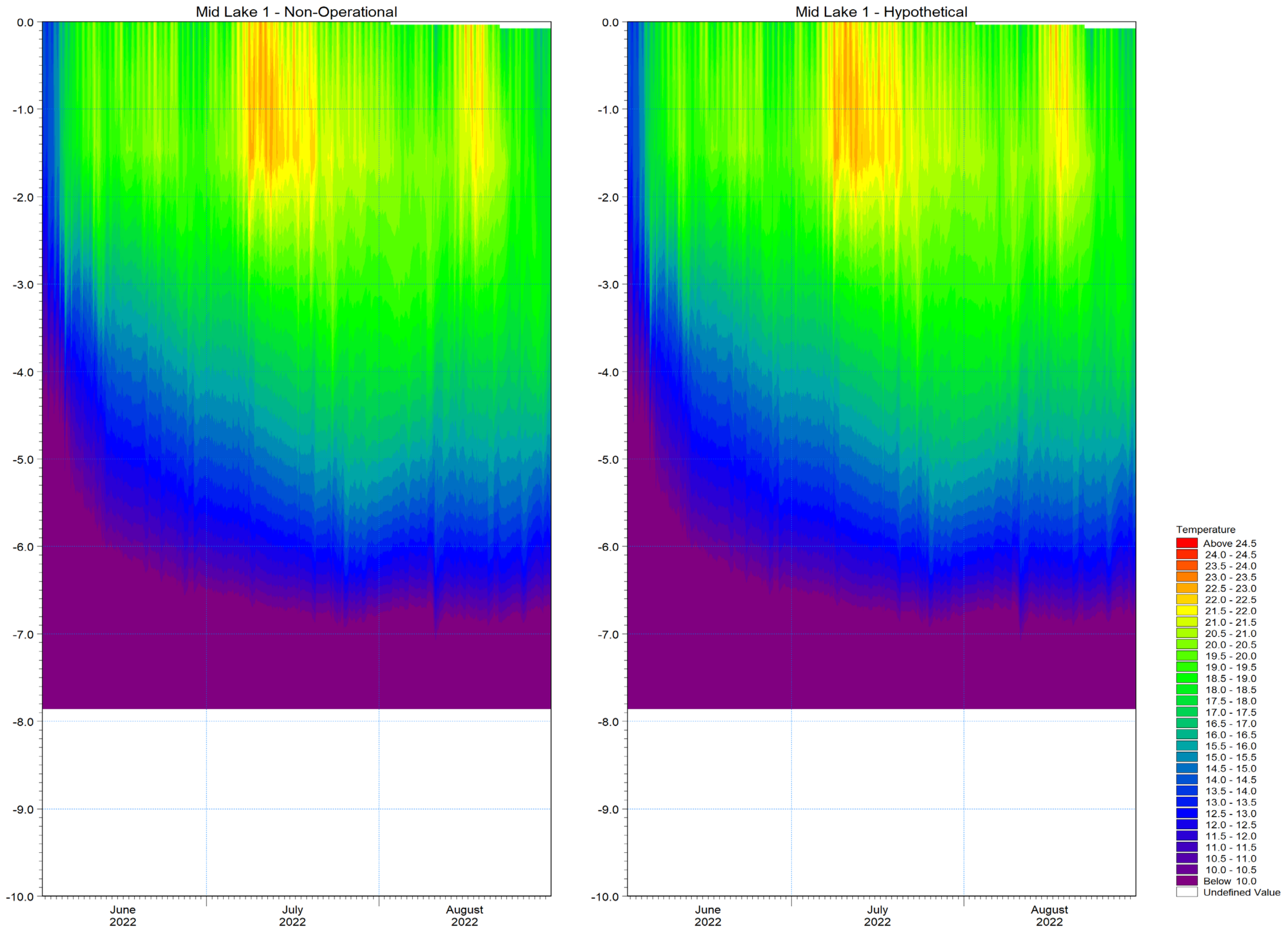


Figure E.6-17: Modelled Temperature Isopleths at Mid Lake 2, 1 June to 31 August

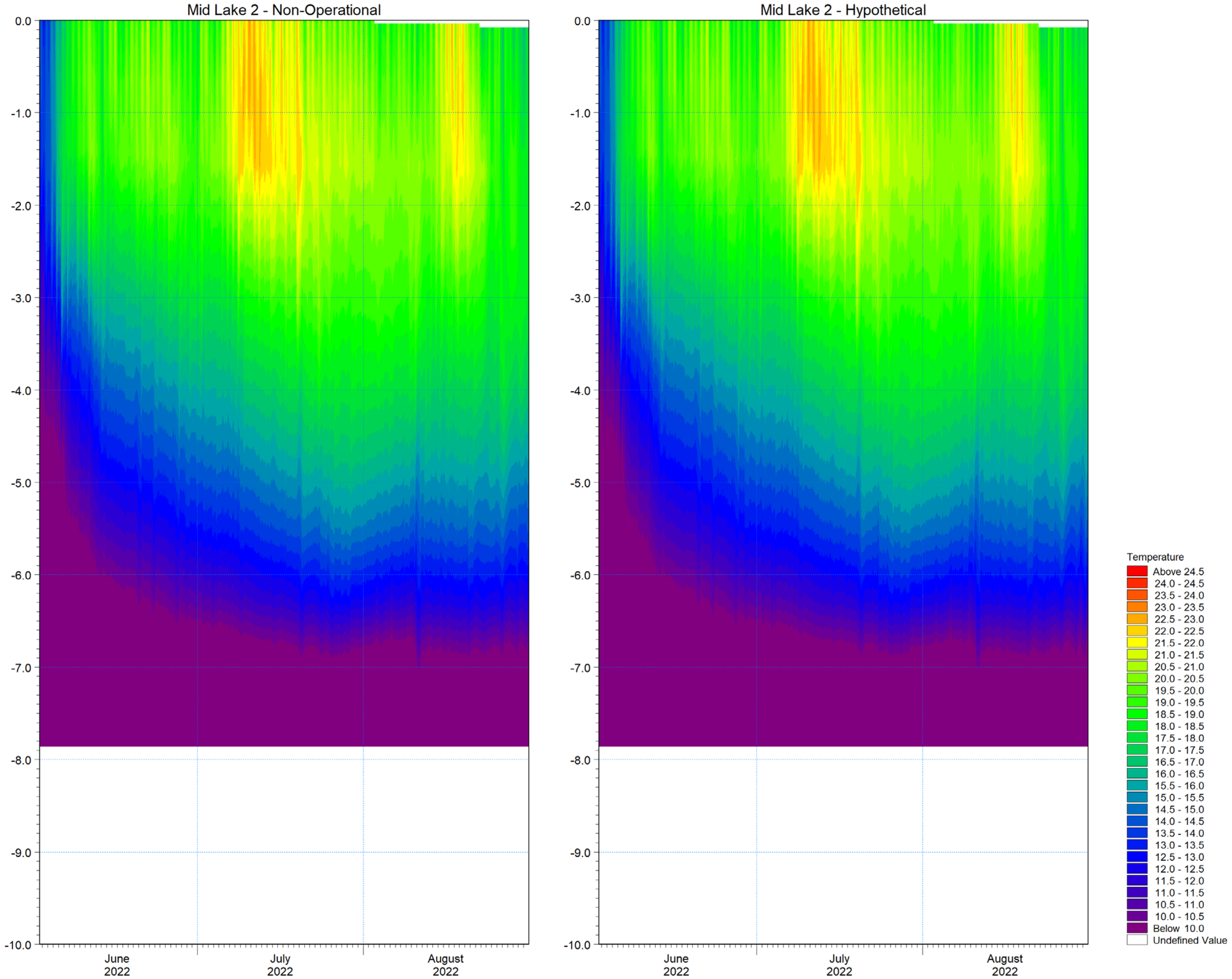


Figure E.6-18: Modelled Temperature Isopleths at Mid Lake 3, 1 June to 31 August

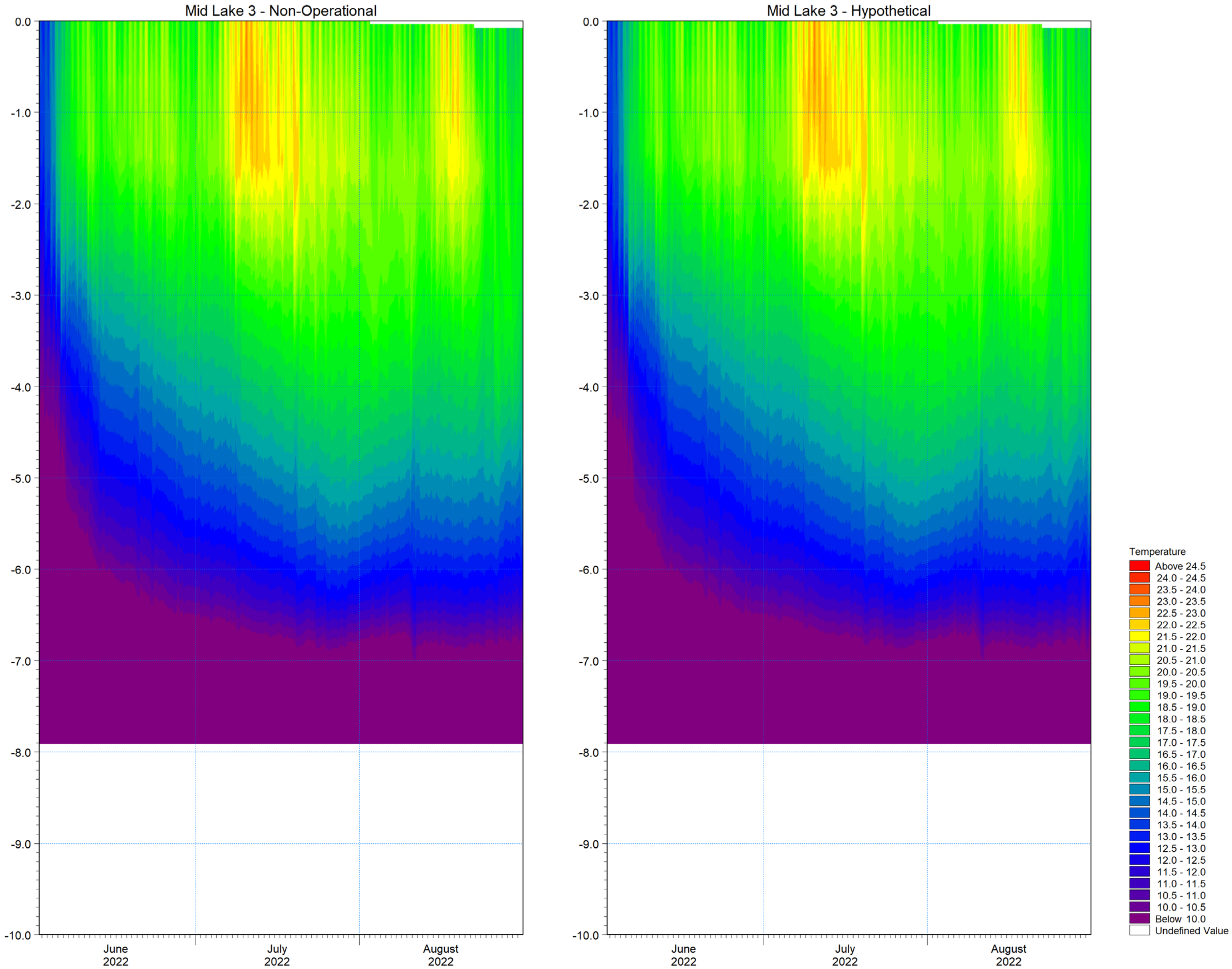


Figure E.6-19: Modelled Temperature Isopleths at Southwest Bay, 1 June to 31 August

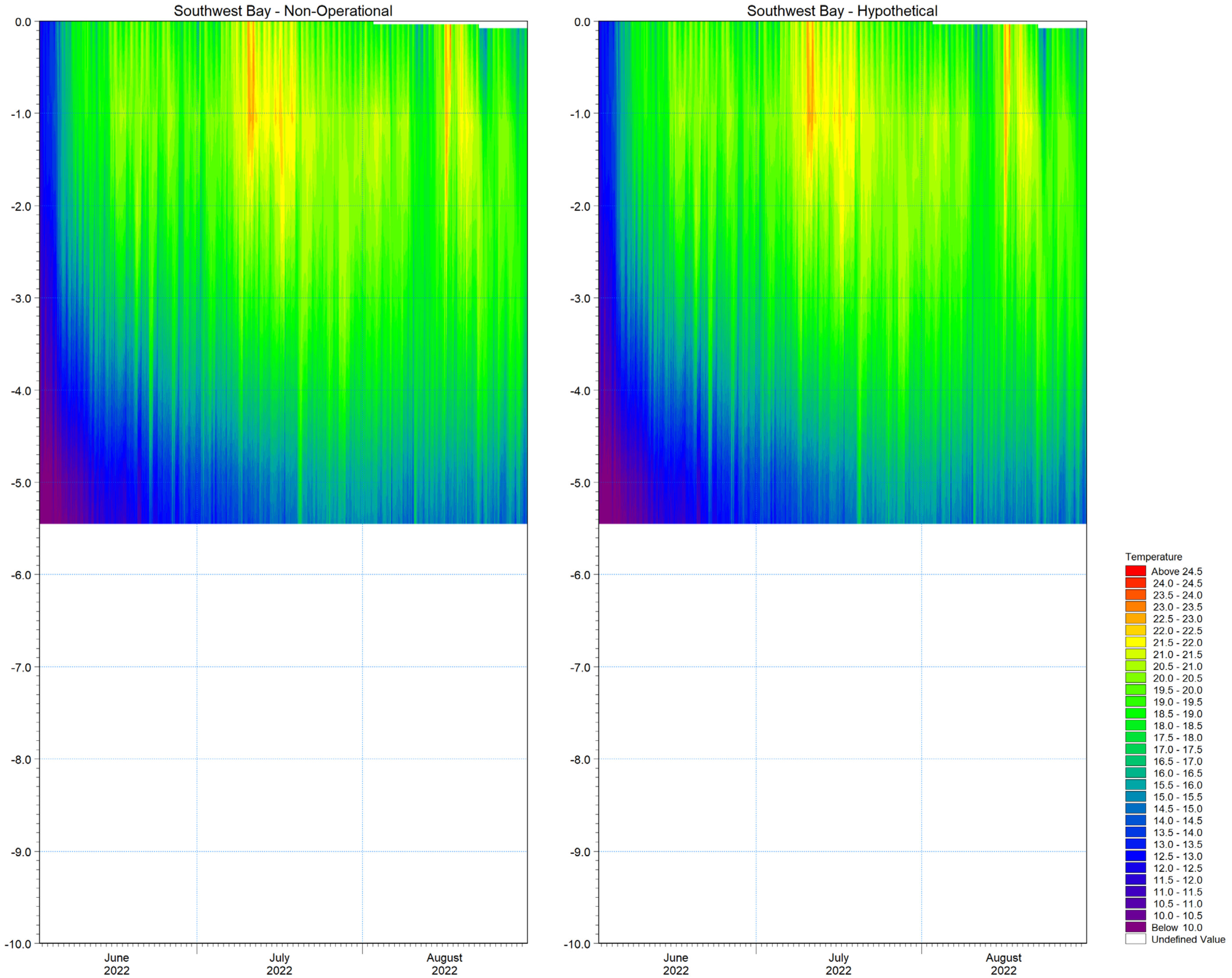
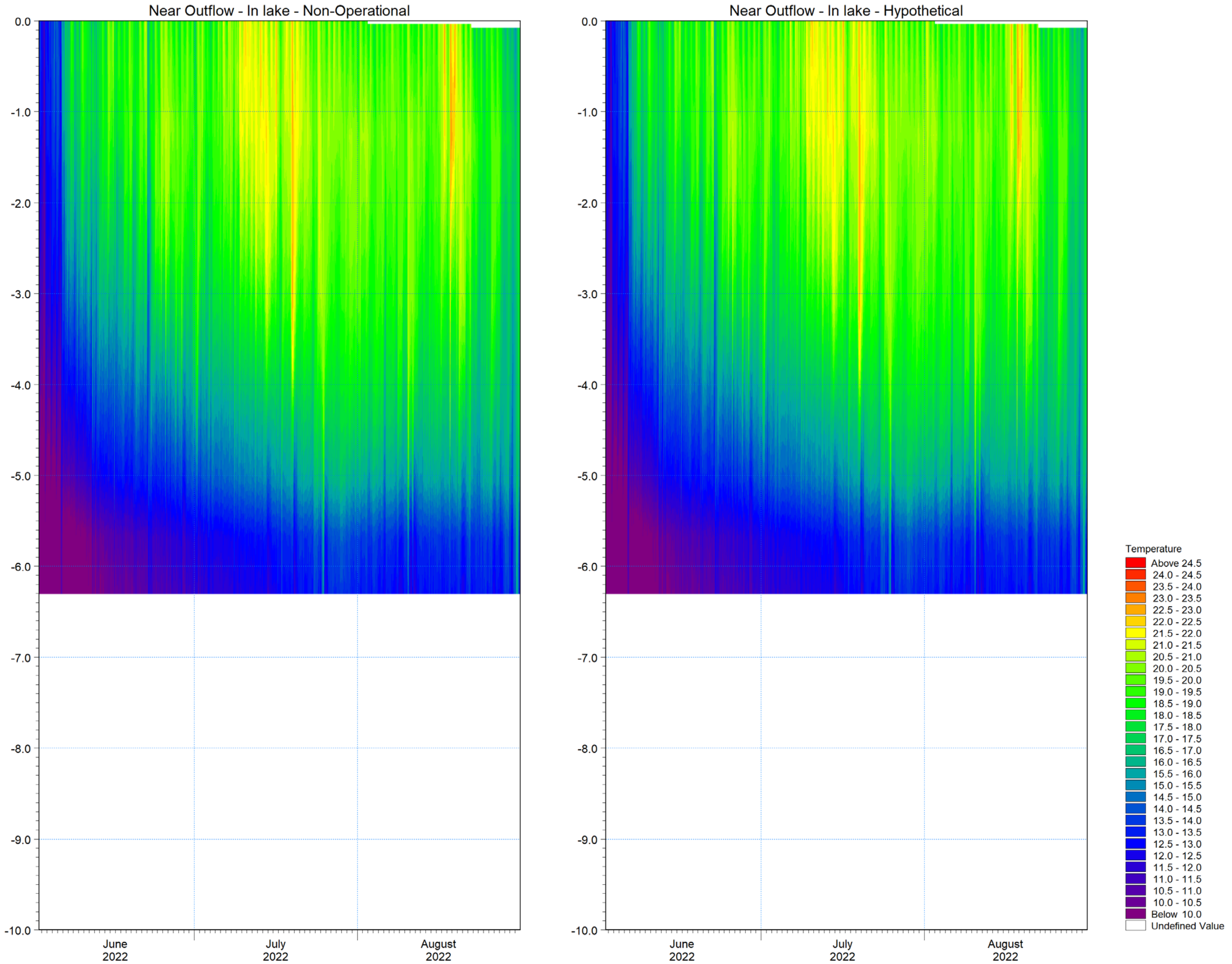


Figure E.6-20: Modelled Temperature Isopleths at Near Outflow - In Lake, 1 June to 31 August



APPENDIX E.7

Certificate of Analyses for Water Quality Samples

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **YL2101440**	Page	: 1 of 12
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Kathy Qin	Account Manager	: Oliver Gregg
Address	: 9 - 4905 48th Street Yellowknife NT Canada X1A 3S3	Address	: 314 Old Airport Road, Unit 116 Yellowknife NT Canada X1A 3T3
Telephone	: ----	Telephone	: 1 867 446 5593
Project	: 21482915	Date Samples Received	: 01-Oct-2021 09:00
PO	: ----	Date Analysis Commenced	: 05-Oct-2021
C-O-C number	: ----	Issue Date	: 14-Oct-2021 15:17
Sampler	: ----		
Site	: ----		
Quote number	: NTPC Jackfish Lake		
No. of samples received	: 8		
No. of samples analysed	: 8		

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*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

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

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

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
RRV	*Reported result verified by repeat analysis.*
SFT	*Sample was filtered due to turbidity interference. Result reflects soluble analyte concentration.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY_MID-DEPTH	NORTHWEST BAY_BOTTOM	NORTHWEST BAY_BOTTOM-4	OUTFLOW	INFLOW TO NW BAY 2
Client sampling date / time					30-Sep-2021 13:40	30-Sep-2021 13:50	30-Sep-2021 13:55	30-Sep-2021 09:45	30-Sep-2021 12:30
					YL2101440-001	YL2101440-002	YL2101440-003	YL2101440-004	YL2101440-005
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, bicarbonate (as $CaCO_3$)	----	E290	1.0	mg/L	111	110	112	117	133
alkalinity, carbonate (as $CaCO_3$)	----	E290	1.0	mg/L	6.2	7.3	3.3	3.1	<1.0
alkalinity, hydroxide (as $CaCO_3$)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as $CaCO_3$)	----	E290	1.0	mg/L	3.1	3.6	1.7	1.5	<1.0
alkalinity, total (as $CaCO_3$)	----	E290	1.0	mg/L	118	118	116	120	133
conductivity	----	E100	2.0	µS/cm	445	446	450	446	719
hardness (as $CaCO_3$), dissolved	----	EC100	0.60	mg/L	141	140	142	144	178
hardness (as $CaCO_3$), from total Ca/Mg	----	EC100A	0.60	mg/L	148	149	152	151	191
pH	----	E108	0.10	pH units	8.41	8.42	8.35	8.33	8.21
solids, total dissolved [TDS]	----	E162	10	mg/L	271	285	279	257	419
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	248	249	248	250	392
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	12.4	14.2	11.8	54.8	<3.0
turbidity	----	E121	0.10	NTU	23.4	21.1	21.0	72.3	1.08
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0082	0.0069	0.0079	0.0406	0.0097
chloride	16887-00-6	E235.Cl	0.50	mg/L	59.4	59.6	59.6	59.3	110
fluoride	16984-48-8	E235.F	0.020	mg/L	0.082	0.084	0.086	0.086	0.078
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0592
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	<0.0051	<0.0051	<0.0051	0.0592
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L	1.70	1.73	1.68	4.36	0.585
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.102	0.109	0.112	0.411	0.0082
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0138	0.0143	0.0132	0.0215	0.0059
silicate (as SiO_2)	7631-86-9	E392	0.50	mg/L	12.8 SFT	13.0 SFT	12.6 SFT	12.6 SFT	9.05 SFT
sulfate (as SO_4)	14808-79-8	E235.SO4	0.30	mg/L	25.3	25.3	25.3	24.2	59.4
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	11.9	12.3	12.0	13.1	16.0
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0079	0.0065	0.0085	0.0160	0.0165

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY_MID-DEPTH	NORTHWEST BAY_BOTTOM	NORTHWEST BAY_BOTTOM-4	OUTFLOW	INFLOW TO NW BAY 2
				Client sampling date / time	30-Sep-2021 13:40	30-Sep-2021 13:50	30-Sep-2021 13:55	30-Sep-2021 09:45	30-Sep-2021 12:30
					YL2101440-001	YL2101440-002	YL2101440-003	YL2101440-004	YL2101440-005
					Result	Result	Result	Result	Result
Total Metals									
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00118	0.00121	0.00127	0.00110	0.00079
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0723	0.0705	0.0714	0.0732	0.0335
barium, total	7440-39-3	E420	0.00010	mg/L	0.0317	0.0314	0.0313	0.0327	0.0246
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	0.028	0.029	0.030	0.028	0.029
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L	39.0	39.5	40.6	39.3	51.5
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000014
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	0.00020	0.00034
copper, total	7440-50-8	E420	0.00050	mg/L	0.00140	0.00143	0.00142	0.00170	0.00156
iron, total	7439-89-6	E420	0.010	mg/L	0.020	0.016	0.018	0.048	0.238
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	0.000071	0.000109
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0060	0.0062	0.0062	0.0062	0.0070
magnesium, total	7439-95-4	E420	0.0050	mg/L	12.4	12.2	12.2	12.9	15.2
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0918	0.0897	0.0922	0.186	0.282
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000190	0.000177	0.000194	0.000193	0.000655
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00058	<0.00050	0.00058	0.00118	0.00186
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.118	0.081	0.113	0.457	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L	4.26	4.13	4.15	4.82	3.77
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00252	0.00253	0.00255	0.00276	0.00349
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000067
silicon, total	7440-21-3	E420	0.10	mg/L	6.18	6.12	6.20	6.18	4.61
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	17341-25-2	E420	0.050	mg/L	32.0	32.4	32.5	33.5	73.0
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0859	0.0878	0.0929	0.0864	0.112
sulfur, total	7704-34-9	E420	0.50	mg/L	9.62	9.53	9.62	9.64	23.5
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY_MID-DEPTH	NORTHWEST BAY_BOTTOM	NORTHWEST BAY_BOTTOM-4	OUTFLOW	INFLOW TO NW BAY 2
				Client sampling date / time	30-Sep-2021 13:40	30-Sep-2021 13:50	30-Sep-2021 13:55	30-Sep-2021 09:45	30-Sep-2021 12:30
					YL2101440-001	YL2101440-002	YL2101440-003	YL2101440-004	YL2101440-005
					Result	Result	Result	Result	Result
Total Metals									
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	0.00062	0.00040
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000549	0.000443	0.000554	0.000480	0.00180
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0052	0.0050	0.0057	0.0061	0.0077
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0014	0.0014	<0.0010	0.0025	0.0078
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00112	0.00116	0.00117	0.00104	0.00073
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0715	0.0717	0.0718	0.0705	0.0275
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0295	0.0302	0.0301	0.0306	0.0234
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<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	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.028	0.028	0.028	0.028	0.028
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L	36.7	36.3	37.4	37.7	48.2
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000013
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00027
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00108	0.00107	0.00108	0.00099	0.0286 DTC
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	0.015	0.112
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000712 DTC
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0063	0.0064	0.0064	0.0064	0.0070
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	11.9	12.0	11.9	12.2	14.1
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00133	0.00173	0.00170	0.125	0.242
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000172	0.000177	0.000173	0.000155	0.000599

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY_MID-DEPTH	NORTHWEST BAY_BOTTOM	NORTHWEST BAY_BOTTOM-4	OUTFLOW	INFLOW TO NW BAY 2
Client sampling date / time					30-Sep-2021 13:40	30-Sep-2021 13:50	30-Sep-2021 13:55	30-Sep-2021 09:45	30-Sep-2021 12:30
					YL2101440-001	YL2101440-002	YL2101440-003	YL2101440-004	YL2101440-005
					Result	Result	Result	Result	Result
Dissolved Metals									
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00163
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.00	4.01	4.04	4.06	3.57
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00242	0.00257	0.00242	0.00262	0.00318
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	0.000075	0.000073
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.16	6.42	6.44	6.53	4.55
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	17341-25-2	E421	0.050	mg/L	32.4	32.4	32.1	31.9	70.7
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0863	0.0910	0.0900	0.0900	0.114
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	9.27	9.39	9.59	9.15	21.1
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<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	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00037 DTC
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000489	0.000480	0.000485	0.000422	0.00162
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0049	0.0047	0.0048	0.0063	0.0220 DTC
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	----	<5.0	<5.0	----	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.00050	mg/L	----	<0.00050	<0.00050	----	----
ethylbenzene	100-41-4	E611A	0.00050	mg/L	----	<0.00050	<0.00050	----	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.00050	mg/L	----	<0.00050	<0.00050	----	----
styrene	100-42-5	E611A	0.00050	mg/L	----	<0.00050	<0.00050	----	----
toluene	108-88-3	E611A	0.00050	mg/L	----	<0.00050	<0.00050	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	NORTHWEST BAY_MID-DEPTH	NORTHWEST BAY_BOTTOM	NORTHWEST BAY_BOTTOM-4	OUTFLOW	INFLOW TO NW BAY 2
				Client sampling date / time	30-Sep-2021 13:40	30-Sep-2021 13:50	30-Sep-2021 13:55	30-Sep-2021 09:45	30-Sep-2021 12:30
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	YL2101440-001	YL2101440-002	YL2101440-003	YL2101440-004	YL2101440-005
					Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]									
xylene, m+p-	179601-23-1	E611A	0.00050	mg/L	----	<0.00050	<0.00050	----	----
xylene, o-	95-47-6	E611A	0.00050	mg/L	----	<0.00050	<0.00050	----	----
xylenes, total	1330-20-7	E611A	0.00075	mg/L	----	<0.00075	<0.00075	----	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	----	91.4	91.1	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	----	103	104	----	----
Hydrocarbons									
EPH (C10-C19)	----	E601A-L	0.050	mg/L	----	<0.050	<0.050	----	----
EPH (C19-C32)	----	E601A-L	0.050	mg/L	----	<0.050	<0.050	----	----
F1 (C6-C10)	----	E581.VH+F1	0.10	mg/L	----	<0.10	<0.10	----	----
F2 (C10-C16)	----	E601	0.30	mg/L	----	<0.30	<0.30	----	----
F3 (C16-C34)	----	E601	0.30	mg/L	----	<0.30	<0.30	----	----
F4 (C34-C50)	----	E601	0.30	mg/L	----	<0.30	<0.30	----	----
TEH (C10-C30), BC	----	E601A-L	0.10	mg/L	----	<0.10	<0.10	----	----
VHw (C6-C10)	----	E581.VH+F1	0.10	mg/L	----	<0.10	<0.10	----	----
F1-BTEX	----	EC580	0.10	mg/L	----	<0.10	<0.10	----	----
VPHw	----	EC580A	0.10	mg/L	----	<0.10	<0.10	----	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A-L	1.0	%	----	84.2	89.5	----	----
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	----	77.2	83.0	----	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	----	97.1	91.0	----	----

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

Analytical Results

Sub-Matrix: Water

(Matrix: Water)

				Client sample ID	SOUTHWEST BAY_MID-DEPTH	SOUTHWEST BAY_BOTTOM	JFLQC-1	----	----
				Client sampling date / time	30-Sep-2021 15:05	30-Sep-2021 15:10	30-Sep-2021 08:45	----	----
Analyte	CAS Number	Method	LOR	Unit	YL2101440-006	YL2101440-007	YL2101440-008	--------	--------
					Result	Result	Result	----	----
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	109	114	<1.0	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	8.8	6.2	<1.0	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	----	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	4.4	3.1	<1.0	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	118	120	<1.0	----	----
conductivity	----	E100	2.0	µS/cm	446	448	<2.0	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	138	138	<0.60	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	146	146	<0.60	----	----
pH	----	E108	0.10	pH units	8.37	8.35	5.06	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	270	271	<10	----	----
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	246	247	<1.0	----	----
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	12.0	14.2	<3.0	----	----
turbidity	----	E121	0.10	NTU	21.8	21.2	<0.10	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0070	0.0108	<0.0050	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	59.5	59.5	<0.50	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.084	0.085	<0.020	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	<0.0050	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	<0.0051	<0.0051	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L	1.74	1.70	<0.030	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.105	0.105	<0.0020	----	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0132	0.0124	0.0029 RRV	----	----
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	12.8 SFT	12.5 SFT	<0.50 SFT	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	25.3	25.2	<0.30	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	12.3	11.6	<0.50	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0052	0.0062	<0.0030	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00123	0.00118	<0.00010	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

				Client sample ID	SOUTHWEST BAY_MID-DEPTH	SOUTHWEST BAY_BOTTOM	JFLQC-1	----	----
				Client sampling date / time	30-Sep-2021 15:05	30-Sep-2021 15:10	30-Sep-2021 08:45	----	----
Analyte	CAS Number	Method	LOR	Unit	YL2101440-006	YL2101440-007	YL2101440-008	--------	--------
					Result	Result	Result	----	----
Total Metals									
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0712	0.0741	<0.00010	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0309	0.0324	0.00016 RRV	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.029	0.029	<0.010	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	38.4	38.1	<0.050	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00142	0.00182	<0.00050	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.014	0.012	<0.010	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0060	0.0061	<0.0010	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	12.1	12.4	<0.0050	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0975	0.101	0.00012 RRV	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000204	0.000193	<0.000050	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00056	0.00058	<0.00050	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.130	0.143	<0.050	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	4.18	4.30	<0.050	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00249	0.00252	<0.00020	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	6.08	6.20	<0.10	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	32.6	32.8	<0.050	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0897	0.0865	<0.00020	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	9.53	9.49	<0.50	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	SOUTHWEST BAY_MID-DEPTH	SOUTHWEST BAY_BOTTOM	JFLQC-1	----	----
				Client sampling date / time	30-Sep-2021 15:05	30-Sep-2021 15:10	30-Sep-2021 08:45	----	----
Analyte	CAS Number	Method	LOR	Unit	YL2101440-006	YL2101440-007	YL2101440-008	--------	--------
					Result	Result	Result	----	----
Total Metals									
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000556	0.000561	<0.000010	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0054	0.0055	0.0049 RRV	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0013	0.0026	<0.0010	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00110	0.00111	<0.00010	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0713	0.0714	<0.00010	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0298	0.0302	0.00018 RRV	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	<0.000100	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.027	0.027	<0.010	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	35.8	35.9	<0.050	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00117	0.00108	<0.00020	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0061	0.0061	<0.0010	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	11.8	11.7	<0.0050	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00102	0.00137	0.00026 RRV	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000164	0.000166	<0.000050	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	SOUTHWEST BAY_MID-DEPTH	SOUTHWEST BAY_BOTTOM	JFLQC-1	----	----
				Client sampling date / time	30-Sep-2021 15:05	30-Sep-2021 15:10	30-Sep-2021 08:45	----	----
					YL2101440-006	YL2101440-007	YL2101440-008	--------	--------
					Result	Result	Result	----	----
Dissolved Metals									
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	3.95	3.93	<0.050	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00236	0.00239	<0.00020	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	0.000050	<0.000050	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.27	6.20	<0.050	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	31.2	31.1	<0.050	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0858	0.0874	<0.00020	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	9.30	9.37	<0.50	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000462	0.000457	<0.000010	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0049	0.0062	0.0068 RRV	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	----	----
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	----	----	<5.0	----	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.00050	mg/L	----	----	<0.00050	----	----
ethylbenzene	100-41-4	E611A	0.00050	mg/L	----	----	<0.00050	----	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.00050	mg/L	----	----	<0.00050	----	----
styrene	100-42-5	E611A	0.00050	mg/L	----	----	<0.00050	----	----
toluene	108-88-3	E611A	0.00050	mg/L	----	----	<0.00050	----	----
xylene, m+p-	179601-23-1	E611A	0.00050	mg/L	----	----	<0.00050	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	SOUTHWEST BAY_MID-DEPTH	SOUTHWEST BAY_BOTTOM	JFLQC-1	----	----
				Client sampling date / time	30-Sep-2021 15:05	30-Sep-2021 15:10	30-Sep-2021 08:45	----	----
					YL2101440-006	YL2101440-007	YL2101440-008	--------	--------
					Result	Result	Result	----	----
Volatile Organic Compounds [Fuels]									
xylene, o-	95-47-6	E611A	0.00050	mg/L	----	----	<0.00050	----	----
xylenes, total	1330-20-7	E611A	0.00075	mg/L	----	----	<0.00075	----	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	----	----	91.1	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	----	----	104	----	----
Hydrocarbons									
EPH (C10-C19)	----	E601A-L	0.050	mg/L	----	----	<0.050	----	----
EPH (C19-C32)	----	E601A-L	0.050	mg/L	----	----	<0.050	----	----
F1 (C6-C10)	----	E581.VH+F1	0.10	mg/L	----	----	<0.10	----	----
F2 (C10-C16)	----	E601	0.30	mg/L	----	----	<0.30	----	----
F3 (C16-C34)	----	E601	0.30	mg/L	----	----	<0.30	----	----
F4 (C34-C50)	----	E601	0.30	mg/L	----	----	<0.30	----	----
TEH (C10-C30), BC	----	E601A-L	0.10	mg/L	----	----	<0.10	----	----
VHw (C6-C10)	----	E581.VH+F1	0.10	mg/L	----	----	<0.10	----	----
F1-BTEX	----	EC580	0.10	mg/L	----	----	<0.10	----	----
VPHw	----	EC580A	0.10	mg/L	----	----	<0.10	----	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A-L	1.0	%	----	----	99.0	----	----
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	----	----	79.7	----	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	----	----	99.0	----	----

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

ALS Environmental

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **YL2101440**	Page	: 1 of 30
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Kathy Qin	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	: 21482915	Date Samples Received	: 01-Oct-2021 09:00
PO	: ----	Issue Date	: 14-Oct-2021 15:20
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: NTPC Jackfish Lake		
No. of samples received	: 8		
No. of samples analysed	: 8		

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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) JFLQC-1	E567	30-Sep-2021	09-Oct-2021	28 days	9 days	✓	09-Oct-2021	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) NORTHWEST BAY_BOTTOM	E567	30-Sep-2021	09-Oct-2021	28 days	9 days	✓	09-Oct-2021	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) NORTHWEST BAY_BOTTOM-4	E567	30-Sep-2021	09-Oct-2021	28 days	9 days	✓	09-Oct-2021	40 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SOUTHWEST BAY_BOTTOM	E298	30-Sep-2021	08-Oct-2021	----	----		10-Oct-2021	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) JFLQC-1	E298	30-Sep-2021	08-Oct-2021	----	----		10-Oct-2021	28 days	11 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) INFLOW TO NW BAY 2	E298	30-Sep-2021	07-Oct-2021	----	----		07-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NORTHWEST BAY_BOTTOM	E298	30-Sep-2021	07-Oct-2021	----	----		07-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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NORTHWEST BAY_BOTTOM-4	E298	30-Sep-2021	07-Oct-2021	----	----		07-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NORTHWEST BAY_MID-DEPTH	E298	30-Sep-2021	07-Oct-2021	----	----		07-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) OUTFLOW	E298	30-Sep-2021	07-Oct-2021	----	----		07-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SOUTHWEST BAY_MID-DEPTH	E298	30-Sep-2021	07-Oct-2021	----	----		07-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE INFLOW TO NW BAY 2	E235.Cl	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE NORTHWEST BAY_BOTTOM	E235.Cl	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE NORTHWEST BAY_BOTTOM-4	E235.Cl	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE NORTHWEST BAY_MID-DEPTH	E235.Cl	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE OUTFLOW	E235.Cl	30-Sep-2021	----	----	----		05-Oct-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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE SOUTHWEST BAY_BOTTOM	E235.Cl	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SOUTHWEST BAY_MID-DEPTH	E235.Cl	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE JFLQC-1	E235.Cl	30-Sep-2021	----	----	----		05-Oct-2021	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE INFLOW TO NW BAY 2	E235.F	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE NORTHWEST BAY_BOTTOM	E235.F	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE NORTHWEST BAY_BOTTOM-4	E235.F	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE NORTHWEST BAY_MID-DEPTH	E235.F	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE OUTFLOW	E235.F	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SOUTHWEST BAY_BOTTOM	E235.F	30-Sep-2021	----	----	----		05-Oct-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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE SOUTHWEST BAY_MID-DEPTH	E235.F	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE JFLQC-1	E235.F	30-Sep-2021	----	----	----		05-Oct-2021	28 days	6 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE INFLOW TO NW BAY 2	E235.NO3-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NORTHWEST BAY_BOTTOM	E235.NO3-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NORTHWEST BAY_BOTTOM-4	E235.NO3-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NORTHWEST BAY_MID-DEPTH	E235.NO3-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE OUTFLOW	E235.NO3-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_BOTTOM	E235.NO3-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_MID-DEPTH	E235.NO3-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
JFLQC-1	E235.NO3-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
INFLOW TO NW BAY 2	E235.NO2-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
NORTHWEST BAY_BOTTOM	E235.NO2-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
NORTHWEST BAY_BOTTOM-4	E235.NO2-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
NORTHWEST BAY_MID-DEPTH	E235.NO2-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
OUTFLOW	E235.NO2-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SOUTHWEST BAY_BOTTOM	E235.NO2-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SOUTHWEST BAY_MID-DEPTH	E235.NO2-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
JFLQC-1	E235.NO2-L	30-Sep-2021	----	----	----		05-Oct-2021	3 days	6 days	✘ EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE INFLOW TO NW BAY 2	E392	30-Sep-2021	----	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE JFLQC-1	E392	30-Sep-2021	----	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NORTHWEST BAY_BOTTOM	E392	30-Sep-2021	----	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NORTHWEST BAY_BOTTOM-4	E392	30-Sep-2021	----	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NORTHWEST BAY_MID-DEPTH	E392	30-Sep-2021	----	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE OUTFLOW	E392	30-Sep-2021	----	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE SOUTHWEST BAY_BOTTOM	E392	30-Sep-2021	----	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE SOUTHWEST BAY_MID-DEPTH	E392	30-Sep-2021	----	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE INFLOW TO NW BAY 2	E235.SO4	30-Sep-2021	----	----	----		05-Oct-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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE NORTHWEST BAY_BOTTOM	E235.SO4	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NORTHWEST BAY_BOTTOM-4	E235.SO4	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NORTHWEST BAY_MID-DEPTH	E235.SO4	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE OUTFLOW	E235.SO4	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SOUTHWEST BAY_BOTTOM	E235.SO4	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SOUTHWEST BAY_MID-DEPTH	E235.SO4	30-Sep-2021	----	----	----		05-Oct-2021	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE JFLQC-1	E235.SO4	30-Sep-2021	----	----	----		05-Oct-2021	28 days	6 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) INFLOW TO NW BAY 2	E375-T	30-Sep-2021	07-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) JFLQC-1	E375-T	30-Sep-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY_BOTTOM	E375-T	30-Sep-2021	07-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY_BOTTOM-4	E375-T	30-Sep-2021	07-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY_MID-DEPTH	E375-T	30-Sep-2021	07-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) OUTFLOW	E375-T	30-Sep-2021	07-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_BOTTOM	E375-T	30-Sep-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_MID-DEPTH	E375-T	30-Sep-2021	07-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) JFLQC-1	E366	30-Sep-2021	08-Oct-2021	----	----		13-Oct-2021	28 days	13 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SOUTHWEST BAY_BOTTOM	E366	30-Sep-2021	08-Oct-2021	----	----		13-Oct-2021	28 days	13 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) INFLOW TO NW BAY 2	E366	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NORTHWEST BAY_BOTTOM	E366	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NORTHWEST BAY_BOTTOM-4	E366	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NORTHWEST BAY_MID-DEPTH	E366	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) OUTFLOW	E366	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SOUTHWEST BAY_MID-DEPTH	E366	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) JFLQC-1	E372-U	30-Sep-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) INFLOW TO NW BAY 2	E372-U	30-Sep-2021	07-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) NORTHWEST BAY_BOTTOM	E372-U	30-Sep-2021	07-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) NORTHWEST BAY_BOTTOM-4	E372-U	30-Sep-2021	07-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) NORTHWEST BAY_MID-DEPTH	E372-U	30-Sep-2021	07-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) OUTFLOW	E372-U	30-Sep-2021	07-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) SOUTHWEST BAY_BOTTOM	E372-U	30-Sep-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) SOUTHWEST BAY_MID-DEPTH	E372-U	30-Sep-2021	07-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) INFLOW TO NW BAY 2	E509	30-Sep-2021	09-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) JFLQC-1	E509	30-Sep-2021	09-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NORTHWEST BAY_BOTTOM	E509	30-Sep-2021	09-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NORTHWEST BAY_BOTTOM-4	E509	30-Sep-2021	09-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NORTHWEST BAY_MID-DEPTH	E509	30-Sep-2021	09-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) OUTFLOW	E509	30-Sep-2021	09-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) SOUTHWEST BAY_BOTTOM	E509	30-Sep-2021	09-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) SOUTHWEST BAY_MID-DEPTH	E509	30-Sep-2021	09-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) INFLOW TO NW BAY 2	E421	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) JFLQC-1	E421	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NORTHWEST BAY_BOTTOM	E421	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NORTHWEST BAY_BOTTOM-4	E421	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NORTHWEST BAY_MID-DEPTH	E421	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) OUTFLOW	E421	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	180 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SOUTHWEST BAY_BOTTOM	E421	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SOUTHWEST BAY_MID-DEPTH	E421	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	180 days	8 days	✓
Hydrocarbons : BC PHC - EPH by GC-FID (Low level)										
Amber glass/Teflon lined cap (sodium bisulfate) JFLQC-1	E601A-L	30-Sep-2021	12-Oct-2021	14 days	12 days	✓	13-Oct-2021	40 days	1 days	✓
Hydrocarbons : BC PHC - EPH by GC-FID (Low level)										
Amber glass/Teflon lined cap (sodium bisulfate) NORTHWEST BAY_BOTTOM	E601A-L	30-Sep-2021	08-Oct-2021	14 days	8 days	✓	10-Oct-2021	40 days	2 days	✓
Hydrocarbons : BC PHC - EPH by GC-FID (Low level)										
Amber glass/Teflon lined cap (sodium bisulfate) NORTHWEST BAY_BOTTOM-4	E601A-L	30-Sep-2021	08-Oct-2021	14 days	8 days	✓	10-Oct-2021	40 days	2 days	✓
Hydrocarbons : CCME PHC - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) JFLQC-1	E601	30-Sep-2021	12-Oct-2021	14 days	12 days	✓	13-Oct-2021	40 days	1 days	✓
Hydrocarbons : CCME PHC - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NORTHWEST BAY_BOTTOM	E601	30-Sep-2021	08-Oct-2021	14 days	8 days	✓	13-Oct-2021	40 days	5 days	✓
Hydrocarbons : CCME PHC - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NORTHWEST BAY_BOTTOM-4	E601	30-Sep-2021	08-Oct-2021	14 days	8 days	✓	13-Oct-2021	40 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) JFLQC-1	E581.VH+F1	30-Sep-2021	09-Oct-2021	----	----		11-Oct-2021	14 days	11 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NORTHWEST BAY_BOTTOM	E581.VH+F1	30-Sep-2021	09-Oct-2021	----	----		11-Oct-2021	14 days	11 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NORTHWEST BAY_BOTTOM-4	E581.VH+F1	30-Sep-2021	09-Oct-2021	----	----		11-Oct-2021	14 days	11 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) JFLQC-1	E358-L	30-Sep-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	10 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) INFLOW TO NW BAY 2	E358-L	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY_BOTTOM	E358-L	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY_BOTTOM-4	E358-L	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY_MID-DEPTH	E358-L	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) OUTFLOW	E358-L	30-Sep-2021	07-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_MID-DEPTH	E358-L	30-Sep-2021	07-Oct-2021	----	----		08-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 Rec*	*Holding Times Actual*	*Eval*	*Analysis Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_BOTTOM	E358-L	30-Sep-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE INFLOW TO NW BAY 2	E290	30-Sep-2021	----	----	----		06-Oct-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE JFLQC-1	E290	30-Sep-2021	----	----	----		06-Oct-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NORTHWEST BAY_BOTTOM	E290	30-Sep-2021	----	----	----		06-Oct-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NORTHWEST BAY_BOTTOM-4	E290	30-Sep-2021	----	----	----		06-Oct-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NORTHWEST BAY_MID-DEPTH	E290	30-Sep-2021	----	----	----		06-Oct-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE OUTFLOW	E290	30-Sep-2021	----	----	----		06-Oct-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SOUTHWEST BAY_BOTTOM	E290	30-Sep-2021	----	----	----		06-Oct-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SOUTHWEST BAY_MID-DEPTH	E290	30-Sep-2021	----	----	----		06-Oct-2021	14 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : Conductivity in Water										
HDPE INFLOW TO NW BAY 2	E100	30-Sep-2021	----	----	----		06-Oct-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE JFLQC-1	E100	30-Sep-2021	----	----	----		06-Oct-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE NORTHWEST BAY_BOTTOM	E100	30-Sep-2021	----	----	----		06-Oct-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE NORTHWEST BAY_BOTTOM-4	E100	30-Sep-2021	----	----	----		06-Oct-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE NORTHWEST BAY_MID-DEPTH	E100	30-Sep-2021	----	----	----		06-Oct-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE OUTFLOW	E100	30-Sep-2021	----	----	----		06-Oct-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE SOUTHWEST BAY_BOTTOM	E100	30-Sep-2021	----	----	----		06-Oct-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE SOUTHWEST BAY_MID-DEPTH	E100	30-Sep-2021	----	----	----		06-Oct-2021	28 days	6 days	✓
Physical Tests : pH by Meter										
HDPE SOUTHWEST BAY_BOTTOM	E108	30-Sep-2021	----	----	----		06-Oct-2021	0.25 hrs	141 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : pH by Meter										
HDPE SOUTHWEST BAY_MID-DEPTH	E108	30-Sep-2021	----	----	----		06-Oct-2021	0.25 hrs	141 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NORTHWEST BAY_BOTTOM	E108	30-Sep-2021	----	----	----		06-Oct-2021	0.25 hrs	142 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NORTHWEST BAY_BOTTOM-4	E108	30-Sep-2021	----	----	----		06-Oct-2021	0.25 hrs	142 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NORTHWEST BAY_MID-DEPTH	E108	30-Sep-2021	----	----	----		06-Oct-2021	0.25 hrs	142 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE INFLOW TO NW BAY 2	E108	30-Sep-2021	----	----	----		06-Oct-2021	0.25 hrs	144 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE OUTFLOW	E108	30-Sep-2021	----	----	----		06-Oct-2021	0.25 hrs	146 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE JFLQC-1	E108	30-Sep-2021	----	----	----		06-Oct-2021	0.25 hrs	147 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE INFLOW TO NW BAY 2	E162	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE JFLQC-1	E162	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : TDS by Gravimetry										
HDPE NORTHWEST BAY_BOTTOM	E162	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE NORTHWEST BAY_BOTTOM-4	E162	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE NORTHWEST BAY_MID-DEPTH	E162	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE OUTFLOW	E162	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SOUTHWEST BAY_BOTTOM	E162	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SOUTHWEST BAY_MID-DEPTH	E162	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE INFLOW TO NW BAY 2	E160-H	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE JFLQC-1	E160-H	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NORTHWEST BAY_BOTTOM	E160-H	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : TSS by Gravimetry										
HDPE NORTHWEST BAY_BOTTOM-4	E160-H	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NORTHWEST BAY_MID-DEPTH	E160-H	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE OUTFLOW	E160-H	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SOUTHWEST BAY_BOTTOM	E160-H	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SOUTHWEST BAY_MID-DEPTH	E160-H	30-Sep-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE INFLOW TO NW BAY 2	E121	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE JFLQC-1	E121	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NORTHWEST BAY_BOTTOM	E121	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NORTHWEST BAY_BOTTOM-4	E121	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE NORTHWEST BAY_MID-DEPTH	E121	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE OUTFLOW	E121	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SOUTHWEST BAY_BOTTOM	E121	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SOUTHWEST BAY_MID-DEPTH	E121	30-Sep-2021	----	----	----		05-Oct-2021	3 days	5 days	× EHT
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SOUTHWEST BAY_BOTTOM	E508	30-Sep-2021	----	----	----		09-Oct-2021	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SOUTHWEST BAY_MID-DEPTH	E508	30-Sep-2021	----	----	----		09-Oct-2021	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) INFLOW TO NW BAY 2	E508	30-Sep-2021	----	----	----		09-Oct-2021	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) JFLQC-1	E508	30-Sep-2021	----	----	----		09-Oct-2021	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NORTHWEST BAY_BOTTOM	E508	30-Sep-2021	----	----	----		09-Oct-2021	28 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NORTHWEST BAY_BOTTOM-4	E508	30-Sep-2021	----	----	----		09-Oct-2021	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NORTHWEST BAY_MID-DEPTH	E508	30-Sep-2021	----	----	----		09-Oct-2021	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) OUTFLOW	E508	30-Sep-2021	----	----	----		09-Oct-2021	28 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) INFLOW TO NW BAY 2	E420	30-Sep-2021	----	----	----		09-Oct-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NORTHWEST BAY_BOTTOM	E420	30-Sep-2021	----	----	----		09-Oct-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NORTHWEST BAY_BOTTOM-4	E420	30-Sep-2021	----	----	----		09-Oct-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NORTHWEST BAY_MID-DEPTH	E420	30-Sep-2021	----	----	----		09-Oct-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SOUTHWEST BAY_BOTTOM	E420	30-Sep-2021	----	----	----		09-Oct-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SOUTHWEST BAY_MID-DEPTH	E420	30-Sep-2021	----	----	----		09-Oct-2021	180 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) JFLQC-1	E420	30-Sep-2021	----	----	----		09-Oct-2021	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) OUTFLOW	E420	30-Sep-2021	----	----	----		09-Oct-2021	180 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) JFLQC-1	E611A	30-Sep-2021	09-Oct-2021	----	----		11-Oct-2021	14 days	11 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NORTHWEST BAY_BOTTOM	E611A	30-Sep-2021	09-Oct-2021	----	----		11-Oct-2021	14 days	11 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NORTHWEST BAY_BOTTOM-4	E611A	30-Sep-2021	09-Oct-2021	----	----		11-Oct-2021	14 days	11 days	✓

Legend & Qualifier Definitions

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

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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	311096	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	313905	2	34	5.8	5.0	✓
BTEX by Headspace GC-MS	E611A	316164	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	311089	1	20	5.0	5.0	✓
Conductivity in Water	E100	311095	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	315582	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	313340	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	313900	2	28	7.1	5.0	✓
Fluoride in Water by IC	E235.F	311088	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	311091	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	311092	1	19	5.2	5.0	✓
pH by Meter	E108	311094	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	315339	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	311090	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	313301	3	45	6.6	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	313904	2	13	15.3	5.0	✓
Total Mercury in Water by CVAAS	E508	315539	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	313351	2	20	10.0	5.0	✓
Total Nitrogen by Colourimetry	E366	313902	2	12	16.6	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	313903	2	21	9.5	5.0	✓
TSS by Gravimetry	E160-H	313305	2	15	13.3	5.0	✓
Turbidity by Nephelometry	E121	311429	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	316163	1	11	9.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	311096	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	313905	2	34	5.8	5.0	✓
BC PHC - EPH by GC-FID (Low level)	E601A-L	315182	2	3	66.6	5.0	✓
BTEX by Headspace GC-MS	E611A	316164	1	16	6.2	5.0	✓
CCME PHC - F2-F4 by GC-FID	E601	315181	2	5	40.0	5.0	✓
Chloride in Water by IC	E235.Cl	311089	1	20	5.0	5.0	✓
Conductivity in Water	E100	311095	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	315582	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	313340	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	313900	2	28	7.1	5.0	✓
Fluoride in Water by IC	E235.F	311088	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	311091	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	311092	1	19	5.2	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Oil & Grease by Gravimetry	E567	315705	1	9	11.1	5.0	✓
pH by Meter	E108	311094	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	315339	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	311090	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	313301	3	45	6.6	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	313904	2	13	15.3	5.0	✓
Total Mercury in Water by CVAAS	E508	315539	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	313351	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	313902	2	12	16.6	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	313903	2	21	9.5	5.0	✓
TSS by Gravimetry	E160-H	313305	2	15	13.3	5.0	✓
Turbidity by Nephelometry	E121	311429	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	316163	1	11	9.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	311096	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	313905	2	34	5.8	5.0	✓
BC PHC - EPH by GC-FID (Low level)	E601A-L	315182	2	3	66.6	5.0	✓
BTEX by Headspace GC-MS	E611A	316164	1	16	6.2	5.0	✓
CCME PHC - F2-F4 by GC-FID	E601	315181	2	5	40.0	5.0	✓
Chloride in Water by IC	E235.Cl	311089	1	20	5.0	5.0	✓
Conductivity in Water	E100	311095	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	315582	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	313340	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	313900	2	28	7.1	5.0	✓
Fluoride in Water by IC	E235.F	311088	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	311091	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	311092	1	19	5.2	5.0	✓
Oil & Grease by Gravimetry	E567	315705	1	9	11.1	5.0	✓
Reactive Silica by Colourimetry	E392	315339	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	311090	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	313301	3	45	6.6	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	313904	2	13	15.3	5.0	✓
Total Mercury in Water by CVAAS	E508	315539	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	313351	2	20	10.0	5.0	✓
Total Nitrogen by Colourimetry	E366	313902	2	12	16.6	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	313903	2	21	9.5	5.0	✓
TSS by Gravimetry	E160-H	313305	2	15	13.3	5.0	✓
Turbidity by Nephelometry	E121	311429	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	316163	1	11	9.0	5.0	✓
Matrix Spikes (MS)							

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Ammonia by Fluorescence	E298	313905	2	34	5.8	5.0	✓
BTEX by Headspace GC-MS	E611A	316164	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	311089	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	315582	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	313340	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	313900	2	28	7.1	5.0	✓
Fluoride in Water by IC	E235.F	311088	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	311091	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	311092	1	19	5.2	5.0	✓
Reactive Silica by Colourimetry	E392	315339	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	311090	1	19	5.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	313904	2	13	15.3	5.0	✓
Total Mercury in Water by CVAAS	E508	315539	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	313351	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	313902	2	12	16.6	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	313903	2	21	9.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	316163	1	11	9.0	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
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
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.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
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.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Reactive Silica by Colourimetry	E392 Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
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.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples 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
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.
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.
BC PHC - EPH by GC-FID (Low level)	E601A-L Vancouver - Environmental	Water	BC MOE Lab Manual (EPH in Water by GC/FID) (mod)	Extractable Petroleum Hydrocarbons (EPH) 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 CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
TDS in Water (Calculation) Using APHA Analyte List	EC103.APHA Vancouver - Environmental	Water	APHA 1030E	Total DIssolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis).
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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
Oil & Grease Extraction for Gravimetry	EP567 Vancouver - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **YL2101440**		Page	: 1 of 21
Client	: Golder Associates Ltd.		Laboratory	: Yellowknife - Environmental
Contact	: Kathy Qin		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	: 21482915		Date Samples Received	: 01-Oct-2021 09:00
PO	: ----		Date Analysis Commenced	: 05-Oct-2021
C-O-C number	: ----		Issue Date	: 14-Oct-2021 15:17
Sampler	: ----			
Site	: ----			
Quote number	: NTPC Jackfish Lake			
No. of samples received	: 8			
No. of samples analysed	: 8			

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.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	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: 311094)											
YL2101440-001	NORTHWEST BAY_MID-DEPTH	pH	----	E108	0.10	pH units	8.41	8.41	0.00%	4%	----
Physical Tests (QC Lot: 311095)											
YL2101440-001	NORTHWEST BAY_MID-DEPTH	conductivity	----	E100	2.0	µS/cm	445	445	0.00%	10%	----
Physical Tests (QC Lot: 311096)											
YL2101440-001	NORTHWEST BAY_MID-DEPTH	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	111	108	2.90%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	6.2	7.9	1.8	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	3.1	4.0	0.9	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	118	116	1.20%	20%	----
Physical Tests (QC Lot: 311429)											
VA21C1847-001	Anonymous	turbidity	----	E121	0.10	NTU	1.01	1.06	0.05	Diff <2x LOR	----
Physical Tests (QC Lot: 313301)											
VA21C1793-017	Anonymous	solids, total dissolved [TDS]	----	E162	13	mg/L	104	108	4	Diff <2x LOR	----
Physical Tests (QC Lot: 313305)											
VA21C2066-001	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	25.2	27.2	2.0	Diff <2x LOR	----
Physical Tests (QC Lot: 313626)											
VA21C1859-002	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 313632)											
VA21C1658-007	Anonymous	solids, total dissolved [TDS]	----	E162	10	mg/L	30	28	2	Diff <2x LOR	----
Physical Tests (QC Lot: 313633)											
YL2101440-002	NORTHWEST BAY_BOTTOM	solids, total dissolved [TDS]	----	E162	20	mg/L	285	275	3.57%	20%	----
Anions and Nutrients (QC Lot: 311088)											
FJ2101042-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.082	0.082	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 311089)											
FJ2101042-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 311090)											
FJ2101042-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	51.7	52.0	0.664%	20%	----
Anions and Nutrients (QC Lot: 311091)											
FJ2101042-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Anions and Nutrients (QC Lot: 311092)											
FJ2101042-001	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: 313902)											
VA21C1544-001	Anonymous	nitrogen, total	7727-37-9	E366	1.50	mg/L	26.5	27.3	3.09%	20%	----
Anions and Nutrients (QC Lot: 313903)											
CG2104573-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0400	mg/L	0.729	0.702	3.72%	20%	----
Anions and Nutrients (QC Lot: 313904)											
VA21C1544-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0088	0.0074	0.0015	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 313905)											
VA21C1544-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.372	0.372	0.0647%	20%	----
Anions and Nutrients (QC Lot: 315339)											
YL2101356-001	Anonymous	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	0.86	0.81	0.05	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 315434)											
YL2101440-007	SOUTHWEST BAY_BOTTOM	nitrogen, total	7727-37-9	E366	0.060	mg/L	1.70	1.66	2.03%	20%	----
Anions and Nutrients (QC Lot: 315435)											
YL2101440-007	SOUTHWEST BAY_BOTTOM	phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.105	0.0907	0.0139	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 315436)											
YL2101440-007	SOUTHWEST BAY_BOTTOM	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0124	0.0121	0.0003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 315437)											
YL2101440-007	SOUTHWEST BAY_BOTTOM	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0108	0.0109	0.00005	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 313900)											
VA21C1544-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.60	1.66	0.06	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 315433)											
YL2101440-007	SOUTHWEST BAY_BOTTOM	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	11.6	13.1	11.8%	20%	----
Total Metals (QC Lot: 313351)											
YL2101442-001	Anonymous	chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
YL2101442-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0790	0.0776	1.76%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00011	0.00010	0.000004	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00038	0.00036	0.00002	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.258	0.233	10.2%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	1.10	1.15	4.37%	20%	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.000187	0.000195	3.83%	20%	----

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
Total Metals (QC Lot: 313351) - continued											
YL2101442-001	Anonymous	calcium, total	7440-70-2	E420	0.050	mg/L	109	112	2.70%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000089	0.000093	0.000004	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00517	0.00511	1.29%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00134	0.00134	0.000005	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.310	0.305	1.77%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000057	0.000062	0.000005	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0109	0.0114	4.39%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	39.2	38.0	3.22%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.667	0.639	4.24%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00620	0.00636	2.46%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.0172	0.0169	2.14%	20%	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	31.1	29.2	6.40%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0278	0.0272	2.21%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000107	0.000172	0.000065	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	4.93	4.79	2.85%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.050	mg/L	81.4	81.2	0.264%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	1.12	1.14	1.36%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	23.6	22.6	4.53%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	0.00021	0.00021	0.000005	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000080	0.000080	0.0000004	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00237	0.00211	0.00026	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000927	0.000909	1.98%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0191	0.0187	0.0004	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 315539)											
VA21C2080-016	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 313340)											
CG2104587-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00108	0.00109	0.565%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Dissolved Metals (QC Lot: 313340) - continued											
CG2104587-001	Anonymous	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	0.0198	0.0191	3.53%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.020	mg/L	<0.020 µg/L	<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	0.049	0.048	0.0007	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0050	mg/L	1.39 µg/L	0.00132	5.40%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	334	336	0.640%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000063	0.000064	0.0000010	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.10	mg/L	0.78 µg/L	0.00075	0.00003	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00058	0.00057	0.00002	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.016	0.016	0.0002	Diff <2x LOR	----
		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	0.581	0.580	0.162%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	159	151	4.65%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00190	0.00180	5.27%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00408	0.00407	0.0689%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.0950	0.0914	3.82%	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	11.0	10.5	3.92%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00974	0.00926	5.04%	20%	----
		selenium, dissolved	7782-49-2	E421	0.050	mg/L	265 µg/L	0.284	6.68%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.17	2.20	1.61%	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	7.35	7.08	3.80%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.526	0.526	0.0310%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	287	301	4.57%	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	0.000091	0.000093	0.000002	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	0.0220	0.0217	1.54%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Dissolved Metals (QC Lot: 313340) - continued											
CG2104587-001	Anonymous	zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.228	0.222	2.70%	20%	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 315582)											
CG2104612-003	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 316164)											
FJ2101052-004	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: 316163)											
FJ2101052-004	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: 311095)						
conductivity	----	E100	1	µS/cm	1.0	----
Physical Tests (QCLot: 311096)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 311429)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 313301)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 313305)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Physical Tests (QCLot: 313626)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Physical Tests (QCLot: 313632)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 313633)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 311088)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 311089)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 311090)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 311091)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 311092)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 313902)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 313903)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 313904)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 313905)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 315339)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 315434)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 315435)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 315436)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 315437)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 313900)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 315433)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 313351)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 313351) - continued						
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 315539)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 313340)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 313340) - continued						
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	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: 315582)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 315705)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 316164)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 316164) - continued						
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: 315181)						
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: 315182)						
EPH (C10-C19)	----	E601A-L	50	µg/L	<50	----
EPH (C19-C32)	----	E601A-L	50	µg/L	<50	----
TEH (C10-C30), BC	----	E601A-L	100	µg/L	<100	----
Hydrocarbons (QCLot: 316163)						
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 316781)						
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: 316782)						
EPH (C10-C19)	----	E601A-L	50	µg/L	<50	----
EPH (C19-C32)	----	E601A-L	50	µg/L	<50	----
TEH (C10-C30), BC	----	E601A-L	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	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 311094)									
pH	----	E108	----	pH units	7 pH units	99.8	98.0	102	----
Physical Tests (QCLot: 311095)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.8	90.0	110	----
Physical Tests (QCLot: 311096)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	108	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	108	85.0	115	----
Physical Tests (QCLot: 311429)									
turbidity	----	E121	0.1	NTU	200 NTU	106	85.0	115	----
Physical Tests (QCLot: 313301)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	94.5	85.0	115	----
Physical Tests (QCLot: 313305)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	86.0	85.0	115	----
Physical Tests (QCLot: 313626)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	88.7	85.0	115	----
Physical Tests (QCLot: 313632)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	96.8	85.0	115	----
Physical Tests (QCLot: 313633)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	95.3	85.0	115	----
Anions and Nutrients (QCLot: 311088)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 311089)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 311090)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 311091)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.9	90.0	110	----
Anions and Nutrients (QCLot: 311092)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 313902)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 313903)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	93.6	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Anions and Nutrients (QCLot: 313904)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	96.1	80.0	120	----
Anions and Nutrients (QCLot: 313905)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.4	85.0	115	----
Anions and Nutrients (QCLot: 315339)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	96.4	85.0	115	----
Anions and Nutrients (QCLot: 315434)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 315435)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.0	80.0	120	----
Anions and Nutrients (QCLot: 315436)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	90.3	80.0	120	----
Anions and Nutrients (QCLot: 315437)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	96.1	85.0	115	----
Organic / Inorganic Carbon (QCLot: 313900)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	104	80.0	120	----
Organic / Inorganic Carbon (QCLot: 315433)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	106	80.0	120	----
Total Metals (QCLot: 313351)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	105	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	100	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	106	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	106	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	105	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	98.5	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Total Metals (QCLot: 313351) - continued									
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	110	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.7	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	101	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	102	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	98.6	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	96.2	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	104	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	100.0	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	103	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	98.4	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	109	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	113	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	101	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	94.4	80.0	120	----
Total Metals (QCLot: 315539)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	86.0	80.0	120	----
Dissolved Metals (QCLot: 313340)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	105	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	98.8	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	98.4	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	98.9	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	98.0	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	99.3	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	92.5	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.4	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	95.3	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	95.2	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	95.6	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 313340) - continued									
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.5	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	97.0	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	95.2	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	98.2	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.3	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.2	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	92.6	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	105	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	98.6	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	100	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	93.8	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	99.9	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	99.6	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	95.8	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.3	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	84.2	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	90.8	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.4	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	93.5	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	94.4	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	102	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	89.9	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	100	80.0	120	----
Aggregate Organics (QCLot: 315705)									
oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	103	70.0	130	----
Volatile Organic Compounds (QCLot: 316164)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	81.9	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	100.0	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	97.9	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Volatile Organic Compounds (QCLot: 316164) - continued									
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	89.6	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	106	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	103	70.0	130	----
Hydrocarbons (QCLot: 315181)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	105	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	96.3	70.0	130	----
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	101	70.0	130	----
Hydrocarbons (QCLot: 315182)									
EPH (C10-C19)	----	E601A-L	50	µg/L	6491 µg/L	90.3	70.0	130	----
EPH (C19-C32)	----	E601A-L	50	µg/L	3363 µg/L	88.9	70.0	130	----
TEH (C10-C30), BC	----	E601A-L	100	µg/L	9202 µg/L	89.8	70.0	130	----
Hydrocarbons (QCLot: 316163)									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	90.6	70.0	130	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	89.2	70.0	130	----
Hydrocarbons (QCLot: 316781)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	101	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	90.5	70.0	130	----
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	94.2	70.0	130	----
Hydrocarbons (QCLot: 316782)									
EPH (C10-C19)	----	E601A-L	50	µg/L	6491 µg/L	99.1	70.0	130	----
EPH (C19-C32)	----	E601A-L	50	µg/L	3363 µg/L	98.2	70.0	130	----
TEH (C10-C30), BC	----	E601A-L	100	µg/L	9202 µg/L	98.9	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: 311088)										
FJ2101042-002	Anonymous	fluoride	16984-48-8	E235.F	1.02 mg/L	1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 311089)										
FJ2101042-002	Anonymous	chloride	16887-00-6	E235.Cl	99.6 mg/L	100 mg/L	99.6	75.0	125	----
Anions and Nutrients (QCLot: 311090)										
FJ2101042-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	99.1 mg/L	100 mg/L	99.1	75.0	125	----
Anions and Nutrients (QCLot: 311091)										
FJ2101042-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.48 mg/L	2.5 mg/L	99.4	75.0	125	----
Anions and Nutrients (QCLot: 311092)										
FJ2101042-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.504 mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 313902)										
VA21C1568-001	Anonymous	nitrogen, total	7727-37-9	E366	0.394 mg/L	0.4 mg/L	98.4	70.0	130	----
Anions and Nutrients (QCLot: 313903)										
CG2104573-003	Anonymous	phosphorus, total	7723-14-0	E372-U	0.451 mg/L	0.5 mg/L	90.2	70.0	130	----
Anions and Nutrients (QCLot: 313904)										
VA21C1568-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0481 mg/L	0.05 mg/L	96.3	70.0	130	----
Anions and Nutrients (QCLot: 313905)										
VA21C1568-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.104 mg/L	0.1 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 315339)										
YL2101356-002	Anonymous	silicate (as SiO2)	7631-86-9	E392	9.88 mg/L	10 mg/L	98.8	75.0	125	----
Anions and Nutrients (QCLot: 315434)										
YL2101440-008	JFLQC-1	nitrogen, total	7727-37-9	E366	0.399 mg/L	0.4 mg/L	99.7	70.0	130	----
Anions and Nutrients (QCLot: 315435)										
YL2101440-008	JFLQC-1	phosphorus, total	7723-14-0	E372-U	0.0496 mg/L	0.05 mg/L	99.3	70.0	130	----
Anions and Nutrients (QCLot: 315436)										
YL2101440-008	JFLQC-1	phosphorus, total dissolved	7723-14-0	E375-T	0.0464 mg/L	0.05 mg/L	92.8	70.0	130	----
Anions and Nutrients (QCLot: 315437)										
YL2101440-008	JFLQC-1	ammonia, total (as N)	7664-41-7	E298	0.107 mg/L	0.1 mg/L	107	75.0	125	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 313900)										
WR2101410-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	5.58 mg/L	5 mg/L	112	70.0	130	----
Organic / Inorganic Carbon (QCLot: 315433)										
YL2101440-008	JFLQC-1	carbon, dissolved organic [DOC]	----	E358-L	5.02 mg/L	5 mg/L	100	70.0	130	----
Total Metals (QCLot: 313351)										
VA21C1347-002	Anonymous	aluminum, total	7429-90-5	E420	0.212 mg/L	0.2 mg/L	106	70.0	130	----
		antimony, total	7440-36-0	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00986 mg/L	0.01 mg/L	98.6	70.0	130	----
		boron, total	7440-42-8	E420	0.086 mg/L	0.1 mg/L	85.8	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00426 mg/L	0.004 mg/L	106	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0106 mg/L	0.01 mg/L	106	70.0	130	----
		chromium, total	7440-47-3	E420	0.0417 mg/L	0.04 mg/L	104	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		copper, total	7440-50-8	E420	0.0205 mg/L	0.02 mg/L	103	70.0	130	----
		iron, total	7439-89-6	E420	2.05 mg/L	2 mg/L	102	70.0	130	----
		lead, total	7439-92-1	E420	0.0199 mg/L	0.02 mg/L	99.4	70.0	130	----
		lithium, total	7439-93-2	E420	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0196 mg/L	0.02 mg/L	97.9	70.0	130	----
		nickel, total	7440-02-0	E420	0.0416 mg/L	0.04 mg/L	104	70.0	130	----
		phosphorus, total	7723-14-0	E420	11.7 mg/L	10 mg/L	117	70.0	130	----
		potassium, total	7440-09-7	E420	4.33 mg/L	4 mg/L	108	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		selenium, total	7782-49-2	E420	0.0405 mg/L	0.04 mg/L	101	70.0	130	----
		silicon, total	7440-21-3	E420	9.46 mg/L	10 mg/L	94.6	70.0	130	----
		silver, total	7440-22-4	E420	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		sodium, total	17341-25-2	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	21.8 mg/L	20 mg/L	109	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0370 mg/L	0.04 mg/L	92.5	70.0	130	----
		thallium, total	7440-28-0	E420	0.00383 mg/L	0.004 mg/L	95.8	70.0	130	----
		thorium, total	7440-29-1	E420	0.0202 mg/L	0.02 mg/L	101	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*
Total Metals (QCLot: 313351) - continued										
VA21C1347-002	Anonymous	tin, total	7440-31-5	E420	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		titanium, total	7440-32-6	E420	0.0419 mg/L	0.04 mg/L	105	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		uranium, total	7440-61-1	E420	0.00419 mg/L	0.004 mg/L	105	70.0	130	----
		vanadium, total	7440-62-2	E420	0.106 mg/L	0.1 mg/L	106	70.0	130	----
		zinc, total	7440-66-6	E420	0.409 mg/L	0.4 mg/L	102	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0391 mg/L	0.04 mg/L	97.8	70.0	130	----
Total Metals (QCLot: 315539)										
YL2101440-001	NORTHWEST BAY_MID-DEPTH	mercury, total	7439-97-6	E508	0.0000875 mg/L	0.0001 mg/L	87.5	70.0	130	----
Dissolved Metals (QCLot: 313340)										
CG2104587-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.410 mg/L	0.4 mg/L	102	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0416 mg/L	0.04 mg/L	104	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0370 mg/L	0.04 mg/L	92.6	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0776 mg/L	0.08 mg/L	97.0	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0167 mg/L	0.02 mg/L	83.6	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00809 mg/L	0.008 mg/L	101	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	8 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0214 mg/L	0.02 mg/L	107	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0772 mg/L	0.08 mg/L	96.4	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0379 mg/L	0.04 mg/L	94.8	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0370 mg/L	0.04 mg/L	92.5	70.0	130	----
		iron, dissolved	7439-89-6	E421	3.80 mg/L	4 mg/L	95.0	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0370 mg/L	0.04 mg/L	92.6	70.0	130	----
		lithium, dissolved	7439-93-2	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0382 mg/L	0.04 mg/L	95.4	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
		nickel, dissolved	7440-02-0	E421	ND mg/L	0.08 mg/L	ND	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	21.9 mg/L	20 mg/L	109	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	8 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0392 mg/L	0.04 mg/L	98.1	70.0	130	----
		selenium, dissolved	7782-49-2	E421	ND mg/L	0.08 mg/L	ND	70.0	130	----
		silicon, dissolved	7440-21-3	E421	19.0 mg/L	20 mg/L	95.0	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: 313340) - continued										
CG2104587-002	Anonymous	silver, dissolved	7440-22-4	E421	0.00740 mg/L	0.008 mg/L	92.5	70.0	130	----
		sodium, dissolved	17341-25-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0824 mg/L	0.08 mg/L	103	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00717 mg/L	0.008 mg/L	89.6	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0376 mg/L	0.04 mg/L	94.0	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0789 mg/L	0.08 mg/L	98.6	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		uranium, dissolved	7440-61-1	E421	ND mg/L	0.008 mg/L	ND	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.205 mg/L	0.2 mg/L	102	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.770 mg/L	0.8 mg/L	96.3	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0822 mg/L	0.08 mg/L	103	70.0	130	----
Dissolved Metals (QCLot: 315582)										
CG2104612-004	Anonymous	mercury, dissolved	7439-97-6	E509	0.000100 mg/L	0.0001 mg/L	100	70.0	130	----
Volatile Organic Compounds (QCLot: 316164)										
VA21C1754-001	Anonymous	benzene	71-43-2	E611A	81.8 µg/L	100 µg/L	81.8	60.0	140	----
		ethylbenzene	100-41-4	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	102 µg/L	100 µg/L	102	60.0	140	----
		styrene	100-42-5	E611A	106 µg/L	100 µg/L	106	60.0	140	----
		toluene	108-88-3	E611A	94.1 µg/L	100 µg/L	94.1	60.0	140	----
		xylene, m+p-	179601-23-1	E611A	224 µg/L	200 µg/L	112	60.0	140	----
		xylene, o-	95-47-6	E611A	108 µg/L	100 µg/L	108	60.0	140	----
Hydrocarbons (QCLot: 316163)										
VA21C1938-027	Anonymous	F1 (C6-C10)	----	E581.VH+F1	5770 µg/L	6310 µg/L	91.4	60.0	140	----
		VHw (C6-C10)	----	E581.VH+F1	5680 µg/L	6310 µg/L	90.0	60.0	140	----

CHAIN OF CUSTODY ALS Laboratory YL2101440 · 9:00	RELINQUISHED BY: SARAH BEATTIE DATE/TIME: 1-OCT-2021	RECEIVED BY: DATE/TIME:	RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME: 1-OCT-21 9.0	

CLIENT:	Golder Associates Ltd.	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
PROJECT:	Jackfish NTPC Thermal Plume Del		
SITE:			
PURCHASE ORDER NO.:		ALS QUOTE NC YL21-GOLD100-008	
PROJECT MANAGER:	Kathy Qin	CONTACT PH: 306 370 6141	EQuIS facility code: 183527250
SAMPLER:		SAMPLER MOBILE:	Project Number: 21482915
EMAIL REPORTS TO:	Kathy_Qin@golder.com; alison_humphries@golder.com	EMAIL INVOICE TO:	Laurence_bonin@golder.com; Kathy_Qin@golder.com

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt	5-1 °C		
Other comments:			

SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS Solid(S) Water(W)	MATRIX:	CONTAINER INFORMATION		ANALYSIS REQUIRED									Additional Information
SAMPLE	Sample identification (This description will appear on the report)	DATE / TIME (dd-mm-yyyy)	MATRIX	TOTAL CONTAINERS	Routine Bottle (500mL Polyethylene)	Total Nutrients (100mL Amber glass)	Dissolved Nutrients (100mL Amber glass)	Total Metals (80mL HDPE)	Dissolved Metals (80mL HDPE)	Total Mercury (40mL glass)	Dissolved Mercury (40mL glass)	Oil and grease (2x250mL Amber glass)	BTEX, F1, F2, F3, F4 (2x40mL vial + 2x60 Amber glass)	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	Northwest Bay_Mid-Depth	30-09-2021 13:40	W	7	x	x	x	x	x	x	x			
2	Northwest Bay_Bottom	30-09-2021 13:50	W	13	x	x	x	x	x	x	x	X	X	
3	Northwest Bay_Bottom-4	30-09-2021 13:55	W	13	x	x	x	x	x	x	x	X	X	
4	Outflow	30-09-2021 9:45	W	~~13~~ 7	x	x	x	x	x	x	x			
5	Inflow to NW Bay 2	30-09-2021 12:30	W	7	x	x	x	x	x	x	x			
6	Southwest Bay_Mid-Depth	30-09-2021 15:05	W	7	x	x	x	x	x	x	x			
7	Southwest Bay_Bottom	30-09-2021 15:10	W	7	x	x	x	x	x	x	x			
8	JFLQC-1	30-09-2021 8:45	W	13	x	x	x	x	x	x	x	X	X	
			TOTAL											

Environmental Division
Yellowknife
Work Order Reference
YL2101440

Telephone : +1 867 873 5593

CERTIFICATE OF ANALYSIS

Work Order	: **YL2101444**	Page	: 1 of 11
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Kathy Qin	Account Manager	: Oliver Gregg
Address	: 9 - 4905 48th Street Yellowknife NT Canada X1A 3S3	Address	: 314 Old Airport Road, Unit 116 Yellowknife NT Canada X1A 3T3
Telephone	: ----	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC Thermal Plume Del	Date Samples Received	: 01-Oct-2021 15:30
PO	: ----	Date Analysis Commenced	: 07-Oct-2021
C-O-C number	: ----	Issue Date	: 19-Oct-2021 11:22
Sampler	: ----		
Site	: ----		
Quote number	: NTPC Jackfish Lake		
No. of samples received	: 7		
No. of samples analysed	: 7		

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*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

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

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

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
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.

Workorder Comments

Re-analysis of solids parameters (total suspended and dissolved) in sample JFLQC-2 took place after the holding time had expired. Initial analysis was within the holding time, but required confirmation or re-testing.

Qualifiers

Qualifier	*Description*
DTMF	*Dissolved concentration exceeds total for field-filtered metals sample. Metallic contaminants may have been introduced to dissolved sample during field filtration.*
SFT	*Sample was filtered due to turbidity interference. Result reflects soluble analyte concentration.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	JFLQC-2	Near Outflow-In Lake_Mid-depth	Near Outflow-In Lake_Bottom	EMD Discharge-In Lake_Mid-depth	EMD Discharge-In Lake_Bottom
Client sampling date / time					01-Oct-2021 14:00	01-Oct-2021 10:45	01-Oct-2021 10:50	01-Oct-2021 12:30	01-Oct-2021 12:35
					YL2101444-001	YL2101444-002	YL2101444-003	YL2101444-004	YL2101444-005
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	108	109	116	114
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	7.0	<1.0	<1.0
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	3.5	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	<1.0	108	116	116	114
conductivity	----	E100	2.0	µS/cm	2.1	471	472	476	477
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	<0.60	148	148	145	146
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	<0.60	146	147	151	152
pH	----	E108	0.10	pH units	5.19	8.18	8.31	8.21	8.24
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	271	273	270	272
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	<1.0	245	249	247	247
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	13.0	12.2	8.8	12.0
turbidity	----	E121	0.10	NTU	<0.10	21.8	22.6	21.0	22.1
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	0.0115	0.0074	0.0083	0.0099
chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	59.9	59.6	59.3	59.4
fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	0.091	0.089	0.086	0.085
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L	<0.030	1.08	0.860	0.822	1.17
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	0.117	0.0454	0.0414	0.0705
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	<0.0020	0.0123	0.0123	0.0114	0.0127
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	<0.50	13.4	13.6	13.2	13.4
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	<0.30	25.2	25.2	25.2	25.2
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	11.5	12.0	11.5	11.7
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	0.0059	0.0045	0.0051	0.0061

Analytical Results

Sub-Matrix: Water

(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	JFLQC-2	Near Outflow-In Lake_Mid-depth	Near Outflow-In Lake_Bottom	EMD Discharge-In Lake_Mid-depth	EMD Discharge-In Lake_Bottom
Client sampling date / time					01-Oct-2021 14:00	01-Oct-2021 10:45	01-Oct-2021 10:50	01-Oct-2021 12:30	01-Oct-2021 12:35
					YL2101444-001	YL2101444-002	YL2101444-003	YL2101444-004	YL2101444-005
					Result	Result	Result	Result	Result
Total Metals									
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	0.00121	0.00123	0.00124	0.00123
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	0.0734	0.0721	0.0728	0.0746
barium, total	7440-39-3	E420	0.00010	mg/L	<0.00010	0.0301	0.0307	0.0308	0.0316
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	<0.010	0.028	0.028	0.029	0.028
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L	<0.050	39.2	38.8	40.7	40.7
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	0.00968	0.00141	0.00142	0.00140
iron, total	7439-89-6	E420	0.010	mg/L	<0.010	0.013	0.012	0.012	0.014
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	0.000223	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	0.0061	0.0061	0.0064	0.0063
magnesium, total	7439-95-4	E420	0.0050	mg/L	<0.0050	11.8	12.1	12.0	12.3
manganese, total	7439-96-5	E420	0.00010	mg/L	<0.00010	0.127	0.125	0.121	0.115
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	<0.000050	0.000181	0.000178	0.000189	0.000203
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	0.00054	<0.00050	0.00052	0.00056
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	0.118	0.104	0.121	0.094
potassium, total	7440-09-7	E420	0.050	mg/L	<0.050	4.24	4.18	4.27	4.35
rubidium, total	7440-17-7	E420	0.00020	mg/L	<0.00020	0.00264	0.00270	0.00260	0.00265
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	0.000073	0.000079	0.000053	0.000064
silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	6.35	6.26	6.13	6.42
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	17341-25-2	E420	0.050	mg/L	<0.050	30.4	30.7	30.7	31.6
strontium, total	7440-24-6	E420	0.00020	mg/L	<0.00020	0.0893	0.0890	0.0900	0.0900
sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	9.56	9.62	9.18	9.54

Analytical Results

Sub-Matrix: Water

(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	JFLQC-2	Near Outflow-In Lake_Mid-depth	Near Outflow-In Lake_Bottom	EMD Discharge-In Lake_Mid-depth	EMD Discharge-In Lake_Bottom
Client sampling date / time					01-Oct-2021 14:00	01-Oct-2021 10:45	01-Oct-2021 10:50	01-Oct-2021 12:30	01-Oct-2021 12:35
					YL2101444-001	YL2101444-002	YL2101444-003	YL2101444-004	YL2101444-005
					Result	Result	Result	Result	Result
Total Metals									
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	0.000506	0.000508	0.000503	0.000527
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	0.0096	0.0047	0.0047	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	0.0021	0.0011	0.0019	0.0087
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	0.00116	0.00116	0.00114	0.00118
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	0.0717	0.0724	0.0712	0.0722
barium, dissolved	7440-39-3	E421	0.00010	mg/L	<0.00010	0.0292	0.0297	0.0292	0.0294
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<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	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	0.028	0.027	0.027	0.028
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L	<0.050	39.4	39.9	38.8	39.3
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	0.00119	0.00114	0.00116	0.00114
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	0.0063	0.0062	0.0061	0.0063
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	<0.0050	12.0	11.8	11.8	11.7
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	0.00209	0.00161	0.00200	0.00170

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	JFLQC-2	Near Outflow-In Lake_Mid-depth	Near Outflow-In Lake_Bottom	EMD Discharge-In Lake_Mid-depth	EMD Discharge-In Lake_Bottom
Client sampling date / time					01-Oct-2021 14:00	01-Oct-2021 10:45	01-Oct-2021 10:50	01-Oct-2021 12:30	01-Oct-2021 12:35
					YL2101444-001	YL2101444-002	YL2101444-003	YL2101444-004	YL2101444-005
					Result	Result	Result	Result	Result
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.000050	0.000177	0.000169	0.000174	0.000172
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L	<0.050	4.18	4.14	4.10	4.14
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	<0.00020	0.00260	0.00271	0.00263	0.00266
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	0.000056	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L	<0.050	6.36	6.28	6.15	6.24
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	17341-25-2	E421	0.050	mg/L	<0.050	31.0	30.8	30.6	30.5
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	<0.00020	0.0870	0.0868	0.0866	0.0924
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	8.60	8.57	8.11	8.44
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<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	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000010	0.000484	0.000478	0.000477	0.000508
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	0.0062	0.0046	0.0048	<0.0010
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00462 DTMF
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	----	----	<5.0	----	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.00050	mg/L	----	----	<0.00050	----	----
ethylbenzene	100-41-4	E611A	0.00050	mg/L	----	----	<0.00050	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	JFLQC-2	Near Outflow-In Lake_Mid-depth	Near Outflow-In Lake_Bottom	EMD Discharge-In Lake_Mid-depth	EMD Discharge-In Lake_Bottom
Client sampling date / time					01-Oct-2021 14:00	01-Oct-2021 10:45	01-Oct-2021 10:50	01-Oct-2021 12:30	01-Oct-2021 12:35
					YL2101444-001	YL2101444-002	YL2101444-003	YL2101444-004	YL2101444-005
					Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]									
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.00050	mg/L	----	----	<0.00050	----	----
styrene	100-42-5	E611A	0.00050	mg/L	----	----	<0.00050	----	----
toluene	108-88-3	E611A	0.00050	mg/L	----	----	<0.00050	----	----
xylene, m+p-	179601-23-1	E611A	0.00050	mg/L	----	----	<0.00050	----	----
xylene, o-	95-47-6	E611A	0.00050	mg/L	----	----	<0.00050	----	----
xylenes, total	1330-20-7	E611A	0.00075	mg/L	----	----	<0.00075	----	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	----	----	97.2	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	----	----	103	----	----
Hydrocarbons									
EPH (C10-C19)	----	E601A-L	0.050	mg/L	----	----	<0.050	----	----
EPH (C19-C32)	----	E601A-L	0.050	mg/L	----	----	<0.050	----	----
F1 (C6-C10)	----	E581.VH+F1	0.10	mg/L	----	----	<0.10	----	----
F2 (C10-C16)	----	E601	0.30	mg/L	----	----	<0.30	----	----
F3 (C16-C34)	----	E601	0.30	mg/L	----	----	<0.30	----	----
F4 (C34-C50)	----	E601	0.30	mg/L	----	----	<0.30	----	----
TEH (C10-C30), BC	----	E601A-L	0.10	mg/L	----	----	<0.10	----	----
VHw (C6-C10)	----	E581.VH+F1	0.10	mg/L	----	----	<0.10	----	----
F1-BTEX	----	EC580	0.10	mg/L	----	----	<0.10	----	----
VPHw	----	EC580A	0.10	mg/L	----	----	<0.10	----	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A-L	1.0	%	----	----	117	----	----
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	----	----	85.4	----	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	----	----	91.4	----	----

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

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	Midlake 1_Mid-depth	Midlake 1_Bottom	----	----	----
				Client sampling date / time	01-Oct-2021 09:30	01-Oct-2021 09:35	----	----	----
Analyte	CAS Number	Method	LOR	Unit	YL2101444-006	YL2101444-007	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	109	109	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	7.6	3.0	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	3.8	1.5	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	117	112	----	----	----
conductivity	----	E100	2.0	µS/cm	544	453	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	144	148	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	149	149	----	----	----
pH	----	E108	0.10	pH units	8.30	8.42	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	257	268	----	----	----
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	248	249	----	----	----
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	14.6	11.8	----	----	----
turbidity	----	E121	0.10	NTU	21.0	29.9	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0081	0.0090	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	59.4	61.2	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.086	0.088	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	----	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	<0.0051	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	----	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L	0.919	0.861	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0426	0.0391	----	----	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0123	0.0138	----	----	----
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	13.0 SFT	13.3 SFT	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	25.2	25.4	----	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	11.9	12.2	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0044	0.0052	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00124	0.00125	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0737	0.0724	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	Midlake 1_Mid-depth	Midlake 1_Bottom	----	----	----
				Client sampling date / time	01-Oct-2021 09:30	01-Oct-2021 09:35	----	----	----
Analyte	CAS Number	Method	LOR	Unit	YL2101444-006	YL2101444-007	--------	--------	--------
					Result	Result	----	----	----
Total Metals									
barium, total	7440-39-3	E420	0.00010	mg/L	0.0308	0.0309	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.028	0.028	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	39.4	39.6	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00139	0.00138	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.012	0.012	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0060	0.0062	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	12.3	12.2	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.112	0.112	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000207	0.000208	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00054	0.00057	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.094	0.131	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	4.34	4.29	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00260	0.00252	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	6.20	6.19	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	31.4	31.0	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0910	0.0893	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	9.27	8.96	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Midlake 1_Mid-depth	Midlake 1_Bottom	----	----	----
				Client sampling date / time	01-Oct-2021 09:30	01-Oct-2021 09:35	----	----	----
					YL2101444-006	YL2101444-007	--------	--------	--------
					Result	Result	----	----	----
Total Metals									
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000516	0.000534	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0050	0.0046	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0011	0.0017	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00117	0.00116	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0730	0.0728	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0298	0.0297	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.026	0.027	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	38.6	40.0	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00110	0.00112	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0060	0.0061	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	11.6	11.8	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00119	0.00184	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000175	0.000184	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.15	4.14	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00253	0.00266	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Midlake 1_Mid-depth	Midlake 1_Bottom	----	----	----
				Client sampling date / time	01-Oct-2021 09:30	01-Oct-2021 09:35	----	----	----
					YL2101444-006	YL2101444-007	--------	--------	--------
					Result	Result	----	----	----
Dissolved Metals									
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.11	6.15	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	30.9	31.0	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0892	0.0880	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	8.42	8.36	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000469	0.000493	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0054	0.0057	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **YL2101444**	Page	: 1 of 28
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Kathy Qin	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	: Jackfish NTPC Thermal Plume Del	Date Samples Received	: 01-Oct-2021 15:30
PO	: ----	Issue Date	: 19-Oct-2021 11:22
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: NTPC Jackfish Lake		
No. of samples received	: 7		
No. of samples analysed	: 7		

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 Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- 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

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Anions and Nutrients	QC-MRG6-314698001	----	chloride	16887-00-6	E235.Cl	1.01 mg/L B	0.5 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	*Description*
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

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	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
Container / Client Sample ID(s)			*Preparation Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*	*Analysis Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) Near Outflow-In Lake_Bottom	E567	01-Oct-2021	08-Oct-2021	28 days	7 days	✓	08-Oct-2021	40 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EMD Discharge-In Lake_Bottom	E298	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EMD Discharge-In Lake_Mid-depth	E298	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) JFLQC-2	E298	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Midlake 1_Bottom	E298	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Midlake 1_Mid-depth	E298	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Near Outflow-In Lake_Bottom	E298	01-Oct-2021	08-Oct-2021	----	----		08-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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Near Outflow-In Lake_Mid-depth	E298	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
EMD Discharge-In Lake_Bottom	E235.Cl	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
EMD Discharge-In Lake_Mid-depth	E235.Cl	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
JFLQC-2	E235.Cl	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Midlake 1_Mid-depth	E235.Cl	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Near Outflow-In Lake_Bottom	E235.Cl	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Near Outflow-In Lake_Mid-depth	E235.Cl	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Midlake 1_Bottom	E235.Cl	01-Oct-2021	----	----	----		10-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
EMD Discharge-In Lake_Bottom	E235.F	01-Oct-2021	----	----	----		08-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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE EMD Discharge-In Lake_Mid-depth	E235.F	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE JFLQC-2	E235.F	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Midlake 1_Mid-depth	E235.F	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Near Outflow-In Lake_Bottom	E235.F	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Near Outflow-In Lake_Mid-depth	E235.F	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Midlake 1_Bottom	E235.F	01-Oct-2021	----	----	----		10-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EMD Discharge-In Lake_Bottom	E235.NO3-L	01-Oct-2021	----	----	----		08-Oct-2021	3 days	7 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EMD Discharge-In Lake_Mid-depth	E235.NO3-L	01-Oct-2021	----	----	----		08-Oct-2021	3 days	7 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE JFLQC-2	E235.NO3-L	01-Oct-2021	----	----	----		08-Oct-2021	3 days	7 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Midlake 1_Mid-depth	E235.NO3-L	01-Oct-2021	----	----	----		08-Oct-2021	3 days	7 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Near Outflow-In Lake_Bottom	E235.NO3-L	01-Oct-2021	----	----	----		08-Oct-2021	3 days	7 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Near Outflow-In Lake_Mid-depth	E235.NO3-L	01-Oct-2021	----	----	----		08-Oct-2021	3 days	7 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Midlake 1_Bottom	E235.NO3-L	01-Oct-2021	----	----	----		10-Oct-2021	3 days	9 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EMD Discharge-In Lake_Bottom	E235.NO2-L	01-Oct-2021	----	----	----		08-Oct-2021	3 days	7 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EMD Discharge-In Lake_Mid-depth	E235.NO2-L	01-Oct-2021	----	----	----		08-Oct-2021	3 days	7 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE JFLQC-2	E235.NO2-L	01-Oct-2021	----	----	----		08-Oct-2021	3 days	7 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Midlake 1_Mid-depth	E235.NO2-L	01-Oct-2021	----	----	----		08-Oct-2021	3 days	7 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Near Outflow-In Lake_Bottom	E235.NO2-L	01-Oct-2021	----	----	----		08-Oct-2021	3 days	7 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Near Outflow-In Lake_Mid-depth	E235.NO2-L	01-Oct-2021	----	----	----		08-Oct-2021	3 days	7 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Midlake 1_Bottom	E235.NO2-L	01-Oct-2021	----	----	----		10-Oct-2021	3 days	9 days	× EHT
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE EMD Discharge-In Lake_Bottom	E392	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE EMD Discharge-In Lake_Mid-depth	E392	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE JFLQC-2	E392	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Midlake 1_Bottom	E392	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Midlake 1_Mid-depth	E392	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Near Outflow-In Lake_Bottom	E392	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Near Outflow-In Lake_Mid-depth	E392	01-Oct-2021	----	----	----		08-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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE EMD Discharge-In Lake_Bottom	E235.SO4	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EMD Discharge-In Lake_Mid-depth	E235.SO4	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE JFLQC-2	E235.SO4	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Midlake 1_Mid-depth	E235.SO4	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Near Outflow-In Lake_Bottom	E235.SO4	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Near Outflow-In Lake_Mid-depth	E235.SO4	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Midlake 1_Bottom	E235.SO4	01-Oct-2021	----	----	----		10-Oct-2021	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) EMD Discharge-In Lake_Bottom	E375-T	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) EMD Discharge-In Lake_Mid-depth	E375-T	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) JFLQC-2	E375-T	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) Midlake 1_Bottom	E375-T	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) Midlake 1_Mid-depth	E375-T	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) Near Outflow-In Lake_Bottom	E375-T	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) Near Outflow-In Lake_Mid-depth	E375-T	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) EMD Discharge-In Lake_Bottom	E366	01-Oct-2021	08-Oct-2021	----	----		11-Oct-2021	28 days	10 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) EMD Discharge-In Lake_Mid-depth	E366	01-Oct-2021	08-Oct-2021	----	----		11-Oct-2021	28 days	10 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) JFLQC-2	E366	01-Oct-2021	08-Oct-2021	----	----		11-Oct-2021	28 days	10 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) Midlake 1_Bottom	E366	01-Oct-2021	08-Oct-2021	----	----		11-Oct-2021	28 days	10 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) Midlake 1_Mid-depth	E366	01-Oct-2021	08-Oct-2021	----	----		11-Oct-2021	28 days	10 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) Near Outflow-In Lake_Bottom	E366	01-Oct-2021	08-Oct-2021	----	----		11-Oct-2021	28 days	10 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) Near Outflow-In Lake_Mid-depth	E366	01-Oct-2021	08-Oct-2021	----	----		11-Oct-2021	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) EMD Discharge-In Lake_Bottom	E372-U	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) EMD Discharge-In Lake_Mid-depth	E372-U	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) JFLQC-2	E372-U	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) Midlake 1_Bottom	E372-U	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) Midlake 1_Mid-depth	E372-U	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) Near Outflow-In Lake_Bottom	E372-U	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) Near Outflow-In Lake_Mid-depth	E372-U	01-Oct-2021	08-Oct-2021	----	----		09-Oct-2021	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EMD Discharge-In Lake_Bottom	E509	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EMD Discharge-In Lake_Mid-depth	E509	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) JFLQC-2	E509	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Midlake 1_Bottom	E509	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Midlake 1_Mid-depth	E509	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Near Outflow-In Lake_Bottom	E509	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Near Outflow-In Lake_Mid-depth	E509	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) EMD Discharge-In Lake_Bottom	E421	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) EMD Discharge-In Lake_Mid-depth	E421	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) JFLQC-2	E421	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Midlake 1_Bottom	E421	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Midlake 1_Mid-depth	E421	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Near Outflow-In Lake_Bottom	E421	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Near Outflow-In Lake_Mid-depth	E421	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	180 days	7 days	✓
Hydrocarbons : BC PHC - EPH by GC-FID (Low level)										
Amber glass/Teflon lined cap (sodium bisulfate) Near Outflow-In Lake_Bottom	E601A-L	01-Oct-2021	08-Oct-2021	14 days	7 days	✓	10-Oct-2021	40 days	2 days	✓
Hydrocarbons : CCME PHC - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) Near Outflow-In Lake_Bottom	E601	01-Oct-2021	08-Oct-2021	14 days	7 days	✓	08-Oct-2021	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Near Outflow-In Lake_Bottom	E581.VH+F1	01-Oct-2021	09-Oct-2021	----	----		10-Oct-2021	14 days	9 days	✓

Matrix: **Water**

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

Analyte Group	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
Container / Client Sample ID(s)			*Preparation Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*	*Analysis Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EMD Discharge-In Lake_Bottom	E358-L	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EMD Discharge-In Lake_Mid-depth	E358-L	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) JFLQC-2	E358-L	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) Midlake 1_Bottom	E358-L	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) Midlake 1_Mid-depth	E358-L	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) Near Outflow-In Lake_Bottom	E358-L	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) Near Outflow-In Lake_Mid-depth	E358-L	01-Oct-2021	08-Oct-2021	----	----		08-Oct-2021	28 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EMD Discharge-In Lake_Bottom	E290	01-Oct-2021	----	----	----		08-Oct-2021	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EMD Discharge-In Lake_Mid-depth	E290	01-Oct-2021	----	----	----		08-Oct-2021	14 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : Alkalinity Species by Titration										
HDPE JFLQC-2	E290	01-Oct-2021	----	----	----		08-Oct-2021	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Midlake 1_Mid-depth	E290	01-Oct-2021	----	----	----		08-Oct-2021	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Near Outflow-In Lake_Bottom	E290	01-Oct-2021	----	----	----		08-Oct-2021	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Near Outflow-In Lake_Mid-depth	E290	01-Oct-2021	----	----	----		08-Oct-2021	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Midlake 1_Bottom	E290	01-Oct-2021	----	----	----		09-Oct-2021	14 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE EMD Discharge-In Lake_Bottom	E100	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE EMD Discharge-In Lake_Mid-depth	E100	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE JFLQC-2	E100	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE Midlake 1_Mid-depth	E100	01-Oct-2021	----	----	----		08-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: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE Near Outflow-In Lake_Bottom	E100	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE Near Outflow-In Lake_Mid-depth	E100	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE Midlake 1_Bottom	E100	01-Oct-2021	----	----	----		09-Oct-2021	28 days	8 days	✓
Physical Tests : pH by Meter										
HDPE JFLQC-2	E108	01-Oct-2021	----	----	----		08-Oct-2021	0.25 hrs	168 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EMD Discharge-In Lake_Bottom	E108	01-Oct-2021	----	----	----		08-Oct-2021	0.25 hrs	169 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EMD Discharge-In Lake_Mid-depth	E108	01-Oct-2021	----	----	----		08-Oct-2021	0.25 hrs	169 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Near Outflow-In Lake_Bottom	E108	01-Oct-2021	----	----	----		08-Oct-2021	0.25 hrs	171 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Near Outflow-In Lake_Mid-depth	E108	01-Oct-2021	----	----	----		08-Oct-2021	0.25 hrs	171 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Midlake 1_Mid-depth	E108	01-Oct-2021	----	----	----		08-Oct-2021	0.25 hrs	172 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE Midlake 1_Bottom	E108	01-Oct-2021	----	----	----		09-Oct-2021	0.25 hrs	198 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE EMD Discharge-In Lake_Bottom	E162	01-Oct-2021	----	----	----		07-Oct-2021	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE EMD Discharge-In Lake_Mid-depth	E162	01-Oct-2021	----	----	----		07-Oct-2021	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE JFLQC-2	E162	01-Oct-2021	----	----	----		07-Oct-2021	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE Near Outflow-In Lake_Bottom	E162	01-Oct-2021	----	----	----		07-Oct-2021	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE Near Outflow-In Lake_Mid-depth	E162	01-Oct-2021	----	----	----		07-Oct-2021	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE Midlake 1_Bottom	E162	01-Oct-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE Midlake 1_Mid-depth	E162	01-Oct-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE EMD Discharge-In Lake_Bottom	E160-H	01-Oct-2021	----	----	----		07-Oct-2021	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE EMD Discharge-In Lake_Mid-depth	E160-H	01-Oct-2021	----	----	----		07-Oct-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE JFLQC-2	E160-H	01-Oct-2021	----	----	----		07-Oct-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Near Outflow-In Lake_Bottom	E160-H	01-Oct-2021	----	----	----		07-Oct-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Near Outflow-In Lake_Mid-depth	E160-H	01-Oct-2021	----	----	----		07-Oct-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Midlake 1_Bottom	E160-H	01-Oct-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Midlake 1_Mid-depth	E160-H	01-Oct-2021	----	----	----		07-Oct-2021	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE EMD Discharge-In Lake_Bottom	E121	01-Oct-2021	----	----	----		07-Oct-2021	3 days	6 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE EMD Discharge-In Lake_Mid-depth	E121	01-Oct-2021	----	----	----		07-Oct-2021	3 days	6 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE JFLQC-2	E121	01-Oct-2021	----	----	----		07-Oct-2021	3 days	6 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE Midlake 1_Bottom	E121	01-Oct-2021	----	----	----		07-Oct-2021	3 days	6 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE Midlake 1_Mid-depth	E121	01-Oct-2021	----	----	----		07-Oct-2021	3 days	6 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE Near Outflow-In Lake_Bottom	E121	01-Oct-2021	----	----	----		07-Oct-2021	3 days	6 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE Near Outflow-In Lake_Mid-depth	E121	01-Oct-2021	----	----	----		07-Oct-2021	3 days	6 days	× EHT
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) EMD Discharge-In Lake_Bottom	E508	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) EMD Discharge-In Lake_Mid-depth	E508	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) JFLQC-2	E508	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Midlake 1_Bottom	E508	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Midlake 1_Mid-depth	E508	01-Oct-2021	----	----	----		08-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: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Near Outflow-In Lake_Bottom	E508	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Near Outflow-In Lake_Mid-depth	E508	01-Oct-2021	----	----	----		08-Oct-2021	28 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) EMD Discharge-In Lake_Bottom	E420	01-Oct-2021	----	----	----		08-Oct-2021	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) EMD Discharge-In Lake_Mid-depth	E420	01-Oct-2021	----	----	----		08-Oct-2021	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) JFLQC-2	E420	01-Oct-2021	----	----	----		08-Oct-2021	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Midlake 1_Bottom	E420	01-Oct-2021	----	----	----		08-Oct-2021	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Midlake 1_Mid-depth	E420	01-Oct-2021	----	----	----		08-Oct-2021	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Near Outflow-In Lake_Bottom	E420	01-Oct-2021	----	----	----		08-Oct-2021	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Near Outflow-In Lake_Mid-depth	E420	01-Oct-2021	----	----	----		08-Oct-2021	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Near Outflow-In Lake_Bottom	E611A	01-Oct-2021	09-Oct-2021	----	----		10-Oct-2021	14 days	9 days	✓

Legend & Qualifier Definitions

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

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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	314705	2	12	16.6	5.0	✓
Ammonia by Fluorescence	E298	315277	1	15	6.6	5.0	✓
BTEX by Headspace GC-MS	E611A	315342	1	8	12.5	5.0	✓
Chloride in Water by IC	E235.Cl	314698	2	14	14.2	5.0	✓
Conductivity in Water	E100	314704	2	14	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	314641	1	7	14.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	314586	1	8	12.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	314797	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	314701	2	13	15.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	314700	2	14	14.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	314699	2	14	14.2	5.0	✓
pH by Meter	E108	314706	2	13	15.3	5.0	✓
Reactive Silica by Colourimetry	E392	315210	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	314703	2	15	13.3	5.0	✓
TDS by Gravimetry	E162	314516	1	7	14.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	314798	1	19	5.2	5.0	✓
Total Mercury in Water by CVAAS	E508	314592	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	314544	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	315275	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	315276	1	7	14.2	5.0	✓
TSS by Gravimetry	E160-H	314514	1	7	14.2	5.0	✓
Turbidity by Nephelometry	E121	314374	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	315343	1	1	100.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	314705	2	12	16.6	5.0	✓
Ammonia by Fluorescence	E298	315277	1	15	6.6	5.0	✓
BC PHC - EPH by GC-FID (Low level)	E601A-L	314523	1	1	100.0	5.0	✓
BTEX by Headspace GC-MS	E611A	315342	1	8	12.5	5.0	✓
CCME PHC - F2-F4 by GC-FID	E601	314522	1	1	100.0	5.0	✓
Chloride in Water by IC	E235.Cl	314698	2	14	14.2	5.0	✓
Conductivity in Water	E100	314704	2	14	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	314641	1	7	14.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	314586	1	8	12.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	314797	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	314701	2	13	15.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	314700	2	14	14.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	314699	2	14	14.2	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Control Samples (LCS) - Continued							
Oil & Grease by Gravimetry	E567	314521	1	1	100.0	5.0	✓
pH by Meter	E108	314706	2	13	15.3	5.0	✓
Reactive Silica by Colourimetry	E392	315210	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	314703	2	15	13.3	5.0	✓
TDS by Gravimetry	E162	314516	1	7	14.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	314798	1	19	5.2	5.0	✓
Total Mercury in Water by CVAAS	E508	314592	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	314544	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	315275	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	315276	1	7	14.2	5.0	✓
TSS by Gravimetry	E160-H	314514	1	7	14.2	5.0	✓
Turbidity by Nephelometry	E121	314374	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	315343	1	1	100.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	314705	2	12	16.6	5.0	✓
Ammonia by Fluorescence	E298	315277	1	15	6.6	5.0	✓
BC PHC - EPH by GC-FID (Low level)	E601A-L	314523	1	1	100.0	5.0	✓
BTEX by Headspace GC-MS	E611A	315342	1	8	12.5	5.0	✓
CCME PHC - F2-F4 by GC-FID	E601	314522	1	1	100.0	5.0	✓
Chloride in Water by IC	E235.Cl	314698	2	14	14.2	5.0	✓
Conductivity in Water	E100	314704	2	14	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	314641	1	7	14.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	314586	1	8	12.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	314797	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	314701	2	13	15.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	314700	2	14	14.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	314699	2	14	14.2	5.0	✓
Oil & Grease by Gravimetry	E567	314521	1	1	100.0	5.0	✓
Reactive Silica by Colourimetry	E392	315210	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	314703	2	15	13.3	5.0	✓
TDS by Gravimetry	E162	314516	1	7	14.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	314798	1	19	5.2	5.0	✓
Total Mercury in Water by CVAAS	E508	314592	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	314544	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	315275	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	315276	1	7	14.2	5.0	✓
TSS by Gravimetry	E160-H	314514	1	7	14.2	5.0	✓
Turbidity by Nephelometry	E121	314374	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	315343	1	1	100.0	5.0	✓
Matrix Spikes (MS)							

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Ammonia by Fluorescence	E298	315277	1	15	6.6	5.0	✓
BTEX by Headspace GC-MS	E611A	315342	1	8	12.5	5.0	✓
Chloride in Water by IC	E235.Cl	314698	2	14	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	314641	1	7	14.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	314586	1	8	12.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	314797	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	314701	2	13	15.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	314700	2	14	14.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	314699	2	14	14.2	5.0	✓
Reactive Silica by Colourimetry	E392	315210	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	314703	2	15	13.3	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	314798	1	19	5.2	5.0	✓
Total Mercury in Water by CVAAS	E508	314592	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	314544	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	315275	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	315276	1	7	14.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	315343	0	1	0.0	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
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
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.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
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.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Reactive Silica by Colourimetry	E392 Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
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.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples 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
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.
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.
BC PHC - EPH by GC-FID (Low level)	E601A-L Vancouver - Environmental	Water	BC MOE Lab Manual (EPH in Water by GC/FID) (mod)	Extractable Petroleum Hydrocarbons (EPH) 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 CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
TDS in Water (Calculation) Using APHA Analyte List	EC103.APHA Vancouver - Environmental	Water	APHA 1030E	Total DIssolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis).
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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
Oil & Grease Extraction for Gravimetry	EP567 Vancouver - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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	: **YL2101444**	Page	: 1 of 21
Client	: Golder Associates Ltd.	Laboratory	: Yellowknife - Environmental
Contact	: Kathy Qin	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	: Jackfish NTPC Thermal Plume Del	Date Samples Received	: 01-Oct-2021 15:30
PO	: ----	Date Analysis Commenced	: 07-Oct-2021
C-O-C number	: ----	Issue Date	: 19-Oct-2021 11:23
Sampler	: ----		
Site	: ----		
Quote number	: NTPC Jackfish Lake		
No. of samples received	: 7		
No. of samples analysed	: 7		

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.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, 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 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: 314374)											
FJ2101053-016	Anonymous	turbidity	----	E121	0.10	NTU	0.77	0.82	0.04	Diff <2x LOR	----
Physical Tests (QC Lot: 314514)											
YL2101444-001	JFLQC-2	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 314516)											
YL2101444-001	JFLQC-2	solids, total dissolved [TDS]	----	E162	10	mg/L	<10	<10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 314704)											
YL2101444-001	JFLQC-2	conductivity	----	E100	2.0	µS/cm	2.1	<2.0	0.1	Diff <2x LOR	----
Physical Tests (QC Lot: 314705)											
YL2101444-001	JFLQC-2	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 314706)											
YL2101444-001	JFLQC-2	pH	----	E108	0.10	pH units	5.19	5.13	1.16%	4%	----
Physical Tests (QC Lot: 316120)											
YL2101444-007	Midlake 1_Bottom	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	109	110	0.549%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	3.0	3.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	1.5	1.5	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	112	112	0.535%	20%	----
Physical Tests (QC Lot: 316121)											
YL2101444-007	Midlake 1_Bottom	conductivity	----	E100	2.0	µS/cm	453	453	0.00%	10%	----
Physical Tests (QC Lot: 316122)											
YL2101444-007	Midlake 1_Bottom	pH	----	E108	0.10	pH units	8.42	8.40	0.238%	4%	----
Anions and Nutrients (QC Lot: 314698)											
VA21C2122-001	Anonymous	chloride	16887-00-6	E235.Cl	50.0	mg/L	32000	30000	6.27%	20%	----
Anions and Nutrients (QC Lot: 314699)											
VA21C2122-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 314700)											

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 314700) - continued											
VA21C2122-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 314701)											
VA21C2122-001	Anonymous	fluoride	16984-48-8	E235.F	2.00	mg/L	3.10	2.95	0.146	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 314703)											
VA21C2122-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	30.0	mg/L	743	695	6.66%	20%	----
Anions and Nutrients (QC Lot: 314798)											
FJ2101024-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0716	0.0710	0.814%	20%	----
Anions and Nutrients (QC Lot: 315210)											
YL2101441-001	Anonymous	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	9.72	10.0	2.93%	20%	----
Anions and Nutrients (QC Lot: 315275)											
YL2101444-001	JFLQC-2	nitrogen, total	7727-37-9	E366	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 315276)											
YL2101444-001	JFLQC-2	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 315277)											
VA21C1090-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.128	0.126	0.925%	20%	----
Anions and Nutrients (QC Lot: 316123)											
YL2101449-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	52.3	52.1	0.412%	20%	----
Anions and Nutrients (QC Lot: 316124)											
YL2101449-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.092	0.092	0.00009	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 316125)											
YL2101449-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	135	133	1.12%	20%	----
Anions and Nutrients (QC Lot: 316126)											
YL2101449-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0871	0.0847	2.81%	20%	----
Anions and Nutrients (QC Lot: 316127)											
YL2101449-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 314797)											
FJ2101024-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.14	1.09	0.05	Diff <2x LOR	----
Total Metals (QC Lot: 314544)											
VA21C1666-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00041	0.00042	0.00001	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00016	0.00018	0.00002	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0225	0.0227	0.846%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.021	0.021	0.0005	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Total Metals (QC Lot: 314544) - continued											
VA21C1666-001	Anonymous	cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.00145	0.00151	3.91%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	274	275	0.395%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000019	0.000016	0.000003	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00097	0.00093	0.00003	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0402	0.0388	3.76%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	182	180	0.885%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00082	0.00080	0.00001	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00186	0.00181	2.64%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.0396	0.0391	1.22%	20%	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	2.63	2.62	0.517%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00208	0.00201	3.67%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.399	0.402	0.784%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.74	2.74	0.168%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.050	mg/L	2.47	2.41	2.49%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.180	0.183	1.97%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	374	374	0.0878%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000027	0.000027	0.0000001	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.0175	0.0178	1.90%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0680	0.0680	0.104%	20%	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 314592)											
YL2101441-002	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 314586)											

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Dissolved Metals (QC Lot: 314586) - continued											
VA21C2123-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	0.0066	0.0076	0.0010	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	0.00078	0.00081	0.00003	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.0871	0.0891	2.27%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.050	mg/L	0.106	0.112	0.006	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000250	mg/L	<0.0000250	<0.0000250	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.250	mg/L	94.3	94.4	0.0989%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000050	mg/L	0.00122	0.00128	4.14%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00100	mg/L	0.00230	0.00217	0.00013	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000250	mg/L	0.000430	0.000422	0.000008	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0050	mg/L	0.0241	0.0252	0.0010	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	175	179	2.62%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00050	mg/L	0.105	0.107	1.82%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.00201	0.00211	0.000099	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.250	mg/L	0.493	0.586	0.093	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.250	mg/L	77.8	78.4	0.845%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00100	mg/L	0.142	0.144	0.997%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.250	mg/L	11.7	11.8	0.686%	20%	----
		silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.250	mg/L	1400	1430	1.89%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00100	mg/L	0.981	1.02	3.62%	20%	----
		sulfur, dissolved	7704-34-9	E421	2.50	mg/L	37.5	38.6	2.69%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 314586) - continued											
VA21C2123-001	Anonymous	uranium, dissolved	7440-61-1	E421	0.000050	mg/L	0.000309	0.000315	0.000006	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0050	mg/L	0.0147	0.0151	0.0004	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 314641)											
YL2101444-001	JFLQC-2	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 315342)											
FJ2101036-001	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, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 315343)											
YL2101444-003	Near Outflow-In Lake_Bottom	F1 (C6-C10)	----	E581.VH+F1	0.10	µg/L	<0.10 mg/L	<100	0.0%	30%	----
		VHw (C6-C10)	----	E581.VH+F1	0.10	µg/L	<0.10 mg/L	<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: 314374)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 314514)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Physical Tests (QCLot: 314516)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 314704)						
conductivity	----	E100	1	μS/cm	1.3	----
Physical Tests (QCLot: 314705)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 316120)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	1.1	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	1.1	----
Physical Tests (QCLot: 316121)						
conductivity	----	E100	1	μS/cm	<1.0	----
Anions and Nutrients (QCLot: 314698)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	# 1.01	B
Anions and Nutrients (QCLot: 314699)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 314700)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 314701)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 314703)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 314798)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 315210)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 315275)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 315276)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 315277)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 316123)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 316124)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 316125)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 316126)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 316127)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 314797)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 314544)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 314544) - continued						
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 314592)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 314586)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 314586) - continued						
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	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: 314641)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 314521)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 315342)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 315342) - continued						
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: 314522)						
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: 314523)						
EPH (C10-C19)	----	E601A-L	50	µg/L	<50	----
EPH (C19-C32)	----	E601A-L	50	µg/L	<50	----
TEH (C10-C30), BC	----	E601A-L	100	µg/L	<100	----
Hydrocarbons (QCLot: 315343)						
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----

Qualifiers

Qualifier	*Description*
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 314374)									
turbidity	----	E121	0.1	NTU	200 NTU	98.5	85.0	115	----
Physical Tests (QCLot: 314514)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	93.0	85.0	115	----
Physical Tests (QCLot: 314516)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	95.8	85.0	115	----
Physical Tests (QCLot: 314704)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	106	90.0	110	----
Physical Tests (QCLot: 314705)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	78.1	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	102	85.0	115	----
Physical Tests (QCLot: 314706)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 316120)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	80.0	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	102	85.0	115	----
Physical Tests (QCLot: 316121)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.0	90.0	110	----
Physical Tests (QCLot: 316122)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Anions and Nutrients (QCLot: 314698)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.5	90.0	110	----
Anions and Nutrients (QCLot: 314699)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 314700)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.2	90.0	110	----
Anions and Nutrients (QCLot: 314701)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 314703)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 314798)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	91.3	80.0	120	----
Anions and Nutrients (QCLot: 315210)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 315210) - continued									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 315275)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 315276)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.4	80.0	120	----
Anions and Nutrients (QCLot: 315277)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	99.2	85.0	115	----
Anions and Nutrients (QCLot: 316123)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 316124)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 316125)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 316126)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 316127)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	101	90.0	110	----
Organic / Inorganic Carbon (QCLot: 314797)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	87.8	80.0	120	----
Total Metals (QCLot: 314544)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	100	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	98.5	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	94.8	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	96.6	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	90.3	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	94.5	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.5	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	96.5	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	96.4	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
Total Metals (QCLot: 314544) - continued									
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.8	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	96.4	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	110	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	97.3	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	95.3	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	99.3	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	99.0	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	85.3	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	99.6	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	92.3	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.3	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	96.9	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	94.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	96.5	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	99.6	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	98.4	80.0	120	----
Total Metals (QCLot: 314592)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	100	80.0	120	----
Dissolved Metals (QCLot: 314586)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	101	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	99.6	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.8	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	97.4	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	100	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	96.1	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	89.0	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.4	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.4	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 314586) - continued									
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	98.2	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.6	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	99.5	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	94.2	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	97.0	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	96.5	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.9	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	100.0	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	106	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	99.5	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	101	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	97.1	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	98.1	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	86.1	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	92.8	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.8	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	93.4	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.7	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	99.8	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	94.8	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	96.6	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	103	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	95.0	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	97.1	80.0	120	----
Aggregate Organics (QCLot: 314521)									
oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	99.4	70.0	130	----
Volatile Organic Compounds (QCLot: 315342)									
benzene	71-43-2	E611A	0.5	μg/L	100 μg/L	84.1	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	μg/L	100 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
Volatile Organic Compounds (QCLot: 315342) - continued									
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	97.3	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	93.5	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	108	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	105	70.0	130	----
Hydrocarbons (QCLot: 314522)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	101	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	89.4	70.0	130	----
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	96.4	70.0	130	----
Hydrocarbons (QCLot: 314523)									
EPH (C10-C19)	----	E601A-L	50	µg/L	6491 µg/L	93.7	70.0	130	----
EPH (C19-C32)	----	E601A-L	50	µg/L	3363 µg/L	92.2	70.0	130	----
TEH (C10-C30), BC	----	E601A-L	100	µg/L	9202 µg/L	93.3	70.0	130	----
Hydrocarbons (QCLot: 315343)									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	96.4	70.0	130	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	94.9	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: 314698)										
VA21C2122-002	Anonymous	chloride	16887-00-6	E235.Cl	ND mg/L	10000 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 314699)										
VA21C2122-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	51.5 mg/L	50 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 314700)										
VA21C2122-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	254 mg/L	250 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 314701)										
VA21C2122-002	Anonymous	fluoride	16984-48-8	E235.F	108 mg/L	100 mg/L	108	75.0	125	----
Anions and Nutrients (QCLot: 314703)										
VA21C2122-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	10200 mg/L	10000 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 314798)										
FJ2101024-002	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0501 mg/L	0.05 mg/L	100	70.0	130	----
Anions and Nutrients (QCLot: 315210)										
YL2101441-002	Anonymous	silicate (as SiO2)	7631-86-9	E392	ND mg/L	10 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 315275)										
YL2101444-002	Near Outflow-In Lake_Mid-depth	nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 315276)										
YL2101444-002	Near Outflow-In Lake_Mid-depth	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 315277)										
VA21C1090-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.106 mg/L	0.1 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 316123)										
YL2101449-001	Anonymous	chloride	16887-00-6	E235.Cl	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 316124)										
YL2101449-001	Anonymous	fluoride	16984-48-8	E235.F	0.962 mg/L	1 mg/L	96.2	75.0	125	----
Anions and Nutrients (QCLot: 316125)										
YL2101449-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 316126)										
YL2101449-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.64 mg/L	2.5 mg/L	106	75.0	125	----

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: 316127)										
YL2101449-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.500 mg/L	0.5 mg/L	100	75.0	125	----
Organic / Inorganic Carbon (QCLot: 314797)										
FJ2101024-002	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	5.30 mg/L	5 mg/L	106	70.0	130	----
Total Metals (QCLot: 314544)										
VA21C1666-002	Anonymous	aluminum, total	7429-90-5	E420	0.382 mg/L	0.4 mg/L	95.4	70.0	130	----
		antimony, total	7440-36-0	E420	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0394 mg/L	0.04 mg/L	98.5	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0824 mg/L	0.08 mg/L	103	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0180 mg/L	0.02 mg/L	89.8	70.0	130	----
		boron, total	7440-42-8	E420	0.197 mg/L	0.2 mg/L	98.4	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00750 mg/L	0.008 mg/L	93.7	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		chromium, total	7440-47-3	E420	0.0792 mg/L	0.08 mg/L	99.0	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0379 mg/L	0.04 mg/L	94.8	70.0	130	----
		copper, total	7440-50-8	E420	0.0362 mg/L	0.04 mg/L	90.6	70.0	130	----
		iron, total	7439-89-6	E420	3.68 mg/L	4 mg/L	92.0	70.0	130	----
		lead, total	7439-92-1	E420	0.0365 mg/L	0.04 mg/L	91.2	70.0	130	----
		lithium, total	7439-93-2	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0392 mg/L	0.04 mg/L	98.0	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		nickel, total	7440-02-0	E420	0.0719 mg/L	0.08 mg/L	89.8	70.0	130	----
		phosphorus, total	7723-14-0	E420	21.5 mg/L	20 mg/L	108	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		selenium, total	7782-49-2	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		silicon, total	7440-21-3	E420	18.4 mg/L	20 mg/L	92.1	70.0	130	----
		silver, total	7440-22-4	E420	0.00767 mg/L	0.008 mg/L	95.8	70.0	130	----
		sodium, total	17341-25-2	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0820 mg/L	0.08 mg/L	102	70.0	130	----
		thallium, total	7440-28-0	E420	0.00746 mg/L	0.008 mg/L	93.3	70.0	130	----
		thorium, total	7440-29-1	E420	0.0404 mg/L	0.04 mg/L	101	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Total Metals (QCLot: 314544) - continued										
VA21C1666-002	Anonymous	tin, total	7440-31-5	E420	0.0391 mg/L	0.04 mg/L	97.8	70.0	130	----
		titanium, total	7440-32-6	E420	0.0796 mg/L	0.08 mg/L	99.5	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.205 mg/L	0.2 mg/L	102	70.0	130	----
		zinc, total	7440-66-6	E420	0.717 mg/L	0.8 mg/L	89.6	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0839 mg/L	0.08 mg/L	105	70.0	130	----
Total Metals (QCLot: 314592)										
YL2101441-003	Anonymous	mercury, total	7439-97-6	E508	0.0000953 mg/L	0.0001 mg/L	95.3	70.0	130	----
Dissolved Metals (QCLot: 314586)										
YL2101444-001	JFLQC-2	aluminum, dissolved	7429-90-5	E421	0.199 mg/L	0.2 mg/L	99.3	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0191 mg/L	0.02 mg/L	95.6	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0405 mg/L	0.04 mg/L	101	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00868 mg/L	0.01 mg/L	86.8	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.091 mg/L	0.1 mg/L	90.9	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00389 mg/L	0.004 mg/L	97.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	4.05 mg/L	4 mg/L	101	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.00966 mg/L	0.01 mg/L	96.6	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0398 mg/L	0.04 mg/L	99.4	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.89 mg/L	2 mg/L	94.4	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0183 mg/L	0.02 mg/L	91.4	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0980 mg/L	0.1 mg/L	98.0	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	0.939 mg/L	1 mg/L	93.9	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0198 mg/L	0.02 mg/L	99.2	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0190 mg/L	0.02 mg/L	94.8	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0399 mg/L	0.04 mg/L	99.7	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	9.73 mg/L	10 mg/L	97.3	70.0	130	----
		potassium, dissolved	7440-09-7	E421	4.06 mg/L	4 mg/L	102	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0384 mg/L	0.04 mg/L	96.0	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.21 mg/L	10 mg/L	92.1	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00381 mg/L	0.004 mg/L	95.2	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: 314586) - continued										
YL2101444-001	JFLQC-2	sodium, dissolved	17341-25-2	E421	1.99 mg/L	2 mg/L	99.7	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.0192 mg/L	0.02 mg/L	95.8	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	19.2 mg/L	20 mg/L	96.0	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00371 mg/L	0.004 mg/L	92.7	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0192 mg/L	0.02 mg/L	95.8	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0394 mg/L	0.04 mg/L	98.4	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0179 mg/L	0.02 mg/L	89.4	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00363 mg/L	0.004 mg/L	90.8	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	0.422 mg/L	0.4 mg/L	105	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0391 mg/L	0.04 mg/L	97.7	70.0	130	----
Dissolved Metals (QCLot: 314641)										
YL2101444-002	Near Outflow-In Lake_Mid-depth	mercury, dissolved	7439-97-6	E509	0.0000997 mg/L	0.0001 mg/L	99.7	70.0	130	----
Volatile Organic Compounds (QCLot: 315342)										
FJ2101036-002	Anonymous	benzene	71-43-2	E611A	87.0 µg/L	100 µg/L	87.0	60.0	140	----
		ethylbenzene	100-41-4	E611A	105 µg/L	100 µg/L	105	60.0	140	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		styrene	100-42-5	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		toluene	108-88-3	E611A	94.5 µg/L	100 µg/L	94.5	60.0	140	----
		xylene, m+p-	179601-23-1	E611A	221 µg/L	200 µg/L	110	60.0	140	----
		xylene, o-	95-47-6	E611A	107 µg/L	100 µg/L	107	60.0	140	----

CHAIN OF CUSTODY

ALS Laboratory

15:30

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
SARAH BEATTIE			
DATE/TIME: 1 OCT 2021	DATE/TIME:	DATE/TIME:	1-OCT-21 DATE/TIME: 1530

CLIENT:	Golder Associates Ltd.
PROJECT:	Jackfish NTPC Thermal Plume Del
SITE:	
PURCHASE ORDER NO.:	
PROJECT MANAGER:	Kathy Qin — CONTACT PH: 306 370 6141
SAMPLER:	SAMPLER MOBILE:
EMAIL REPORTS TO:	Kathy_Qin@golder.com; alison_humphries@golder.com

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)

☐ Standard TAT (List due date):

☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NC YL21-GOLD100-008

EQuIS facility code: 183527250

Project Number: 21482915

EMAIL INVOICE TO: Laurence_bonin@golder.com; Kathy_Qin@golder.com

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 7.2 °C

Other comments:

SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY — SAMPLE DETAILS — MATRIX: Solid(S) Water(W) — CONTAINER INFORMATION — ANALYSIS REQUIRED — Additional Information

SAMPLE	Sample identification (This description will appear on the report)	DATE / TIME (dd-mm-yyyy)	MATRIX	TOTAL CONTAINERS	Routine Bottle (500mL Polyethylene)	Total Nutrients (100mL Amber glass)	Dissolved Nutrients (100mL Amber glass)	Total Metals (60mL HDPE)	Dissolved Metals (60mL HDPE)	Total Mercury (40mL glass)	Dissolved Mercury (40mL glass)	Oil and grease (2x250mL Amber glass)	BTEX, F1, F2, F3, F4 (2x40mL vial + 2x60 Amber glass)		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	JFLQC-2 14:00	01-10-2021	W	7	x	x	x	x	x	x	x				
2	Near Outflow-In Lake Mid-depth 10:45	01-10-2021	W	7	x	x	x	x	x	x	x				
3	Near Outflow-In Lake Bottom 10:50	01-10-2021	W	13	x	x	x	x	x	x	x	X	X		
4	EMD Discharge-In Lake-Mid-depth 12:30	01-10-2021	W	7	x	x	x	x	x	x	x				
5	EMD Discharge-In Lake-Bottom 12:35	01-10-2021	W	7	x	x	x	x	x	x	x				
6	Midlake1_Mid-depth 9:30	01-10-2021	W	7	x	x	x	x	x	x	x				
7	Midlake1_Bottom 9:35	01-10-2021	W	7	x	x	x	x	x	x	x				
8			W		x	x	x	x	x	x	x				
			TOTAL												

Environmental Division
Yellowknife
Work Order Reference
YL2101444

Telephone : +1 867 873 5593

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **YL2200260**	Page	: 1 of 7
Amendment	: **1**		
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	Account Manager	: Oliver Gregg
Address	: 9 - 4905 48th Street Yellowknife NT Canada X1A 3S3	Address	: 314 Old Airport Road, Unit 116 Yellowknife NT Canada X1A 3T3
Telephone	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: 21482915	Date Samples Received	: 24-Mar-2022 11:45
PO	: ----	Date Analysis Commenced	: 28-Mar-2022
C-O-C number	: ----	Issue Date	: 19-Apr-2022 12:18
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 5		
No. of samples analysed	: 5		

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*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

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

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

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
DTMF	*Dissolved concentration exceeds total for field-filtered metals sample. Metallic contaminants may have been introduced to dissolved sample during field filtration.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	JFLQC_1
				Client sampling date / time	23-Mar-2022 13:40	23-Mar-2022 13:30	22-Mar-2022 11:50	22-Mar-2022 11:45	22-Mar-2022 09:00
					YL2200260-001	YL2200260-002	YL2200260-003	YL2200260-004	YL2200260-005
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	122	124	122	124	<1.0
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	122	124	122	124	<1.0
conductivity	----	E100	2.0	µS/cm	505	507	508	506	<2.0
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	171	171	169	171	<0.60
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	173	170	175	174	<0.60
pH	----	E108	0.10	pH units	8.01	8.01	8.02	8.00	5.25
solids, total dissolved [TDS]	----	E162	10	mg/L	304	308	288	298	<10
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	278	279	277	280	<1.0
solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0
turbidity	----	E121	0.10	NTU	1.21	1.17	1.09	1.06	<0.10
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0604	0.0610	0.0468	0.0532	<0.0050
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	67.1	66.8	66.8	67.2	<0.10
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.091	0.088	0.092	0.090	<0.010
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.121	0.123	0.163	0.126	<0.0050
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	0.125	0.127	0.165	0.126	<0.0051
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0039	0.0038	0.0023	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L	0.884	0.870	0.874	0.875	<0.030
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0316	0.0329	0.0328	0.0316	<0.0020
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0221	0.0206	0.0260	0.0214	<0.0020
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	14.8	14.7	14.9	14.7	<0.50
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	28.8	28.8	28.8	29.1	<0.30
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	12.3	12.6	12.2	13.4	<0.50
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0045	0.0047	0.0035	0.0048	<0.0030

Analytical Results

Sub-Matrix: Water

(Matrix: Water)

				Client sample ID	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	JFLQC_1
				Client sampling date / time	23-Mar-2022 13:40	23-Mar-2022 13:30	22-Mar-2022 11:50	22-Mar-2022 11:45	22-Mar-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	YL2200260-001	YL2200260-002	YL2200260-003	YL2200260-004	YL2200260-005
					Result	Result	Result	Result	Result
Total Metals									
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00125	0.00126	0.00126	0.00127	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0742	0.0707	0.0747	0.0721	<0.00010
barium, total	7440-39-3	E420	0.00010	mg/L	0.0354	0.0339	0.0348	0.0337	0.00012 RRV
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	0.032	0.031	0.032	0.032	<0.010
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L	43.9	44.1	44.8	44.9	<0.050
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L	0.00201	0.00191	0.00191	0.00190	<0.00050
iron, total	7439-89-6	E420	0.010	mg/L	0.014	<0.010	<0.010	<0.010	<0.010
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0066	0.0066	0.0067	0.0067	<0.0010
magnesium, total	7439-95-4	E420	0.0050	mg/L	15.3	14.6	15.4	15.1	<0.0050
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0670	0.0563	0.0322	0.0257	<0.00010
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000215	0.000218	0.000224	0.000206	<0.000050
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	0.00051	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L	4.66	4.45	4.66	4.54	<0.050
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00291	0.00283	0.00299	0.00292	<0.00020
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	0.000060	0.000060	<0.000050	<0.000050
silicon, total	7440-21-3	E420	0.10	mg/L	7.74	7.50	7.79	7.52	<0.10
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L	36.6	34.9	36.8	35.9	<0.050
strontium, total	7440-24-6	E420	0.00020	mg/L	0.103	0.104	0.105	0.105	<0.00020
sulfur, total	7704-34-9	E420	0.50	mg/L	10.7	10.6	10.9	10.9	<0.50

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	JFLQC_1
				Client sampling date / time	23-Mar-2022 13:40	23-Mar-2022 13:30	22-Mar-2022 11:50	22-Mar-2022 11:45	22-Mar-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	YL2200260-001	YL2200260-002	YL2200260-003	YL2200260-004	YL2200260-005
					Result	Result	Result	Result	Result
Total Metals									
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L	0.00026	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000561	0.000567	0.000572	0.000573	<0.000010
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0058	0.0048	0.0047	0.0047	0.0054 RRV
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0010	<0.0010	0.0016	0.0017	<0.0010
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00121	0.00121	0.00122	0.00120	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0728	0.0740	0.0732	0.0731	<0.00010
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0345	0.0343	0.0336	0.0342	0.00013 RRV
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<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	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.031	0.031	0.031	0.031	<0.010
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L	44.8	44.8	44.1	44.8	<0.050
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00172	0.00205	0.00168	0.00170	<0.00020
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0067	0.0068	0.0175 DTMF	0.0068	<0.0010
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	14.3	14.4	14.3	14.4	<0.0050
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00517	0.00338	0.00385	0.00063	<0.00010

Analytical Results

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

				Client sample ID	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	JFLQC_1
				Client sampling date / time	23-Mar-2022 13:40	23-Mar-2022 13:30	22-Mar-2022 11:50	22-Mar-2022 11:45	22-Mar-2022 09:00
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**YL2200260-001**	**YL2200260-002**	**YL2200260-003**	**YL2200260-004**	**YL2200260-005**
					Result	Result	Result	Result	Result
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000224	0.000208	0.000211	0.000201	<0.000050
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.45	4.48	4.49	4.51	0.093 RRV
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00280	0.00278	0.00258	0.00276	<0.00020
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L	7.39	7.53	7.50	7.59	<0.050
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L	35.3	35.4	35.3	35.7	<0.050
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.103	0.103	0.103	0.102	<0.00020
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	10.7	9.97	10.0	10.4	<0.50
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<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	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00121 DTMF	<0.00010	<0.00010	<0.00010	0.00025 DTC, RRV
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000563	0.000556	0.000558	0.000555	<0.000010
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0047	0.0046	0.0051	0.0049	0.0057 RRV
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	----	----	----	----	<5.0
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.50	µg/L	----	----	----	----	<0.50
ethylbenzene	100-41-4	E611A	0.50	µg/L	----	----	----	----	<0.50

Analytical Results

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

				Client sample ID	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	JFLQC_1
				Client sampling date / time	23-Mar-2022 13:40	23-Mar-2022 13:30	22-Mar-2022 11:50	22-Mar-2022 11:45	22-Mar-2022 09:00
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	YL2200260-001	YL2200260-002	YL2200260-003	YL2200260-004	YL2200260-005
					Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]									
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	----	----	----	----	<0.50
styrene	100-42-5	E611A	0.50	µg/L	----	----	----	----	<0.50
toluene	108-88-3	E611A	0.50	µg/L	----	----	----	----	<0.50
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	----	----	----	----	<0.40
xylene, o-	95-47-6	E611A	0.30	µg/L	----	----	----	----	<0.30
xylenes, total	1330-20-7	E611A	0.50	µg/L	----	----	----	----	<0.50
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	----	----	----	----	93.5
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	----	----	----	----	97.4
Hydrocarbons									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	----	----	----	----	<100
F2 (C10-C16)	----	E601	300	µg/L	----	----	----	----	<300
F3 (C16-C34)	----	E601	300	µg/L	----	----	----	----	<300
F4 (C34-C50)	----	E601	300	µg/L	----	----	----	----	<300
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	----	----	----	----	<100
F1-BTEX	----	EC580	100	µg/L	----	----	----	----	<100
VPHw	----	EC580A	100	µg/L	----	----	----	----	<100
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	----	----	----	----	89.8
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	----	----	----	----	102

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **YL2200260**	Page	: 1 of 24
Amendment	: 1		
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	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	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: 21482915	Date Samples Received	: 24-Mar-2022 11:45
PO	: ----	Issue Date	: 19-Apr-2022 12:18
C-O-C number	: ----		
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 5		
No. of samples analysed	: 5		

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.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- 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.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Total Metals	QC-MRG2-444671002	----	thorium, total	7440-29-1	E420	76.9 % MES	80.0-120%	Recovery less than lower control limit
Dissolved Metals	QC-445278-002	----	thorium, dissolved	7440-29-1	E421	76.9 % MES	80.0-120%	Recovery less than lower control limit

Result Qualifiers

Qualifier	*Description*
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) JFLQC_1	E567	22-Mar-2022	30-Mar-2022	28 days	8 days	✓	30-Mar-2022	40 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) JFLQC_1	E298	22-Mar-2022	30-Mar-2022	----	----		01-Apr-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Bottom	E298	22-Mar-2022	30-Mar-2022	----	----		01-Apr-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Mid-depth	E298	22-Mar-2022	30-Mar-2022	----	----		01-Apr-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E298	23-Mar-2022	30-Mar-2022	----	----		01-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E298	23-Mar-2022	30-Mar-2022	----	----		01-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.Cl-L	23-Mar-2022	----	----	----		29-Mar-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.Cl-L	23-Mar-2022	----	----	----		29-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE JFLQC_1	E235.Cl-L	22-Mar-2022	----	----	----		29-Mar-2022	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.Cl-L	22-Mar-2022	----	----	----		29-Mar-2022	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.Cl-L	22-Mar-2022	----	----	----		29-Mar-2022	28 days	7 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.F-L	23-Mar-2022	----	----	----		29-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.F-L	23-Mar-2022	----	----	----		29-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE JFLQC_1	E235.F-L	22-Mar-2022	----	----	----		29-Mar-2022	28 days	7 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.F-L	22-Mar-2022	----	----	----		29-Mar-2022	28 days	7 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.F-L	22-Mar-2022	----	----	----		29-Mar-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.NO3-L	23-Mar-2022	----	----	----		29-Mar-2022	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.NO3-L	23-Mar-2022	----	----	----		29-Mar-2022	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE JFLQC_1	E235.NO3-L	22-Mar-2022	----	----	----		29-Mar-2022	3 days	7 days	✖ EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.NO3-L	22-Mar-2022	----	----	----		29-Mar-2022	3 days	7 days	✖ EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.NO3-L	22-Mar-2022	----	----	----		29-Mar-2022	3 days	7 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.NO2-L	23-Mar-2022	----	----	----		29-Mar-2022	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.NO2-L	23-Mar-2022	----	----	----		29-Mar-2022	3 days	6 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE JFLQC_1	E235.NO2-L	22-Mar-2022	----	----	----		29-Mar-2022	3 days	7 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.NO2-L	22-Mar-2022	----	----	----		29-Mar-2022	3 days	7 days	✖ EHT

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.NO2-L	22-Mar-2022	----	----	----		29-Mar-2022	3 days	7 days	× EHT
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE EMD DISCHARGE INLAKE_Bottom	E392	23-Mar-2022	----	----	----		28-Mar-2022	28 days	5 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E392	23-Mar-2022	----	----	----		28-Mar-2022	28 days	5 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE JFLQC_1	E392	22-Mar-2022	----	----	----		28-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE SOUTHWEST BAY_Bottom	E392	22-Mar-2022	----	----	----		28-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE SOUTHWEST BAY_Mid-depth	E392	22-Mar-2022	----	----	----		28-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.SO4	23-Mar-2022	----	----	----		29-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.SO4	23-Mar-2022	----	----	----		29-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE JFLQC_1	E235.SO4	22-Mar-2022	----	----	----		29-Mar-2022	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE SOUTHWEST BAY_Bottom	E235.SO4	22-Mar-2022	----	----	----		29-Mar-2022	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SOUTHWEST BAY_Mid-depth	E235.SO4	22-Mar-2022	----	----	----		29-Mar-2022	28 days	7 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) JFLQC_1	E375-T	22-Mar-2022	30-Mar-2022	----	----		01-Apr-2022	28 days	10 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Bottom	E375-T	22-Mar-2022	30-Mar-2022	----	----		01-Apr-2022	28 days	10 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Mid-depth	E375-T	22-Mar-2022	30-Mar-2022	----	----		01-Apr-2022	28 days	10 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E375-T	23-Mar-2022	30-Mar-2022	----	----		01-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E375-T	23-Mar-2022	30-Mar-2022	----	----		01-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E366	23-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E366	23-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) JFLQC_1	E366	22-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Bottom	E366	22-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Mid-depth	E366	22-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E372-U	23-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E372-U	23-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) JFLQC_1	E372-U	22-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Bottom	E372-U	22-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Mid-depth	E372-U	22-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EMD DISCHARGE INLAKE_Bottom	E509	23-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EMD DISCHARGE INLAKE_Mid-depth	E509	23-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) JFLQC_1	E509	22-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) SOUTHWEST BAY_Bottom	E509	22-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) SOUTHWEST BAY_Mid-depth	E509	22-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) EMD DISCHARGE INLAKE_Bottom	E421	23-Mar-2022	29-Mar-2022	----	----		29-Mar-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) EMD DISCHARGE INLAKE_Mid-depth	E421	23-Mar-2022	29-Mar-2022	----	----		29-Mar-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) JFLQC_1	E421	22-Mar-2022	29-Mar-2022	----	----		29-Mar-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SOUTHWEST BAY_Bottom	E421	22-Mar-2022	29-Mar-2022	----	----		29-Mar-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SOUTHWEST BAY_Mid-depth	E421	22-Mar-2022	29-Mar-2022	----	----		29-Mar-2022	180 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) JFLQC_1	E601	22-Mar-2022	29-Mar-2022	14 days	7 days	✓	30-Mar-2022	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) JFLQC_1	E581.VH+F1	22-Mar-2022	29-Mar-2022	----	----		30-Mar-2022	14 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E358-L	23-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E358-L	23-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) JFLQC_1	E358-L	22-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Bottom	E358-L	22-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Mid-depth	E358-L	22-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	28 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EMD DISCHARGE INLAKE_Bottom	E290	23-Mar-2022	----	----	----		29-Mar-2022	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E290	23-Mar-2022	----	----	----		29-Mar-2022	14 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : Alkalinity Species by Titration										
HDPE JFLQC_1	E290	22-Mar-2022	----	----	----		29-Mar-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SOUTHWEST BAY_Bottom	E290	22-Mar-2022	----	----	----		29-Mar-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SOUTHWEST BAY_Mid-depth	E290	22-Mar-2022	----	----	----		29-Mar-2022	14 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE EMD DISCHARGE INLAKE_Bottom	E100	23-Mar-2022	----	----	----		29-Mar-2022	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E100	23-Mar-2022	----	----	----		29-Mar-2022	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE JFLQC_1	E100	22-Mar-2022	----	----	----		29-Mar-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE SOUTHWEST BAY_Bottom	E100	22-Mar-2022	----	----	----		29-Mar-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE SOUTHWEST BAY_Mid-depth	E100	22-Mar-2022	----	----	----		29-Mar-2022	28 days	7 days	✓
Physical Tests : pH by Meter										
HDPE EMD DISCHARGE INLAKE_Bottom	E108	23-Mar-2022	----	----	----		29-Mar-2022	0.25 hrs	147 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E108	23-Mar-2022	----	----	----		29-Mar-2022	0.25 hrs	147 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SOUTHWEST BAY_Bottom	E108	22-Mar-2022	----	----	----		29-Mar-2022	0.25 hrs	173 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SOUTHWEST BAY_Mid-depth	E108	22-Mar-2022	----	----	----		29-Mar-2022	0.25 hrs	173 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE JFLQC_1	E108	22-Mar-2022	----	----	----		29-Mar-2022	0.25 hrs	176 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE EMD DISCHARGE INLAKE_Bottom	E162	23-Mar-2022	----	----	----		28-Mar-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E162	23-Mar-2022	----	----	----		28-Mar-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE JFLQC_1	E162	22-Mar-2022	----	----	----		28-Mar-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SOUTHWEST BAY_Bottom	E162	22-Mar-2022	----	----	----		28-Mar-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SOUTHWEST BAY_Mid-depth	E162	22-Mar-2022	----	----	----		28-Mar-2022	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE										
EMD DISCHARGE INLAKE_Bottom	E160	23-Mar-2022	----	----	----		28-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
EMD DISCHARGE INLAKE_Mid-depth	E160	23-Mar-2022	----	----	----		28-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
JFLQC_1	E160	22-Mar-2022	----	----	----		28-Mar-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SOUTHWEST BAY_Bottom	E160	22-Mar-2022	----	----	----		28-Mar-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SOUTHWEST BAY_Mid-depth	E160	22-Mar-2022	----	----	----		28-Mar-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
EMD DISCHARGE INLAKE_Bottom	E121	23-Mar-2022	----	----	----		29-Mar-2022	3 days	6 days	✘ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE										
EMD DISCHARGE INLAKE_Mid-depth	E121	23-Mar-2022	----	----	----		29-Mar-2022	3 days	6 days	✘ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE										
JFLQC_1	E121	22-Mar-2022	----	----	----		29-Mar-2022	3 days	7 days	✘ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE										
SOUTHWEST BAY_Bottom	E121	22-Mar-2022	----	----	----		29-Mar-2022	3 days	7 days	✘ EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : Turbidity by Nephelometry										
HDPE										
SOUTHWEST BAY_Mid-depth	E121	22-Mar-2022	----	----	----		29-Mar-2022	3 days	7 days	× EHT
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
EMD DISCHARGE INLAKE_Bottom	E508	23-Mar-2022	----	----	----		31-Mar-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
EMD DISCHARGE INLAKE_Mid-depth	E508	23-Mar-2022	----	----	----		31-Mar-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
JFLQC_1	E508	22-Mar-2022	----	----	----		31-Mar-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SOUTHWEST BAY_Bottom	E508	22-Mar-2022	----	----	----		31-Mar-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SOUTHWEST BAY_Mid-depth	E508	22-Mar-2022	----	----	----		31-Mar-2022	28 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
EMD DISCHARGE INLAKE_Bottom	E420	23-Mar-2022	----	----	----		29-Mar-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
EMD DISCHARGE INLAKE_Mid-depth	E420	23-Mar-2022	----	----	----		29-Mar-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
JFLQC_1	E420	22-Mar-2022	----	----	----		29-Mar-2022	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SOUTHWEST BAY_Bottom	E420	22-Mar-2022	----	----	----		29-Mar-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SOUTHWEST BAY_Mid-depth	E420	22-Mar-2022	----	----	----		29-Mar-2022	180 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) JFLQC_1	E611A	22-Mar-2022	29-Mar-2022	----	----		30-Mar-2022	14 days	8 days	✓

Legend & Qualifier Definitions

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

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			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	444919	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	446370	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	445451	1	6	16.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	444928	1	5	20.0	5.0	✓
Conductivity in Water	E100	444917	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	446692	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	445278	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	446364	1	19	5.2	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	444927	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	444922	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	444923	1	20	5.0	5.0	✓
pH by Meter	E108	444918	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	444642	1	7	14.2	5.0	✓
Sulfate in Water by IC	E235.SO4	444921	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	444577	1	18	5.5	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	446369	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	446696	1	16	6.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	444671	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	446366	1	13	7.6	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	446368	1	13	7.6	5.0	✓
TSS by Gravimetry	E160	444575	1	12	8.3	5.0	✓
Turbidity by Nephelometry	E121	445138	1	10	10.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	445450	1	4	25.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	444919	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	446370	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	445451	1	6	16.6	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	445586	1	2	50.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	444928	1	5	20.0	5.0	✓
Conductivity in Water	E100	444917	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	446692	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	445278	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	446364	1	19	5.2	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	444927	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	444922	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	444923	1	20	5.0	5.0	✓
Oil & Grease by Gravimetry	E567	446330	1	8	12.5	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
pH by Meter	E108	444918	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	444642	1	7	14.2	5.0	✓
Sulfate in Water by IC	E235.SO4	444921	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	444577	1	18	5.5	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	446369	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	446696	1	16	6.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	444671	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	446366	1	13	7.6	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	446368	1	13	7.6	5.0	✓
TSS by Gravimetry	E160	444575	1	12	8.3	5.0	✓
Turbidity by Nephelometry	E121	445138	1	10	10.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	445450	1	4	25.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	444919	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	446370	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	445451	1	6	16.6	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	445586	1	2	50.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	444928	1	5	20.0	5.0	✓
Conductivity in Water	E100	444917	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	446692	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	445278	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	446364	1	19	5.2	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	444927	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	444922	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	444923	1	20	5.0	5.0	✓
Oil & Grease by Gravimetry	E567	446330	1	8	12.5	5.0	✓
Reactive Silica by Colourimetry	E392	444642	1	7	14.2	5.0	✓
Sulfate in Water by IC	E235.SO4	444921	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	444577	1	18	5.5	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	446369	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	446696	1	16	6.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	444671	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	446366	1	13	7.6	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	446368	1	13	7.6	5.0	✓
TSS by Gravimetry	E160	444575	1	12	8.3	5.0	✓
Turbidity by Nephelometry	E121	445138	1	10	10.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	445450	1	4	25.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	446370	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	445451	1	6	16.6	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Chloride in Water by IC (Low Level)	E235.Cl-L	444928	1	5	20.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	446692	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	445278	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	446364	1	19	5.2	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	444927	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	444922	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	444923	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	444642	1	7	14.2	5.0	✓
Sulfate in Water by IC	E235.SO4	444921	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	446369	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	446696	1	16	6.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	444671	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	446366	1	13	7.6	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	446368	1	13	7.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	445450	1	4	25.0	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
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
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.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 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.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC (Low Level)	E235.Cl-L 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 (Low Level)	E235.F-L 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.

Analytical Methods	*Method / Lab*	*Matrix*	*Method Reference*	*Method Descriptions*
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Reactive Silica by Colourimetry	E392 Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
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.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples 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
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.
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 PHCs - F2-F4 by GC-FID	E601 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4).
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 CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
TDS in Water (Calculation) Using APHA Analyte List	EC103.APHA Vancouver - Environmental	Water	APHA 1030E	Total DIssolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis).
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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
Oil & Grease Extraction for Gravimetry	EP567 Vancouver - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **YL2200260**	Page	: 1 of 18
Amendment	: **1**		
Client	: Golder Associates Ltd.	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	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	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: 21482915	Date Samples Received	: 24-Mar-2022 11:45
PO	: ----	Date Analysis Commenced	: 28-Mar-2022
C-O-C number	: ----	Issue Date	: 19-Apr-2022 12:18
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 5		
No. of samples analysed	: 5		

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.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	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.

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 444575)											
VA22A6330-004	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 444577)											
VA22A6252-002	Anonymous	solids, total dissolved [TDS]	----	E162	13	mg/L	98	100	2	Diff <2x LOR	----
Physical Tests (QC Lot: 444917)											
VA22A6371-012	Anonymous	conductivity	----	E100	2.0	µS/cm	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 444918)											
VA22A6371-012	Anonymous	pH	----	E108	0.10	pH units	5.22	5.24	0.516%	4%	----
Physical Tests (QC Lot: 444919)											
VA22A6371-012	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 445138)											
VA22A6173-001	Anonymous	turbidity	----	E121	0.10	NTU	>4000	>4000	0.00%	15%	----
Anions and Nutrients (QC Lot: 444642)											
YL2200257-001	Anonymous	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	0.85	0.84	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 444921)											
VA22A6371-010	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	87.0	86.9	0.155%	20%	----
Anions and Nutrients (QC Lot: 444922)											
VA22A6371-010	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.146	0.149	2.44%	20%	----
Anions and Nutrients (QC Lot: 444923)											
VA22A6371-010	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: 444927)											
YL2200260-001	EMD DISCHARGE INLAKE_Bottom	fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.091	0.088	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 444928)											
YL2200260-001	EMD DISCHARGE INLAKE_Bottom	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	67.1	66.8	0.466%	20%	----
Anions and Nutrients (QC Lot: 446366)											
FJ2200729-001	Anonymous	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.148	0.154	0.006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 446368)											

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Anions and Nutrients (QC Lot: 446368) - continued											
FJ2200729-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0113	0.0118	0.0005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 446369)											
FJ2200729-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0039	0.0037	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 446370)											
FJ2200729-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0140	0.0145	0.0005	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 446364)											
FJ2200729-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.02	1.70	0.32	Diff <2x LOR	----
Total Metals (QC Lot: 444671)											
YL2200258-001	Anonymous	aluminum, total	7429-90-5	E420	0.0600	mg/L	<0.0600	<0.0600	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00200	mg/L	1.04	1.07	2.80%	20%	----
		arsenic, total	7440-38-2	E420	0.00200	mg/L	23.3	24.1	3.66%	20%	----
		barium, total	7440-39-3	E420	0.00200	mg/L	0.0327	0.0348	6.10%	20%	----
		beryllium, total	7440-41-7	E420	0.000400	mg/L	<0.000400	<0.000400	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.200	mg/L	0.264	0.277	0.013	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.000100	mg/L	0.000281	0.000306	0.0000250	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	1.00	mg/L	314	322	2.56%	20%	----
		cesium, total	7440-46-2	E420	0.000200	mg/L	0.000587	0.000535	0.000052	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00200	mg/L	0.0365	0.0384	4.90%	20%	----
		copper, total	7440-50-8	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.200	mg/L	<0.200	<0.200	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.00100	mg/L	0.00301	0.00307	0.000055	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0200	mg/L	0.0270	0.0274	0.0004	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	81.2	83.6	2.88%	20%	----
		manganese, total	7439-96-5	E420	0.00200	mg/L	0.418	0.438	4.66%	20%	----
		molybdenum, total	7439-98-7	E420	0.00100	mg/L	0.0138	0.0144	4.36%	20%	----
		nickel, total	7440-02-0	E420	0.0100	mg/L	0.0490	0.0512	0.00222	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	1.00	mg/L	8.77	9.23	0.462	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00400	mg/L	0.00830	0.00800	0.00030	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	2.00	mg/L	5.40	5.36	0.03	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	1.00	mg/L	138	143	3.46%	20%	----

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
Total Metals (QC Lot: 444671) - continued											
YL2200258-001	Anonymous	strontium, total	7440-24-6	E420	0.00400	mg/L	3.31	3.42	3.27%	20%	----
		sulfur, total	7704-34-9	E420	10.0	mg/L	244	252	3.35%	20%	----
		tellurium, total	13494-80-9	E420	0.00400	mg/L	<0.00400	<0.00400	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00600	mg/L	<0.00600	<0.00600	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000200	mg/L	0.00445	0.00467	4.89%	20%	----
		vanadium, total	7440-62-2	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0600	mg/L	0.0890	0.0925	0.0035	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00400	mg/L	<0.00400	<0.00400	0	Diff <2x LOR	----
Total Metals (QC Lot: 446696)											
VA22A5448-009	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 445278)											
KS2200998-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0039	0.0036	0.0003	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00081	0.00085	0.00004	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00148	0.00148	0.0520%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0561	0.0563	0.450%	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	0.122	0.125	2.35%	20%	----
		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	149	151	1.21%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000109	0.000108	0.200%	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	<0.00010	0.00011	0.00001	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00078	0.00075	0.00002	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.066	0.067	0.0006	Diff <2x LOR	----
		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	0.0113	0.0114	1.16%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	61.2	61.0	0.362%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.159	0.157	1.12%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00344	0.00347	1.05%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00050	<0.00050	0.000005	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Dissolved Metals (QC Lot: 445278) - continued											
KS2200998-001	Anonymous	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	13.8	13.3	3.30%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00618	0.00588	4.96%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000122	0.000104	0.000018	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	10.5	10.6	1.30%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	66.6	65.6	1.38%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	1.51	1.49	1.32%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	181	182	0.594%	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	<0.000010	<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	0.00071	0.00071	0.000003	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	0.00026	0.00028	0.00002	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.0138	0.0140	1.07%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00117	0.00117	0.000002	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0012	0.0013	0.00006	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 446692)											
YL2200260-001	EMD DISCHARGE INLAKE_Bottom	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 445451)											
VA22A5917-001	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: 445450)											
VA22A5917-001	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: 444575)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 444577)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 444917)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 444919)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 445138)						
turbidity	----	E121	0.1	NTU	<0.10	----
Anions and Nutrients (QCLot: 444642)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 444921)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 444922)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 444923)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 444927)						
fluoride	16984-48-8	E235.F-L	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 444928)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 446366)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 446368)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 446369)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 446370)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 446364)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 444671)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 444671) - continued						
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 446696)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 445278)						
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	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 445278) - continued						
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: 446692)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 446330)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 445451)						
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: 445450)						
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 445586)						
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				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 444575)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	91.8	85.0	115	----
Physical Tests (QCLot: 444577)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	93.4	85.0	115	----
Physical Tests (QCLot: 444917)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 444918)									
pH	----	E108	----	pH units	7 pH units	99.8	98.0	102	----
Physical Tests (QCLot: 444919)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	93.8	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	102	85.0	115	----
Physical Tests (QCLot: 445138)									
turbidity	----	E121	0.1	NTU	200 NTU	94.0	85.0	115	----
Anions and Nutrients (QCLot: 444642)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	97.6	85.0	115	----
Anions and Nutrients (QCLot: 444921)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 444922)									
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: 444923)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 444927)									
fluoride	16984-48-8	E235.F-L	0.01	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 444928)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 446366)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	116	75.0	125	----
Anions and Nutrients (QCLot: 446368)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	93.4	80.0	120	----
Anions and Nutrients (QCLot: 446369)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	92.2	80.0	120	----
Anions and Nutrients (QCLot: 446370)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	104	85.0	115	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 446364)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	102	80.0	120	----
Total Metals (QCLot: 444671)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	96.4	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	108	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	96.7	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	97.7	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	87.2	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	92.1	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.8	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	96.4	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	93.8	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	93.8	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	94.4	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	95.0	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	89.2	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	95.0	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	98.0	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	98.1	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.3	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	95.4	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	94.6	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	99.2	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	97.9	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	108	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	102	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	90.3	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	98.9	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	94.4	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	91.2	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	108	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	103	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	# 76.9	80.0	120	MES
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	94.0	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	95.8	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Total Metals (QCLot: 444671) - continued									
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	95.8	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	93.0	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	95.9	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	104	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	89.6	80.0	120	----
Total Metals (QCLot: 446696)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	100.0	80.0	120	----
Dissolved Metals (QCLot: 445278)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	103	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	110	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	106	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	109	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	81.0	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	104	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	100	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	99.5	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.6	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.3	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	92.2	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	108	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	106	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	99.5	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	108	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.2	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	112	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	97.8	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	119	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	111	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	96.3	80.0	120	----
sodium, dissolved	7440-23-5	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	109	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Dissolved Metals (QCLot: 445278) - continued									
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	103	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	119	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	112	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	# 76.9	80.0	120	MES
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	99.2	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	99.7	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.7	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.5	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	107	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	94.9	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	97.5	80.0	120	----
Aggregate Organics (QCLot: 446330)									
oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	106	70.0	130	----
Volatile Organic Compounds (QCLot: 445451)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	118	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	108	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	120	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	113	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	109	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	115	70.0	130	----
Hydrocarbons (QCLot: 445450)									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	77.1	70.0	130	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	70.1	70.0	130	----
Hydrocarbons (QCLot: 445586)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	111	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	105	70.0	130	----

Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).

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: 444642)										
YL2200258-001	Anonymous	silicate (as SiO2)	7631-86-9	E392	9.50 mg/L	10 mg/L	95.0	75.0	125	----
Anions and Nutrients (QCLot: 444921)										
VA22A6371-011	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 444922)										
VA22A6371-011	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.59 mg/L	2.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 444923)										
VA22A6371-011	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.499 mg/L	0.5 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 444927)										
YL2200260-002	EMD DISCHARGE INLAKE_Mid-depth	fluoride	16984-48-8	E235.F-L	1.00 mg/L	1 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 444928)										
YL2200260-002	EMD DISCHARGE INLAKE_Mid-depth	chloride	16887-00-6	E235.Cl-L	99.9 mg/L	100 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 446366)										
FJ2200729-002	Anonymous	nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 446368)										
FJ2200729-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0476 mg/L	0.05 mg/L	95.2	70.0	130	----
Anions and Nutrients (QCLot: 446369)										
FJ2200729-002	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0487 mg/L	0.05 mg/L	97.4	70.0	130	----
Anions and Nutrients (QCLot: 446370)										
FJ2200729-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.101 mg/L	0.1 mg/L	101	75.0	125	----
Organic / Inorganic Carbon (QCLot: 446364)										
FJ2200729-002	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	4.59 mg/L	5 mg/L	91.9	70.0	130	----
Total Metals (QCLot: 444671)										
YL2200255-001	Anonymous	aluminum, total	7429-90-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		antimony, total	7440-36-0	E420	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		arsenic, total	7440-38-2	E420	0.219 mg/L	0.2 mg/L	109	70.0	130	----
		barium, total	7440-39-3	E420	0.209 mg/L	0.2 mg/L	104	70.0	130	----
		beryllium, total	7440-41-7	E420	0.410 mg/L	0.4 mg/L	103	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*
Total Metals (QCLot: 444671) - continued										
YL2200255-001	Anonymous	bismuth, total	7440-69-9	E420	0.0802 mg/L	0.1 mg/L	80.2	70.0	130	----
		boron, total	7440-42-8	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0395 mg/L	0.04 mg/L	98.9	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0979 mg/L	0.1 mg/L	97.9	70.0	130	----
		chromium, total	7440-47-3	E420	0.418 mg/L	0.4 mg/L	104	70.0	130	----
		cobalt, total	7440-48-4	E420	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		copper, total	7440-50-8	E420	0.193 mg/L	0.2 mg/L	96.7	70.0	130	----
		iron, total	7439-89-6	E420	21.1 mg/L	20 mg/L	106	70.0	130	----
		lead, total	7439-92-1	E420	0.191 mg/L	0.2 mg/L	95.4	70.0	130	----
		lithium, total	7439-93-2	E420	1.03 mg/L	1 mg/L	103	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.221 mg/L	0.2 mg/L	111	70.0	130	----
		nickel, total	7440-02-0	E420	0.393 mg/L	0.4 mg/L	98.4	70.0	130	----
		phosphorus, total	7723-14-0	E420	120 mg/L	100 mg/L	120	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.218 mg/L	0.2 mg/L	109	70.0	130	----
		selenium, total	7782-49-2	E420	0.424 mg/L	0.4 mg/L	106	70.0	130	----
		silicon, total	7440-21-3	E420	111 mg/L	100 mg/L	111	70.0	130	----
		silver, total	7440-22-4	E420	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	200 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.377 mg/L	0.4 mg/L	94.3	70.0	130	----
		thallium, total	7440-28-0	E420	0.0351 mg/L	0.04 mg/L	87.8	70.0	130	----
		thorium, total	7440-29-1	E420	0.177 mg/L	0.2 mg/L	88.6	70.0	130	----
		tin, total	7440-31-5	E420	0.204 mg/L	0.2 mg/L	102	70.0	130	----
		titanium, total	7440-32-6	E420	0.429 mg/L	0.4 mg/L	107	70.0	130	----
		tungsten, total	7440-33-7	E420	0.203 mg/L	0.2 mg/L	101	70.0	130	----
		uranium, total	7440-61-1	E420	0.0376 mg/L	0.04 mg/L	94.0	70.0	130	----
		vanadium, total	7440-62-2	E420	1.11 mg/L	1 mg/L	111	70.0	130	----
		zinc, total	7440-66-6	E420	4.12 mg/L	4 mg/L	103	70.0	130	----
		zirconium, total	7440-67-7	E420	0.452 mg/L	0.4 mg/L	113	70.0	130	----
Total Metals (QCLot: 446696)										
VA22A5448-010	Anonymous	mercury, total	7439-97-6	E508	0.000102 mg/L	0.0001 mg/L	102	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 445278)										
KS2200998-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.188 mg/L	0.2 mg/L	93.9	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0195 mg/L	0.02 mg/L	97.3	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0385 mg/L	0.04 mg/L	96.3	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00922 mg/L	0.01 mg/L	92.2	70.0	130	----
		boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00382 mg/L	0.004 mg/L	95.4	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	0.00939 mg/L	0.01 mg/L	93.9	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0184 mg/L	0.02 mg/L	92.0	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0178 mg/L	0.02 mg/L	89.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.88 mg/L	2 mg/L	93.9	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0189 mg/L	0.02 mg/L	94.6	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0967 mg/L	0.1 mg/L	96.7	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0351 mg/L	0.04 mg/L	87.8	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	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0184 mg/L	0.02 mg/L	92.0	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0442 mg/L	0.04 mg/L	110	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.37 mg/L	10 mg/L	93.7	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00379 mg/L	0.004 mg/L	94.6	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	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	0.00352 mg/L	0.004 mg/L	88.0	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0214 mg/L	0.02 mg/L	107	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0376 mg/L	0.04 mg/L	94.1	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0192 mg/L	0.02 mg/L	96.2	70.0	130	----
		uranium, dissolved	7440-61-1	E421	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0982 mg/L	0.1 mg/L	98.2	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: 445278) - continued										
KS2200998-002	Anonymous	zinc, dissolved	7440-66-6	E421	0.361 mg/L	0.4 mg/L	90.3	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0421 mg/L	0.04 mg/L	105	70.0	130	----
Dissolved Metals (QCLot: 446692)										
YL2200260-002	EMD DISCHARGE INLAKE_Mid-depth	mercury, dissolved	7439-97-6	E509	0.0000944 mg/L	0.0001 mg/L	94.4	70.0	130	----
Volatile Organic Compounds (QCLot: 445451)										
VA22A5917-001	Anonymous	benzene	71-43-2	E611A	114 µg/L	100 µg/L	114	70.0	130	----
		ethylbenzene	100-41-4	E611A	102 µg/L	100 µg/L	102	70.0	130	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	116 µg/L	100 µg/L	116	70.0	130	----
		styrene	100-42-5	E611A	113 µg/L	100 µg/L	113	70.0	130	----
		toluene	108-88-3	E611A	108 µg/L	100 µg/L	108	70.0	130	----
		xylene, m+p-	179601-23-1	E611A	207 µg/L	200 µg/L	103	70.0	130	----
		xylene, o-	95-47-6	E611A	111 µg/L	100 µg/L	111	70.0	130	----
Hydrocarbons (QCLot: 445450)										
VA22A5917-002	Anonymous	F1 (C6-C10)	----	E581.VH+F1	5400 µg/L	6310 µg/L	85.6	60.0	140	----
		VHw (C6-C10)	----	E581.VH+F1	4920 µg/L	6310 µg/L	78.0	60.0	140	----

CHAIN OF CUSTODY

ALS Laboratory

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S Beattie DATE/TIME: 9:00	MA Mar 24/22 DATE/TIME: 1145	DATE/TIME:	DATE/TIME:

CLIENT:	Golder Associates Ltd.
PROJECT:	Jackfish NTPC
SITE:	Jackfish Lake
PURCHASE ORDER NO.:	
PROJECT MANAGER:	Kathy Qin
CONTACT PH:	306 370 6141
SAMPLER:	Sarah Beattie
SAMPLER MOBILE:	867 678 0964
EMAIL REPORTS TO:	Kathy_Qin@golder.com; alison_humphries@golder.com

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)

- ☐ Standard TAT (List due date): √
- ☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO: YL21-GOLD100-008
EQuIS facility code: 183527250
Project Number: 21482915
EMAIL INVOICE TO: Laurence_bonin@golder.com; Kathy_Qin@golder.com

FOR LABORATORY USE ONLY (Circle)

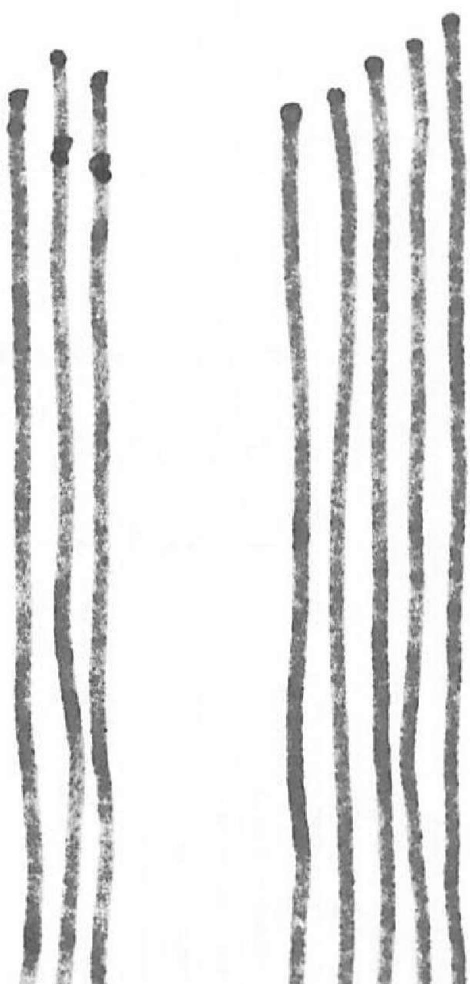
Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:	6.1 °C		
Other comments:			

SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY SAMPLE	SAMPLE DETAILS Sample identification (This description will appear on the report)	DATE / TIME (dd-mm-yyyy)	MATRIX: Solid(S) Water(W)	CONTAINER INFORMATION TOTAL CONTAINERS	ANALYSIS REQUIRED Standard Parameters Suite	Organics parameter suite	Additional Information Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	~~OUTFLOW~~		~~W~~		~~X~~		
2	~~NORTHWEST BAY NORTH_Bottom~~		~~W~~		~~X~~	~~X~~	
3	~~NORTHWEST BAY NORTH_Mid-depth~~		~~W~~		~~X~~		
4	~~MID LAKE 1_Bottom~~		~~W~~		~~X~~		
5	~~MID LAKE 1_Mid-depth~~		~~W~~		~~X~~		
6	EMD DISCHARGE INLAKE_Bottom	23-03-2022 13:40	W		X		
7	EMD DISCHARGE INLAKE_Mid-depth	23-03-2022 13:30	W		X		
8	SOUTHWEST BAY_Bottom	22-03-2022 11:50	W		X		
9	SOUTHWEST BAY_Mid-depth	22-03-2022 11:45	W		X		
10	~~NEAR OUTFLOW INLAKE_Bottom~~		~~W~~		~~X~~	~~X~~	
11	~~NEAR OUTFLOW INLAKE_Mid-depth~~		~~W~~		~~X~~		
12	~~NEAR OUTFLOW INLAKE_Bottom_4~~		~~W~~		~~X~~	~~X~~	
13	JFLQC_1	22-03-2022 9:00	W		X	X	
14	JFLQC-3		W		X		
			TOTAL				

Environmental Division
Yellowknife
Work Order Reference
YL2200260

Telephone : +1 867 873 5593



CERTIFICATE OF ANALYSIS

Work Order	: **YL2200265**	Page	: 1 of 13
Amendment	: **1**		
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	Account Manager	: Oliver Gregg
Address	: 9 - 4905 48th Street Yellowknife NT Canada X1A 3S3	Address	: 314 Old Airport Road, Unit 116 Yellowknife NT Canada X1A 3T3
Telephone	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 25-Mar-2022 13:41
PO	: ----	Date Analysis Commenced	: 29-Mar-2022
C-O-C number	: ----	Issue Date	: 19-Apr-2022 10:20
Sampler	: Sarah Beattie		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 8		
No. of samples analysed	: 8		

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*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Ann Ho	Laboratory Analyst	Metals, Burnaby, British Columbia
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

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

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

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	NEAR OUTFLOW INLAKE_Bottom
Client sampling date / time					24-Mar-2022 11:55	24-Mar-2022 11:45	24-Mar-2022 15:10	24-Mar-2022 15:00	25-Mar-2022 09:50
					YL2200265-001	YL2200265-002	YL2200265-003	YL2200265-004	YL2200265-005
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	122	123	122	123	122
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	122	123	122	123	122
conductivity	----	E100	2.0	µS/cm	502	512	504	505	503
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	158	163	159	161	161
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	172	169	166	168	165
pH	----	E108	0.10	pH units	8.08	8.00	8.00	7.96	8.07
solids, total dissolved [TDS]	----	E162	10	mg/L	307	318	319	308	315
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	272	279	275	276	275
solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0
turbidity	----	E121	0.10	NTU	1.43	2.24	1.02	1.54	1.18
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0547	0.0546	0.0361	0.0510	0.0576
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	67.7	68.8	67.8	67.9	67.8
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.101	0.100	0.098	0.102	0.100
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.137	0.131	0.132	0.133	0.137
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	0.141	0.134	0.134	0.136	0.142
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0044	0.0031	0.0019	0.0029	0.0049
nitrogen, total	7727-37-9	E366	0.030	mg/L	0.848	0.898	0.815	0.854	0.846
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0368	0.0268	0.0296	0.0316	0.0333
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0226	0.0228	0.0198	0.0221	0.0235
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	14.6	14.8	14.5	14.7	14.6
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	29.8	30.2	29.8	29.8	29.8
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	12.4	14.3	13.4	13.4	14.1
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0053	0.0040	0.0040	0.0047	0.0056

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

				Client sample ID	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	NEAR OUTFLOW INLAKE_Bottom
				Client sampling date / time	24-Mar-2022 11:55	24-Mar-2022 11:45	24-Mar-2022 15:10	24-Mar-2022 15:00	25-Mar-2022 09:50
Analyte	CAS Number	Method	LOR	Unit	YL2200265-001	YL2200265-002	YL2200265-003	YL2200265-004	YL2200265-005
					Result	Result	Result	Result	Result
Total Metals									
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00138	0.00132	0.00124	0.00127	0.00127
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0745	0.0765	0.0751	0.0744	0.0746
barium, total	7440-39-3	E420	0.00010	mg/L	0.0368	0.0374	0.0371	0.0366	0.0368
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	0.034	0.033	0.032	0.032	0.032
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L	45.5	43.6	43.2	43.9	42.6
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L	0.00196	0.00194	0.00178	0.00190	0.00196
iron, total	7439-89-6	E420	0.010	mg/L	0.018	<0.010	<0.010	<0.010	0.010
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0074	0.0069	0.0067	0.0068	0.0067
magnesium, total	7439-95-4	E420	0.0050	mg/L	14.3	14.7	14.1	14.3	14.3
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0392	0.0279	0.0308	0.0410	0.0527
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000232	0.000225	0.000197	0.000194	0.000191
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L	4.46	4.62	4.49	4.46	4.47
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00275	0.00287	0.00291	0.00286	0.00285
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000058	0.000050	0.000066	0.000075	<0.000050
silicon, total	7440-21-3	E420	0.10	mg/L	7.13	7.29	7.28	7.18	7.18
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L	37.0	37.4	36.5	36.3	36.8
strontium, total	7440-24-6	E420	0.00020	mg/L	0.105	0.103	0.100	0.0987	0.100
sulfur, total	7704-34-9	E420	0.50	mg/L	10.4	10.4	10.2	10.1	10.1

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	NEAR OUTFLOW INLAKE_Bottom
				Client sampling date / time	24-Mar-2022 11:55	24-Mar-2022 11:45	24-Mar-2022 15:10	24-Mar-2022 15:00	25-Mar-2022 09:50
					YL2200265-001	YL2200265-002	YL2200265-003	YL2200265-004	YL2200265-005
					Result	Result	Result	Result	Result
Total Metals									
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00060 DLM	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000639	0.000610	0.000590	0.000603	0.000586
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0049	0.0048	0.0046	0.0048	0.0050
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0014	0.0014	0.0017	0.0018	0.0013
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00133	0.00136	0.00134	0.00135	0.00133
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0715	0.0743	0.0734	0.0721	0.0716
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0343	0.0355	0.0352	0.0341	0.0344
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<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	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.034	0.031	0.031	0.032	0.031
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L	41.8	42.7	42.2	42.4	42.0
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00170	0.00169	0.00153	0.00166	0.00174
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0065	0.0070	0.0070	0.0072	0.0071
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	13.0	13.6	13.1	13.5	13.6
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00135	0.00086	0.00046	0.00135	0.00131

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	NEAR OUTFLOW INLAKE_Bottom
				Client sampling date / time	24-Mar-2022 11:55	24-Mar-2022 11:45	24-Mar-2022 15:10	24-Mar-2022 15:00	25-Mar-2022 09:50
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	YL2200265-001	YL2200265-002	YL2200265-003	YL2200265-004	YL2200265-005
					Result	Result	Result	Result	Result
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000210	0.000230	0.000204	0.000209	0.000199
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.50	4.64	4.53	4.53	4.59
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00280	0.00292	0.00290	0.00290	0.00282
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000054
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.91	7.47	7.32	7.33	7.26
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L	33.1	34.9	34.5	33.7	34.1
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.101	0.104	0.101	0.103	0.103
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	10.2	10.3	10.7	10.2	10.2
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<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	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000585	0.000595	0.000581	0.000598	0.000579
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0052	0.0047	0.0046	0.0054	0.0051
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	<5.0	----	----	----	<5.0
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.50	µg/L	<0.50	----	----	----	<0.50
ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	----	----	----	<0.50

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	NEAR OUTFLOW INLAKE_Bottom
				Client sampling date / time	24-Mar-2022 11:55	24-Mar-2022 11:45	24-Mar-2022 15:10	24-Mar-2022 15:00	25-Mar-2022 09:50
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**YL2200265-001**	**YL2200265-002**	**YL2200265-003**	**YL2200265-004**	**YL2200265-005**
					Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]									
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	----	----	----	<0.50
styrene	100-42-5	E611A	0.50	µg/L	<0.50	----	----	----	<0.50
toluene	108-88-3	E611A	0.50	µg/L	<0.50	----	----	----	<0.50
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	----	----	----	<0.40
xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	----	----	----	<0.30
xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	----	----	----	<0.50
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	97.3	----	----	----	90.9
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	98.4	----	----	----	97.4
Hydrocarbons									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----	----	----	<100
F2 (C10-C16)	----	E601	300	µg/L	<300	----	----	----	<300
F3 (C16-C34)	----	E601	300	µg/L	<300	----	----	----	<300
F4 (C34-C50)	----	E601	300	µg/L	<300	----	----	----	<300
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----	----	----	<100
F1-BTEX	----	EC580	100	µg/L	<100	----	----	----	<100
VPHw	----	EC580A	100	µg/L	<100	----	----	----	<100
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	85.0	----	----	----	82.8
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	96.8	----	----	----	90.5

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

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	NEAR OUTFLOW INLAKE_Mid-depth	NEAR OUTFLOW INLAKE_Bottom_4	JFLQC-3	----	----
				Client sampling date / time	25-Mar-2022 09:45	25-Mar-2022 10:00	24-Mar-2022 12:15	----	----
					YL2200265-006	YL2200265-007	YL2200265-008	--------	--------
					Result	Result	Result	----	----
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	123	121	<1.0	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	----	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	123	121	<1.0	----	----
conductivity	----	E100	2.0	µS/cm	504	501	<2.0	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	161	163	<0.60	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	164	174	<0.60	----	----
pH	----	E108	0.10	pH units	8.02	7.98	5.35	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	312	320	<10	----	----
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	276	276	<1.0	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	<3.0	----	----
turbidity	----	E121	0.10	NTU	1.48	1.31	<0.10	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0569	0.0562	<0.0050	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	68.1	68.0	<0.10	----	----
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.103	0.102	<0.010	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.125	0.138	<0.0050	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	0.128	0.143	<0.0051	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0028	0.0048	<0.0010	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L	0.840	0.833	<0.030	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0309	0.0310	<0.0020	----	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0224	0.0218	<0.0020	----	----
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	14.9	14.8	<0.50	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	29.9	29.8	<0.30	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	13.1	13.0	<0.50	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0056	0.0048	<0.0030	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	NEAR OUTFLOW INLAKE_Mid-depth	NEAR OUTFLOW INLAKE_Bottom_4	JFLQC-3	----	----
				Client sampling date / time	25-Mar-2022 09:45	25-Mar-2022 10:00	24-Mar-2022 12:15	----	----
					YL2200265-006	YL2200265-007	YL2200265-008	--------	--------
					Result	Result	Result	----	----
Total Metals									
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00126	0.00130	<0.00010	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0743	0.0721	<0.00010	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0372	0.0369	0.00010 RRV	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.032	0.033	<0.010	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	41.9	44.7	<0.050	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00193	0.00201	<0.00050	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.010	<0.010	<0.010	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0066	0.0069	<0.0010	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	14.3	15.2	<0.0050	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0491	0.0520	<0.00010	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000216	0.000223	<0.000050	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	<0.050	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	4.44	4.61	<0.050	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00289	0.00282	<0.00020	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000060	<0.000050	<0.000050	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	7.04	7.38	<0.10	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
sodium, total	7440-23-5	E420	0.050	mg/L	36.5	37.6	<0.050	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0997	0.103	<0.00020	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	10.1	10.5	<0.50	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	NEAR OUTFLOW INLAKE_Mid-depth	NEAR OUTFLOW INLAKE_Bottom_4	JFLQC-3	----	----
				Client sampling date / time	25-Mar-2022 09:45	25-Mar-2022 10:00	24-Mar-2022 12:15	----	----
					YL2200265-006	YL2200265-007	YL2200265-008	--------	--------
					Result	Result	Result	----	----
Total Metals									
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00031	<0.00030	<0.00030	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000589	0.000622	<0.000010	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0050	0.0046	0.0048 RRV	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0017	0.0016	<0.0010	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00134	0.00121	<0.00010	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0712	0.0653	<0.00010	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0348	0.0332	0.00012 RRV	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	<0.000100	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.031	0.030	<0.010	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	41.9	42.6	<0.050	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00171	0.00169	<0.00020	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0071	0.0065	<0.0010	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	13.7	13.7	<0.0050	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00137	0.00134	<0.00010	----	----

Analytical Results

Sub-Matrix: Water

(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	NEAR OUTFLOW INLAKE_Mid-depth	NEAR OUTFLOW INLAKE_Bottom_4	JFLQC-3	----	----
Client sampling date / time					25-Mar-2022 09:45	25-Mar-2022 10:00	24-Mar-2022 12:15	----	----
					YL2200265-006	YL2200265-007	YL2200265-008	--------	--------
					Result	Result	Result	----	----
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000208	0.000197	<0.000050	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.55	4.29	<0.050	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00288	0.00264	<0.00020	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	7.33	6.88	<0.050	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	34.1	35.4	<0.050	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.102	0.101	<0.00020	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	10.8	10.2	<0.50	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000584	0.000592	<0.000010	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0053	0.0049	0.0043 RRV	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	----	----
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	----	<5.0	----	----	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.50	µg/L	----	<0.50	----	----	----
ethylbenzene	100-41-4	E611A	0.50	µg/L	----	<0.50	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	NEAR OUTFLOW INLAKE_Mid-depth	NEAR OUTFLOW INLAKE_Bottom_4	JFLQC-3	----	----
				Client sampling date / time	25-Mar-2022 09:45	25-Mar-2022 10:00	24-Mar-2022 12:15	----	----
					YL2200265-006	YL2200265-007	YL2200265-008	--------	--------
					Result	Result	Result	----	----
Volatile Organic Compounds [Fuels]									
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	----	<0.50	----	----	----
styrene	100-42-5	E611A	0.50	µg/L	----	<0.50	----	----	----
toluene	108-88-3	E611A	0.50	µg/L	----	<0.50	----	----	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	----	<0.40	----	----	----
xylene, o-	95-47-6	E611A	0.30	µg/L	----	<0.30	----	----	----
xylenes, total	1330-20-7	E611A	0.50	µg/L	----	<0.50	----	----	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	----	96.6	----	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	----	98.3	----	----	----
Hydrocarbons									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	----	<100	----	----	----
F2 (C10-C16)	----	E601	300	µg/L	----	<300	----	----	----
F3 (C16-C34)	----	E601	300	µg/L	----	<300	----	----	----
F4 (C34-C50)	----	E601	300	µg/L	----	<300	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	----	<100	----	----	----
F1-BTEX	----	EC580	100	µg/L	----	<100	----	----	----
VPHw	----	EC580A	100	µg/L	----	<100	----	----	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	----	79.3	----	----	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	----	96.1	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **YL2200265**	Page	: 1 of 31
Amendment	: 1		
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	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	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 25-Mar-2022 13:41
PO	: ----	Issue Date	: 19-Apr-2022 10:20
C-O-C number	: ----		
Sampler	: Sarah Beattie		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 8		
No. of samples analysed	: 8		

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.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) NEAR OUTFLOW INLAKE_Bottom	E567	25-Mar-2022	31-Mar-2022	28 days	6 days	✓	31-Mar-2022	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) NEAR OUTFLOW INLAKE_Bottom_4	E567	25-Mar-2022	31-Mar-2022	28 days	6 days	✓	31-Mar-2022	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) NORTHWEST BAY NORTH_Bottom	E567	24-Mar-2022	31-Mar-2022	28 days	7 days	✓	31-Mar-2022	40 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) JFLQC-3	E298	24-Mar-2022	31-Mar-2022	----	----		03-Apr-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MID LAKE 1_Bottom	E298	24-Mar-2022	31-Mar-2022	----	----		03-Apr-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MID LAKE 1_Mid-depth	E298	24-Mar-2022	31-Mar-2022	----	----		03-Apr-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E298	24-Mar-2022	31-Mar-2022	----	----		03-Apr-2022	28 days	10 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
NORTHWEST BAY NORTH_Mid-depth	E298	24-Mar-2022	31-Mar-2022	----	----		03-Apr-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
NEAR OUTFLOW INLAKE_Bottom	E298	25-Mar-2022	31-Mar-2022	----	----		03-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
NEAR OUTFLOW INLAKE_Bottom_4	E298	25-Mar-2022	31-Mar-2022	----	----		03-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
NEAR OUTFLOW INLAKE_Mid-depth	E298	25-Mar-2022	31-Mar-2022	----	----		03-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
NEAR OUTFLOW INLAKE_Bottom	E235.Cl-L	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
NEAR OUTFLOW INLAKE_Bottom_4	E235.Cl-L	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
NEAR OUTFLOW INLAKE_Mid-depth	E235.Cl-L	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
JFLQC-3	E235.Cl-L	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
MID LAKE 1_Bottom	E235.Cl-L	24-Mar-2022	----	----	----		30-Mar-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE MID LAKE 1_Mid-depth	E235.Cl-L	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom	E235.Cl-L	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.Cl-L	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.F-L	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom_4	E235.F-L	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E235.F-L	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE JFLQC-3	E235.F-L	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE MID LAKE 1_Bottom	E235.F-L	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE MID LAKE 1_Mid-depth	E235.F-L	24-Mar-2022	----	----	----		30-Mar-2022	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: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom	E235.F-L	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.F-L	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.NO3-L	25-Mar-2022	----	----	----		30-Mar-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom_4	E235.NO3-L	25-Mar-2022	----	----	----		30-Mar-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E235.NO3-L	25-Mar-2022	----	----	----		30-Mar-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE JFLQC-3	E235.NO3-L	24-Mar-2022	----	----	----		30-Mar-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MID LAKE 1_Bottom	E235.NO3-L	24-Mar-2022	----	----	----		30-Mar-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MID LAKE 1_Mid-depth	E235.NO3-L	24-Mar-2022	----	----	----		30-Mar-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom	E235.NO3-L	24-Mar-2022	----	----	----		30-Mar-2022	3 days	6 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.NO3-L	24-Mar-2022	----	----	----		30-Mar-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.NO2-L	25-Mar-2022	----	----	----		30-Mar-2022	3 days	5 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom_4	E235.NO2-L	25-Mar-2022	----	----	----		30-Mar-2022	3 days	5 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E235.NO2-L	25-Mar-2022	----	----	----		30-Mar-2022	3 days	5 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE JFLQC-3	E235.NO2-L	24-Mar-2022	----	----	----		30-Mar-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MID LAKE 1_Bottom	E235.NO2-L	24-Mar-2022	----	----	----		30-Mar-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MID LAKE 1_Mid-depth	E235.NO2-L	24-Mar-2022	----	----	----		30-Mar-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom	E235.NO2-L	24-Mar-2022	----	----	----		30-Mar-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.NO2-L	24-Mar-2022	----	----	----		30-Mar-2022	3 days	6 days	✘ EHT

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NEAR OUTFLOW INLAKE_Bottom	E392	25-Mar-2022	----	----	----		31-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NEAR OUTFLOW INLAKE_Bottom_4	E392	25-Mar-2022	----	----	----		31-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E392	25-Mar-2022	----	----	----		31-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE JFLQC-3	E392	24-Mar-2022	----	----	----		31-Mar-2022	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE MID LAKE 1_Bottom	E392	24-Mar-2022	----	----	----		31-Mar-2022	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE MID LAKE 1_Mid-depth	E392	24-Mar-2022	----	----	----		31-Mar-2022	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NORTHWEST BAY NORTH_Bottom	E392	24-Mar-2022	----	----	----		31-Mar-2022	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NORTHWEST BAY NORTH_Mid-depth	E392	24-Mar-2022	----	----	----		31-Mar-2022	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.SO4	25-Mar-2022	----	----	----		30-Mar-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
NEAR OUTFLOW INLAKE_Bottom_4	E235.SO4	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
NEAR OUTFLOW INLAKE_Mid-depth	E235.SO4	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
JFLQC-3	E235.SO4	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MID LAKE 1_Bottom	E235.SO4	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MID LAKE 1_Mid-depth	E235.SO4	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
NORTHWEST BAY NORTH_Bottom	E235.SO4	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
NORTHWEST BAY NORTH_Mid-depth	E235.SO4	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid)										
NEAR OUTFLOW INLAKE_Bottom	E375-T	25-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid)										
NEAR OUTFLOW INLAKE_Bottom_4	E375-T	25-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E375-T	25-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) JFLQC-3	E375-T	24-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) MID LAKE 1_Bottom	E375-T	24-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) MID LAKE 1_Mid-depth	E375-T	24-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E375-T	24-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (Trace Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E375-T	24-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E366	25-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	7 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom_4	E366	25-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	7 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E366	25-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	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 Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) JFLQC-3	E366	24-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) MID LAKE 1_Bottom	E366	24-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) MID LAKE 1_Mid-depth	E366	24-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E366	24-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E366	24-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E372-U	25-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom_4	E372-U	25-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E372-U	25-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) JFLQC-3	E372-U	24-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	9 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) MID LAKE 1_Bottom	E372-U	24-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) MID LAKE 1_Mid-depth	E372-U	24-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E372-U	24-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E372-U	24-Mar-2022	31-Mar-2022	----	----		02-Apr-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NEAR OUTFLOW INLAKE_Bottom	E509	25-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NEAR OUTFLOW INLAKE_Bottom_4	E509	25-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NEAR OUTFLOW INLAKE_Mid-depth	E509	25-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) JFLQC-3	E509	24-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MID LAKE 1_Bottom	E509	24-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	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: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MID LAKE 1_Mid-depth	E509	24-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NORTHWEST BAY NORTH_Bottom	E509	24-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NORTHWEST BAY NORTH_Mid-depth	E509	24-Mar-2022	31-Mar-2022	----	----		31-Mar-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) JFLQC-3	E421	24-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MID LAKE 1_Bottom	E421	24-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MID LAKE 1_Mid-depth	E421	24-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NEAR OUTFLOW INLAKE_Bottom	E421	25-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NEAR OUTFLOW INLAKE_Bottom_4	E421	25-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NEAR OUTFLOW INLAKE_Mid-depth	E421	25-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NORTHWEST BAY NORTH_Bottom	E421	24-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NORTHWEST BAY NORTH_Mid-depth	E421	24-Mar-2022	30-Mar-2022	----	----		31-Mar-2022	180 days	7 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NEAR OUTFLOW INLAKE_Bottom	E601	25-Mar-2022	01-Apr-2022	14 days	7 days	✓	04-Apr-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NEAR OUTFLOW INLAKE_Bottom_4	E601	25-Mar-2022	01-Apr-2022	14 days	7 days	✓	04-Apr-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NORTHWEST BAY NORTH_Bottom	E601	24-Mar-2022	01-Apr-2022	14 days	8 days	✓	04-Apr-2022	40 days	3 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NEAR OUTFLOW INLAKE_Bottom	E581.VH+F1	25-Mar-2022	29-Mar-2022	----	----		30-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NEAR OUTFLOW INLAKE_Bottom_4	E581.VH+F1	25-Mar-2022	29-Mar-2022	----	----		30-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NORTHWEST BAY NORTH_Bottom	E581.VH+F1	24-Mar-2022	29-Mar-2022	----	----		30-Mar-2022	14 days	5 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E358-L	25-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom_4	E358-L	25-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	6 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E358-L	25-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	6 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) JFLQC-3	E358-L	24-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) MID LAKE 1_Bottom	E358-L	24-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) MID LAKE 1_Mid-depth	E358-L	24-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E358-L	24-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E358-L	24-Mar-2022	31-Mar-2022	----	----		01-Apr-2022	28 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NEAR OUTFLOW INLAKE_Bottom	E290	25-Mar-2022	----	----	----		30-Mar-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NEAR OUTFLOW INLAKE_Bottom_4	E290	25-Mar-2022	----	----	----		30-Mar-2022	14 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : Alkalinity Species by Titration										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E290	25-Mar-2022	----	----	----		30-Mar-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE JFLQC-3	E290	24-Mar-2022	----	----	----		30-Mar-2022	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MID LAKE 1_Bottom	E290	24-Mar-2022	----	----	----		30-Mar-2022	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MID LAKE 1_Mid-depth	E290	24-Mar-2022	----	----	----		30-Mar-2022	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NORTHWEST BAY NORTH_Bottom	E290	24-Mar-2022	----	----	----		30-Mar-2022	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NORTHWEST BAY NORTH_Mid-depth	E290	24-Mar-2022	----	----	----		30-Mar-2022	14 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE NEAR OUTFLOW INLAKE_Bottom	E100	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE NEAR OUTFLOW INLAKE_Bottom_4	E100	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E100	25-Mar-2022	----	----	----		30-Mar-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : Conductivity in Water										
HDPE JFLQC-3	E100	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE MID LAKE 1_Bottom	E100	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE MID LAKE 1_Mid-depth	E100	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE NORTHWEST BAY NORTH_Bottom	E100	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE NORTHWEST BAY NORTH_Mid-depth	E100	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Physical Tests : pH by Meter										
HDPE NEAR OUTFLOW INLAKE_Bottom	E108	25-Mar-2022	----	----	----		30-Mar-2022	0.25 hrs	130 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NEAR OUTFLOW INLAKE_Bottom_4	E108	25-Mar-2022	----	----	----		30-Mar-2022	0.25 hrs	130 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E108	25-Mar-2022	----	----	----		30-Mar-2022	0.25 hrs	130 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MID LAKE 1_Bottom	E108	24-Mar-2022	----	----	----		30-Mar-2022	0.25 hrs	149 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE MID LAKE 1_Mid-depth	E108	24-Mar-2022	----	----	----		30-Mar-2022	0.25 hrs	149 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE JFLQC-3	E108	24-Mar-2022	----	----	----		30-Mar-2022	0.25 hrs	151 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NORTHWEST BAY NORTH_Bottom	E108	24-Mar-2022	----	----	----		30-Mar-2022	0.25 hrs	152 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NORTHWEST BAY NORTH_Mid-depth	E108	24-Mar-2022	----	----	----		30-Mar-2022	0.25 hrs	152 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE NEAR OUTFLOW INLAKE_Bottom	E162	25-Mar-2022	----	----	----		30-Mar-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE NEAR OUTFLOW INLAKE_Bottom_4	E162	25-Mar-2022	----	----	----		30-Mar-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E162	25-Mar-2022	----	----	----		30-Mar-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE JFLQC-3	E162	24-Mar-2022	----	----	----		30-Mar-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE MID LAKE 1_Bottom	E162	24-Mar-2022	----	----	----		30-Mar-2022	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE MID LAKE 1_Mid-depth	E162	24-Mar-2022	----	----	----		30-Mar-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Bottom	E162	24-Mar-2022	----	----	----		30-Mar-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Mid-depth	E162	24-Mar-2022	----	----	----		30-Mar-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NEAR OUTFLOW INLAKE_Bottom	E160	25-Mar-2022	----	----	----		30-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NEAR OUTFLOW INLAKE_Bottom_4	E160	25-Mar-2022	----	----	----		30-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E160	25-Mar-2022	----	----	----		30-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE JFLQC-3	E160	24-Mar-2022	----	----	----		30-Mar-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MID LAKE 1_Bottom	E160	24-Mar-2022	----	----	----		30-Mar-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MID LAKE 1_Mid-depth	E160	24-Mar-2022	----	----	----		30-Mar-2022	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Bottom	E160	24-Mar-2022	----	----	----		30-Mar-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Mid-depth	E160	24-Mar-2022	----	----	----		30-Mar-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE NEAR OUTFLOW INLAKE_Bottom	E121	25-Mar-2022	----	----	----		31-Mar-2022	3 days	6 days	✗ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NEAR OUTFLOW INLAKE_Bottom_4	E121	25-Mar-2022	----	----	----		31-Mar-2022	3 days	6 days	✗ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E121	25-Mar-2022	----	----	----		31-Mar-2022	3 days	6 days	✗ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE JFLQC-3	E121	24-Mar-2022	----	----	----		31-Mar-2022	3 days	7 days	✗ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE MID LAKE 1_Bottom	E121	24-Mar-2022	----	----	----		31-Mar-2022	3 days	7 days	✗ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE MID LAKE 1_Mid-depth	E121	24-Mar-2022	----	----	----		31-Mar-2022	3 days	7 days	✗ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NORTHWEST BAY NORTH_Bottom	E121	24-Mar-2022	----	----	----		31-Mar-2022	3 days	7 days	✗ EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : Turbidity by Nephelometry										
HDPE NORTHWEST BAY NORTH_Mid-depth	E121	24-Mar-2022	----	----	----		31-Mar-2022	3 days	7 days	× EHT
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NEAR OUTFLOW INLAKE_Bottom	E508	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NEAR OUTFLOW INLAKE_Bottom_4	E508	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NEAR OUTFLOW INLAKE_Mid-depth	E508	25-Mar-2022	----	----	----		30-Mar-2022	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) JFLQC-3	E508	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) MID LAKE 1_Bottom	E508	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) MID LAKE 1_Mid-depth	E508	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NORTHWEST BAY NORTH_Bottom	E508	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NORTHWEST BAY NORTH_Mid-depth	E508	24-Mar-2022	----	----	----		30-Mar-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NEAR OUTFLOW INLAKE_Bottom	E420	25-Mar-2022	----	----	----		01-Apr-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NEAR OUTFLOW INLAKE_Bottom_4	E420	25-Mar-2022	----	----	----		01-Apr-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NEAR OUTFLOW INLAKE_Mid-depth	E420	25-Mar-2022	----	----	----		01-Apr-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) JFLQC-3	E420	24-Mar-2022	----	----	----		01-Apr-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MID LAKE 1_Bottom	E420	24-Mar-2022	----	----	----		01-Apr-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MID LAKE 1_Mid-depth	E420	24-Mar-2022	----	----	----		01-Apr-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NORTHWEST BAY NORTH_Bottom	E420	24-Mar-2022	----	----	----		01-Apr-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NORTHWEST BAY NORTH_Mid-depth	E420	24-Mar-2022	----	----	----		01-Apr-2022	180 days	8 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NEAR OUTFLOW INLAKE_Bottom	E611A	25-Mar-2022	29-Mar-2022	----	----		30-Mar-2022	14 days	5 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NEAR OUTFLOW INLAKE_Bottom_4	E611A	25-Mar-2022	29-Mar-2022	----	----		30-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NORTHWEST BAY NORTH_Bottom	E611A	24-Mar-2022	29-Mar-2022	----	----		30-Mar-2022	14 days	5 days	✓

Legend & Qualifier Definitions

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

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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	446245	1	14	7.1	5.0	✓
Ammonia by Fluorescence	E298	447282	1	18	5.5	5.0	✓
BTEX by Headspace GC-MS	E611A	445666	1	4	25.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	446242	1	8	12.5	5.0	✓
Conductivity in Water	E100	446244	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	446751	2	24	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	446661	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	447283	1	12	8.3	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	446241	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	446234	1	12	8.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	446235	1	17	5.8	5.0	✓
pH by Meter	E108	446243	1	18	5.5	5.0	✓
Reactive Silica by Colourimetry	E392	447706	1	8	12.5	5.0	✓
Sulfate in Water by IC	E235.SO4	446236	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	446304	1	17	5.8	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	447284	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	446091	2	24	8.3	5.0	✓
Total Metals in Water by CRC ICPMS	E420	447753	1	17	5.8	5.0	✓
Total Nitrogen by Colourimetry	E366	447280	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	447281	1	19	5.2	5.0	✓
TSS by Gravimetry	E160	446320	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	446885	2	21	9.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	445667	1	3	33.3	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	446245	1	14	7.1	5.0	✓
Ammonia by Fluorescence	E298	447282	1	18	5.5	5.0	✓
BTEX by Headspace GC-MS	E611A	445666	1	4	25.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	447843	1	3	33.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	446242	1	8	12.5	5.0	✓
Conductivity in Water	E100	446244	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	446751	2	24	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	446661	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	447283	1	12	8.3	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	446241	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	446234	1	12	8.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	446235	1	17	5.8	5.0	✓
Oil & Grease by Gravimetry	E567	447120	1	6	16.6	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
pH by Meter	E108	446243	1	18	5.5	5.0	✓
Reactive Silica by Colourimetry	E392	447706	1	8	12.5	5.0	✓
Sulfate in Water by IC	E235.SO4	446236	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	446304	1	17	5.8	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	447284	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	446091	2	24	8.3	5.0	✓
Total Metals in Water by CRC ICPMS	E420	447753	1	17	5.8	5.0	✓
Total Nitrogen by Colourimetry	E366	447280	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	447281	1	19	5.2	5.0	✓
TSS by Gravimetry	E160	446320	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	446885	2	21	9.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	445667	1	3	33.3	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	446245	1	14	7.1	5.0	✓
Ammonia by Fluorescence	E298	447282	1	18	5.5	5.0	✓
BTEX by Headspace GC-MS	E611A	445666	1	4	25.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	447843	1	3	33.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	446242	1	8	12.5	5.0	✓
Conductivity in Water	E100	446244	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	446751	2	24	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	446661	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	447283	1	12	8.3	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	446241	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	446234	1	12	8.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	446235	1	17	5.8	5.0	✓
Oil & Grease by Gravimetry	E567	447120	1	6	16.6	5.0	✓
Reactive Silica by Colourimetry	E392	447706	1	8	12.5	5.0	✓
Sulfate in Water by IC	E235.SO4	446236	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	446304	1	17	5.8	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	447284	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	446091	2	24	8.3	5.0	✓
Total Metals in Water by CRC ICPMS	E420	447753	1	17	5.8	5.0	✓
Total Nitrogen by Colourimetry	E366	447280	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	447281	1	19	5.2	5.0	✓
TSS by Gravimetry	E160	446320	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	446885	2	21	9.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	445667	1	3	33.3	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	447282	1	18	5.5	5.0	✓
BTEX by Headspace GC-MS	E611A	445666	1	4	25.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Chloride in Water by IC (Low Level)	E235.Cl-L	446242	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	446751	2	24	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	446661	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	447283	1	12	8.3	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	446241	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	446234	1	12	8.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	446235	1	17	5.8	5.0	✓
Reactive Silica by Colourimetry	E392	447706	1	8	12.5	5.0	✓
Sulfate in Water by IC	E235.SO4	446236	1	16	6.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T	447284	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	446091	2	24	8.3	5.0	✓
Total Metals in Water by CRC ICPMS	E420	447753	1	17	5.8	5.0	✓
Total Nitrogen by Colourimetry	E366	447280	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	447281	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	445667	1	3	33.3	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
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
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.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 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.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC (Low Level)	E235.Cl-L 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 (Low Level)	E235.F-L 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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (Trace Level)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Reactive Silica by Colourimetry	E392 Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
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.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples 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
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.
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 PHCs - F2-F4 by GC-FID	E601 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4).
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 CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
TDS in Water (Calculation) Using APHA Analyte List	EC103.APHA Vancouver - Environmental	Water	APHA 1030E	Total DIssolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis).
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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
Oil & Grease Extraction for Gravimetry	EP567 Vancouver - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
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	: **YL2200265**	Page	: 1 of 20
Amendment	: **1**		
Client	: Golder Associates Ltd.	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	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	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 25-Mar-2022 13:41
PO	: ----	Date Analysis Commenced	: 29-Mar-2022
C-O-C number	: ----	Issue Date	: 19-Apr-2022 10:20
Sampler	: Sarah Beattie		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 8		
No. of samples analysed	: 8		

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.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Ann Ho	Laboratory Analyst	Metals, Burnaby, British Columbia
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
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Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
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Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	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.

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 446243)											
VA22A6454-001	Anonymous	pH	----	E108	0.10	pH units	7.93	7.91	0.215%	4%	----
Physical Tests (QC Lot: 446244)											
VA22A6454-001	Anonymous	conductivity	----	E100	2.0	µS/cm	296	294	0.678%	10%	----
Physical Tests (QC Lot: 446245)											
VA22A6454-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	114	114	0.00%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	114	114	0.00%	20%	----
Physical Tests (QC Lot: 446304)											
VA22A6336-001	Anonymous	solids, total dissolved [TDS]	----	E162	13	mg/L	38	35	3	Diff <2x LOR	----
Physical Tests (QC Lot: 446320)											
VA22A6337-001	Anonymous	solids, total suspended [TSS]	----	E160	3000	mg/L	<3000 µg/L	4.5	1.5	Diff <2x LOR	----
Physical Tests (QC Lot: 446885)											
FJ2200769-001	Anonymous	turbidity	----	E121	0.10	NTU	25.4	25.4	0.236%	15%	----
Physical Tests (QC Lot: 446886)											
YL2200265-008	JFLQC-3	turbidity	----	E121	0.10	NTU	<0.10	<0.10	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 446234)											
YL2200265-001	NORTHWEST BAY NORTH_Bottom	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.137	0.137	0.130%	20%	----
Anions and Nutrients (QC Lot: 446235)											
YL2200265-001	NORTHWEST BAY NORTH_Bottom	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0044	0.0043	0.00006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 446236)											
VA22A6454-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	19.4	19.4	0.182%	20%	----
Anions and Nutrients (QC Lot: 446241)											
YL2200265-001	NORTHWEST BAY NORTH_Bottom	fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.101	0.107	5.76%	20%	----
Anions and Nutrients (QC Lot: 446242)											
YL2200265-001	NORTHWEST BAY NORTH_Bottom	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	67.7	67.7	0.0480%	20%	----
Anions and Nutrients (QC Lot: 447280)											
VA22A5618-001	Anonymous	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.176	0.175	0.001	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Anions and Nutrients (QC Lot: 447281)											
VA22A5618-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 447282)											
VA22A5618-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 447284)											
VA22A6089-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 447706)											
YL2200265-001	NORTHWEST BAY NORTH_Bottom	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	14.6	14.9	2.04%	20%	----
Organic / Inorganic Carbon (QC Lot: 447283)											
VA22A5907-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	8.71	9.18	5.25%	20%	----
Total Metals (QC Lot: 446091)											
VA22A6441-006	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 446092)											
YL2200265-005	NEAR OUTFLOW INLAKE_Bottom	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 447753)											
CG2203473-005	Anonymous	aluminum, total	7429-90-5	E420	0.0150	mg/L	<0.0150	<0.0150	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00050	mg/L	0.00175	0.00172	0.00002	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00050	mg/L	0.0188	0.0191	1.89%	20%	----
		beryllium, total	7440-41-7	E420	0.100	mg/L	<0.100 µg/L	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.050	mg/L	0.108	0.110	0.002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0250	mg/L	1.34 µg/L	0.00131	2.39%	20%	----
		calcium, total	7440-70-2	E420	0.250	mg/L	639	656	2.71%	20%	----
		cesium, total	7440-46-2	E420	0.000050	mg/L	0.000598	0.000608	1.58%	20%	----
		chromium, total	7440-47-3	E420	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.50	mg/L	69.9 µg/L	0.0700	0.0753%	20%	----
		copper, total	7440-50-8	E420	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0050	mg/L	1.32	1.33	0.639%	20%	----
		magnesium, total	7439-95-4	E420	0.0250	mg/L	300	303	1.17%	20%	----
		manganese, total	7439-96-5	E420	0.00050	mg/L	0.698	0.700	0.199%	20%	----
		molybdenum, total	7439-98-7	E420	0.000250	mg/L	0.00308	0.00295	4.26%	20%	----
		nickel, total	7440-02-0	E420	0.00250	mg/L	0.398	0.405	1.75%	20%	----

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
Total Metals (QC Lot: 447753) - continued											
CG2203473-005	Anonymous	phosphorus, total	7723-14-0	E420	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.250	mg/L	20.0	19.9	0.566%	20%	----
		rubidium, total	7440-17-7	E420	0.00100	mg/L	0.0348	0.0350	0.595%	20%	----
		selenium, total	7782-49-2	E420	0.250	mg/L	23.5 µg/L	0.0225	4.26%	20%	----
		silicon, total	7440-21-3	E420	0.50	mg/L	2.99	2.97	0.02	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.250	mg/L	39.3	39.8	1.23%	20%	----
		strontium, total	7440-24-6	E420	0.00100	mg/L	1.99	1.97	1.14%	20%	----
		sulfur, total	7704-34-9	E420	2.50	mg/L	445	450	1.12%	20%	----
		tellurium, total	13494-80-9	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000050	mg/L	0.000330	0.000335	0.000004	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000050	mg/L	0.0364	0.0360	1.06%	20%	----
		vanadium, total	7440-62-2	E420	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0150	mg/L	0.0862	0.0905	0.0044	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 446661)											
VA22A6182-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0036	0.0045	0.0009	Diff <2x LOR	----
		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	0.00023	0.00023	0.000002	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0484	0.0478	1.31%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	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	0.253	0.250	1.16%	20%	----
		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	101	103	1.97%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000034	0.000034	0.0000004	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	17.9	17.9	0.149%	20%	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Dissolved Metals (QC Lot: 446661) - continued											
VA22A6182-001	Anonymous	lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0158	0.0155	2.16%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	14.0	14.2	1.70%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.678	0.690	1.62%	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	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.329	0.323	0.006	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	12.0	12.3	3.20%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00597	0.00611	2.22%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000073	<0.000050	0.000023	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	15.3	15.0	2.46%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	38.5	38.5	0.0713%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.844	0.880	4.13%	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	0.00037	0.00040	0.00003	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	0.00051	<0.00050	0.00001	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: 446751)											
CG2203477-017	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 446752)											
YL2200265-005	NEAR OUTFLOW INLAKE_Bottom	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 445666)											
VA22A6468-001	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	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Volatile Organic Compounds (QC Lot: 445666) - continued											
VA22A6468-001	Anonymous	xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 445667)											
YL2200265-001	NORTHWEST BAY NORTH_Bottom	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: 446244)						
conductivity	----	E100	1	μS/cm	<1.0	----
Physical Tests (QCLot: 446245)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 446304)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 446320)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 446885)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 446886)						
turbidity	----	E121	0.1	NTU	<0.10	----
Anions and Nutrients (QCLot: 446234)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 446235)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 446236)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 446241)						
fluoride	16984-48-8	E235.F-L	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 446242)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 447280)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 447281)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 447282)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 447284)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 447706)						
silicate (as SiO_2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 447283)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 446091)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 446092)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 447753)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 447753) - continued						
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 446661)						
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	----
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 446661) - continued						
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 446751)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 446752)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 447120)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 445666)						
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: 445667)						
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 447843)						
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				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 446243)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 446244)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.3	90.0	110	----
Physical Tests (QCLot: 446245)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	101	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Physical Tests (QCLot: 446304)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	96.7	85.0	115	----
Physical Tests (QCLot: 446320)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	92.8	85.0	115	----
Physical Tests (QCLot: 446885)									
turbidity	----	E121	0.1	NTU	200 NTU	99.0	85.0	115	----
Physical Tests (QCLot: 446886)									
turbidity	----	E121	0.1	NTU	200 NTU	99.0	85.0	115	----
Anions and Nutrients (QCLot: 446234)									
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: 446235)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 446236)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	106	90.0	110	----
Anions and Nutrients (QCLot: 446241)									
fluoride	16984-48-8	E235.F-L	0.01	mg/L	1 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 446242)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 447280)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	114	75.0	125	----
Anions and Nutrients (QCLot: 447281)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	93.9	80.0	120	----
Anions and Nutrients (QCLot: 447282)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 447284)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	92.9	80.0	120	----

Sub-Matrix: **Water**

Laboratory Control Sample (LCS) Report

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Anions and Nutrients (QCLot: 447706)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	98.7	85.0	115	----
Organic / Inorganic Carbon (QCLot: 447283)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	112	80.0	120	----
Total Metals (QCLot: 446091)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	90.9	80.0	120	----
Total Metals (QCLot: 446092)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	89.9	80.0	120	----
Total Metals (QCLot: 447753)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	100	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	94.7	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.7	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	94.2	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.2	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	94.7	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	97.9	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.6	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	97.6	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	94.0	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.9	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	96.0	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	105	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.6	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	97.9	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.5	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	97.6	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	98.4	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	100.0	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.7	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	96.8	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	88.4	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	103	80.0	120	----

Sub-Matrix: **Water**

Laboratory Control Sample (LCS) Report

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Total Metals (QCLot: 447753) - continued									
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	97.5	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	88.1	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	96.9	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	104	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	96.1	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	93.3	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	95.0	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	94.7	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	98.5	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	99.6	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	96.6	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	95.1	80.0	120	----
Dissolved Metals (QCLot: 446661)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	102	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	109	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	99.7	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	103	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	94.9	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.7	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	106	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	96.6	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.4	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	105	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	97.3	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	97.9	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	97.7	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	108	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.6	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	100	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.3	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Dissolved Metals (QCLot: 446661) - continued									
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	98.1	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	99.6	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	99.7	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	96.4	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	101	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	98.6	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	100	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	91.9	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	100.0	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.7	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.8	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	99.6	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	98.8	80.0	120	----
Aggregate Organics (QCLot: 447120)									
oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	102	70.0	130	----
Volatile Organic Compounds (QCLot: 445666)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	88.8	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	108	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	94.1	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	90.3	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	98.4	70.0	130	----
Hydrocarbons (QCLot: 445667)									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	80.5	70.0	130	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	73.3	70.0	130	----
Hydrocarbons (QCLot: 447843)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	117	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	106	70.0	130	----
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	106	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: 446234)										
VA22A6495-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	12.8 mg/L	12.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 446235)										
VA22A6456-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.520 mg/L	0.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 446236)										
VA22A6456-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	106 mg/L	100 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 446241)										
YL2200265-002	NORTHWEST BAY NORTH_Mid-depth	fluoride	16984-48-8	E235.F-L	1.04 mg/L	1 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 446242)										
YL2200265-002	NORTHWEST BAY NORTH_Mid-depth	chloride	16887-00-6	E235.Cl-L	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 447280)										
VA22A5618-002	Anonymous	nitrogen, total	7727-37-9	E366	0.457 mg/L	0.4 mg/L	114	70.0	130	----
Anions and Nutrients (QCLot: 447281)										
VA22A5618-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0496 mg/L	0.05 mg/L	99.1	70.0	130	----
Anions and Nutrients (QCLot: 447282)										
VA22A5618-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.108 mg/L	0.1 mg/L	108	75.0	125	----
Anions and Nutrients (QCLot: 447284)										
VA22A6089-002	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0467 mg/L	0.05 mg/L	93.3	70.0	130	----
Anions and Nutrients (QCLot: 447706)										
YL2200265-002	NORTHWEST BAY NORTH_Mid-depth	silicate (as SiO2)	7631-86-9	E392	ND mg/L	10 mg/L	ND	75.0	125	----
Organic / Inorganic Carbon (QCLot: 447283)										
VA22A6089-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 446091)										
VA22A6441-007	Anonymous	mercury, total	7439-97-6	E508	0.0000828 mg/L	0.0001 mg/L	82.8	70.0	130	----
Total Metals (QCLot: 446092)										
YL2200265-006	NEAR OUTFLOW INLAKE_Mid-depth	mercury, total	7439-97-6	E508	0.0000813 mg/L	0.0001 mg/L	81.3	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
Total Metals (QCLot: 447753)										
CG2203480-001	Anonymous	aluminum, total	7429-90-5	E420	0.189 mg/L	0.2 mg/L	94.4	70.0	130	----
		antimony, total	7440-36-0	E420	0.0199 mg/L	0.02 mg/L	99.4	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0386 mg/L	0.04 mg/L	96.5	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00962 mg/L	0.01 mg/L	96.2	70.0	130	----
		boron, total	7440-42-8	E420	0.095 mg/L	0.1 mg/L	95.0	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00403 mg/L	0.004 mg/L	101	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00974 mg/L	0.01 mg/L	97.4	70.0	130	----
		chromium, total	7440-47-3	E420	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0190 mg/L	0.02 mg/L	95.3	70.0	130	----
		copper, total	7440-50-8	E420	0.0189 mg/L	0.02 mg/L	94.7	70.0	130	----
		iron, total	7439-89-6	E420	1.95 mg/L	2 mg/L	97.4	70.0	130	----
		lead, total	7439-92-1	E420	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		lithium, total	7439-93-2	E420	0.0980 mg/L	0.1 mg/L	98.0	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0209 mg/L	0.02 mg/L	104	70.0	130	----
		nickel, total	7440-02-0	E420	0.0379 mg/L	0.04 mg/L	94.8	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.4 mg/L	10 mg/L	104	70.0	130	----
		potassium, total	7440-09-7	E420	4.10 mg/L	4 mg/L	102	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0199 mg/L	0.02 mg/L	99.6	70.0	130	----
		selenium, total	7782-49-2	E420	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		silicon, total	7440-21-3	E420	9.27 mg/L	10 mg/L	92.7	70.0	130	----
		silver, total	7440-22-4	E420	0.00409 mg/L	0.004 mg/L	102	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	18.4 mg/L	20 mg/L	92.0	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0396 mg/L	0.04 mg/L	99.1	70.0	130	----
		thallium, total	7440-28-0	E420	0.00390 mg/L	0.004 mg/L	97.6	70.0	130	----
		thorium, total	7440-29-1	E420	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		tin, total	7440-31-5	E420	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		titanium, total	7440-32-6	E420	0.0382 mg/L	0.04 mg/L	95.5	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0191 mg/L	0.02 mg/L	95.3	70.0	130	----
		uranium, total	7440-61-1	E420	0.00400 mg/L	0.004 mg/L	100.0	70.0	130	----
		vanadium, total	7440-62-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 447753) - continued										
CG2203480-001	Anonymous	zinc, total	7440-66-6	E420	0.373 mg/L	0.4 mg/L	93.3	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
Dissolved Metals (QCLot: 446661)										
VA22A6182-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.203 mg/L	0.2 mg/L	101	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0213 mg/L	0.02 mg/L	107	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0417 mg/L	0.04 mg/L	104	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00925 mg/L	0.01 mg/L	92.5	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.094 mg/L	0.1 mg/L	93.9	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00404 mg/L	0.004 mg/L	101	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	0.0106 mg/L	0.01 mg/L	106	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	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0187 mg/L	0.02 mg/L	93.6	70.0	130	----
		iron, dissolved	7439-89-6	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0973 mg/L	0.1 mg/L	97.3	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0218 mg/L	0.02 mg/L	109	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.2 mg/L	10 mg/L	102	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
		silicon, dissolved	7440-21-3	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00368 mg/L	0.004 mg/L	91.9	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	21.5 mg/L	20 mg/L	108	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0420 mg/L	0.04 mg/L	105	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00384 mg/L	0.004 mg/L	96.0	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0209 mg/L	0.02 mg/L	104	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0201 mg/L	0.02 mg/L	100	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: 446661) - continued										
VA22A6182-002	Anonymous	titanium, dissolved	7440-32-6	E421	0.0377 mg/L	0.04 mg/L	94.2	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00397 mg/L	0.004 mg/L	99.3	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.398 mg/L	0.4 mg/L	99.6	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0421 mg/L	0.04 mg/L	105	70.0	130	----
Dissolved Metals (QCLot: 446751)										
CG2203477-018	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000946 mg/L	0.0001 mg/L	94.6	70.0	130	----
Dissolved Metals (QCLot: 446752)										
YL2200265-006	NEAR OUTFLOW INLAKE_Mid-depth	mercury, dissolved	7439-97-6	E509	0.0000916 mg/L	0.0001 mg/L	91.6	70.0	130	----
Volatile Organic Compounds (QCLot: 445666)										
VA22A6468-001	Anonymous	benzene	71-43-2	E611A	112 µg/L	100 µg/L	112	70.0	130	----
		ethylbenzene	100-41-4	E611A	104 µg/L	100 µg/L	104	70.0	130	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	111 µg/L	100 µg/L	111	70.0	130	----
		styrene	100-42-5	E611A	107 µg/L	100 µg/L	107	70.0	130	----
		toluene	108-88-3	E611A	109 µg/L	100 µg/L	109	70.0	130	----
		xylene, m+p-	179601-23-1	E611A	209 µg/L	200 µg/L	104	70.0	130	----
		xylene, o-	95-47-6	E611A	110 µg/L	100 µg/L	110	70.0	130	----
Hydrocarbons (QCLot: 445667)										
YL2200265-005	NEAR OUTFLOW INLAKE_Bottom	F1 (C6-C10)	----	E581.VH+F1	5600 µg/L	6310 µg/L	88.7	60.0	140	----
		VHw (C6-C10)	----	E581.VH+F1	5100 µg/L	6310 µg/L	80.8	60.0	140	----

CHAIN OF COSTODY

ALS Laboratory

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Sarah Beattie DATE/TIME: 13:00	SA DATE/TIME:	MAR 25, 2022 DATE/TIME: 13:41	TEMP 1.4 DATE/TIME:

CLIENT:	Golder Associates Ltd.	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	☐ Standard TAT (List due date): √ ☐ Non Standard or urgent TAT (List due date):
PROJECT:	Jackfish NTPC		
SITE:	Jackfish Lake		
PURCHASE ORDER NO.:		ALS QUOTE NC YL21-GOLD100-008	
PROJECT MANAGER:	Kathy Qin	CONTACT PH: 306 370 6141	EQuIS facility code: 183527250
SAMPLER:	SARAH BEATTIE	SAMPLER MOBILE: 867 678 0484	Project Number: 21482915
EMAIL REPORTS TO:	Kathy_Qin@golder.com; alison_humphries@golder.com	EMAIL INVOICE TO:	Laurence_bonin@golder.com; Kathy_Qin@golder.com

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS Solid(S) Water(W)	MATRIX:	CONTAINER INFORMATION	ANALYSIS REQUIRED		Additional Information
SAMPLE	Sample identification (This description will appear on the report)	DATE / TIME (dd-mm-yyyy)	MATRIX	TOTAL CONTAINERS	Standard Parameters Suite	Organics parameter suite	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
~~1~~	~~OUTFLOW~~		~~W~~		~~x~~		
2	NORTHWEST BAY NORTH_Bottom	24-03-22 11:55	W	13	x	x	
3	NORTHWEST BAY NORTH_Mid-depth	24-03-22 11:45	W	7	x		
4	MID LAKE 1_ Bottom	24-03-22 15:10	W	7	x		
5	MID LAKE 1_Mid-depth	24-03-22 15:30	W	7	x		
~~6~~	~~EMD DISCHARGE INLAKE_Bottom~~		W		~~x~~		
~~7~~	~~EMD DISCHARGE INLAKE_Mid-depth~~		~~W~~		~~x~~		
~~8~~	~~SOUTHWEST BAY_Bottom~~		W		x		
~~9~~	~~SOUTHWEST BAY_Mid-depth~~		~~W~~		~~x~~		
10	NEAR OUTFLOW INLAKE_Bottom	25-03-22 9:30	W	13	x	x	
11	NEAR OUTFLOW INLAKE_Mid-depth	25-03-22 9:45	W	7	x		
12	NEAR OUTFLOW INLAKE_Bottom_4	25-03-22 10:30	W	13	x	x	
~~13~~	~~JFLQC-1~~		~~W~~		~~x~~	~~x~~	
14	JFLQC-3	24-03-22 12:15	W	7	x		
		TOTAL					

Environmental Division
Yellowknife
Work Order Reference
YL2200265

Telephone : +1 867 873 5593

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **YL2200516**	Page	: 1 of 7
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	Account Manager	: Oliver Gregg
Address	: 9 - 4905 48th Street Yellowknife NT Canada X1A 3S3	Address	: 314 Old Airport Road, Unit 116 Yellowknife NT Canada X1A 3T3
Telephone	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 25-May-2022 10:38
PO	: ----	Date Analysis Commenced	: 27-May-2022
C-O-C number	: ----	Issue Date	: 08-Jun-2022 16:25
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
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 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*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Anshim Anshim	Lab Assistant	Metals, Burnaby, British Columbia
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
David Stewart	Analyst - Chemistry	Inorganics, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia

General Comments

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

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

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

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

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DTMF	*Dissolved concentration exceeds total for field-filtered metals sample. Metallic contaminants may have been introduced to dissolved sample during field filtration.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	OUTFLOW	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	JFLQC_1	----
				Client sampling date / time	24-May-2022 13:15	24-May-2022 15:10	24-May-2022 15:10	24-May-2022 10:00	----
					YL2200516-001	YL2200516-002	YL2200516-003	YL2200516-004	--------
					Result	Result	Result	Result	----
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	110	109	109	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	110	109	109	<1.0	----
conductivity	----	E100	2.0	µS/cm	464	462	464	<2.0	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	149	144	149	<0.60	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	147	147	143	<0.60	----
pH	----	E108	0.10	pH units	8.16	8.16	8.16	5.74	----
solids, total dissolved [TDS]	----	E162	10	mg/L	285	275	297	<10	----
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	247	244	245	<1.0	----
solids, total suspended [TSS]	----	E160	3.0	mg/L	6.0	4.8	3.4	<3.0	----
turbidity	----	E121	0.10	NTU	7.70	6.46	6.88	<0.10	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0668	0.0701	0.0696	<0.0050	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	60.2	61.0	59.5	<0.10	----
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.091	0.092	0.078	<0.010	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.125	0.141	0.135	<0.0050	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	0.127	0.143	0.136	<0.0051	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0016	0.0016	0.0015	<0.0010	----
nitrogen, total	7727-37-9	E366	0.030	mg/L	1.26	1.25	1.24	<0.030	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0982	0.0902	0.0851	<0.0020	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0197	0.0195	0.0233	<0.0020	----
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	12.8	13.1	13.2	<0.50	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	24.7	25.1	24.6	<0.30	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	12.5	13.4	12.8	<0.50	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0290	0.0105	0.0109	<0.0030	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

				Client sample ID	OUTFLOW	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-de pth	JFLQC_1	----
				Client sampling date / time	24-May-2022 13:15	24-May-2022 15:10	24-May-2022 15:10	24-May-2022 10:00	----
Analyte	CAS Number	Method	LOR	Unit	YL2200516-001	YL2200516-002	YL2200516-003	YL2200516-004	--------
					Result	Result	Result	Result	----
Total Metals									
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00122	0.00123	0.00121	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0638	0.0613	0.0620	<0.00010	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0307	0.0304	0.0296	<0.00010	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L	0.029	0.028	0.028	<0.010	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
calcium, total	7440-70-2	E420	0.050	mg/L	38.6	38.6	37.0	<0.050	----
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00010	<0.00010	<0.00010	<0.00010	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00210	0.00203	0.00221	<0.00050	----
iron, total	7439-89-6	E420	0.010	mg/L	0.046	0.018	0.020	<0.010	----
lead, total	7439-92-1	E420	0.000050	mg/L	0.000056	<0.000050	0.000066	<0.000050	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0070	0.0068	0.0066	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	12.3	12.2	12.3	<0.0050	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0614	0.0633	0.0642	<0.00010	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000210	0.000220	0.00132	<0.000050	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00076	0.00068	0.00073	<0.00050	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.094	0.076	0.068	<0.050	----
potassium, total	7440-09-7	E420	0.050	mg/L	3.88	3.80	3.86	<0.050	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00260	0.00250	0.00252	<0.00020	----
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000056	<0.000050	<0.000050	<0.000050	----
silicon, total	7440-21-3	E420	0.10	mg/L	6.33	6.28	6.18	<0.10	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L	31.5	29.8	30.5	<0.050	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0831	0.0843	0.0845	<0.00020	----
sulfur, total	7704-34-9	E420	0.50	mg/L	8.78	8.62	8.73	<0.50	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	OUTFLOW	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	JFLQC_1	----
				Client sampling date / time	24-May-2022 13:15	24-May-2022 15:10	24-May-2022 15:10	24-May-2022 10:00	----
					YL2200516-001	YL2200516-002	YL2200516-003	YL2200516-004	--------
					Result	Result	Result	Result	----
Total Metals									
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00090	<0.00030	<0.00030	<0.00030	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000566	0.000611	0.000582	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0.0032	<0.0030	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0045	0.0036	0.0034	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00126	0.00122	0.00122	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0609	0.0583	0.0597	<0.00010	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0328	0.0314	0.0322	<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	0.029	0.029	0.029	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	40.0	38.6	39.7	<0.050	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<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	<0.00010	<0.00010	<0.00010	<0.00010	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00181	0.00179	0.00183	<0.00020	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.014	0.011	0.010	<0.010	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0062	0.0063	0.0062	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	12.0	11.5	12.1	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0475	0.0468	0.0477	<0.00010	----

Analytical Results

Sub-Matrix: Water

(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	OUTFLOW	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	JFLQC_1	----
				Client sampling date / time	24-May-2022 13:15	24-May-2022 15:10	24-May-2022 15:10	24-May-2022 10:00	----
					YL2200516-001	YL2200516-002	YL2200516-003	YL2200516-004	--------
					Result	Result	Result	Result	----
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	0.0000060	<0.0000050	<0.0000050	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000213	0.00149 DTMF	0.000204	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<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	3.80	3.75	3.87	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00250	0.00252	0.00251	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000056	<0.000050	<0.000050	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.15	6.18	6.35	<0.050	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	31.6	30.0	31.3	<0.050	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0891	0.0880	0.0888	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	9.60	9.23	9.49	<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	<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<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	0.000572	0.000551	0.000572	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<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	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.50	µg/L	----	----	----	<0.50	----
ethylbenzene	100-41-4	E611A	0.50	µg/L	----	----	----	<0.50	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	OUTFLOW	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	JFLQC_1	----
				Client sampling date / time	24-May-2022 13:15	24-May-2022 15:10	24-May-2022 15:10	24-May-2022 10:00	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**YL2200516-001**	**YL2200516-002**	**YL2200516-003**	**YL2200516-004**	**--------**
					Result	Result	Result	Result	----
Volatile Organic Compounds [Fuels]									
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	----	----	----	<0.50	----
styrene	100-42-5	E611A	0.50	µg/L	----	----	----	<0.50	----
toluene	108-88-3	E611A	0.50	µg/L	----	----	----	<0.50	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	----	----	----	<0.40	----
xylene, o-	95-47-6	E611A	0.30	µg/L	----	----	----	<0.30	----
xylenes, total	1330-20-7	E611A	0.50	µg/L	----	----	----	<0.50	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	----	----	----	102	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	----	----	----	101	----
Hydrocarbons									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	----	----	----	<100	----
F2 (C10-C16)	----	E601	300	µg/L	----	----	----	<300	----
F3 (C16-C34)	----	E601	300	µg/L	----	----	----	<300	----
F4 (C34-C50)	----	E601	300	µg/L	----	----	----	<300	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	----	----	----	<100	----
F1-BTEX	----	EC580	100	µg/L	----	----	----	<100	----
VPHw	----	EC580A	100	µg/L	----	----	----	<100	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	----	----	----	86.4	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	----	----	----	116	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **YL2200516**	Page	: 1 of 22
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	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	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 25-May-2022 10:38
PO	: ----	Issue Date	: 08-Jun-2022 16:26
C-O-C number	: ----		
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
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 Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- 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.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Total Metals	QC-MRG2-505664001	----	lithium, total	7439-93-2	E420	0.0012 mg/L MB-LOR	0.001 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	*Description*
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

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	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
Container / Client Sample ID(s)			*Preparation Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*	*Analysis Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) JFLQC_1	E567	24-May-2022	02-Jun-2022	28 days	9 days	✓	02-Jun-2022	40 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E298	24-May-2022	01-Jun-2022	----	----		02-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E298	24-May-2022	01-Jun-2022	----	----		02-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) JFLQC_1	E298	24-May-2022	01-Jun-2022	----	----		02-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) OUTFLOW	E298	24-May-2022	01-Jun-2022	----	----		02-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.Cl-L	24-May-2022	----	----	----		27-May-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.Cl-L	24-May-2022	----	----	----		27-May-2022	28 days	3 days	✓

Work Order : YL2200516
Client : Golder Associates Ltd.
Project : Jackfish NTPC

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE JFLQC_1	E235.Cl-L	24-May-2022	----	----	----		27-May-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE OUTFLOW	E235.Cl-L	24-May-2022	----	----	----		27-May-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.F-L	24-May-2022	----	----	----		27-May-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.F-L	24-May-2022	----	----	----		27-May-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE JFLQC_1	E235.F-L	24-May-2022	----	----	----		27-May-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE OUTFLOW	E235.F-L	24-May-2022	----	----	----		27-May-2022	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.NO3-L	24-May-2022	----	----	----		27-May-2022	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.NO3-L	24-May-2022	----	----	----		27-May-2022	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE JFLQC_1	E235.NO3-L	24-May-2022	----	----	----		27-May-2022	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: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE OUTFLOW	E235.NO3-L	24-May-2022	----	----	----		27-May-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.NO2-L	24-May-2022	----	----	----		27-May-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.NO2-L	24-May-2022	----	----	----		27-May-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE JFLQC_1	E235.NO2-L	24-May-2022	----	----	----		27-May-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE OUTFLOW	E235.NO2-L	24-May-2022	----	----	----		27-May-2022	3 days	3 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE EMD DISCHARGE INLAKE_Bottom	E392	24-May-2022	----	----	----		30-May-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E392	24-May-2022	----	----	----		30-May-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE JFLQC_1	E392	24-May-2022	----	----	----		30-May-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE OUTFLOW	E392	24-May-2022	----	----	----		30-May-2022	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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.SO4	24-May-2022	----	----	----		27-May-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.SO4	24-May-2022	----	----	----		27-May-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE JFLQC_1	E235.SO4	24-May-2022	----	----	----		27-May-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE OUTFLOW	E235.SO4	24-May-2022	----	----	----		27-May-2022	28 days	3 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E375-T	24-May-2022	02-Jun-2022	----	----		02-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E375-T	24-May-2022	02-Jun-2022	----	----		02-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) JFLQC_1	E375-T	24-May-2022	02-Jun-2022	----	----		02-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) OUTFLOW	E375-T	24-May-2022	02-Jun-2022	----	----		02-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) JFLQC_1	E366	24-May-2022	01-Jun-2022	----	----		02-Jun-2022	28 days	10 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E366	24-May-2022	01-Jun-2022	----	----		02-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E366	24-May-2022	01-Jun-2022	----	----		02-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) OUTFLOW	E366	24-May-2022	01-Jun-2022	----	----		02-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E372-U	24-May-2022	01-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E372-U	24-May-2022	01-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) JFLQC_1	E372-U	24-May-2022	01-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) OUTFLOW	E372-U	24-May-2022	01-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EMD DISCHARGE INLAKE_Bottom	E509	24-May-2022	28-May-2022	----	----		28-May-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EMD DISCHARGE INLAKE_Mid-depth	E509	24-May-2022	28-May-2022	----	----		28-May-2022	28 days	4 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) JFLQC_1	E509	24-May-2022	28-May-2022	----	----		28-May-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) OUTFLOW	E509	24-May-2022	28-May-2022	----	----		28-May-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) EMD DISCHARGE INLAKE_Bottom	E421	24-May-2022	31-May-2022	----	----		02-Jun-2022	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) EMD DISCHARGE INLAKE_Mid-depth	E421	24-May-2022	31-May-2022	----	----		02-Jun-2022	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) JFLQC_1	E421	24-May-2022	31-May-2022	----	----		02-Jun-2022	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) OUTFLOW	E421	24-May-2022	31-May-2022	----	----		02-Jun-2022	180 days	9 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) JFLQC_1	E601	24-May-2022	01-Jun-2022	14 days	8 days	✓	06-Jun-2022	40 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) JFLQC_1	E581.VH+F1	24-May-2022	01-Jun-2022	----	----		01-Jun-2022	14 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E358-L	24-May-2022	02-Jun-2022	----	----		02-Jun-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E358-L	24-May-2022	02-Jun-2022	----	----		02-Jun-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) OUTFLOW	E358-L	24-May-2022	02-Jun-2022	----	----		02-Jun-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) JFLQC_1	E358-L	24-May-2022	02-Jun-2022	----	----		02-Jun-2022	28 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EMD DISCHARGE INLAKE_Bottom	E290	24-May-2022	----	----	----		29-May-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E290	24-May-2022	----	----	----		29-May-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE JFLQC_1	E290	24-May-2022	----	----	----		29-May-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE OUTFLOW	E290	24-May-2022	----	----	----		29-May-2022	14 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE EMD DISCHARGE INLAKE_Bottom	E100	24-May-2022	----	----	----		29-May-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E100	24-May-2022	----	----	----		29-May-2022	28 days	5 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE										
JFLQC_1	E100	24-May-2022	----	----	----		29-May-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE										
OUTFLOW	E100	24-May-2022	----	----	----		29-May-2022	28 days	5 days	✓
Physical Tests : pH by Meter										
HDPE										
EMD DISCHARGE INLAKE_Bottom	E108	24-May-2022	----	----	----		29-May-2022	0.25 hrs	114 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
EMD DISCHARGE INLAKE_Mid-depth	E108	24-May-2022	----	----	----		29-May-2022	0.25 hrs	114 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
OUTFLOW	E108	24-May-2022	----	----	----		29-May-2022	0.25 hrs	116 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
JFLQC_1	E108	24-May-2022	----	----	----		29-May-2022	0.25 hrs	119 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE										
EMD DISCHARGE INLAKE_Bottom	E162	24-May-2022	----	----	----		27-May-2022	7 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
EMD DISCHARGE INLAKE_Mid-depth	E162	24-May-2022	----	----	----		27-May-2022	7 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
JFLQC_1	E162	24-May-2022	----	----	----		27-May-2022	7 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 Rec*	*Holding Times Actual*	*Eval*	*Analysis Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*
Physical Tests : TDS by Gravimetry										
HDPE OUTFLOW	E162	24-May-2022	----	----	----		27-May-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE EMD DISCHARGE INLAKE_Bottom	E160	24-May-2022	----	----	----		27-May-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E160	24-May-2022	----	----	----		27-May-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE JFLQC_1	E160	24-May-2022	----	----	----		27-May-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE OUTFLOW	E160	24-May-2022	----	----	----		27-May-2022	7 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE EMD DISCHARGE INLAKE_Bottom	E121	24-May-2022	----	----	----		27-May-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E121	24-May-2022	----	----	----		27-May-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE JFLQC_1	E121	24-May-2022	----	----	----		27-May-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE OUTFLOW	E121	24-May-2022	----	----	----		27-May-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) EMD DISCHARGE INLAKE_Bottom	E508	24-May-2022	----	----	----		31-May-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) EMD DISCHARGE INLAKE_Mid-depth	E508	24-May-2022	----	----	----		31-May-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) JFLQC_1	E508	24-May-2022	----	----	----		31-May-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) OUTFLOW	E508	24-May-2022	----	----	----		31-May-2022	28 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) EMD DISCHARGE INLAKE_Bottom	E420	24-May-2022	----	----	----		01-Jun-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) EMD DISCHARGE INLAKE_Mid-depth	E420	24-May-2022	----	----	----		01-Jun-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) JFLQC_1	E420	24-May-2022	----	----	----		01-Jun-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) OUTFLOW	E420	24-May-2022	----	----	----		01-Jun-2022	180 days	8 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) JFLQC_1	E611A	24-May-2022	01-Jun-2022	----	----		01-Jun-2022	14 days	8 days	✓

Legend & Qualifier Definitions

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

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	501763	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	507802	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	506513	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	501770	1	5	20.0	5.0	✓
Conductivity in Water	E100	501762	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	502935	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	505686	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	507798	1	15	6.6	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	501771	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	501766	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	501767	1	20	5.0	5.0	✓
pH by Meter	E108	501761	1	12	8.3	5.0	✓
Reactive Silica by Colourimetry	E392	504758	1	11	9.0	5.0	✓
Sulfate in Water by IC	E235.SO4	501768	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	502465	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	507801	1	15	6.6	5.0	✓
Total Mercury in Water by CVAAS	E508	505550	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	505664	1	18	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	507799	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	507800	1	15	6.6	5.0	✓
TSS by Gravimetry	E160	502466	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	502276	1	18	5.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	506512	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	501763	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	507802	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	506513	1	20	5.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	506679	1	11	9.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	501770	1	5	20.0	5.0	✓
Conductivity in Water	E100	501762	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	502935	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	505686	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	507798	1	15	6.6	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	501771	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	501766	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	501767	1	20	5.0	5.0	✓
Oil & Grease by Gravimetry	E567	508326	1	7	14.2	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
pH by Meter	E108	501761	1	12	8.3	5.0	✓
Reactive Silica by Colourimetry	E392	504758	1	11	9.0	5.0	✓
Sulfate in Water by IC	E235.SO4	501768	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	502465	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	507801	1	15	6.6	5.0	✓
Total Mercury in Water by CVAAS	E508	505550	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	505664	1	18	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	507799	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	507800	1	15	6.6	5.0	✓
TSS by Gravimetry	E160	502466	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	502276	1	18	5.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	506512	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	501763	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	507802	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	506513	1	20	5.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	506679	1	11	9.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	501770	1	5	20.0	5.0	✓
Conductivity in Water	E100	501762	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	502935	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	505686	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	507798	1	15	6.6	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	501771	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	501766	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	501767	1	20	5.0	5.0	✓
Oil & Grease by Gravimetry	E567	508326	1	7	14.2	5.0	✓
Reactive Silica by Colourimetry	E392	504758	1	11	9.0	5.0	✓
Sulfate in Water by IC	E235.SO4	501768	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	502465	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	507801	1	15	6.6	5.0	✓
Total Mercury in Water by CVAAS	E508	505550	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	505664	1	18	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	507799	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	507800	1	15	6.6	5.0	✓
TSS by Gravimetry	E160	502466	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	502276	1	18	5.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	506512	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	507802	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	506513	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Chloride in Water by IC (Low Level)	E235.Cl-L	501770	1	5	20.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	502935	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	505686	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	507798	1	15	6.6	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	501771	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	501766	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	501767	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	504758	1	11	9.0	5.0	✓
Sulfate in Water by IC	E235.SO4	501768	1	19	5.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	507801	1	15	6.6	5.0	✓
Total Mercury in Water by CVAAS	E508	505550	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	505664	1	18	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	507799	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	507800	1	15	6.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	506512	1	20	5.0	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
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
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.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 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.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC (Low Level)	E235.Cl-L 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 (Low Level)	E235.F-L 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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Reactive Silica by Colourimetry	E392 Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
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.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples 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
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.
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 PHCs - F2-F4 by GC-FID	E601 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4).
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 CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
TDS in Water (Calculation) Using APHA Analyte List	EC103.APHA Vancouver - Environmental	Water	APHA 1030E	Total DIssolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis).
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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
Oil & Grease Extraction for Gravimetry	EP567 Vancouver - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	:	**YL2200516**	Page	:	1 of 18
Client	:	Golder Associates Ltd.	Laboratory	:	Yellowknife - Environmental
Contact	:	Sarah Beattie	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	:	867 873 6319	Telephone	:	1 867 446 5593
Project	:	Jackfish NTPC	Date Samples Received	:	25-May-2022 10:38
PO	:	----	Date Analysis Commenced	:	27-May-2022
C-O-C number	:	----	Issue Date	:	08-Jun-2022 16:26
Sampler	:	----			
Site	:	Jackfish NTPC			
Quote number	:	YL21-GOLD100-008			
No. of samples received	:	4			
No. of samples analysed	:	4			

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Anshim Anshim	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Caleb Deroche	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
David Stewart	Analyst - Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 501761)											
VA22B1544-004	Anonymous	pH	----	E108	0.10	pH units	8.00	8.02	0.250%	4%	----
Physical Tests (QC Lot: 501762)											
VA22B1544-004	Anonymous	conductivity	----	E100	2.0	µS/cm	164	165	0.670%	10%	----
Physical Tests (QC Lot: 501763)											
VA22B1544-004	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	74.8	74.4	0.536%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	74.8	74.4	0.536%	20%	----
Physical Tests (QC Lot: 502276)											
KS2201757-001	Anonymous	turbidity	----	E121	0.10	NTU	0.18	0.17	0.009	Diff <2x LOR	----
Physical Tests (QC Lot: 502465)											
FJ2201318-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	1180	1160	1.67%	20%	----
Physical Tests (QC Lot: 502466)											
FJ2201318-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 501766)											
VA22B1542-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	5.56	5.58	0.206%	20%	----
Anions and Nutrients (QC Lot: 501767)											
VA22B1542-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	0.0097	0.0104	0.0007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 501768)											
VA22B1542-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	559	562	0.567%	20%	----
Anions and Nutrients (QC Lot: 501770)											
YL2200514-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.50	mg/L	314	309	1.57%	20%	----
Anions and Nutrients (QC Lot: 501771)											
YL2200514-001	Anonymous	fluoride	16984-48-8	E235.F-L	0.020	mg/L	0.421	0.419	0.566%	20%	----
Anions and Nutrients (QC Lot: 504758)											
YL2200510-003	Anonymous	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	4.49	4.44	0.05	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 507799)											
KS2201675-001	Anonymous	nitrogen, total	7727-37-9	E366	1.20	mg/L	50.5	51.2	1.40%	20%	----
Anions and Nutrients (QC Lot: 507800)											
VA22B0836-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0458	0.0439	4.20%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Anions and Nutrients (QC Lot: 507801)											
VA22B0836-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0460	0.0459	0.283%	20%	----
Anions and Nutrients (QC Lot: 507802)											
VA22B0836-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 507798)											
VA22B0836-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.22	1.83	0.39	Diff <2x LOR	----
Total Metals (QC Lot: 505550)											
VA22B1610-002	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 505664)											
CG2206309-001	Anonymous	aluminum, total	7429-90-5	E420	0.0060	mg/L	<0.0060	0.0097	0.0037	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00020	mg/L	0.00084	0.00080	0.00004	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00020	mg/L	0.00028	0.00026	0.00001	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00020	mg/L	0.0583	0.0569	2.38%	20%	----
		beryllium, total	7440-41-7	E420	0.000040	mg/L	<0.040 µg/L	<0.000040	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.020	mg/L	0.048	0.046	0.001	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000100	mg/L	<0.0100 µg/L	<0.0000100	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.100	mg/L	228	229	0.234%	20%	----
		cesium, total	7440-46-2	E420	0.000020	mg/L	0.000059	0.000061	0.000002	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00020	mg/L	<0.20 µg/L	<0.00020	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0020	mg/L	0.122	0.116	4.88%	20%	----
		magnesium, total	7439-95-4	E420	0.0100	mg/L	194	197	1.93%	20%	----
		manganese, total	7439-96-5	E420	0.00020	mg/L	0.00168	0.00164	0.00003	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000100	mg/L	0.0111	0.0108	2.73%	20%	----
		nickel, total	7440-02-0	E420	0.00100	mg/L	0.0230	0.0229	0.664%	20%	----
		phosphorus, total	7723-14-0	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	5.42	5.41	0.166%	20%	----
		rubidium, total	7440-17-7	E420	0.00040	mg/L	0.00577	0.00584	1.22%	20%	----
		selenium, total	7782-49-2	E420	0.000100	mg/L	165 µg/L	0.166	0.503%	20%	----
		silicon, total	7440-21-3	E420	0.20	mg/L	1.55	1.53	0.02	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.100	mg/L	7.75	7.98	2.93%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Total Metals (QC Lot: 505664) - continued											
CG2206309-001	Anonymous	strontium, total	7440-24-6	E420	0.00040	mg/L	0.879	0.871	0.921%	20%	----
		sulfur, total	7704-34-9	E420	1.00	mg/L	341	337	1.22%	20%	----
		tellurium, total	13494-80-9	E420	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000020	mg/L	0.000030	0.000031	0.000001	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000020	mg/L	0.0116	0.0113	2.34%	20%	----
		vanadium, total	7440-62-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0060	mg/L	<0.0060	<0.0060	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 502935)											
VA22B1556-003	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 505686)											
CG2206322-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0020	mg/L	0.0021	<0.0020	0.00006	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00020	mg/L	0.00259	0.00265	2.40%	20%	----
		arsenic, dissolved	7440-38-2	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00020	mg/L	0.0187	0.0189	1.28%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000040	mg/L	<0.040 µg/L	<0.000040	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.020	mg/L	0.112	0.106	0.006	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000100	mg/L	1.68 µg/L	0.00167	0.602%	20%	----
		calcium, dissolved	7440-70-2	E421	0.100	mg/L	583	563	3.40%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000020	mg/L	0.000628	0.000631	0.358%	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	0.00020	mg/L	56.2 µg/L	0.0565	0.582%	20%	----
		copper, dissolved	7440-50-8	E421	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.020	mg/L	0.026	0.025	0.0006	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0020	mg/L	1.14	1.05	8.37%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0100	mg/L	253	261	3.10%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00020	mg/L	0.328	0.332	1.22%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000100	mg/L	0.00469	0.00479	2.24%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00100	mg/L	0.468	0.469	0.191%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Dissolved Metals (QC Lot: 505686) - continued											
CG2206322-001	Anonymous	phosphorus, dissolved	7723-14-0	E421	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.100	mg/L	16.4	16.8	2.15%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00040	mg/L	0.0280	0.0286	2.02%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000100	mg/L	75.4 µg/L	0.0766	1.60%	20%	----
		silicon, dissolved	7440-21-3	E421	0.100	mg/L	3.10	3.06	1.39%	20%	----
		silver, dissolved	7440-22-4	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.100	mg/L	32.0	32.4	1.33%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00040	mg/L	1.53	1.56	2.31%	20%	----
		sulfur, dissolved	7704-34-9	E421	1.00	mg/L	497	491	1.28%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000020	mg/L	0.000149	0.000144	0.000005	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000020	mg/L	0.0326	0.0313	4.04%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0020	mg/L	0.115	0.113	1.63%	20%	----
		zirconium, dissolved	7440-67-7	E421	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 506513)											
VA22B1080-001	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	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 506512)											
VA22B1080-001	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: 501762)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 501763)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 502276)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 502465)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 502466)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 501766)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 501767)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 501768)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 501770)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 501771)						
fluoride	16984-48-8	E235.F-L	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 504758)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 507799)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 507800)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 507801)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 507802)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 507798)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 505550)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 505664)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	# 0.0012	MB-LOR
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 505664) - continued						
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 502935)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 505686)						
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	----
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 505686) - continued						
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 508326)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 506513)						
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: 506512)						
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 506679)						
F2 (C10-C16)	----	E601	100	µg/L	<100	----
F3 (C16-C34)	----	E601	250	µg/L	<250	----
F4 (C34-C50)	----	E601	250	µg/L	<250	----

Qualifiers

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 501761)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 501762)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	102	90.0	110	----
Physical Tests (QCLot: 501763)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	97.9	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	101	85.0	115	----
Physical Tests (QCLot: 502276)									
turbidity	----	E121	0.1	NTU	200 NTU	95.5	85.0	115	----
Physical Tests (QCLot: 502465)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	102	85.0	115	----
Physical Tests (QCLot: 502466)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	111	85.0	115	----
Anions and Nutrients (QCLot: 501766)									
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: 501767)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 501768)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 501770)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 501771)									
fluoride	16984-48-8	E235.F-L	0.01	mg/L	1 mg/L	109	90.0	110	----
Anions and Nutrients (QCLot: 504758)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 507799)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	89.1	75.0	125	----
Anions and Nutrients (QCLot: 507800)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	93.5	80.0	120	----
Anions and Nutrients (QCLot: 507801)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	94.4	80.0	120	----
Anions and Nutrients (QCLot: 507802)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.0	85.0	115	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Organic / Inorganic Carbon (QCLot: 507798)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	106	80.0	120	----
Total Metals (QCLot: 505550)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	104	80.0	120	----
Total Metals (QCLot: 505664)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	104	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	107	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	109	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	104	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	90.2	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	103	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	104	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	97.3	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	106	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	109	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	106	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	101	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	97.2	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	106	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.0	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	94.8	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	104	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	99.8	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Total Metals (QCLot: 505664) - continued									
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	97.9	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	104	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	109	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	103	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	98.3	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	113	80.0	120	----
Dissolved Metals (QCLot: 505686)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	101	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	97.6	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	94.9	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	107	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.3	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	99.5	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	97.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	99.8	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	102	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	103	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	100	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.2	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	101	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	98.1	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	106	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	88.8	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	99.2	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	98.5	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
					Laboratory Control Sample (LCS) Report				
Dissolved Metals (QCLot: 505686) - continued									
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	101	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	98.7	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.9	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	95.1	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	99.5	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	93.8	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	99.6	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	96.8	80.0	120	----
Aggregate Organics (QCLot: 508326)									
oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	102	70.0	130	----
Volatile Organic Compounds (QCLot: 506513)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	97.8	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	99.7	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	97.9	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	99.3	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	94.1	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	103	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	99.3	70.0	130	----
Hydrocarbons (QCLot: 506512)									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	85.0	70.0	130	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	78.6	70.0	130	----
Hydrocarbons (QCLot: 506679)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	119	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	106	70.0	130	----
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	118	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: 501766)										
VA22B1542-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	12.1 mg/L	12.5 mg/L	97.0	75.0	125	----
Anions and Nutrients (QCLot: 501767)										
VA22B1542-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	2.40 mg/L	2.5 mg/L	96.1	75.0	125	----
Anions and Nutrients (QCLot: 501768)										
VA22B1542-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	500 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 501770)										
YL2200516-001	OUTFLOW	chloride	16887-00-6	E235.Cl-L	99.9 mg/L	100 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 501771)										
YL2200516-001	OUTFLOW	fluoride	16984-48-8	E235.F-L	1.07 mg/L	1 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 504758)										
YL2200510-004	Anonymous	silicate (as SiO2)	7631-86-9	E392	10.1 mg/L	10 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 507799)										
VA22B0521-001	Anonymous	nitrogen, total	7727-37-9	E366	0.404 mg/L	0.4 mg/L	101	70.0	130	----
Anions and Nutrients (QCLot: 507800)										
VA22B0836-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0469 mg/L	0.05 mg/L	93.7	70.0	130	----
Anions and Nutrients (QCLot: 507801)										
VA22B0836-002	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0483 mg/L	0.05 mg/L	96.5	70.0	130	----
Anions and Nutrients (QCLot: 507802)										
VA22B0836-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.110 mg/L	0.1 mg/L	110	75.0	125	----
Organic / Inorganic Carbon (QCLot: 507798)										
VA22B0836-002	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	5.44 mg/L	5 mg/L	109	70.0	130	----
Total Metals (QCLot: 505550)										
VA22B1610-003	Anonymous	mercury, total	7439-97-6	E508	0.000104 mg/L	0.0001 mg/L	104	70.0	130	----
Total Metals (QCLot: 505664)										
CG2206309-002	Anonymous	aluminum, total	7429-90-5	E420	0.199 mg/L	0.2 mg/L	99.5	70.0	130	----
		antimony, total	7440-36-0	E420	0.0211 mg/L	0.02 mg/L	106	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0212 mg/L	0.02 mg/L	106	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0418 mg/L	0.04 mg/L	104	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
Total Metals (QCLot: 505664) - continued										
CG2206309-002	Anonymous	bismuth, total	7440-69-9	E420	0.00956 mg/L	0.01 mg/L	95.6	70.0	130	----
		boron, total	7440-42-8	E420	0.096 mg/L	0.1 mg/L	96.1	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00364 mg/L	0.004 mg/L	91.0	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0104 mg/L	0.01 mg/L	104	70.0	130	----
		chromium, total	7440-47-3	E420	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		copper, total	7440-50-8	E420	0.0193 mg/L	0.02 mg/L	96.3	70.0	130	----
		iron, total	7439-89-6	E420	2.06 mg/L	2 mg/L	103	70.0	130	----
		lead, total	7439-92-1	E420	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		lithium, total	7439-93-2	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0211 mg/L	0.02 mg/L	106	70.0	130	----
		nickel, total	7440-02-0	E420	0.0381 mg/L	0.04 mg/L	95.3	70.0	130	----
		phosphorus, total	7723-14-0	E420	11.0 mg/L	10 mg/L	110	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0209 mg/L	0.02 mg/L	104	70.0	130	----
		selenium, total	7782-49-2	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		silicon, total	7440-21-3	E420	9.92 mg/L	10 mg/L	99.2	70.0	130	----
		silver, total	7440-22-4	E420	0.00425 mg/L	0.004 mg/L	106	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0421 mg/L	0.04 mg/L	105	70.0	130	----
		thallium, total	7440-28-0	E420	0.00384 mg/L	0.004 mg/L	96.0	70.0	130	----
		thorium, total	7440-29-1	E420	0.0191 mg/L	0.02 mg/L	95.6	70.0	130	----
		tin, total	7440-31-5	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		titanium, total	7440-32-6	E420	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.106 mg/L	0.1 mg/L	106	70.0	130	----
		zinc, total	7440-66-6	E420	0.389 mg/L	0.4 mg/L	97.2	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0425 mg/L	0.04 mg/L	106	70.0	130	----
Dissolved Metals (QCLot: 502935)										
VA22B1556-004	Anonymous	mercury, dissolved	7439-97-6	E509	0.000111 mg/L	0.0001 mg/L	111	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Dissolved Metals (QCLot: 505686)										
CG2206322-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.402 mg/L	0.4 mg/L	100	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0400 mg/L	0.04 mg/L	100.0	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0784 mg/L	0.08 mg/L	97.9	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0166 mg/L	0.02 mg/L	82.9	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00780 mg/L	0.008 mg/L	97.5	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	8 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0778 mg/L	0.08 mg/L	97.2	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0371 mg/L	0.04 mg/L	92.7	70.0	130	----
		iron, dissolved	7439-89-6	E421	3.81 mg/L	4 mg/L	95.2	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0364 mg/L	0.04 mg/L	91.1	70.0	130	----
		lithium, dissolved	7439-93-2	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		nickel, dissolved	7440-02-0	E421	ND mg/L	0.08 mg/L	ND	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	20.6 mg/L	20 mg/L	103	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	8 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0392 mg/L	0.04 mg/L	98.1	70.0	130	----
		selenium, dissolved	7782-49-2	E421	ND mg/L	0.08 mg/L	ND	70.0	130	----
		silicon, dissolved	7440-21-3	E421	19.8 mg/L	20 mg/L	98.8	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00754 mg/L	0.008 mg/L	94.3	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0772 mg/L	0.08 mg/L	96.5	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00736 mg/L	0.008 mg/L	92.0	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0413 mg/L	0.04 mg/L	103	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0789 mg/L	0.08 mg/L	98.7	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0375 mg/L	0.04 mg/L	93.7	70.0	130	----
		uranium, dissolved	7440-61-1	E421	ND mg/L	0.008 mg/L	ND	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.206 mg/L	0.2 mg/L	103	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: 505686) - continued										
CG2206322-002	Anonymous	zinc, dissolved	7440-66-6	E421	0.718 mg/L	0.8 mg/L	89.7	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0833 mg/L	0.08 mg/L	104	70.0	130	----
Volatile Organic Compounds (QCLot: 506513)										
VA22B1080-001	Anonymous	benzene	71-43-2	E611A	98.6 µg/L	100 µg/L	98.6	70.0	130	----
		ethylbenzene	100-41-4	E611A	98.3 µg/L	100 µg/L	98.3	70.0	130	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	99.6 µg/L	100 µg/L	99.6	70.0	130	----
		styrene	100-42-5	E611A	107 µg/L	100 µg/L	107	70.0	130	----
		toluene	108-88-3	E611A	91.6 µg/L	100 µg/L	91.6	70.0	130	----
		xylene, m+p-	179601-23-1	E611A	198 µg/L	200 µg/L	99.3	70.0	130	----
		xylene, o-	95-47-6	E611A	100 µg/L	100 µg/L	100	70.0	130	----
Hydrocarbons (QCLot: 506512)										
VA22B1080-002	Anonymous	F1 (C6-C10)	----	E581.VH+F1	4830 µg/L	6310 µg/L	76.5	60.0	140	----
		VHw (C6-C10)	----	E581.VH+F1	4450 µg/L	6310 µg/L	70.5	60.0	140	----

ALS

CHAIN OF CUSTODY

ALS Laboratory

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Tamara Derkowski DATE/TIME: 25 May 2022 8:30	SA DATE/TIME:	MAY 25/22 8:57 DATE/TIME:	DATE/TIME:

CLIENT: Golder Associates Ltd.
PROJECT: Jackfish NTPC
SITE:
PURCHASE ORDER NO.:
PROJECT MANAGER: Kathy Qin CONTACT PH: 587 969 6141
SAMPLER: Tamara Derkowski SAMPLER MOBILE: 867-446-4757
EMAIL REPORTS TO: Kathy_Qin@golder.com; alison_humphries@golder.com; GAL_equis@golder.com

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)
☐ Standard TAT (List due date): √
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NC YL21-GOLD100-008 (updated in April 2022)
EQuIS facility code: 183527250
Project Number: 21482915
EMAIL INVOICE TO: Laurence_bonin@golder.com; Kathy_Qin@golder.co

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt 8.9 °C
Other comments

SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS Solid(S) Water(W)	MATRIX	CONTAINER INFORMATION		ANALYSIS REQUIRED		Additional Information
SAMPLE	Sample identification (This description will appear on the report)	DATE / TIME (dd-mm-yyyy)	MATRIX	TOTAL CONTAINERS	Standard Parameters Suite	Organics parameter suite	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc
1	OUTFLOW		W	7	x		All samples field
2	NORTHWEST BAY NORTH_Bottom		W		x	x	filtered, metals
3	NORTHWEST BAY NORTH_Mid-depth		W		x		preserved in field
4	MID LAKE 1_ Bottom		W		x		
5	MID LAKE 1_Mid-depth		W		x		
6	EMD DISCHARGE INLAKE_Bottom		W	7	x		
7	EMD DISCHARGE INLAKE_Mid-depth		W	7	x		
8	SOUTHWEST BAY_Bottom		W		x		
9	SOUTHWEST BAY_Mid-depth		W		x		
10	NEAR OUTFLOW INLAKE_Bottom		W		x	x	
11	NEAR OUTFLOW INLAKE_Mid-depth		W		x		
12	NORTHWEST BAY NORTH_Bottom_4		W		x	x	
13	JFLQC_1		W	13	x	x	
14	JFLQC-2		W		x		
			TOTAL	34			

Environmental Division
Yellowknife
Work Order Reference
YL2200516

Telephone : +1 867 873 5593

CERTIFICATE OF ANALYSIS

Work Order	: **YL2200527**	Page	: 1 of 12
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	Account Manager	: Oliver Gregg
Address	: 9 - 4905 48th Street Yellowknife NT Canada X1A 3S3	Address	: 314 Old Airport Road, Unit 116 Yellowknife NT Canada X1A 3T3
Telephone	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 26-May-2022 09:05
PO	: ----	Date Analysis Commenced	: 30-May-2022
C-O-C number	: ----	Issue Date	: 07-Jun-2022 16:56
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 9		
No. of samples analysed	: 9		

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*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Christopher Li	Lab Assistant	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kenson Lo		Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia

General Comments

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

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

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DTMF	*Dissolved concentration exceeds total for field-filtered metals sample. Metallic contaminants may have been introduced to dissolved sample during field filtration.*

Analytical Results

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

				Client sample ID	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	SOUTHWEST BAY_Bottom
				Client sampling date / time	25-May-2022 13:50	25-May-2022 13:50	25-May-2022 12:10	25-May-2022 12:10	25-May-2022 10:30
Analyte	CAS Number	Method	LOR	Unit	YL2200527-001	YL2200527-002	YL2200527-003	YL2200527-004	YL2200527-005
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	108	108	110	108	107
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	108	108	110	108	107
conductivity	----	E100	2.0	µS/cm	440	441	442	445	444
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	135	130	138	128	137
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	136	140	140	139	140
pH	----	E108	0.10	pH units	8.23	8.24	8.28	8.30	8.28
solids, total dissolved [TDS]	----	E162	10	mg/L	278	292	279	277	263
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	240	236	242	234	240
solids, total suspended [TSS]	----	E160	3.0	mg/L	7.7	5.9	5.3	6.3	7.5
turbidity	----	E121	0.10	NTU	7.24	6.45	6.96	6.74	6.91
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0585	0.0624	0.0696	0.0628	0.0672
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	59.3	59.1	58.9	58.9	58.9
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.083	0.082	0.084	0.083	0.083
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0926	0.0759	0.0894	0.0894	0.0858
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	0.0998	0.0820	0.0957	0.0959	0.0921
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0072	0.0061	0.0063	0.0065	0.0063
nitrogen, total	7727-37-9	E366	0.030	mg/L	1.28	1.32	1.25	1.27	1.28
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0875	0.0866	0.0848	0.0900	0.0854
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0177	0.0196	0.0190	0.0217	0.0195
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	12.8	13.0	12.9	13.0	12.9
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	25.5	25.5	25.5	25.5	25.5
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	12.1	14.1	13.4	14.0	14.0
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0108	0.0114	0.0085	0.0112	0.0088

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

				Client sample ID	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	SOUTHWEST BAY_Bottom
				Client sampling date / time	25-May-2022 13:50	25-May-2022 13:50	25-May-2022 12:10	25-May-2022 12:10	25-May-2022 10:30
Analyte	CAS Number	Method	LOR	Unit	YL2200527-001	YL2200527-002	YL2200527-003	YL2200527-004	YL2200527-005
					Result	Result	Result	Result	Result
Total Metals									
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00120	0.00119	0.00118	0.00120	0.00118
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0597	0.0618	0.0627	0.0614	0.0618
barium, total	7440-39-3	E420	0.00010	mg/L	0.0299	0.0316	0.0318	0.0320	0.0319
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	0.027	0.028	0.028	0.028	0.028
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L	36.1	36.7	37.0	36.7	36.9
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L	0.00181	0.00191	0.00193	0.00196	0.00185
iron, total	7439-89-6	E420	0.010	mg/L	0.018	0.018	0.015	0.019	0.014
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0059	0.0059	0.0060	0.0059	0.0059
magnesium, total	7439-95-4	E420	0.0050	mg/L	11.1	11.7	11.7	11.5	11.6
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0635	0.0650	0.0657	0.0641	0.0678
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000226	0.000207	0.00175	0.00193	0.000180
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00053	0.00057	0.00056	0.00059	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	0.075	0.054	0.099	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L	4.09	4.24	4.28	4.27	4.28
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00241	0.00253	0.00254	0.00254	0.00250
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000061
silicon, total	7440-21-3	E420	0.10	mg/L	6.40	6.50	6.55	6.46	6.35
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L	29.8	31.2	31.2	31.0	30.8
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0853	0.0848	0.0852	0.0867	0.0869
sulfur, total	7704-34-9	E420	0.50	mg/L	9.62	9.66	9.53	9.69	9.20

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

				Client sample ID	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	SOUTHWEST BAY_Bottom
				Client sampling date / time	25-May-2022 13:50	25-May-2022 13:50	25-May-2022 12:10	25-May-2022 12:10	25-May-2022 10:30
Analyte	CAS Number	Method	LOR	Unit	YL2200527-001	YL2200527-002	YL2200527-003	YL2200527-004	YL2200527-005
					Result	Result	Result	Result	Result
Total Metals									
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000456	0.000500	0.000476	0.000551	0.000412
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0040	0.0040	0.0045	0.0029	0.0038
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00123	0.00119	0.00124	0.00120	0.00126
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0655	0.0599	0.0651	0.0601	0.0646
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0316	0.0288	0.0313	0.0292	0.0325
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<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	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.028	0.027	0.028	0.027	0.029
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L	37.1	36.4	37.8	35.6	37.9
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00185	0.00179	0.00192	0.00178	0.00192
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.010	<0.010	0.011	<0.010	<0.010
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0056	0.0054	0.0058	0.0054	0.0059
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	10.3	9.50	10.7	9.40	10.4
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0559	0.0506	0.0523	0.0469	0.0551

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	SOUTHWEST BAY_Bottom
				Client sampling date / time	25-May-2022 13:50	25-May-2022 13:50	25-May-2022 12:10	25-May-2022 12:10	25-May-2022 10:30
					YL2200527-001	YL2200527-002	YL2200527-003	YL2200527-004	YL2200527-005
					Result	Result	Result	Result	Result
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000191	0.000203	0.000236	0.000254	0.00216 DTMF
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00051
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.32	3.98	4.34	4.01	4.34
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00279	0.00257	0.00261	0.00253	0.00272
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000053	0.000056	<0.000050	<0.000050	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.01	5.89	6.16	5.84	6.19
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L	30.6	28.5	30.9	28.4	30.9
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0908	0.0879	0.0926	0.0906	0.0943
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	9.02	9.21	9.38	8.92	9.25
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<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	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000568	0.000552	0.000590	0.000557	0.000597 DTMF
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0.0014	<0.0010	<0.0010
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	<5.0	----	----	----	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.50	µg/L	<0.50	----	----	----	----
ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	SOUTHWEST BAY_Bottom
Client sampling date / time					25-May-2022 13:50	25-May-2022 13:50	25-May-2022 12:10	25-May-2022 12:10	25-May-2022 10:30
					YL2200527-001	YL2200527-002	YL2200527-003	YL2200527-004	YL2200527-005
					Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]									
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	----	----	----	----
styrene	100-42-5	E611A	0.50	µg/L	<0.50	----	----	----	----
toluene	108-88-3	E611A	0.50	µg/L	<0.50	----	----	----	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	----	----	----	----
xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	----	----	----	----
xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	----	----	----	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	90.0	----	----	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	101	----	----	----	----
Hydrocarbons									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----	----	----	----
F2 (C10-C16)	----	E601	300	µg/L	<300	----	----	----	----
F3 (C16-C34)	----	E601	300	µg/L	<300	----	----	----	----
F4 (C34-C50)	----	E601	300	µg/L	<300	----	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----	----	----	----
F1-BTEX	----	EC580	100	µg/L	<100	----	----	----	----
VPHw	----	EC580A	100	µg/L	<100	----	----	----	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	81.6	----	----	----	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	100	----	----	----	----

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

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	SOUTHWEST BAY_Mid-depth	NEAR OUTFLOW INLAKE_Bottom	NEAR OUTFLOW INLAKE_Mid-depth	NORTHWEST BAY NORTH_Bottom_4	----
				Client sampling date / time	25-May-2022 10:30	25-May-2022 09:10	25-May-2022 09:10	25-May-2022 13:55	----
					YL2200527-006	YL2200527-007	YL2200527-008	YL2200527-009	--------
					Result	Result	Result	Result	----
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	108	108	107	108	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	1.2	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	108	108	108	108	----
conductivity	----	E100	2.0	µS/cm	442	442	443	446	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	125	133	133	131	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	140	140	140	139	----
pH	----	E108	0.10	pH units	8.27	8.30	8.30	8.29	----
solids, total dissolved [TDS]	----	E162	10	mg/L	272	298	294	276	----
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	233	237	236	236	----
solids, total suspended [TSS]	----	E160	3.0	mg/L	6.9	6.9	8.1	6.7	----
turbidity	----	E121	0.10	NTU	6.62	7.59	7.22	6.63	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0651	0.0706	0.0725	0.0599	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	58.9	58.9	58.8	59.0	----
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.083	0.083	0.083	0.083	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0911	0.0903	0.0915	0.0906	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	0.0977	0.0970	0.0978	0.0982	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0066	0.0067	0.0063	0.0076	----
nitrogen, total	7727-37-9	E366	0.030	mg/L	1.27	1.27	1.27	1.26	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0870	0.0873	0.0869	0.0890	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0181	0.0179	0.0185	0.0185	----
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	13.0	12.8	13.1	12.8	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	25.5	25.5	25.5	25.5	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	13.1	14.1	13.0	13.6	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0100	0.0117	0.0102	0.0116	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	SOUTHWEST BAY_Mid-depth	NEAR OUTFLOW INLAKE_Bottom	NEAR OUTFLOW INLAKE_Mid-depth	NORTHWEST BAY NORTH_Bottom_4	----
				Client sampling date / time	25-May-2022 10:30	25-May-2022 09:10	25-May-2022 09:10	25-May-2022 13:55	----
					YL2200527-006	YL2200527-007	YL2200527-008	YL2200527-009	--------
					Result	Result	Result	Result	----
Total Metals									
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00120	0.00120	0.00119	0.00116	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0624	0.0623	0.0624	0.0607	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0318	0.0320	0.0324	0.0313	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L	0.028	0.028	0.028	0.027	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
calcium, total	7440-70-2	E420	0.050	mg/L	37.0	36.8	36.6	37.1	----
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00199	0.00194	0.00194	0.00186	----
iron, total	7439-89-6	E420	0.010	mg/L	0.019	0.018	0.015	0.017	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0059	0.0058	0.0059	0.0058	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	11.6	11.8	11.8	11.3	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0691	0.0751	0.0662	0.0663	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00149	0.000190	0.000208	0.000204	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00064	0.00057	0.00052	0.00052	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.102	0.070	<0.050	<0.050	----
potassium, total	7440-09-7	E420	0.050	mg/L	4.30	4.28	4.28	4.22	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00245	0.00247	0.00255	0.00238	----
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000062	<0.000050	<0.000050	<0.000050	----
silicon, total	7440-21-3	E420	0.10	mg/L	6.46	6.46	6.47	6.40	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L	31.3	31.2	31.1	30.2	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0862	0.0867	0.0877	0.0859	----
sulfur, total	7704-34-9	E420	0.50	mg/L	9.68	9.44	9.71	9.55	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	SOUTHWEST BAY_Mid-depth	NEAR OUTFLOW INLAKE_Bottom	NEAR OUTFLOW INLAKE_Mid-depth	NORTHWEST BAY NORTH_Bottom_4	----
				Client sampling date / time	25-May-2022 10:30	25-May-2022 09:10	25-May-2022 09:10	25-May-2022 13:55	----
					YL2200527-006	**YL2200527-007**	**YL2200527-008**	**YL2200527-009**	--------
					Result	Result	Result	Result	----
Total Metals									
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000614	0.000538	0.000430	0.000396	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0035	0.0036	0.0036	0.0039	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00120	0.00120	0.00120	0.00120	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0603	0.0600	0.0597	0.0617	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0289	0.0292	0.0285	0.0293	----
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	0.027	0.028	0.028	0.028	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	34.8	37.1	37.5	36.1	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<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	<0.00010	<0.00010	<0.00010	<0.00010	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00168	0.00179	0.00177	0.00182	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	0.010	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0054	0.0055	0.0057	0.0055	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	9.31	9.90	9.56	9.83	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0505	0.0531	0.0491	0.0538	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	SOUTHWEST BAY_Mid-depth	NEAR OUTFLOW INLAKE_Bottom	NEAR OUTFLOW INLAKE_Mid-depth	NORTHWEST BAY NORTH_Bottom_4	----
				Client sampling date / time	25-May-2022 10:30	25-May-2022 09:10	25-May-2022 09:10	25-May-2022 13:55	----
					YL2200527-006	YL2200527-007	YL2200527-008	YL2200527-009	--------
					Result	Result	Result	Result	----
Dissolved Metals									
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	0.000212	0.00165 DTMF	0.000207	0.000221	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<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	3.95	4.06	3.97	4.08	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00238	0.00242	0.00252	0.00255	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	0.000051	<0.000050	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.74	5.71	5.85	5.96	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	28.4	28.8	28.1	29.2	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0882	0.0905	0.0896	0.0921	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	8.80	8.72	9.42	8.99	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	0.00023	<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	<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<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	0.000558	0.000555	0.000557	0.000572 DTMF	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<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	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.50	µg/L	----	<0.50	----	<0.50	----
ethylbenzene	100-41-4	E611A	0.50	µg/L	----	<0.50	----	<0.50	----

Analytical Results

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

				Client sample ID	SOUTHWEST BAY_Mid-depth	NEAR OUTFLOW INLAKE_Bottom	NEAR OUTFLOW INLAKE_Mid-depth	NORTHWEST BAY NORTH_Bottom _4	----
				Client sampling date / time	25-May-2022 10:30	25-May-2022 09:10	25-May-2022 09:10	25-May-2022 13:55	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	YL2200527-006	YL2200527-007	YL2200527-008	YL2200527-009	--------
					Result	Result	Result	Result	----
Volatile Organic Compounds [Fuels]									
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	----	<0.50	----	<0.50	----
styrene	100-42-5	E611A	0.50	µg/L	----	<0.50	----	<0.50	----
toluene	108-88-3	E611A	0.50	µg/L	----	<0.50	----	<0.50	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	----	<0.40	----	<0.40	----
xylene, o-	95-47-6	E611A	0.30	µg/L	----	<0.30	----	<0.30	----
xylenes, total	1330-20-7	E611A	0.50	µg/L	----	<0.50	----	<0.50	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	----	95.3	----	93.0	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	----	101	----	101	----
Hydrocarbons									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	----	<100	----	<100	----
F2 (C10-C16)	----	E601	300	µg/L	----	<300	----	<300	----
F3 (C16-C34)	----	E601	300	µg/L	----	<300	----	<300	----
F4 (C34-C50)	----	E601	300	µg/L	----	<300	----	<300	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	----	<100	----	<100	----
F1-BTEX	----	EC580	100	µg/L	----	<100	----	<100	----
VPHw	----	EC580A	100	µg/L	----	<100	----	<100	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	----	90.9	----	90.0	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	----	107	----	102	----

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

ALS Environmental

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **YL2200527**	Page	: 1 of 34
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	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	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 26-May-2022 09:05
PO	: ----	Issue Date	: 07-Jun-2022 16:57
C-O-C number	: ----		
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 9		
No. of samples analysed	: 9		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- 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.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Physical Tests	QC-MRG2-505090001	----	conductivity	----	E100	2.5 µS/cm B	2 µS/cm	Blank result exceeds permitted value
Dissolved Metals	QC-507895-001	----	magnesium, dissolved	7439-95-4	E421	0.0051 mg/L B	0.005 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	*Description*
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

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: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) NEAR OUTFLOW INLAKE_Bottom	E567	25-May-2022	02-Jun-2022	28 days	8 days	✓	02-Jun-2022	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) NORTHWEST BAY NORTH_Bottom	E567	25-May-2022	02-Jun-2022	28 days	8 days	✓	02-Jun-2022	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) NORTHWEST BAY NORTH_Bottom_4	E567	25-May-2022	02-Jun-2022	28 days	8 days	✓	02-Jun-2022	40 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MID LAKE 1_Bottom	E298	25-May-2022	02-Jun-2022	----	----		05-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MID LAKE 1_Mid-depth	E298	25-May-2022	02-Jun-2022	----	----		05-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E298	25-May-2022	02-Jun-2022	----	----		05-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom_4	E298	25-May-2022	02-Jun-2022	----	----		05-Jun-2022	28 days	10 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E298	25-May-2022	02-Jun-2022	----	----		05-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E298	25-May-2022	02-Jun-2022	----	----		05-Jun-2022	28 days	11 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E298	25-May-2022	02-Jun-2022	----	----		05-Jun-2022	28 days	11 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Bottom	E298	25-May-2022	02-Jun-2022	----	----		05-Jun-2022	28 days	11 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Mid-depth	E298	25-May-2022	02-Jun-2022	----	----		05-Jun-2022	28 days	11 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE MID LAKE 1_Bottom	E235.Cl-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE MID LAKE 1_Mid-depth	E235.Cl-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.Cl-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E235.Cl-L	25-May-2022	----	----	----		31-May-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom	E235.Cl-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom_4	E235.Cl-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.Cl-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.Cl-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.Cl-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE MID LAKE 1_Bottom	E235.F-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE MID LAKE 1_Mid-depth	E235.F-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.F-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E235.F-L	25-May-2022	----	----	----		31-May-2022	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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom	E235.F-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom_4	E235.F-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.F-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.F-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.F-L	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MID LAKE 1_Bottom	E235.NO3-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MID LAKE 1_Mid-depth	E235.NO3-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.NO3-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E235.NO3-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom	E235.NO3-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom_4	E235.NO3-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.NO3-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.NO3-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.NO3-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MID LAKE 1_Bottom	E235.NO2-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MID LAKE 1_Mid-depth	E235.NO2-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.NO2-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E235.NO2-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	✘ EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom	E235.NO2-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom_4	E235.NO2-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.NO2-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.NO2-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.NO2-L	25-May-2022	----	----	----		31-May-2022	3 days	6 days	× EHT
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE MID LAKE 1_Bottom	E392	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE MID LAKE 1_Mid-depth	E392	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NEAR OUTFLOW INLAKE_Bottom	E392	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E392	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE										
NORTHWEST BAY NORTH_Bottom	E392	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE										
NORTHWEST BAY NORTH_Bottom_4	E392	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE										
NORTHWEST BAY NORTH_Mid-depth	E392	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE										
SOUTHWEST BAY_Bottom	E392	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE										
SOUTHWEST BAY_Mid-depth	E392	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MID LAKE 1_Bottom	E235.SO4	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MID LAKE 1_Mid-depth	E235.SO4	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
NEAR OUTFLOW INLAKE_Bottom	E235.SO4	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
NEAR OUTFLOW INLAKE_Mid-depth	E235.SO4	25-May-2022	----	----	----		31-May-2022	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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE NORTHWEST BAY NORTH_Bottom	E235.SO4	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NORTHWEST BAY NORTH_Bottom_4	E235.SO4	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.SO4	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SOUTHWEST BAY_Bottom	E235.SO4	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SOUTHWEST BAY_Mid-depth	E235.SO4	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E375-T	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E375-T	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Bottom	E375-T	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Mid-depth	E375-T	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	10 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) MID LAKE 1_Bottom	E375-T	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) MID LAKE 1_Mid-depth	E375-T	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E375-T	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Bottom_4	E375-T	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E375-T	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E366	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E366	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Bottom	E366	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Mid-depth	E366	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	10 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) MID LAKE 1_Bottom	E366	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) MID LAKE 1_Mid-depth	E366	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E366	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom_4	E366	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E366	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MID LAKE 1_Bottom	E372-U	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MID LAKE 1_Mid-depth	E372-U	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E372-U	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom_4	E372-U	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	10 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E372-U	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E372-U	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	11 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E372-U	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	11 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Bottom	E372-U	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	11 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Mid-depth	E372-U	25-May-2022	02-Jun-2022	----	----		04-Jun-2022	28 days	11 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MID LAKE 1_Bottom	E509	25-May-2022	30-May-2022	----	----		30-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MID LAKE 1_Mid-depth	E509	25-May-2022	30-May-2022	----	----		30-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NEAR OUTFLOW INLAKE_Bottom	E509	25-May-2022	30-May-2022	----	----		30-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NEAR OUTFLOW INLAKE_Mid-depth	E509	25-May-2022	30-May-2022	----	----		30-May-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NORTHWEST BAY NORTH_Bottom	E509	25-May-2022	30-May-2022	----	----		30-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NORTHWEST BAY NORTH_Bottom_4	E509	25-May-2022	30-May-2022	----	----		30-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NORTHWEST BAY NORTH_Mid-depth	E509	25-May-2022	30-May-2022	----	----		30-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) SOUTHWEST BAY_Bottom	E509	25-May-2022	30-May-2022	----	----		30-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) SOUTHWEST BAY_Mid-depth	E509	25-May-2022	30-May-2022	----	----		30-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MID LAKE 1_Bottom	E421	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MID LAKE 1_Mid-depth	E421	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NEAR OUTFLOW INLAKE_Bottom	E421	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NEAR OUTFLOW INLAKE_Mid-depth	E421	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	180 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times Rec*	*Holding Times Actual*	*Eval*	*Analysis Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NORTHWEST BAY NORTH_Bottom	E421	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NORTHWEST BAY NORTH_Bottom_4	E421	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NORTHWEST BAY NORTH_Mid-depth	E421	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SOUTHWEST BAY_Bottom	E421	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SOUTHWEST BAY_Mid-depth	E421	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	180 days	8 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NEAR OUTFLOW INLAKE_Bottom	E601	25-May-2022	02-Jun-2022	14 days	8 days	✓	06-Jun-2022	40 days	4 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NORTHWEST BAY NORTH_Bottom	E601	25-May-2022	02-Jun-2022	14 days	8 days	✓	06-Jun-2022	40 days	4 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NORTHWEST BAY NORTH_Bottom_4	E601	25-May-2022	02-Jun-2022	14 days	8 days	✓	06-Jun-2022	40 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NORTHWEST BAY NORTH_Bottom	E581.VH+F1	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	14 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NORTHWEST BAY NORTH_Bottom_4	E581.VH+F1	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NEAR OUTFLOW INLAKE_Bottom	E581.VH+F1	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	14 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) MID LAKE 1_Bottom	E358-L	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) MID LAKE 1_Mid-depth	E358-L	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E358-L	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Bottom_4	E358-L	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E358-L	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E358-L	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E358-L	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Bottom	E358-L	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Mid-depth	E358-L	25-May-2022	02-Jun-2022	----	----		03-Jun-2022	28 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MID LAKE 1_Bottom	E290	25-May-2022	----	----	----		02-Jun-2022	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MID LAKE 1_Mid-depth	E290	25-May-2022	----	----	----		02-Jun-2022	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NEAR OUTFLOW INLAKE_Bottom	E290	25-May-2022	----	----	----		02-Jun-2022	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E290	25-May-2022	----	----	----		02-Jun-2022	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NORTHWEST BAY NORTH_Bottom	E290	25-May-2022	----	----	----		02-Jun-2022	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NORTHWEST BAY NORTH_Bottom_4	E290	25-May-2022	----	----	----		02-Jun-2022	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NORTHWEST BAY NORTH_Mid-depth	E290	25-May-2022	----	----	----		02-Jun-2022	14 days	8 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE SOUTHWEST BAY_Bottom	E290	25-May-2022	----	----	----		02-Jun-2022	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SOUTHWEST BAY_Mid-depth	E290	25-May-2022	----	----	----		02-Jun-2022	14 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE MID LAKE 1_Bottom	E100	25-May-2022	----	----	----		02-Jun-2022	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE MID LAKE 1_Mid-depth	E100	25-May-2022	----	----	----		02-Jun-2022	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE NEAR OUTFLOW INLAKE_Bottom	E100	25-May-2022	----	----	----		02-Jun-2022	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E100	25-May-2022	----	----	----		02-Jun-2022	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE NORTHWEST BAY NORTH_Bottom	E100	25-May-2022	----	----	----		02-Jun-2022	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE NORTHWEST BAY NORTH_Bottom_4	E100	25-May-2022	----	----	----		02-Jun-2022	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE NORTHWEST BAY NORTH_Mid-depth	E100	25-May-2022	----	----	----		02-Jun-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE SOUTHWEST BAY_Bottom	E100	25-May-2022	----	----	----		02-Jun-2022	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE SOUTHWEST BAY_Mid-depth	E100	25-May-2022	----	----	----		02-Jun-2022	28 days	8 days	✓
Physical Tests : pH by Meter										
HDPE NORTHWEST BAY NORTH_Bottom	E108	25-May-2022	----	----	----		02-Jun-2022	0.25 hrs	192 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NORTHWEST BAY NORTH_Bottom_4	E108	25-May-2022	----	----	----		02-Jun-2022	0.25 hrs	192 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NORTHWEST BAY NORTH_Mid-depth	E108	25-May-2022	----	----	----		02-Jun-2022	0.25 hrs	192 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MID LAKE 1_Bottom	E108	25-May-2022	----	----	----		02-Jun-2022	0.25 hrs	194 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MID LAKE 1_Mid-depth	E108	25-May-2022	----	----	----		02-Jun-2022	0.25 hrs	194 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SOUTHWEST BAY_Bottom	E108	25-May-2022	----	----	----		02-Jun-2022	0.25 hrs	196 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SOUTHWEST BAY_Mid-depth	E108	25-May-2022	----	----	----		02-Jun-2022	0.25 hrs	196 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : pH by Meter										
HDPE NEAR OUTFLOW INLAKE_Bottom	E108	25-May-2022	----	----	----		02-Jun-2022	0.25 hrs	197 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E108	25-May-2022	----	----	----		02-Jun-2022	0.25 hrs	197 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE MID LAKE 1_Bottom	E162	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE MID LAKE 1_Mid-depth	E162	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE NEAR OUTFLOW INLAKE_Bottom	E162	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E162	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Bottom	E162	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Bottom_4	E162	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Mid-depth	E162	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE SOUTHWEST BAY_Bottom	E162	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SOUTHWEST BAY_Mid-depth	E162	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MID LAKE 1_Bottom	E160	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MID LAKE 1_Mid-depth	E160	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NEAR OUTFLOW INLAKE_Bottom	E160	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E160	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Bottom	E160	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Bottom_4	E160	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Mid-depth	E160	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation* Preparation Date	Holding Times Rec	Holding Times Actual	Eval	*Analysis* Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE SOUTHWEST BAY_Bottom	E160	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SOUTHWEST BAY_Mid-depth	E160	25-May-2022	----	----	----		31-May-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE MID LAKE 1_Bottom	E121	25-May-2022	----	----	----		30-May-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE MID LAKE 1_Mid-depth	E121	25-May-2022	----	----	----		30-May-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NEAR OUTFLOW INLAKE_Bottom	E121	25-May-2022	----	----	----		30-May-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E121	25-May-2022	----	----	----		30-May-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NORTHWEST BAY NORTH_Bottom	E121	25-May-2022	----	----	----		30-May-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NORTHWEST BAY NORTH_Bottom_4	E121	25-May-2022	----	----	----		30-May-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NORTHWEST BAY NORTH_Mid-depth	E121	25-May-2022	----	----	----		30-May-2022	3 days	5 days	× EHT

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE SOUTHWEST BAY_Bottom	E121	25-May-2022	----	----	----		30-May-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SOUTHWEST BAY_Mid-depth	E121	25-May-2022	----	----	----		30-May-2022	3 days	5 days	× EHT
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) MID LAKE 1_Bottom	E508	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) MID LAKE 1_Mid-depth	E508	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NEAR OUTFLOW INLAKE_Bottom	E508	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NEAR OUTFLOW INLAKE_Mid-depth	E508	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NORTHWEST BAY NORTH_Bottom	E508	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NORTHWEST BAY NORTH_Bottom_4	E508	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NORTHWEST BAY NORTH_Mid-depth	E508	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SOUTHWEST BAY_Bottom	E508	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SOUTHWEST BAY_Mid-depth	E508	25-May-2022	----	----	----		31-May-2022	28 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NORTHWEST BAY NORTH_Bottom	E420	25-May-2022	----	----	----		03-Jun-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NORTHWEST BAY NORTH_Bottom_4	E420	25-May-2022	----	----	----		03-Jun-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NORTHWEST BAY NORTH_Mid-depth	E420	25-May-2022	----	----	----		03-Jun-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MID LAKE 1_Bottom	E420	25-May-2022	----	----	----		03-Jun-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MID LAKE 1_Mid-depth	E420	25-May-2022	----	----	----		03-Jun-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NEAR OUTFLOW INLAKE_Bottom	E420	25-May-2022	----	----	----		03-Jun-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NEAR OUTFLOW INLAKE_Mid-depth	E420	25-May-2022	----	----	----		03-Jun-2022	180 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SOUTHWEST BAY_Bottom	E420	25-May-2022	----	----	----		03-Jun-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SOUTHWEST BAY_Mid-depth	E420	25-May-2022	----	----	----		03-Jun-2022	180 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NORTHWEST BAY NORTH_Bottom	E611A	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NORTHWEST BAY NORTH_Bottom_4	E611A	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NEAR OUTFLOW INLAKE_Bottom	E611A	25-May-2022	02-Jun-2022	----	----		02-Jun-2022	14 days	8 days	✓

Legend & Qualifier Definitions

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

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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	505091	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	509369	1	17	5.8	5.0	✓
BTEX by Headspace GC-MS	E611A	507923	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	505099	1	9	11.1	5.0	✓
Conductivity in Water	E100	505090	1	17	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	504857	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	507895	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	509370	1	9	11.1	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	505098	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	505095	1	17	5.8	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	505096	1	17	5.8	5.0	✓
pH by Meter	E108	505089	1	17	5.8	5.0	✓
Reactive Silica by Colourimetry	E392	506280	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	505097	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	505533	1	15	6.6	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	509368	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	506428	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	506032	1	18	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	509371	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	509367	1	17	5.8	5.0	✓
TSS by Gravimetry	E160	505528	1	15	6.6	5.0	✓
Turbidity by Nephelometry	E121	504226	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	507922	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	505091	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	509369	1	17	5.8	5.0	✓
BTEX by Headspace GC-MS	E611A	507923	1	20	5.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	508157	1	4	25.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	505099	1	9	11.1	5.0	✓
Conductivity in Water	E100	505090	1	17	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	504857	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	507895	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	509370	1	9	11.1	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	505098	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	505095	1	17	5.8	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	505096	1	17	5.8	5.0	✓
Oil & Grease by Gravimetry	E567	508807	1	10	10.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
pH by Meter	E108	505089	1	17	5.8	5.0	✓
Reactive Silica by Colourimetry	E392	506280	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	505097	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	505533	1	15	6.6	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	509368	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	506428	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	506032	1	18	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	509371	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	509367	1	17	5.8	5.0	✓
TSS by Gravimetry	E160	505528	1	15	6.6	5.0	✓
Turbidity by Nephelometry	E121	504226	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	507922	1	18	5.5	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	505091	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	509369	1	17	5.8	5.0	✓
BTEX by Headspace GC-MS	E611A	507923	1	20	5.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	508157	1	4	25.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	505099	1	9	11.1	5.0	✓
Conductivity in Water	E100	505090	1	17	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	504857	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	507895	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	509370	1	9	11.1	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	505098	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	505095	1	17	5.8	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	505096	1	17	5.8	5.0	✓
Oil & Grease by Gravimetry	E567	508807	1	10	10.0	5.0	✓
Reactive Silica by Colourimetry	E392	506280	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	505097	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	505533	1	15	6.6	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	509368	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	506428	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	506032	2	18	11.1	5.0	✓
Total Nitrogen by Colourimetry	E366	509371	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	509367	1	17	5.8	5.0	✓
TSS by Gravimetry	E160	505528	1	15	6.6	5.0	✓
Turbidity by Nephelometry	E121	504226	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	507922	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	509369	1	17	5.8	5.0	✓
BTEX by Headspace GC-MS	E611A	507923	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Chloride in Water by IC (Low Level)	E235.Cl-L	505099	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	504857	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	507895	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	509370	1	9	11.1	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	505098	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	505095	1	17	5.8	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	505096	1	17	5.8	5.0	✓
Reactive Silica by Colourimetry	E392	506280	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	505097	1	17	5.8	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	509368	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	506428	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	506032	1	18	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	509371	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	509367	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	507922	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
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
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.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 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.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC (Low Level)	E235.Cl-L 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 (Low Level)	E235.F-L 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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Reactive Silica by Colourimetry	E392 Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
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.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples 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
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.
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 PHCs - F2-F4 by GC-FID	E601 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4).
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.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as $CaCO_3$), from total Ca/Mg" is calculated from the sum of total 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. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
TDS in Water (Calculation) Using APHA Analyte List	EC103.APHA Vancouver - Environmental	Water	APHA 1030E	Total DIssolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis).
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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
Oil & Grease Extraction for Gravimetry	EP567 Vancouver - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **YL2200527**	Page	: 1 of 18
Client	: Golder Associates Ltd.	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	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	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 26-May-2022 09:05
PO	: ----	Date Analysis Commenced	: 30-May-2022
C-O-C number	: ----	Issue Date	: 07-Jun-2022 16:56
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 9		
No. of samples analysed	: 9		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Christopher Li	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Dee Lee	Analyst	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kenson Lo		Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 504226)											
FJ2201217-006	Anonymous	turbidity	----	E121	0.10	NTU	0.11	0.11	0.003	Diff <2x LOR	----
Physical Tests (QC Lot: 505089)											
VA22B1662-001	Anonymous	pH	----	E108	0.10	pH units	7.97	7.95	0.251%	4%	----
Physical Tests (QC Lot: 505090)											
VA22B1662-001	Anonymous	conductivity	----	E100	2.0	µS/cm	2580	2600	0.772%	10%	----
Physical Tests (QC Lot: 505091)											
VA22B1662-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	302	314	3.64%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	302	314	3.64%	20%	----
Physical Tests (QC Lot: 505528)											
YL2200527-001	NORTHWEST BAY NORTH_Bottom	solids, total suspended [TSS]	----	E160	3.0	mg/L	7.7	8.7	1.0	Diff <2x LOR	----
Physical Tests (QC Lot: 505533)											
YL2200527-001	NORTHWEST BAY NORTH_Bottom	solids, total dissolved [TDS]	----	E162	20	mg/L	278	278	0.00%	20%	----
Anions and Nutrients (QC Lot: 505095)											
VA22B1662-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	19.8	19.8	0.221%	20%	----
Anions and Nutrients (QC Lot: 505096)											
VA22B1662-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	0.131	0.130	0.0013	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 505097)											
VA22B1662-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	1360	1360	0.491%	20%	----
Anions and Nutrients (QC Lot: 505098)											
YL2200527-001	NORTHWEST BAY NORTH_Bottom	fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.083	0.082	0.0006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 505099)											
YL2200527-001	NORTHWEST BAY NORTH_Bottom	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	59.3	59.0	0.593%	20%	----
Anions and Nutrients (QC Lot: 506280)											
YL2200508-005	Anonymous	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	2.92	2.83	0.09	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 509367)											
FJ2201271-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0901	0.0963	6.72%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Anions and Nutrients (QC Lot: 509368)											
FJ2201271-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0274	0.0271	0.992%	20%	----
Anions and Nutrients (QC Lot: 509369)											
FJ2201271-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0096	0.0103	0.0007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 509371)											
YL2200527-001	NORTHWEST BAY NORTH_Bottom	nitrogen, total	7727-37-9	E366	0.030	mg/L	1.28	1.25	1.99%	20%	----
Organic / Inorganic Carbon (QC Lot: 509370)											
YL2200527-001	NORTHWEST BAY NORTH_Bottom	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	12.1	12.9	6.46%	20%	----
Total Metals (QC Lot: 506032)											
YL2200532-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.376	0.412	9.10%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00331	0.00335	1.06%	20%	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0681	0.0687	0.931%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0301	0.0305	1.19%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.010	0.010	0.00003	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000053	0.0000064	0.0000010	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	30.6	29.8	2.45%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000041	0.000047	0.000006	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.00064	0.00071	0.00006	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00045	0.00045	0.000002	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00135	0.00133	0.00002	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.567	0.597	5.23%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000224	0.000228	0.000004	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0060	0.0060	0.00007	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	10.2	10.3	1.39%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0363	0.0367	0.955%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000537	0.000547	1.73%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00109	0.00112	0.00004	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	2.35	2.36	0.310%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00232	0.00229	1.34%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000063	0.000064	0.000001	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.29	2.34	2.09%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Total Metals (QC Lot: 506032) - continued											
YL2200532-001	Anonymous	sodium, total	7440-23-5	E420	0.050	mg/L	8.06	8.09	0.322%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.120	0.121	0.337%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	7.70	7.59	1.49%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	0.00012	0.00013	0.00001	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.0132	0.0145	9.94%	20%	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000901	0.000926	2.74%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00108	0.00109	0.000008	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0135	0.0128	0.0007	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00030	mg/L	0.00043	0.00043	0.000006	Diff <2x LOR	----
Total Metals (QC Lot: 506428)											
VA22B1772-005	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 504857)											
VA22B1773-004	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 507895)											
FJ2201270-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0014	0.0018	0.0003	Diff <2x LOR	----
		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	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0489	0.0498	1.80%	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	0.104	0.108	4.55%	20%	----
		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	18.0	18.9	5.19%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000021	0.000022	0.000001	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.115	0.120	4.02%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	6.13	6.37	3.84%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0457	0.0458	0.280%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000265	0.000273	0.000008	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	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: 507895) - continued											
FJ2201270-001	Anonymous	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	1.24	1.26	1.97%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00137	0.00147	0.00010	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	3.52	3.46	1.68%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	36.0	36.4	1.18%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.544	0.530	2.60%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	13.9	13.6	2.76%	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	<0.000010	<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	0.00013	0.00012	0.000005	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	0.0034	0.0035	0.0002	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: 507923)											
VA22B1218-001	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: 507922)											
VA22B1218-001	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: 504226)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 505090)						
conductivity	----	E100	1	µS/cm	# 2.5	B
Physical Tests (QCLot: 505091)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 505528)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 505533)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 505095)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 505096)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 505097)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 505098)						
fluoride	16984-48-8	E235.F-L	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 505099)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 506280)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 509367)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 509368)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 509369)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 509371)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 509370)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 506032)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	MBRR
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 506032) - continued						
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 506428)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 504857)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 507895)						
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	# 0.0051	B
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 507895) - continued						
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 508807)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 507923)						
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: 507922)						
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 508157)						
F2 (C10-C16)	----	E601	100	µg/L	<100	----
F3 (C16-C34)	----	E601	250	µg/L	<250	----
F4 (C34-C50)	----	E601	250	µg/L	<250	----

Qualifiers

Qualifier	*Description*
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*
MBRR	*Initial MB for this submission had positive results for flagged analyte (data not shown). Low level samples were repeated with new QC (2nd MB results shown). High level results (>5x initial MB level) and non-detect results were reported and are defensible*

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 504226)									
turbidity	----	E121	0.1	NTU	200 NTU	97.1	85.0	115	----
Physical Tests (QCLot: 505089)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 505090)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	98.8	90.0	110	----
Physical Tests (QCLot: 505091)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	97.3	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.4	85.0	115	----
Physical Tests (QCLot: 505528)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	106	85.0	115	----
Physical Tests (QCLot: 505533)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 505095)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 505096)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.2	90.0	110	----
Anions and Nutrients (QCLot: 505097)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 505098)									
fluoride	16984-48-8	E235.F-L	0.01	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 505099)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 506280)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	99.8	85.0	115	----
Anions and Nutrients (QCLot: 509367)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.5	80.0	120	----
Anions and Nutrients (QCLot: 509368)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	91.2	80.0	120	----
Anions and Nutrients (QCLot: 509369)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	105	85.0	115	----
Anions and Nutrients (QCLot: 509371)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	100	75.0	125	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Organic / Inorganic Carbon (QCLot: 509370)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	105	80.0	120	----
Total Metals (QCLot: 506032)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	100	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	98.6	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	93.1	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	99.8	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	100	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	104	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.6	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.3	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	106	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	99.0	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.4	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	98.7	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	99.3	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.7	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	107	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	107	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	103	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	100	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	94.8	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	99.1	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	93.4	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	98.3	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	95.7	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.3	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	99.5	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
Total Metals (QCLot: 506032) - continued									
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	97.7	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	96.4	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	97.2	80.0	120	----
Total Metals (QCLot: 506428)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	89.1	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 507895)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	103	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	98.0	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.8	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	99.4	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	96.7	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.5	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	97.7	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	102	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	97.9	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.4	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	114	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	93.4	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	80.4	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.2	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.3	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	91.7	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	96.3	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	92.4	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	95.1	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	96.8	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 507895) - continued									
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	105	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	104	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	91.0	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.1	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	89.5	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	107	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	95.7	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	95.1	80.0	120	----
Aggregate Organics (QCLot: 508807)									
oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	101	70.0	130	----
Volatile Organic Compounds (QCLot: 507923)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	96.8	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	97.3	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	97.4	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	93.2	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	99.4	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	98.3	70.0	130	----
Hydrocarbons (QCLot: 507922)									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	85.4	70.0	130	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	79.0	70.0	130	----
Hydrocarbons (QCLot: 508157)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	112	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	103	70.0	130	----
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	123	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: 505095)										
VA22B1662-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	51.3 mg/L	50 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 505096)										
VA22B1662-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	9.92 mg/L	10 mg/L	99.2	75.0	125	----
Anions and Nutrients (QCLot: 505097)										
VA22B1662-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	2000 mg/L	2000 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 505098)										
YL2200527-002	NORTHWEST BAY NORTH_Mid-depth	fluoride	16984-48-8	E235.F-L	1.02 mg/L	1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 505099)										
YL2200527-002	NORTHWEST BAY NORTH_Mid-depth	chloride	16887-00-6	E235.Cl-L	99.4 mg/L	100 mg/L	99.4	75.0	125	----
Anions and Nutrients (QCLot: 506280)										
YL2200508-006	Anonymous	silicate (as SiO2)	7631-86-9	E392	9.14 mg/L	10 mg/L	91.4	75.0	125	----
Anions and Nutrients (QCLot: 509367)										
FJ2201271-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0474 mg/L	0.05 mg/L	94.8	70.0	130	----
Anions and Nutrients (QCLot: 509368)										
FJ2201271-002	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0480 mg/L	0.05 mg/L	96.1	70.0	130	----
Anions and Nutrients (QCLot: 509369)										
FJ2201271-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.106 mg/L	0.1 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 509371)										
YL2200527-002	NORTHWEST BAY NORTH_Mid-depth	nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 509370)										
YL2200527-002	NORTHWEST BAY NORTH_Mid-depth	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 506032)										
FJ2201300-001	Anonymous	aluminum, total	7429-90-5	E420	0.178 mg/L	0.2 mg/L	89.2	70.0	130	----
		antimony, total	7440-36-0	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0381 mg/L	0.04 mg/L	95.3	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 506032) - continued										
FJ2201300-001	Anonymous	bismuth, total	7440-69-9	E420	0.00921 mg/L	0.01 mg/L	92.1	70.0	130	----
		boron, total	7440-42-8	E420	0.093 mg/L	0.1 mg/L	93.0	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00394 mg/L	0.004 mg/L	98.6	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00983 mg/L	0.01 mg/L	98.3	70.0	130	----
		chromium, total	7440-47-3	E420	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0185 mg/L	0.02 mg/L	92.4	70.0	130	----
		copper, total	7440-50-8	E420	0.0183 mg/L	0.02 mg/L	91.7	70.0	130	----
		iron, total	7439-89-6	E420	1.83 mg/L	2 mg/L	91.6	70.0	130	----
		lead, total	7439-92-1	E420	0.0183 mg/L	0.02 mg/L	91.4	70.0	130	----
		lithium, total	7439-93-2	E420	0.0898 mg/L	0.1 mg/L	89.8	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0184 mg/L	0.02 mg/L	92.0	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0211 mg/L	0.02 mg/L	105	70.0	130	----
		nickel, total	7440-02-0	E420	0.0366 mg/L	0.04 mg/L	91.6	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.2 mg/L	10 mg/L	102	70.0	130	----
		potassium, total	7440-09-7	E420	3.58 mg/L	4 mg/L	89.5	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		selenium, total	7782-49-2	E420	0.0414 mg/L	0.04 mg/L	104	70.0	130	----
		silicon, total	7440-21-3	E420	9.79 mg/L	10 mg/L	97.9	70.0	130	----
		silver, total	7440-22-4	E420	0.00404 mg/L	0.004 mg/L	101	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0393 mg/L	0.04 mg/L	98.3	70.0	130	----
		thallium, total	7440-28-0	E420	0.00369 mg/L	0.004 mg/L	92.2	70.0	130	----
		thorium, total	7440-29-1	E420	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		tin, total	7440-31-5	E420	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		titanium, total	7440-32-6	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		uranium, total	7440-61-1	E420	0.00384 mg/L	0.004 mg/L	95.9	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0982 mg/L	0.1 mg/L	98.2	70.0	130	----
		zinc, total	7440-66-6	E420	0.362 mg/L	0.4 mg/L	90.4	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
Total Metals (QCLot: 506428)										
VA22B1773-001	Anonymous	mercury, total	7439-97-6	E508	0.0000986 mg/L	0.0001 mg/L	98.6	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 504857)										
VA22B1773-005	Anonymous	mercury, dissolved	7439-97-6	E509	0.000103 mg/L	0.0001 mg/L	103	70.0	130	----
Dissolved Metals (QCLot: 507895)										
FJ2201270-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.214 mg/L	0.2 mg/L	107	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0214 mg/L	0.02 mg/L	107	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0226 mg/L	0.02 mg/L	113	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00868 mg/L	0.01 mg/L	86.8	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.097 mg/L	0.1 mg/L	97.4	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00438 mg/L	0.004 mg/L	109	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	0.0106 mg/L	0.01 mg/L	106	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0433 mg/L	0.04 mg/L	108	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0209 mg/L	0.02 mg/L	104	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.92 mg/L	2 mg/L	96.2	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0211 mg/L	0.02 mg/L	105	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	11.3 mg/L	10 mg/L	113	70.0	130	----
		potassium, dissolved	7440-09-7	E421	4.16 mg/L	4 mg/L	104	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0223 mg/L	0.02 mg/L	111	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0374 mg/L	0.04 mg/L	93.4	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.22 mg/L	10 mg/L	92.2	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00735 mg/L	0.008 mg/L	91.9	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	19.5 mg/L	20 mg/L	97.7	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0360 mg/L	0.04 mg/L	90.1	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00393 mg/L	0.004 mg/L	98.3	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0211 mg/L	0.02 mg/L	105	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0405 mg/L	0.04 mg/L	101	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: 507895) - continued										
FJ2201270-002	Anonymous	tungsten, dissolved	7440-33-7	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00409 mg/L	0.004 mg/L	102	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.111 mg/L	0.1 mg/L	111	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.426 mg/L	0.4 mg/L	106	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0420 mg/L	0.04 mg/L	105	70.0	130	----
Volatile Organic Compounds (QCLot: 507923)										
VA22B1218-001	Anonymous	benzene	71-43-2	E611A	93.8 µg/L	100 µg/L	93.8	70.0	130	----
		ethylbenzene	100-41-4	E611A	94.2 µg/L	100 µg/L	94.2	70.0	130	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	97.1 µg/L	100 µg/L	97.1	70.0	130	----
		styrene	100-42-5	E611A	96.6 µg/L	100 µg/L	96.6	70.0	130	----
		toluene	108-88-3	E611A	85.9 µg/L	100 µg/L	85.9	70.0	130	----
		xylene, m+p-	179601-23-1	E611A	196 µg/L	200 µg/L	98.0	70.0	130	----
		xylene, o-	95-47-6	E611A	97.0 µg/L	100 µg/L	97.0	70.0	130	----
Hydrocarbons (QCLot: 507922)										
VA22B1218-002	Anonymous	F1 (C6-C10)	----	E581.VH+F1	3790 µg/L	6310 µg/L	60.0	60.0	140	----
		VHw (C6-C10)	----	E581.VH+F1	3790 µg/L	6310 µg/L	60.1	60.0	140	----

CHAIN OF CUSTODY

ALS Laboratory

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Tamara Derkowski		SA	MAY 26/22
DATE/TIME: 26 May 2022 8:30 am	DATE/TIME:	DATE/TIME:	DATE/TIME: 9:65

CLIENT:	Golder Associates Ltd.	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	☐ Standard TAT (List due date): √
PROJECT:	Jackfish NTPC		☐ Non Standard or urgent TAT (List due date):
SITE:			
PURCHASE ORDER NO.:			ALS QUOTE NC YL21-GOLD100-008 (updated in April 2022)
PROJECT MANAGER:	Kathy Qin	CONTACT PH: 587 969 6141	EQuIS facility code: 183527250
SAMPLER:	Tamara Derkowski	SAMPLER MOBILE: 867-446-4757	Project Number: 21482915
EMAIL REPORTS TO:	Kathy_Qin@golder.com; alison_humphries@golder.com; GAL_equis@golder.com		EMAIL INVOICE TO: Laurence_bonin@golder.com; Kathy_Qin@golder.co

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt	7.1	°C	
Other comments			

SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY | SAMPLE DETAILS | MATRIX: Solid(S) Water(W) | CONTAINER INFORMATION | ANALYSIS REQUIRED | Additional Information

SAMPLE	Sample identification (This description will appear on the report)	DATE / TIME (dd-mm-yyyy)	MATRIX	TOTAL CONTAINERS	Standard Parameters Suite	Organics parameter suite									Additional Information: Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc
1	OUTFLOW		W		x										Dissolved parameters
2	NORTHWEST BAY NORTH_Bottom	25 May 2022 14:40	W	13	x	x									field filtered,
3	NORTHWEST BAY NORTH_Mid-depth	25 May 2022 14:30	W	7	x										metals preserved in field
4	MID LAKE 1_ Bottom	25 May 2022 12:50	W	7	x										
5	MID LAKE 1_Mid-depth	25 May 2022 12:40	W	7	x										
6	EMD DISCHARGE INLAKE_Bottom		W		x										
7	EMD DISCHARGE INLAKE_Mid-depth		W		x										
8	SOUTHWEST BAY_Bottom	25 May 2022 11:10	W	7	x										
9	SOUTHWEST BAY_Mid-depth	25 May 2022 11:00	W	7	x										
10	NEAR OUTFLOW INLAKE_Bottom	25 May 2022 10:00	W	13	x	x									
11	NEAR OUTFLOW INLAKE_Mid-depth	25 May 2022 9:45	W	7	x										
12	NORTHWEST BAY NORTH_Bottom_4	25 May 2022 14:50	W	13	x	x									
13	JFLQC_1		W		x	x									
14	JFLQC-2		W		x										
			TOTAL	81											

Environmental Division
Yellowknife
Work Order Reference
YL2200527

Telephone : +1 867 873 5593

Approval Date: 27/04/2013

CERTIFICATE OF ANALYSIS

Work Order	: **YL2200533**	Page	: 1 of 6
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	Account Manager	: Oliver Gregg
Address	: 9 - 4905 48th Street Yellowknife NT Canada X1A 3S3	Address	: 314 Old Airport Road, Unit 116 Yellowknife NT Canada X1A 3T3
Telephone	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 27-May-2022 10:00
PO	: ----	Date Analysis Commenced	: 29-May-2022
C-O-C number	: ----	Issue Date	: 09-Jun-2022 15:54
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 2		
No. of samples analysed	: 2		

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia

General Comments

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

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

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLB	*Detection Limit Raised. Analyte detected at comparable level in Method Blank.*

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	INFLOW TO NW BAY 2	JFLQC-2	----	----	----
				Client sampling date / time	26-May-2022 13:40	26-May-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	YL2200533-001	YL2200533-002	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	55.5	<1.0	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	55.5	<1.0	----	----	----
conductivity	----	E100	2.0	µS/cm	434	<2.0	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	98.6	<0.60	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	107	<0.60	----	----	----
pH	----	E108	0.10	pH units	7.86	5.27	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	272	<10	----	----	----
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	222	<1.0	----	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	----	----	----
turbidity	----	E121	0.10	NTU	<0.10	0.23	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0088	<0.0050	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	78.6	<0.10	----	----	----
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.055	<0.010	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0385	<0.0050	----	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	0.0385	<0.0051	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	----	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L	0.775	<0.030	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0108	<0.0020	----	----	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0092	<0.0020	----	----	----
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	2.40	<0.50	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	26.1	<0.30	----	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	20.0	<0.50	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0164	<0.0030	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00208	<0.00010	----	----	----

Analytical Results

Sub-Matrix: Water

(Matrix: Water)

				Client sample ID	INFLOW TO NW BAY 2	JFLQC-2	----	----	----
				Client sampling date / time	26-May-2022 13:40	26-May-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	YL2200533-001	YL2200533-002	--------	--------	--------
					Result	Result	----	----	----
Total Metals									
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0252	<0.00010	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0143	<0.00010	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.034	<0.010	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	28.1	<0.050	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00143	<0.00050	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.036	<0.010	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0050 DLB	<0.0010	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	9.05	<0.0050	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00875	<0.00010	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000403	<0.000050	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00129	<0.00050	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	3.23	<0.050	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00315	<0.00020	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	1.17	<0.10	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L	45.1	<0.050	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0617	<0.00020	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	10.2	<0.50	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	INFLOW TO NW BAY 2	JFLQC-2	----	----	----
				Client sampling date / time	26-May-2022 13:40	26-May-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	YL2200533-001	YL2200533-002	--------	--------	--------
					Result	Result	----	----	----
Total Metals									
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000201	<0.000010	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0033	<0.0030	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0136	<0.0010	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00219	<0.00010	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0245	<0.00010	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0129	<0.00010	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.035	<0.010	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	26.6	<0.050	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00137	<0.00020	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.032	<0.010	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0044	<0.0010	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	7.81	<0.0050	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00583	<0.00010	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000214	<0.000050	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00130	<0.00050	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	3.32	<0.050	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	INFLOW TO NW BAY 2	JFLQC-2	----	----	----
				Client sampling date / time	26-May-2022 13:40	26-May-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	YL2200533-001	YL2200533-002	--------	--------	--------
					Result	Result	----	----	----
Dissolved Metals									
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00305	<0.00020	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.14	<0.050	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	44.4	<0.050	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0569	<0.00020	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	9.17	<0.50	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000185	<0.000010	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0029	<0.0010	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **YL2200533**	Page	: 1 of 15
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	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	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 27-May-2022 10:00
PO	: ----	Issue Date	: 09-Jun-2022 15:54
C-O-C number	: ----		
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- 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.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Total Metals	QC-MRG2-506300001	----	lithium, total	7439-93-2	E420	0.0011 mg/L MB-LOR	0.001 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	*Description*
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) INFLOW TO NW BAY 2	E298	26-May-2022	06-Jun-2022	----	----		06-Jun-2022	28 days	11 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) JFLQC-2	E298	26-May-2022	06-Jun-2022	----	----		06-Jun-2022	28 days	11 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE INFLOW TO NW BAY 2	E235.Cl-L	26-May-2022	----	----	----		29-May-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE JFLQC-2	E235.Cl-L	26-May-2022	----	----	----		29-May-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE INFLOW TO NW BAY 2	E235.F-L	26-May-2022	----	----	----		29-May-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE JFLQC-2	E235.F-L	26-May-2022	----	----	----		29-May-2022	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE INFLOW TO NW BAY 2	E235.NO3-L	26-May-2022	----	----	----		29-May-2022	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: *Preparation Date*	Extraction / Preparation: Holding Times *Rec*	Extraction / Preparation: Holding Times *Actual*	Extraction / Preparation: *Eval*	Analysis: *Analysis Date*	Analysis: Holding Times *Rec*	Analysis: Holding Times *Actual*	Analysis: *Eval*
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE JFLQC-2	E235.NO3-L	26-May-2022	----	----	----		29-May-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE INFLOW TO NW BAY 2	E235.NO2-L	26-May-2022	----	----	----		29-May-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE JFLQC-2	E235.NO2-L	26-May-2022	----	----	----		29-May-2022	3 days	3 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE INFLOW TO NW BAY 2	E392	26-May-2022	----	----	----		31-May-2022	28 days	5 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE JFLQC-2	E392	26-May-2022	----	----	----		31-May-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE INFLOW TO NW BAY 2	E235.SO4	26-May-2022	----	----	----		29-May-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE JFLQC-2	E235.SO4	26-May-2022	----	----	----		29-May-2022	28 days	3 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) INFLOW TO NW BAY 2	E375-T	26-May-2022	06-Jun-2022	----	----		07-Jun-2022	28 days	12 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) JFLQC-2	E375-T	26-May-2022	06-Jun-2022	----	----		07-Jun-2022	28 days	12 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) INFLOW TO NW BAY 2	E366	26-May-2022	06-Jun-2022	----	----		07-Jun-2022	28 days	12 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) JFLQC-2	E366	26-May-2022	06-Jun-2022	----	----		07-Jun-2022	28 days	12 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) INFLOW TO NW BAY 2	E372-U	26-May-2022	06-Jun-2022	----	----		07-Jun-2022	28 days	12 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) JFLQC-2	E372-U	26-May-2022	06-Jun-2022	----	----		07-Jun-2022	28 days	12 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) INFLOW TO NW BAY 2	E509	26-May-2022	30-May-2022	----	----		30-May-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) JFLQC-2	E509	26-May-2022	30-May-2022	----	----		30-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) INFLOW TO NW BAY 2	E421	26-May-2022	03-Jun-2022	----	----		03-Jun-2022	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) JFLQC-2	E421	26-May-2022	03-Jun-2022	----	----		03-Jun-2022	180 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) INFLOW TO NW BAY 2	E358-L	26-May-2022	06-Jun-2022	----	----		06-Jun-2022	28 days	11 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) JFLQC-2	E358-L	26-May-2022	06-Jun-2022	----	----		06-Jun-2022	28 days	11 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE INFLOW TO NW BAY 2	E290	26-May-2022	----	----	----		30-May-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE JFLQC-2	E290	26-May-2022	----	----	----		30-May-2022	14 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE INFLOW TO NW BAY 2	E100	26-May-2022	----	----	----		30-May-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE JFLQC-2	E100	26-May-2022	----	----	----		30-May-2022	28 days	4 days	✓
Physical Tests : pH by Meter										
HDPE JFLQC-2	E108	26-May-2022	----	----	----		30-May-2022	0.25 hrs	101 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE INFLOW TO NW BAY 2	E108	26-May-2022	----	----	----		30-May-2022	0.25 hrs	97 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE INFLOW TO NW BAY 2	E162	26-May-2022	----	----	----		01-Jun-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE JFLQC-2	E162	26-May-2022	----	----	----		01-Jun-2022	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : TSS by Gravimetry										
HDPE INFLOW TO NW BAY 2	E160	26-May-2022	----	----	----		01-Jun-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE JFLQC-2	E160	26-May-2022	----	----	----		01-Jun-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE INFLOW TO NW BAY 2	E121	26-May-2022	----	----	----		30-May-2022	3 days	4 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE JFLQC-2	E121	26-May-2022	----	----	----		30-May-2022	3 days	4 days	× EHT
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) INFLOW TO NW BAY 2	E508	26-May-2022	----	----	----		03-Jun-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) JFLQC-2	E508	26-May-2022	----	----	----		03-Jun-2022	28 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) INFLOW TO NW BAY 2	E420	26-May-2022	----	----	----		02-Jun-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) JFLQC-2	E420	26-May-2022	----	----	----		02-Jun-2022	180 days	8 days	✓

Legend & Qualifier Definitions

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

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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	503761	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	512271	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	503759	1	2	50.0	5.0	✓
Conductivity in Water	E100	503762	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	504913	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	509268	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	512264	1	15	6.6	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	503758	1	2	50.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	503755	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	503756	1	20	5.0	5.0	✓
pH by Meter	E108	503760	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	506280	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	503757	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	506940	1	19	5.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	512270	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	509477	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	506300	2	20	10.0	5.0	✓
Total Nitrogen by Colourimetry	E366	512265	1	6	16.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	512266	1	14	7.1	5.0	✓
TSS by Gravimetry	E160	506936	1	19	5.2	5.0	✓
Turbidity by Nephelometry	E121	504481	1	16	6.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	503761	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	512271	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	503759	1	2	50.0	5.0	✓
Conductivity in Water	E100	503762	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	504913	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	509268	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	512264	1	15	6.6	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	503758	1	2	50.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	503755	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	503756	1	20	5.0	5.0	✓
pH by Meter	E108	503760	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	506280	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	503757	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	506940	1	19	5.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	512270	1	2	50.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Mercury in Water by CVAAS	E508	509477	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	506300	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	512265	1	6	16.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	512266	1	14	7.1	5.0	✓
TSS by Gravimetry	E160	506936	1	19	5.2	5.0	✓
Turbidity by Nephelometry	E121	504481	1	16	6.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	503761	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	512271	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	503759	1	2	50.0	5.0	✓
Conductivity in Water	E100	503762	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	504913	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	509268	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	512264	1	15	6.6	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	503758	1	2	50.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	503755	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	503756	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	506280	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	503757	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	506940	1	19	5.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	512270	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	509477	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	506300	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	512265	1	6	16.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	512266	1	14	7.1	5.0	✓
TSS by Gravimetry	E160	506936	1	19	5.2	5.0	✓
Turbidity by Nephelometry	E121	504481	1	16	6.2	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	512271	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	503759	1	2	50.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	504913	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	509268	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	512264	1	15	6.6	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	503758	1	2	50.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	503755	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	503756	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	506280	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	503757	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	512270	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	509477	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Total Metals in Water by CRC ICPMS	E420	506300	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	512265	1	6	16.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	512266	1	14	7.1	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
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
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.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 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.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC (Low Level)	E235.Cl-L 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 (Low Level)	E235.F-L 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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Reactive Silica by Colourimetry	E392 Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
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.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples 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*
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.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
TDS in Water (Calculation) Using APHA Analyte List	EC103.APHA Vancouver - Environmental	Water	APHA 1030E	Total DIssolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis).
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).

Preparation Methods	*Method / Lab*	*Matrix*	*Method Reference*	*Method Descriptions*
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.

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 HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **YL2200533**	Page	: 1 of 18
Client	: Golder Associates Ltd.	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	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	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 27-May-2022 10:00
PO	: ----	Date Analysis Commenced	: 29-May-2022
C-O-C number	: ----	Issue Date	: 09-Jun-2022 15:54
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Delson Resende	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Physical Tests (QC Lot: 503760)											
FJ2201342-001	Anonymous	pH	----	E108	0.10	pH units	8.50	8.51	0.106%	4%	----
Physical Tests (QC Lot: 503761)											
FJ2201342-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	255	257	0.859%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	16.2	17.0	4.82%	20%	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	8.1	8.5	0.4	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	271	274	1.10%	20%	----
Physical Tests (QC Lot: 503762)											
FJ2201342-001	Anonymous	conductivity	----	E100	2.0	µS/cm	800	801	0.125%	10%	----
Physical Tests (QC Lot: 504481)											
FJ2201288-001	Anonymous	turbidity	----	E121	0.10	NTU	10.5	11.0	4.82%	15%	----
Physical Tests (QC Lot: 506936)											
FJ2201364-007	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 506940)											
FJ2201364-007	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	1610	1680	4.26%	20%	----
Anions and Nutrients (QC Lot: 503755)											
FJ2201342-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.359	0.356	0.883%	20%	----
Anions and Nutrients (QC Lot: 503756)											
FJ2201342-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 503757)											
FJ2201342-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	189	190	0.377%	20%	----
Anions and Nutrients (QC Lot: 503758)											
YL2200533-001	INFLOW TO NW BAY 2	fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.055	0.055	0.0006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 503759)											
YL2200533-001	INFLOW TO NW BAY 2	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	78.6	77.5	1.39%	20%	----
Anions and Nutrients (QC Lot: 506280)											
YL2200508-005	Anonymous	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	2.92	2.83	0.09	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 512265)											
VA22B1907-001	Anonymous	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.063	0.065	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 512266)											
VA22B1907-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0059	0.0054	0.0004	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Anions and Nutrients (QC Lot: 512270)											
YL2200533-001	INFLOW TO NW BAY 2	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0092	0.0086	0.0006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 512271)											
VA22B1907-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 512264)											
YL2200483-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.31	1.36	0.06	Diff <2x LOR	----
Total Metals (QC Lot: 506300)											
CG2206448-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.446	0.462	3.59%	20%	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.581	0.605	4.03%	20%	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00538	0.00603	11.4%	20%	----
CG2206448-001	Anonymous	antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00028	0.00033	0.00005	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0939	0.0943	0.487%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	0.021 µg/L	0.000026	0.000006	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0458 µg/L	0.0000506	0.0000048	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	69.8	71.7	2.60%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000041	0.000057	0.000015	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.00054	0.00062	0.00007	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.39 µg/L	0.00043	0.00003	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00074	0.00079	0.00004	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000391	0.000422	0.000031	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0061	0.0062	0.00009	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	21.2	21.6	1.61%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0306	0.0309	0.804%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000863	0.000923	6.75%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00091	0.00100	0.00009	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	0.061	0.055	0.006	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.597	0.633	5.74%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00062	0.00078	0.00016	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	11.0 µg/L	0.0112	1.22%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.47	2.63	6.45%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	0.000010	0.0000002	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	1.83	1.83	0.212%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.156	0.160	3.08%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Total Metals (QC Lot: 506300) - continued											
CG2206448-001	Anonymous	sulfur, total	7704-34-9	E420	0.50	mg/L	29.5	29.7	0.504%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000013	0.000015	0.000002	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00110	0.00109	0.440%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00087	0.00103	0.00016	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 509477)											
CG2206687-006	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 504913)											
VA22B1807-004	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 509268)											
YL2200483-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0324	0.0319	1.64%	20%	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00013	0.00013	0.000006	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00012	0.00014	0.00001	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00790	0.00812	2.83%	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	0.032	0.034	0.002	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	12.7	13.0	1.75%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000011	<0.000010	0.000001	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00016	0.00015	0.000005	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00165	0.00164	0.00002	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.055	0.055	0.0002	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000106	0.000103	0.000002	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0016	0.0016	0.000008	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	1.90	1.94	2.08%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00490	0.00489	0.180%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00171	0.00173	0.819%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00308	0.00308	0.000005	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 509268) - continued											
YL2200483-001	Anonymous	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	1.50	1.50	0.0105%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00228	0.00220	3.61%	20%	----
		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	0.564	0.580	2.87%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	0.818	0.810	0.905%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0892	0.0895	0.355%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	5.12	5.60	8.99%	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	<0.000010	<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	0.00152	0.00151	0.00001	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.00033	0.00030	0.00003	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000563	0.000540	4.10%	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	0.0025	0.0026	0.00004	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----

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: 503761)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 503762)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 504481)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 506936)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 506940)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 503755)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 503756)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 503757)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 503758)						
fluoride	16984-48-8	E235.F-L	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 503759)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 506280)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 512265)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 512266)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 512270)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 512271)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 512264)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 506300)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	# 0.0011	MB-LOR
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 506300) - continued						
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 509477)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 504913)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 509268)						
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	----
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 509268) - continued						
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----

Qualifiers

Qualifier	*Description*
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 503760)									
pH	----	E108	----	pH units	7 pH units	99.6	98.0	102	----
Physical Tests (QCLot: 503761)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	86.6	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Physical Tests (QCLot: 503762)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.5	90.0	110	----
Physical Tests (QCLot: 504481)									
turbidity	----	E121	0.1	NTU	200 NTU	92.2	85.0	115	----
Physical Tests (QCLot: 506936)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	100	85.0	115	----
Physical Tests (QCLot: 506940)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	109	85.0	115	----
Anions and Nutrients (QCLot: 503755)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100.0	90.0	110	----
Anions and Nutrients (QCLot: 503756)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	97.6	90.0	110	----
Anions and Nutrients (QCLot: 503757)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 503758)									
fluoride	16984-48-8	E235.F-L	0.01	mg/L	1 mg/L	99.0	90.0	110	----
Anions and Nutrients (QCLot: 503759)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	99.2	90.0	110	----
Anions and Nutrients (QCLot: 506280)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	99.8	85.0	115	----
Anions and Nutrients (QCLot: 512265)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 512266)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	94.3	80.0	120	----
Anions and Nutrients (QCLot: 512270)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	92.1	80.0	120	----
Anions and Nutrients (QCLot: 512271)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	92.5	85.0	115	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 512264)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	104	80.0	120	----
Total Metals (QCLot: 506300)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	107	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	106	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	109	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	95.6	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	91.1	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	103	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	106	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.0	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	110	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	99.7	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	104	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	104	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	95.5	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	96.2	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	100	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	99.6	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	102	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	95.0	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.8	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	99.0	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Total Metals (QCLot: 506300) - continued									
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	100	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	102	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	91.0	80.0	120	----
Total Metals (QCLot: 509477)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	93.1	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	101	80.0	120	----
Dissolved Metals (QCLot: 509268)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	100	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.5	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	96.5	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	106	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	105	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.6	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	98.1	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	96.9	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	95.3	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.5	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	100	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.2	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	98.2	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	105	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	96.7	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	92.8	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Dissolved Metals (QCLot: 509268) - continued									
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	98.2	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	94.8	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	103	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	98.3	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	99.4	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	97.5	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	95.6	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.8	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.9	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	95.5	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	95.6	80.0	120	----

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: 503755)										
FJ2201342-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	12.8 mg/L	12.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 503756)										
FJ2201342-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	2.48 mg/L	2.5 mg/L	99.1	75.0	125	----
Anions and Nutrients (QCLot: 503757)										
FJ2201342-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	493 mg/L	500 mg/L	98.7	75.0	125	----
Anions and Nutrients (QCLot: 503758)										
YL2200533-002	JFLQC-2	fluoride	16984-48-8	E235.F-L	1.03 mg/L	1 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 503759)										
YL2200533-002	JFLQC-2	chloride	16887-00-6	E235.Cl-L	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 506280)										
YL2200508-006	Anonymous	silicate (as SiO2)	7631-86-9	E392	9.14 mg/L	10 mg/L	91.4	75.0	125	----
Anions and Nutrients (QCLot: 512265)										
VA22B1907-002	Anonymous	nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 512266)										
VA22B1907-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0499 mg/L	0.05 mg/L	99.7	70.0	130	----
Anions and Nutrients (QCLot: 512270)										
YL2200533-002	JFLQC-2	phosphorus, total dissolved	7723-14-0	E375-T	0.0468 mg/L	0.05 mg/L	93.5	70.0	130	----
Anions and Nutrients (QCLot: 512271)										
VA22B1907-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.100 mg/L	0.1 mg/L	100	75.0	125	----
Organic / Inorganic Carbon (QCLot: 512264)										
YL2200483-002	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 506300)										
CG2206448-002	Anonymous	aluminum, total	7429-90-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		antimony, total	7440-36-0	E420	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0382 mg/L	0.04 mg/L	95.5	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00900 mg/L	0.01 mg/L	90.0	70.0	130	----
		boron, total	7440-42-8	E420	0.098 mg/L	0.1 mg/L	98.3	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
Total Metals (QCLot: 506300) - continued										
CG2206448-002	Anonymous	cadmium, total	7440-43-9	E420	0.00385 mg/L	0.004 mg/L	96.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00892 mg/L	0.01 mg/L	89.2	70.0	130	----
		chromium, total	7440-47-3	E420	0.0377 mg/L	0.04 mg/L	94.3	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0182 mg/L	0.02 mg/L	91.3	70.0	130	----
		copper, total	7440-50-8	E420	0.0176 mg/L	0.02 mg/L	88.1	70.0	130	----
		iron, total	7439-89-6	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		lead, total	7439-92-1	E420	0.0186 mg/L	0.02 mg/L	93.3	70.0	130	----
		lithium, total	7439-93-2	E420	0.0952 mg/L	0.1 mg/L	95.2	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		nickel, total	7440-02-0	E420	0.0354 mg/L	0.04 mg/L	88.5	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.62 mg/L	10 mg/L	96.2	70.0	130	----
		potassium, total	7440-09-7	E420	3.91 mg/L	4 mg/L	97.8	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0192 mg/L	0.02 mg/L	96.2	70.0	130	----
		selenium, total	7782-49-2	E420	0.0402 mg/L	0.04 mg/L	101	70.0	130	----
		silicon, total	7440-21-3	E420	9.07 mg/L	10 mg/L	90.7	70.0	130	----
		silver, total	7440-22-4	E420	0.00379 mg/L	0.004 mg/L	94.8	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0384 mg/L	0.04 mg/L	96.1	70.0	130	----
		thallium, total	7440-28-0	E420	0.00362 mg/L	0.004 mg/L	90.4	70.0	130	----
		thorium, total	7440-29-1	E420	0.0186 mg/L	0.02 mg/L	93.2	70.0	130	----
		tin, total	7440-31-5	E420	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		titanium, total	7440-32-6	E420	0.0378 mg/L	0.04 mg/L	94.4	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		uranium, total	7440-61-1	E420	0.00374 mg/L	0.004 mg/L	93.6	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0970 mg/L	0.1 mg/L	97.0	70.0	130	----
		zinc, total	7440-66-6	E420	0.372 mg/L	0.4 mg/L	93.0	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0394 mg/L	0.04 mg/L	98.4	70.0	130	----
Total Metals (QCLot: 509477)										
CG2206687-007	Anonymous	mercury, total	7439-97-6	E508	0.0000946 mg/L	0.0001 mg/L	94.6	70.0	130	----
Dissolved Metals (QCLot: 504913)										
VA22B1807-005	Anonymous	mercury, dissolved	7439-97-6	E509	0.000100 mg/L	0.0001 mg/L	100	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: 509268)										
YL2200483-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.191 mg/L	0.2 mg/L	95.6	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0207 mg/L	0.02 mg/L	103	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0435 mg/L	0.04 mg/L	109	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00916 mg/L	0.01 mg/L	91.6	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.111 mg/L	0.1 mg/L	111	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00394 mg/L	0.004 mg/L	98.5	70.0	130	----
		calcium, dissolved	7440-70-2	E421	4.18 mg/L	4 mg/L	104	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.00997 mg/L	0.01 mg/L	99.7	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0384 mg/L	0.04 mg/L	96.1	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0185 mg/L	0.02 mg/L	92.5	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0189 mg/L	0.02 mg/L	94.6	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.93 mg/L	2 mg/L	96.3	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0383 mg/L	0.04 mg/L	95.7	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	9.71 mg/L	10 mg/L	97.1	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.62 mg/L	4 mg/L	90.5	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	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.39 mg/L	10 mg/L	93.9	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00415 mg/L	0.004 mg/L	104	70.0	130	----
		sodium, dissolved	7440-23-5	E421	1.98 mg/L	2 mg/L	98.8	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	19.0 mg/L	20 mg/L	95.0	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0432 mg/L	0.04 mg/L	108	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00404 mg/L	0.004 mg/L	101	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0391 mg/L	0.04 mg/L	97.7	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00394 mg/L	0.004 mg/L	98.6	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0970 mg/L	0.1 mg/L	97.0	70.0	130	----

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: 509268) - continued										
YL2200483-002	Anonymous	zinc, dissolved	7440-66-6	E421	0.385 mg/L	0.4 mg/L	96.3	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0397 mg/L	0.04 mg/L	99.2	70.0	130	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **YL2200829**	Page	: 1 of 7
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	Account Manager	: Oliver Gregg
Address	: 9 - 4905 48th Street Yellowknife NT Canada X1A 3S3	Address	: 314 Old Airport Road, Unit 116 Yellowknife NT Canada X1A 3T3
Telephone	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 06-Jul-2022 10:35
PO	: ----	Date Analysis Commenced	: 11-Jul-2022
C-O-C number	: ----	Issue Date	: 18-Jul-2022 09:37
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 5		
No. of samples analysed	: 5		

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*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Organics, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

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

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

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	JFLQC_1
				Client sampling date / time	05-Jul-2022 13:10	05-Jul-2022 13:00	05-Jul-2022 15:05	05-Jul-2022 15:00	05-Jul-2022 08:45
					YL2200829-001	YL2200829-002	YL2200829-003	YL2200829-004	YL2200829-005
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	112	98.9	107	101	<1.0
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	12.6	6.8	12.4	<1.0
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	6.3	3.4	6.2	<1.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	112	112	113	114	<1.0
conductivity	----	E100	2.0	µS/cm	449	450	449	453	5.2
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	141	143	143	141	<0.60
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	144	144	144	145	<0.60
pH	----	E108	0.10	pH units	8.28	8.72	8.47	8.71	4.95
solids, total dissolved [TDS]	----	E162	10	mg/L	294	273	281	292	<10
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	245	249	248	248	<1.0
solids, total suspended [TSS]	----	E160	3.0	mg/L	7.6	12.8	13.2	18.0	<3.0
turbidity	----	E121	0.10	NTU	7.60	14.6	15.1	19.6	<0.10
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0208	0.0099	0.0157	0.0094	<0.0050
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	59.6	61.3	60.3	60.9	<0.10
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.080	0.081	0.084	0.083	<0.010
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.206 RRV
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	<0.0051	<0.0051	<0.0051	0.206
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L	1.10	1.25	1.32	1.41	<0.030
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0827	0.0851	0.0876	0.0922	<0.0020
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0076	0.0174	0.0216	0.0180	<0.0020
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	12.8	12.4	12.6	12.4	<0.50
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	24.4	25.5	24.7	25.3	<0.30
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	13.0	13.2	12.7	13.0	<0.50
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0036	0.0048	0.0055	0.0046	<0.0030

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-de pth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	JFLQC_1
				Client sampling date / time	05-Jul-2022 13:10	05-Jul-2022 13:00	05-Jul-2022 15:05	05-Jul-2022 15:00	05-Jul-2022 08:45
Analyte	CAS Number	Method	LOR	Unit	YL2200829-001	YL2200829-002	YL2200829-003	YL2200829-004	YL2200829-005
					Result	Result	Result	Result	Result
Total Metals									
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00114	0.00122	0.00119	0.00123	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0705	0.0715	0.0709	0.0707	<0.00010
barium, total	7440-39-3	E420	0.00010	mg/L	0.0323	0.0297	0.0314	0.0297	<0.00010
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	0.029	0.030	0.030	0.030	<0.010
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L	37.2	37.4	37.2	37.7	<0.050
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L	0.00174	0.00204	0.00180	0.00196	<0.00050
iron, total	7439-89-6	E420	0.010	mg/L	0.027	<0.010	0.019	0.010	<0.010
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0065	0.0067	0.0066	0.0067	<0.0010
magnesium, total	7439-95-4	E420	0.0050	mg/L	12.4	12.4	12.5	12.4	<0.0050
manganese, total	7439-96-5	E420	0.00010	mg/L	0.153	0.0185	0.0867	0.0192	<0.00010
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000199	0.000214	0.000215	0.000214	<0.000050
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00060	0.00058	0.00060	0.00066	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.057	<0.050	0.079	0.058	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L	4.29	4.31	4.33	4.30	<0.050
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00273	0.00269	0.00283	0.00259	<0.00020
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000062	0.000057	0.000094	0.000080	<0.000050
silicon, total	7440-21-3	E420	0.10	mg/L	6.58	6.47	6.46	6.45	<0.10
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L	33.1	33.5	33.6	33.0	<0.050
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0899	0.0908	0.0887	0.0907	<0.00020
sulfur, total	7704-34-9	E420	0.50	mg/L	8.73	9.28	9.11	9.36	<0.50
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	JFLQC_1
				Client sampling date / time	05-Jul-2022 13:10	05-Jul-2022 13:00	05-Jul-2022 15:05	05-Jul-2022 15:00	05-Jul-2022 08:45
Analyte	CAS Number	Method	LOR	Unit	YL2200829-001	YL2200829-002	YL2200829-003	YL2200829-004	YL2200829-005
					Result	Result	Result	Result	Result
Total Metals									
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000579	0.000586	0.000547	0.000569	<0.000010
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0014	0.0020	0.0015	0.0017	<0.0010
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00121	0.00129	0.00126	0.00128	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0725	0.0734	0.0736	0.0724	<0.00010
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0326	0.0300	0.0326	0.0307	<0.00010
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<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	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.027	0.026	0.028	0.027	<0.010
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L	35.6	35.8	36.5	35.5	<0.050
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00144	0.00182	0.00142	0.00174	<0.00020
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0061	0.0061	0.0062	0.0061	<0.0010
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	12.7	13.0	12.6	12.7	<0.0050
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.102	0.00263	0.0777	0.00248	<0.00010
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000188	0.000205	0.000184	0.000188	<0.000050

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	JFLQC_1
				Client sampling date / time	05-Jul-2022 13:10	05-Jul-2022 13:00	05-Jul-2022 15:05	05-Jul-2022 15:00	05-Jul-2022 08:45
					YL2200829-001	YL2200829-002	YL2200829-003	YL2200829-004	YL2200829-005
					Result	Result	Result	Result	Result
Dissolved Metals									
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.15	4.25	4.21	4.22	<0.050
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00255	0.00268	0.00259	0.00281	<0.00020
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	0.000056	0.000051	0.000057	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.39	6.27	6.44	6.07	<0.050
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L	33.4	34.0	34.1	33.0	<0.050
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0924	0.0909	0.0922	0.0909	<0.00020
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	8.52	8.82	8.75	8.61	<0.50
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<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	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000491	0.000546	0.000480	0.000525	<0.000010
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	0.0012	0.0014	<0.0010	<0.0010
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	----	----	----	----	<5.0
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.50	µg/L	----	----	----	----	<0.50
ethylbenzene	100-41-4	E611A	0.50	µg/L	----	----	----	----	<0.50
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	----	----	----	----	<0.50
styrene	100-42-5	E611A	0.50	µg/L	----	----	----	----	<0.50
toluene	108-88-3	E611A	0.50	µg/L	----	----	----	----	<0.50

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	EMD DISCHARGE INLAKE_Bottom	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	JFLQC_1
				Client sampling date / time	05-Jul-2022 13:10	05-Jul-2022 13:00	05-Jul-2022 15:05	05-Jul-2022 15:00	05-Jul-2022 08:45
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**YL2200829-001**	**YL2200829-002**	**YL2200829-003**	**YL2200829-004**	**YL2200829-005**
					Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]									
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	----	----	----	----	<0.40
xylene, o-	95-47-6	E611A	0.30	µg/L	----	----	----	----	<0.30
xylenes, total	1330-20-7	E611A	0.50	µg/L	----	----	----	----	<0.50
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	----	----	----	----	94.3
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	----	----	----	----	102
Hydrocarbons									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	----	----	----	----	<100
F2 (C10-C16)	----	E601	300	µg/L	----	----	----	----	<300
F3 (C16-C34)	----	E601	300	µg/L	----	----	----	----	<300
F4 (C34-C50)	----	E601	300	µg/L	----	----	----	----	<300
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	----	----	----	----	<100
F1-BTEX	----	EC580	100	µg/L	----	----	----	----	<100
VPHw	----	EC580A	100	µg/L	----	----	----	----	<100
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	----	----	----	----	83.7
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	----	----	----	----	107

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

ALS Environmental

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **YL2200829**	Page	: 1 of 23
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	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	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 06-Jul-2022 10:35
PO	: ----	Issue Date	: 18-Jul-2022 09:37
C-O-C number	: ----		
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) JFLQC_1	E567	05-Jul-2022	13-Jul-2022	28 days	8 days	✓	13-Jul-2022	40 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E298	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E298	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) JFLQC_1	E298	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Bottom	E298	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Mid-depth	E298	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.Cl-L	05-Jul-2022	----	----	----		11-Jul-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.Cl-L	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE JFLQC_1	E235.Cl-L	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.Cl-L	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.Cl-L	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.F-L	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.F-L	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE JFLQC_1	E235.F-L	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.F-L	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.F-L	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times Rec*	*Holding Times Actual*	*Eval*	*Analysis Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.NO3-L	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.NO3-L	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE JFLQC_1	E235.NO3-L	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.NO3-L	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.NO3-L	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.NO2-L	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.NO2-L	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE JFLQC_1	E235.NO2-L	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.NO2-L	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.NO2-L	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE EMD DISCHARGE INLAKE_Bottom	E392	05-Jul-2022	----	----	----		12-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E392	05-Jul-2022	----	----	----		12-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE JFLQC_1	E392	05-Jul-2022	----	----	----		12-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE SOUTHWEST BAY_Bottom	E392	05-Jul-2022	----	----	----		12-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE SOUTHWEST BAY_Mid-depth	E392	05-Jul-2022	----	----	----		12-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.SO4	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.SO4	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE JFLQC_1	E235.SO4	05-Jul-2022	----	----	----		11-Jul-2022	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: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE SOUTHWEST BAY_Bottom	E235.SO4	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SOUTHWEST BAY_Mid-depth	E235.SO4	05-Jul-2022	----	----	----		11-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E375-T	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E375-T	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Bottom	E375-T	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Mid-depth	E375-T	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) JFLQC_1	E375-T	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E366	05-Jul-2022	12-Jul-2022	----	----		14-Jul-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E366	05-Jul-2022	12-Jul-2022	----	----		14-Jul-2022	28 days	9 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) JFLQC_1	E366	05-Jul-2022	12-Jul-2022	----	----		14-Jul-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Bottom	E366	05-Jul-2022	12-Jul-2022	----	----		14-Jul-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Mid-depth	E366	05-Jul-2022	12-Jul-2022	----	----		14-Jul-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E372-U	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E372-U	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) JFLQC_1	E372-U	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Bottom	E372-U	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Mid-depth	E372-U	05-Jul-2022	12-Jul-2022	----	----		13-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EMD DISCHARGE INLAKE_Bottom	E509	05-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EMD DISCHARGE INLAKE_Mid-depth	E509	05-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) JFLQC_1	E509	05-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) SOUTHWEST BAY_Bottom	E509	05-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) SOUTHWEST BAY_Mid-depth	E509	05-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) EMD DISCHARGE INLAKE_Bottom	E421	05-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) EMD DISCHARGE INLAKE_Mid-depth	E421	05-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) JFLQC_1	E421	05-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SOUTHWEST BAY_Bottom	E421	05-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SOUTHWEST BAY_Mid-depth	E421	05-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 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 Rec*	*Holding Times Actual*	*Eval*	*Analysis Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) JFLQC_1	E601	05-Jul-2022	12-Jul-2022	14 days	7 days	✓	13-Jul-2022	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) JFLQC_1	E581.VH+F1	05-Jul-2022	14-Jul-2022	----	----		15-Jul-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E358-L	05-Jul-2022	12-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E358-L	05-Jul-2022	12-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Bottom	E358-L	05-Jul-2022	12-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Mid-depth	E358-L	05-Jul-2022	12-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) JFLQC_1	E358-L	05-Jul-2022	12-Jul-2022	----	----		14-Jul-2022	28 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EMD DISCHARGE INLAKE_Bottom	E290	05-Jul-2022	----	----	----		12-Jul-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E290	05-Jul-2022	----	----	----		12-Jul-2022	14 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : Alkalinity Species by Titration										
HDPE JFLQC_1	E290	05-Jul-2022	----	----	----		12-Jul-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SOUTHWEST BAY_Bottom	E290	05-Jul-2022	----	----	----		12-Jul-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SOUTHWEST BAY_Mid-depth	E290	05-Jul-2022	----	----	----		12-Jul-2022	14 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE EMD DISCHARGE INLAKE_Bottom	E100	05-Jul-2022	----	----	----		12-Jul-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E100	05-Jul-2022	----	----	----		12-Jul-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE JFLQC_1	E100	05-Jul-2022	----	----	----		12-Jul-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE SOUTHWEST BAY_Bottom	E100	05-Jul-2022	----	----	----		12-Jul-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE SOUTHWEST BAY_Mid-depth	E100	05-Jul-2022	----	----	----		12-Jul-2022	28 days	7 days	✓
Physical Tests : pH by Meter										
HDPE SOUTHWEST BAY_Bottom	E108	05-Jul-2022	----	----	----		12-Jul-2022	0.25 hrs	170 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE SOUTHWEST BAY_Mid-depth	E108	05-Jul-2022	----	----	----		12-Jul-2022	0.25 hrs	170 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EMD DISCHARGE INLAKE_Bottom	E108	05-Jul-2022	----	----	----		12-Jul-2022	0.25 hrs	172 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E108	05-Jul-2022	----	----	----		12-Jul-2022	0.25 hrs	172 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE JFLQC_1	E108	05-Jul-2022	----	----	----		12-Jul-2022	0.25 hrs	177 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE EMD DISCHARGE INLAKE_Bottom	E162	05-Jul-2022	----	----	----		12-Jul-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E162	05-Jul-2022	----	----	----		12-Jul-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE JFLQC_1	E162	05-Jul-2022	----	----	----		12-Jul-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SOUTHWEST BAY_Bottom	E162	05-Jul-2022	----	----	----		12-Jul-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SOUTHWEST BAY_Mid-depth	E162	05-Jul-2022	----	----	----		12-Jul-2022	7 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : TSS by Gravimetry										
HDPE										
EMD DISCHARGE INLAKE_Bottom	E160	05-Jul-2022	----	----	----		12-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
EMD DISCHARGE INLAKE_Mid-depth	E160	05-Jul-2022	----	----	----		12-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
JFLQC_1	E160	05-Jul-2022	----	----	----		12-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SOUTHWEST BAY_Bottom	E160	05-Jul-2022	----	----	----		12-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SOUTHWEST BAY_Mid-depth	E160	05-Jul-2022	----	----	----		12-Jul-2022	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
EMD DISCHARGE INLAKE_Bottom	E121	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	✘ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE										
EMD DISCHARGE INLAKE_Mid-depth	E121	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	✘ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE										
JFLQC_1	E121	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	✘ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE										
SOUTHWEST BAY_Bottom	E121	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	✘ EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE SOUTHWEST BAY_Mid-depth	E121	05-Jul-2022	----	----	----		11-Jul-2022	3 days	6 days	× EHT
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) EMD DISCHARGE INLAKE_Bottom	E508	05-Jul-2022	----	----	----		13-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) EMD DISCHARGE INLAKE_Mid-depth	E508	05-Jul-2022	----	----	----		13-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) JFLQC_1	E508	05-Jul-2022	----	----	----		13-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SOUTHWEST BAY_Bottom	E508	05-Jul-2022	----	----	----		13-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SOUTHWEST BAY_Mid-depth	E508	05-Jul-2022	----	----	----		13-Jul-2022	28 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) EMD DISCHARGE INLAKE_Bottom	E420	05-Jul-2022	----	----	----		12-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) EMD DISCHARGE INLAKE_Mid-depth	E420	05-Jul-2022	----	----	----		12-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) JFLQC_1	E420	05-Jul-2022	----	----	----		12-Jul-2022	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SOUTHWEST BAY_Bottom	E420	05-Jul-2022	----	----	----		12-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SOUTHWEST BAY_Mid-depth	E420	05-Jul-2022	----	----	----		12-Jul-2022	180 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) JFLQC_1	E611A	05-Jul-2022	14-Jul-2022	----	----		15-Jul-2022	14 days	9 days	✓

Legend & Qualifier Definitions

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

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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	557181	1	10	10.0	5.0	✓
Ammonia by Fluorescence	E298	559434	1	19	5.2	5.0	✓
BTEX by Headspace GC-MS	E611A	563359	1	18	5.5	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	557178	1	5	20.0	5.0	✓
Conductivity in Water	E100	557180	1	11	9.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	559625	1	11	9.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	558237	1	15	6.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	559435	1	13	7.6	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	557177	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	557173	1	8	12.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	557174	1	8	12.5	5.0	✓
pH by Meter	E108	557179	1	16	6.2	5.0	✓
Reactive Silica by Colourimetry	E392	559494	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	557171	1	11	9.0	5.0	✓
TDS by Gravimetry	E162	559164	1	9	11.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	559433	1	19	5.2	5.0	✓
Total Mercury in Water by CVAAS	E508	559907	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	557112	1	6	16.6	5.0	✓
Total Nitrogen by Colourimetry	E366	559431	1	19	5.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	559432	1	19	5.2	5.0	✓
TSS by Gravimetry	E160	559152	1	9	11.1	5.0	✓
Turbidity by Nephelometry	E121	557274	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	563360	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	557181	1	10	10.0	5.0	✓
Ammonia by Fluorescence	E298	559434	1	19	5.2	5.0	✓
BTEX by Headspace GC-MS	E611A	563359	1	18	5.5	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	558679	1	5	20.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	557178	1	5	20.0	5.0	✓
Conductivity in Water	E100	557180	1	11	9.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	559625	1	11	9.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	558237	1	15	6.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	559435	1	13	7.6	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	557177	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	557173	1	8	12.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	557174	1	8	12.5	5.0	✓
Oil & Grease by Gravimetry	E567	560264	1	10	10.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
pH by Meter	E108	557179	1	16	6.2	5.0	✓
Reactive Silica by Colourimetry	E392	559494	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	557171	1	11	9.0	5.0	✓
TDS by Gravimetry	E162	559164	1	9	11.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	559433	1	19	5.2	5.0	✓
Total Mercury in Water by CVAAS	E508	559907	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	557112	1	6	16.6	5.0	✓
Total Nitrogen by Colourimetry	E366	559431	1	19	5.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	559432	1	19	5.2	5.0	✓
TSS by Gravimetry	E160	559152	1	9	11.1	5.0	✓
Turbidity by Nephelometry	E121	557274	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	563360	1	13	7.6	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	557181	1	10	10.0	5.0	✓
Ammonia by Fluorescence	E298	559434	1	19	5.2	5.0	✓
BTEX by Headspace GC-MS	E611A	563359	1	18	5.5	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	558679	1	5	20.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	557178	1	5	20.0	5.0	✓
Conductivity in Water	E100	557180	1	11	9.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	559625	1	11	9.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	558237	1	15	6.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	559435	1	13	7.6	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	557177	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	557173	1	8	12.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	557174	1	8	12.5	5.0	✓
Oil & Grease by Gravimetry	E567	560264	1	10	10.0	5.0	✓
Reactive Silica by Colourimetry	E392	559494	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	557171	1	11	9.0	5.0	✓
TDS by Gravimetry	E162	559164	1	9	11.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	559433	1	19	5.2	5.0	✓
Total Mercury in Water by CVAAS	E508	559907	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	557112	1	6	16.6	5.0	✓
Total Nitrogen by Colourimetry	E366	559431	1	19	5.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	559432	1	19	5.2	5.0	✓
TSS by Gravimetry	E160	559152	1	9	11.1	5.0	✓
Turbidity by Nephelometry	E121	557274	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	563360	1	13	7.6	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	559434	1	19	5.2	5.0	✓
BTEX by Headspace GC-MS	E611A	563359	1	18	5.5	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Chloride in Water by IC (Low Level)	E235.Cl-L	557178	1	5	20.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	559625	1	11	9.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	558237	1	15	6.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	559435	1	13	7.6	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	557177	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	557173	1	8	12.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	557174	1	8	12.5	5.0	✓
Reactive Silica by Colourimetry	E392	559494	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	557171	1	11	9.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	559433	1	19	5.2	5.0	✓
Total Mercury in Water by CVAAS	E508	559907	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	557112	1	6	16.6	5.0	✓
Total Nitrogen by Colourimetry	E366	559431	1	19	5.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	559432	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	563360	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
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
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.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 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.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC (Low Level)	E235.Cl-L 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 (Low Level)	E235.F-L 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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Reactive Silica by Colourimetry	E392 Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
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.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples 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
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.
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 PHCs - F2-F4 by GC-FID	E601 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4).
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 CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
TDS in Water (Calculation) Using APHA Analyte List	EC103.APHA Vancouver - Environmental	Water	APHA 1030E	Total DIssolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis).
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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
Oil & Grease Extraction for Gravimetry	EP567 Vancouver - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **YL2200829**	Page	: 1 of 19
Client	: Golder Associates Ltd.	Laboratory	: Yellowknife - Environmental
Contact	: Sarah Beattie	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	: 867 873 6319	Telephone	: 1 867 446 5593
Project	: Jackfish NTPC	Date Samples Received	: 06-Jul-2022 10:35
PO	: ----	Date Analysis Commenced	: 11-Jul-2022
C-O-C number	: ----	Issue Date	: 18-Jul-2022 09:37
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Delson Resende	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
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Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Organics, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 557179)											
WR2200665-022	Anonymous	pH	----	E108	0.10	pH units	7.42	7.44	0.269%	4%	----
Physical Tests (QC Lot: 557180)											
WR2200665-022	Anonymous	conductivity	----	E100	1.0	µS/cm	55.7	54.9	1.45%	10%	----
Physical Tests (QC Lot: 557181)											
WR2200665-022	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	23.1	23.2	0.432%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	23.1	23.2	0.432%	20%	----
Physical Tests (QC Lot: 557274)											
FJ2201783-001	Anonymous	turbidity	----	E121	0.10	NTU	1.25	1.25	0	Diff <2x LOR	----
Physical Tests (QC Lot: 559152)											
VA22B5689-012	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 559164)											
VA22B5689-012	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	2240	2360	5.47%	20%	----
Anions and Nutrients (QC Lot: 557171)											
WR2200665-022	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	3.28	3.23	1.71%	20%	----
Anions and Nutrients (QC Lot: 557173)											
WR2200665-022	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 557174)											
WR2200665-022	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: 557177)											
YL2200829-001	EMD DISCHARGE INLAKE_Bottom	fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.080	0.078	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 557178)											
YL2200829-001	EMD DISCHARGE INLAKE_Bottom	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	59.6	59.6	0.0796%	20%	----
Anions and Nutrients (QC Lot: 559431)											
FJ2201799-001	Anonymous	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.132	0.130	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 559432)											
FJ2201799-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0107	0.0108	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 559433)											

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 559433) - continued											
FJ2201799-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 559434)											
FJ2201799-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 559494)											
YL2200819-003	Anonymous	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 559435)											
VA22B5135-002	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	4.54	4.84	0.30	Diff <2x LOR	----
Total Metals (QC Lot: 557112)											
KS2202425-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0034	<0.0030	0.0004	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00669	0.00670	0.137%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0373	0.0371	0.531%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.013	0.013	0.00005	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000213	0.0000151	0.0000062	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	46.8	46.0	1.80%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000014	0.000014	0.000000002	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00101	0.00100	0.000009	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.060	0.062	0.001	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0047	0.0047	0.00006	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	23.1	23.6	2.21%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0977	0.101	3.02%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00325	0.00322	1.19%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	3.34	3.40	1.67%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00375	0.00398	6.02%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	15.9	16.1	1.29%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	14.4	14.7	1.84%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 557112) - continued											
KS2202425-001	Anonymous	strontium, total	7440-24-6	E420	0.00020	mg/L	0.437	0.437	0.0586%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	9.54	10.1	5.51%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00060	0.00059	0.00001	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000202	0.000206	1.83%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00158	0.00157	0.000008	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 559907)											
YL2200819-006	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 558237)											
YL2200829-001	EMD DISCHARGE INLAKE_Bottom	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0014	0.0015	0.00007	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00121	0.00119	1.63%	20%	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0725	0.0713	1.68%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0326	0.0327	0.316%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	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	0.027	0.027	0.0004	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	35.6	35.6	0.246%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00144	0.00140	0.00004	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		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	0.0061	0.0060	0.00009	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	12.7	12.5	1.50%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.102	0.0973	4.54%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000188	0.000188	0.000000005	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	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: 558237) - continued											
YL2200829-001	EMD DISCHARGE INLAKE_Bottom	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	4.15	4.10	1.28%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00255	0.00246	3.75%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	0.000059	0.000009	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.39	6.24	2.44%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	33.4	32.6	2.40%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0924	0.0886	4.12%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	8.52	8.72	2.32%	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	<0.000010	<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	0.000491	0.000480	2.22%	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	<0.0010	<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: 559625)											
VA22B5583-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 563359)											
WR2200653-001	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: 563360)											
YL2200819-001	Anonymous	F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<0.10 mg/L	<100	0.0%	30%	----
		VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<0.10 mg/L	<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: 557180)						
conductivity	----	E100	1	μS/cm	1.4	----
Physical Tests (QCLot: 557181)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	1.1	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	1.1	----
Physical Tests (QCLot: 557274)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 559152)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 559164)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 557171)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 557173)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 557174)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 557177)						
fluoride	16984-48-8	E235.F-L	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 557178)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 559431)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 559432)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 559433)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 559434)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 559494)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 559435)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 557112)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 557112) - continued						
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 559907)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 558237)						
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	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 558237) - continued						
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: 559625)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 560264)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 563359)						
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: 558679)						
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: 563360)						
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
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	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 557179)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 557180)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.2	90.0	110	----
Physical Tests (QCLot: 557181)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	91.8	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Physical Tests (QCLot: 557274)									
turbidity	----	E121	0.1	NTU	200 NTU	96.5	85.0	115	----
Physical Tests (QCLot: 559152)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	108	85.0	115	----
Physical Tests (QCLot: 559164)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 557171)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 557173)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 557174)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 557177)									
fluoride	16984-48-8	E235.F-L	0.01	mg/L	1 mg/L	99.0	90.0	110	----
Anions and Nutrients (QCLot: 557178)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 559431)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 559432)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.3	80.0	120	----
Anions and Nutrients (QCLot: 559433)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	93.3	80.0	120	----
Anions and Nutrients (QCLot: 559434)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.3	85.0	115	----
Anions and Nutrients (QCLot: 559494)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	102	85.0	115	----

Sub-Matrix: **Water**

Laboratory Control Sample (LCS) Report

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Organic / Inorganic Carbon (QCLot: 559435)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	98.8	80.0	120	----
Total Metals (QCLot: 557112)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	99.8	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	96.7	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	97.0	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	99.3	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	95.7	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	98.6	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	99.2	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.9	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.3	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.0	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	96.8	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.4	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	109	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	107	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	95.4	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	98.2	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	92.7	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	100	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	92.8	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	96.0	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	97.5	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 557112) - continued									
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	103	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	99.9	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	101	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	92.7	80.0	120	----
Total Metals (QCLot: 559907)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	91.4	80.0	120	----
Dissolved Metals (QCLot: 558237)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	106	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	90.2	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	92.8	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	90.6	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.3	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	97.7	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	116	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	97.5	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	98.9	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	106	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.0	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	101	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	97.4	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	108	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	95.9	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	107	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	105	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Dissolved Metals (QCLot: 558237) - continued									
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	96.0	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	98.8	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.8	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	90.6	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.0	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	92.3	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	96.0	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	97.0	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	97.9	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	96.5	80.0	120	----
Aggregate Organics (QCLot: 560264)									
oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	99.7	70.0	130	----
Volatile Organic Compounds (QCLot: 563359)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	108	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	113	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	112	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	118	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	113	70.0	130	----
Hydrocarbons (QCLot: 558679)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	107	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	98.1	70.0	130	----
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	114	70.0	130	----
Hydrocarbons (QCLot: 563360)									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	83.6	70.0	130	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	83.4	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: 557171)										
WR2200665-024	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1010 mg/L	1000 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 557173)										
WR2200665-024	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	25.5 mg/L	25 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 557174)										
WR2200665-024	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	5.02 mg/L	5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 557177)										
YL2200829-002	EMD DISCHARGE INLAKE_Mid-depth	fluoride	16984-48-8	E235.F-L	1.07 mg/L	1 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 557178)										
YL2200829-002	EMD DISCHARGE INLAKE_Mid-depth	chloride	16887-00-6	E235.Cl-L	108 mg/L	100 mg/L	108	75.0	125	----
Anions and Nutrients (QCLot: 559431)										
FJ2201799-002	Anonymous	nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 559432)										
FJ2201799-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0480 mg/L	0.05 mg/L	95.9	70.0	130	----
Anions and Nutrients (QCLot: 559433)										
FJ2201799-002	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0482 mg/L	0.05 mg/L	96.4	70.0	130	----
Anions and Nutrients (QCLot: 559434)										
FJ2201799-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.103 mg/L	0.1 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 559494)										
YL2200821-001	Anonymous	silicate (as SiO2)	7631-86-9	E392	10.1 mg/L	10 mg/L	101	75.0	125	----
Organic / Inorganic Carbon (QCLot: 559435)										
VA22B5135-006	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 557112)										
YL2200829-001	EMD DISCHARGE INLAKE_Bottom	aluminum, total	7429-90-5	E420	0.199 mg/L	0.2 mg/L	99.6	70.0	130	----
		antimony, total	7440-36-0	E420	0.0192 mg/L	0.02 mg/L	96.2	70.0	130	----
		arsenic, total	7440-38-2	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0393 mg/L	0.04 mg/L	98.3	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00938 mg/L	0.01 mg/L	93.8	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 557112) - continued										
YL2200829-001	EMD DISCHARGE INLAKE_Bottom	boron, total	7440-42-8	E420	0.098 mg/L	0.1 mg/L	97.8	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00391 mg/L	0.004 mg/L	97.7	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00961 mg/L	0.01 mg/L	96.1	70.0	130	----
		chromium, total	7440-47-3	E420	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0196 mg/L	0.02 mg/L	97.9	70.0	130	----
		copper, total	7440-50-8	E420	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		iron, total	7439-89-6	E420	1.94 mg/L	2 mg/L	96.9	70.0	130	----
		lead, total	7439-92-1	E420	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		lithium, total	7439-93-2	E420	0.0958 mg/L	0.1 mg/L	95.8	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0199 mg/L	0.02 mg/L	99.6	70.0	130	----
		nickel, total	7440-02-0	E420	0.0383 mg/L	0.04 mg/L	95.8	70.0	130	----
		phosphorus, total	7723-14-0	E420	11.2 mg/L	10 mg/L	112	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		selenium, total	7782-49-2	E420	0.0416 mg/L	0.04 mg/L	104	70.0	130	----
		silicon, total	7440-21-3	E420	9.92 mg/L	10 mg/L	99.2	70.0	130	----
		silver, total	7440-22-4	E420	0.00387 mg/L	0.004 mg/L	96.7	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	20.5 mg/L	20 mg/L	102	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		thallium, total	7440-28-0	E420	0.00377 mg/L	0.004 mg/L	94.2	70.0	130	----
		thorium, total	7440-29-1	E420	0.0183 mg/L	0.02 mg/L	91.6	70.0	130	----
		tin, total	7440-31-5	E420	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		titanium, total	7440-32-6	E420	0.0394 mg/L	0.04 mg/L	98.4	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		uranium, total	7440-61-1	E420	0.00397 mg/L	0.004 mg/L	99.3	70.0	130	----
		vanadium, total	7440-62-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		zinc, total	7440-66-6	E420	0.388 mg/L	0.4 mg/L	97.1	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
Total Metals (QCLot: 559907)										
YL2200819-007	Anonymous	mercury, total	7439-97-6	E508	0.0000892 mg/L	0.0001 mg/L	89.2	70.0	130	----
Dissolved Metals (QCLot: 558237)										

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 558237) - continued										
YL2200829-002	EMD DISCHARGE INLAKE_Mid-depth	aluminum, dissolved	7429-90-5	E421	0.205 mg/L	0.2 mg/L	103	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	ND mg/L	0.02 mg/L	ND	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0376 mg/L	0.04 mg/L	93.9	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00865 mg/L	0.01 mg/L	86.5	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.087 mg/L	0.1 mg/L	87.0	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00412 mg/L	0.004 mg/L	103	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	0.00961 mg/L	0.01 mg/L	96.1	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		iron, dissolved	7439-89-6	E421	2.00 mg/L	2 mg/L	100.0	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0187 mg/L	0.02 mg/L	93.5	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0983 mg/L	0.1 mg/L	98.3	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	0.0205 mg/L	0.02 mg/L	103	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.7 mg/L	10 mg/L	107	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0410 mg/L	0.04 mg/L	103	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.72 mg/L	10 mg/L	97.2	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00371 mg/L	0.004 mg/L	92.7	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	20.8 mg/L	20 mg/L	104	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0392 mg/L	0.04 mg/L	98.0	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00352 mg/L	0.004 mg/L	88.0	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0167 mg/L	0.02 mg/L	83.5	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0397 mg/L	0.04 mg/L	99.3	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0186 mg/L	0.02 mg/L	92.8	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00374 mg/L	0.004 mg/L	93.4	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.104 mg/L	0.1 mg/L	104	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: 558237) - continued										
YL2200829-002	EMD DISCHARGE INLAKE_Mid-depth	zinc, dissolved	7440-66-6	E421	0.384 mg/L	0.4 mg/L	96.1	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
Dissolved Metals (QCLot: 559625)										
VA22B5583-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000973 mg/L	0.0001 mg/L	97.3	70.0	130	----
Volatile Organic Compounds (QCLot: 563359)										
WR2200653-001	Anonymous	benzene	71-43-2	E611A	98.8 µg/L	100 µg/L	98.8	60.0	140	----
		ethylbenzene	100-41-4	E611A	97.7 µg/L	100 µg/L	97.7	60.0	140	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	99.7 µg/L	100 µg/L	99.7	60.0	140	----
		styrene	100-42-5	E611A	95.9 µg/L	100 µg/L	95.9	60.0	140	----
		toluene	108-88-3	E611A	98.0 µg/L	100 µg/L	98.0	60.0	140	----
		xylene, m+p-	179601-23-1	E611A	203 µg/L	200 µg/L	101	60.0	140	----
		xylene, o-	95-47-6	E611A	99.1 µg/L	100 µg/L	99.1	60.0	140	----
Hydrocarbons (QCLot: 563360)										
YL2200819-002	Anonymous	F1 (C6-C10)	----	E581.VH+F1	4560 µg/L	6310 µg/L	72.2	60.0	140	----
		VHw (C6-C10)	----	E581.VH+F1	4560 µg/L	6310 µg/L	72.2	60.0	140	----

CHAIN OF CUSTODY ALS Laboratory	RELINQUISHED BY: Tamara Derkowski DATE/TIME: 6 July 2022 8:00	RECEIVED BY: [signature] DATE/TIME: July 6/22 10:35	RELINQUISHED BY: DATE/TIME: · RECEIVED BY: DATE/TIME:

CLIENT:	Golder Associates Ltd.
PROJECT:	Jackfish NTPC
SITE:	
PURCHASE ORDER NO.:	
PROJECT MANAGER:	Kathy Qin — CONTACT PH: 587-969-6141
SAMPLER:	Tamara Derkowski — SAMPLER MOBILE: 867-446-4757
EMAIL REPORTS TO:	Kathy_Qin@golder.com; alison_humphries@golder.com; GAL_equis@golder.com

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)

- ☐ Standard TAT (List due date): ✓
- ☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO YL21-GOLD100-008 (updated in April 2022)
EQuIS facility code: 183527250
Project Number: 21482915
EMAIL INVOICE TO: Laurence_bonin@golder.com; Kathy_Qin@golder.co

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt	5.5	°C	
Other comments:			

SPECIAL HANDLING/STORAGE OR DISPOSAL:

SAMPLE (ALS USE ONLY)	Sample identification (This description will appear on the report)	DATE / TIME (dd-mm-yyyy)	MATRIX (Solid(S) Water(W))	TOTAL CONTAINERS	Standard Parameters Suite	Organics parameter suite	Additional Information (Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc)
~~1~~	~~OUTFLOW~~		~~W~~		~~X~~		All dissolved parameters field
~~2~~	~~INFLOW TO NW BAY 1~~		~~W~~		~~X~~		filtered; metals
~~3~~	~~INFLOW TO NW BAY 2~~		~~W~~		~~X~~		preserved in field
~~4~~	~~NORTHWEST BAY NORTH_Bottom~~		~~W~~		~~X~~	~~X~~	
~~5~~	~~NORTHWEST BAY NORTH_Mid-depth~~		~~W~~		~~X~~		
~~6~~	~~MID LAKE 1_ Bottom~~		~~W~~		~~X~~		
~~7~~	~~MID LAKE 1_Mid-depth~~		~~W~~		~~X~~		
8	EMD DISCHARGE INLAKE_Bottom	5 July 2022 13:10	W	7	X		
9	EMD DISCHARGE INLAKE_Mid-depth	5 July 2022 13:00	W	7	X		
10	SOUTHWEST BAY_Bottom	5 July 2022 15:05	W	7	X		
11	SOUTHWEST BAY_Mid-depth	5 July 2022 15:00	W	7	X		
~~12~~	~~NEAR OUTFLOW INLAKE_Bottom~~		~~W~~		~~X~~	~~X~~	
~~13~~	~~NEAR OUTFLOW INLAKE_Mid-depth~~		~~W~~		~~X~~		
~~14~~	~~NEAR OUTFLOW INLAKE_Bottom_4~~		~~W~~		~~X~~	~~X~~	
15	JFLQC_1	5 July 2022 8:45	W	13	X	X	
~~16~~	~~JFLQC-3~~		~~W~~		~~X~~		
			TOTAL	41			

Environmental Division
Yellowknife
Work Order Reference
YL2200829

Telephone : +1 867 873 5593

[illegible]

[illegible]

CERTIFICATE OF ANALYSIS

Work Order	: **YL2200852**	Page	: 1 of 12
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Kathy Qin	Account Manager	: Oliver Gregg
Address	: 9 - 4905 48th Street Yellowknife NT Canada X1A 3S3	Address	: 314 Old Airport Road, Unit 116 Yellowknife NT Canada X1A 3T3
Telephone	: ----	Telephone	: 1 867 446 5593
Project	: 21482915	Date Samples Received	: 07-Jul-2022 10:05
PO	: ----	Date Analysis Commenced	: 12-Jul-2022
C-O-C number	: ----	Issue Date	: 20-Jul-2022 16:34
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 10		
No. of samples analysed	: 10		

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*
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Hamideh Moradi	Analyst	Metals, Burnaby, British Columbia
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Owen Cheng		Metals, Burnaby, British Columbia

General Comments

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

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

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Outflow	Inflow to NW Bay 2	Northwest Bay North_Bottom	Northwest Bay North_Mid-Depth	MID Lake1_Bottom
Client sampling date / time					06-Jul-2022 15:20	06-Jul-2022 16:50	06-Jul-2022 12:55	06-Jul-2022 12:45	06-Jul-2022 11:40
					YL2200852-001	YL2200852-002	YL2200852-003	YL2200852-004	YL2200852-005
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	104	136	95.4	93.2	104
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	6.2	<1.0	18.0	20.0	8.0
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	3.1	<1.0	9.0	10.0	4.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	110	136	113	113	112
conductivity	----	E100	2.0	µS/cm	468	600	462	462	483
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	143	151	146	146	140
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	132	142	136	136	135
pH	----	E108	0.10	pH units	8.40	7.94	8.79	8.85	8.48
solids, total dissolved [TDS]	----	E162	10	mg/L	236	308	232	262	263
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	248	313	251	252	245
solids, total suspended [TSS]	----	E160	3.0	mg/L	11.4	<3.0	13.0	12.2	6.8
turbidity	----	E121	0.10	NTU	12.3	0.42	16.1	13.9	9.06
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0100 RRV	0.0154 RRV	0.0085 RRV	0.0092 RRV	0.0069
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	62.2	103	61.6	61.7	60.0
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.088	0.061	0.077	0.075	0.070
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L	0.768	0.754	1.22	1.06	1.08
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0922	0.0097	0.0941	0.0776	0.0890
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0204	0.0086	0.0158	0.0161	0.0182
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	12.6	4.50	12.5	12.5	12.7
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	24.8	7.22	25.5	25.7	24.9
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	13.5	20.7	13.5	13.0	12.6
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0094	0.0166	0.0048	0.0036	<0.0030
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00129	0.00098	0.00129	0.00136	0.00129

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	Outflow	Inflow to NW Bay 2	Northwest Bay North_Bottom	Northwest Bay North_Mid-Depth	MID Lake1_Bottom
				Client sampling date / time	06-Jul-2022 15:20	06-Jul-2022 16:50	06-Jul-2022 12:55	06-Jul-2022 12:45	06-Jul-2022 11:40
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**YL2200852-001**	**YL2200852-002**	**YL2200852-003**	**YL2200852-004**	**YL2200852-005**
					Result	Result	Result	Result	Result
Total Metals									
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0624	0.0364	0.0664	0.0640	0.0587
barium, total	7440-39-3	E420	0.00010	mg/L	0.0271	0.0182	0.0275	0.0267	0.0282
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	0.028	0.045	0.027	0.028	0.026
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L	34.8	37.7	35.4	36.3	36.1
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	0.000018	<0.000010	<0.000010	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	0.00018	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L	0.00166	0.00124	0.00180	0.00448	0.00145
iron, total	7439-89-6	E420	0.010	mg/L	0.021	0.117	0.015	<0.010	0.013
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	0.000266	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0052	0.0048	0.0053	0.0056	0.0051
magnesium, total	7439-95-4	E420	0.0050	mg/L	11.0	11.6	11.6	10.9	10.8
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0320	0.131	0.0283	0.0129	0.122
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000225	0.000315	0.000220	0.000204	0.000212
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00069	0.00222	0.00063	0.00059	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.066	<0.050	0.099	0.058	0.054
potassium, total	7440-09-7	E420	0.050	mg/L	3.82	3.00	3.93	3.77	3.50
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00238	0.00294	0.00234	0.00240	0.00212
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000064	0.000055	<0.000050	0.000064	<0.000050
silicon, total	7440-21-3	E420	0.10	mg/L	5.75	2.15	5.93	5.90	5.70
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L	30.1	55.3	29.2	29.6	27.2
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0952	0.102	0.0902	0.0940	0.0942
sulfur, total	7704-34-9	E420	0.50	mg/L	8.52	3.04	8.68	8.74	8.28
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Outflow	Inflow to NW Bay 2	Northwest Bay North_Bottom	Northwest Bay North_Mid-Depth	MID Lake1_Bottom
				Client sampling date / time	06-Jul-2022 15:20	06-Jul-2022 16:50	06-Jul-2022 12:55	06-Jul-2022 12:45	06-Jul-2022 11:40
					YL2200852-001	YL2200852-002	YL2200852-003	YL2200852-004	YL2200852-005
					Result	Result	Result	Result	Result
Total Metals									
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	0.00019	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	0.00034	<0.00030	<0.00030	<0.00030
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000560	0.000742	0.000596	0.000599	0.000529
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	0.0041	<0.0030	<0.0030	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0042	0.0112	0.0019	0.0020	0.0014
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00121	0.00096	0.00125	0.00127	0.00117
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0724	0.0398	0.0751	0.0744	0.0693
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0307	0.0194	0.0303	0.0292	0.0317
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<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	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.028	0.046	0.028	0.027	0.026
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L	36.6	38.8	36.7	37.1	35.1
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	0.000017	<0.000010	<0.000010	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	0.00016	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00168	0.00126	0.00171	0.00179	0.00131
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.016	0.101	<0.010	<0.010	<0.010
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0064	0.0057	0.0064	0.0063	0.0059
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	12.6	13.2	13.1	13.1	12.6
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0296	0.124	0.0102	0.00232	0.0882
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000188	0.000272	0.000197	0.000198	0.000182
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	0.00227	<0.00050	<0.00050	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.26	3.41	4.26	4.29	4.15

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	Outflow	Inflow to NW Bay 2	Northwest Bay North_Bottom	Northwest Bay North_Mid-Depth	MID Lake1_Bottom
				Client sampling date / time	06-Jul-2022 15:20	06-Jul-2022 16:50	06-Jul-2022 12:55	06-Jul-2022 12:45	06-Jul-2022 11:40
Analyte	CAS Number	Method	LOR	Unit	YL2200852-001	YL2200852-002	YL2200852-003	YL2200852-004	YL2200852-005
					Result	Result	Result	Result	Result
Dissolved Metals									
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00255	0.00319	0.00266	0.00251	0.00249
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	0.000062	<0.000050	<0.000050	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.32	2.35	6.26	6.22	6.30
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L	33.4	62.4	34.2	34.1	33.3
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0889	0.100	0.0885	0.0897	0.0911
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	8.47	3.35	8.70	8.58	8.69
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<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	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00012
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000489	0.000678	0.000516	0.000524	0.000486
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0013	0.0038	<0.0010	<0.0010	0.0024
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	----	----	<5.0	----	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.50	µg/L	----	----	<0.50	----	----
ethylbenzene	100-41-4	E611A	0.50	µg/L	----	----	<0.50	----	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	----	----	<0.50	----	----
styrene	100-42-5	E611A	0.50	µg/L	----	----	<0.50	----	----
toluene	108-88-3	E611A	0.50	µg/L	----	----	<0.50	----	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	----	----	<0.40	----	----
xylene, o-	95-47-6	E611A	0.30	µg/L	----	----	<0.30	----	----
xylenes, total	1330-20-7	E611A	0.50	µg/L	----	----	<0.50	----	----
Volatile Organic Compounds Surrogates									

Analytical Results

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

				Client sample ID	Outflow	Inflow to NW Bay 2	Northwest Bay North_Bottom	Northwest Bay North_Mid-Depth	MID Lake1_Bottom
				Client sampling date / time	06-Jul-2022 15:20	06-Jul-2022 16:50	06-Jul-2022 12:55	06-Jul-2022 12:45	06-Jul-2022 11:40
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**YL2200852-001**	**YL2200852-002**	**YL2200852-003**	**YL2200852-004**	**YL2200852-005**
					Result	Result	Result	Result	Result
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	----	----	91.9	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	----	----	99.9	----	----
Hydrocarbons									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	----	----	<100	----	----
F2 (C10-C16)	----	E601	300	µg/L	----	----	<300	----	----
F3 (C16-C34)	----	E601	300	µg/L	----	----	<300	----	----
F4 (C34-C50)	----	E601	300	µg/L	----	----	<300	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	----	----	<100	----	----
F1-BTEX	----	EC580	100	µg/L	----	----	<100	----	----
VPHw	----	EC580A	100	µg/L	----	----	<100	----	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	----	----	89.3	----	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	----	----	85.7	----	----

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

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	MID Lake1_Mid-Depth	Near Outflow Inlake_Bottom	Near Outflow Inlake_Mid-Depth	Near Outflow Inlake_Bottom_4	JFLQC-3
Client sampling date / time					06-Jul-2022 11:30	06-Jul-2022 09:40	06-Jul-2022 09:30	06-Jul-2022 09:45	06-Jul-2022 15:00
					YL2200852-006	YL2200852-007	YL2200852-008	YL2200852-009	YL2200852-010
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	110	103	89.1	105	<1.0
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	7.2	21.8	5.6	<1.0
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	3.6	10.9	2.8	<1.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	110	110	111	110	<1.0
conductivity	----	E100	2.0	µS/cm	475	483	439	443	<2.0
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	145	144	149	147	<0.60
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	139	132	142	133	<0.60
pH	----	E108	0.10	pH units	8.29	8.47	8.81	8.36	5.51
solids, total dissolved [TDS]	----	E162	10	mg/L	264	262	259	274	<10
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	248	247	253	249	<1.0
solids, total suspended [TSS]	----	E160	3.0	mg/L	14.2	11.8	14.4	12.4	<3.0
turbidity	----	E121	0.10	NTU	16.2	15.2	16.5	15.7	<0.10
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0487	0.0114 RRV	0.0098 RRV	0.0140	<0.0050
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	61.2	60.8	61.9	61.3	<0.10
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.077	0.077	0.082	0.079	<0.010
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L	1.72	1.21	1.21	1.39	<0.030
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.121	0.104	0.0853	0.0453	<0.0020
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0173	0.0177	0.0168	0.0170	<0.0020
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	12.4	12.6	12.4	12.6	<0.50
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	25.3	25.0	25.8	25.2	<0.30
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	12.8	12.5	13.0	12.8	<0.50
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0041	<0.0030	0.0040	0.0044	<0.0030
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00133	0.00127	0.00132	0.00126	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0639	0.0608	0.0649	0.0635	<0.00010

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	MID Lake1_Mid-Depth	Near Outflow Inlake_Bottom	Near Outflow Inlake_Mid-Depth	Near Outflow Inlake_Bottom_4	JFLQC-3
				Client sampling date / time	06-Jul-2022 11:30	06-Jul-2022 09:40	06-Jul-2022 09:30	06-Jul-2022 09:45	06-Jul-2022 15:00
Analyte	CAS Number	Method	LOR	Unit	YL2200852-006	YL2200852-007	YL2200852-008	YL2200852-009	YL2200852-010
					Result	Result	Result	Result	Result
Total Metals									
barium, total	7440-39-3	E420	0.00010	mg/L	0.0272	0.0276	0.0272	0.0288	<0.00010
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	0.029	0.027	0.027	0.026	<0.010
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L	36.5	35.3	37.1	34.5	<0.050
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L	0.00177	0.00150	0.00183	0.00162	<0.00050
iron, total	7439-89-6	E420	0.010	mg/L	<0.010	0.014	<0.010	0.014	<0.010
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0056	0.0052	0.0054	0.0052	<0.0010
magnesium, total	7439-95-4	E420	0.0050	mg/L	11.7	10.6	12.0	11.4	<0.0050
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0186	0.0720	0.0174	0.0596	<0.00010
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000237	0.000224	0.000220	0.000214	<0.000050
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00067	<0.00050	0.00054	0.00058	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L	0.084	0.097	0.060	0.083	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L	3.82	3.59	3.89	3.85	<0.050
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00224	0.00223	0.00241	0.00231	<0.00020
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000054	<0.000050	<0.000050	<0.000050	<0.000050
silicon, total	7440-21-3	E420	0.10	mg/L	5.88	5.63	5.85	5.83	<0.10
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L	29.4	27.3	30.1	29.2	<0.050
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0936	0.0925	0.0947	0.0920	<0.00020
sulfur, total	7704-34-9	E420	0.50	mg/L	8.98	8.42	9.18	8.56	<0.50
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	MID Lake1_Mid-Depth	Near Outflow Inlake_Bottom	Near Outflow Inlake_Mid-Depth	Near Outflow Inlake_Bottom_4	JFLQC-3
Client sampling date / time					06-Jul-2022 11:30	06-Jul-2022 09:40	06-Jul-2022 09:30	06-Jul-2022 09:45	06-Jul-2022 15:00
					YL2200852-006	YL2200852-007	YL2200852-008	YL2200852-009	YL2200852-010
					Result	Result	Result	Result	Result
Total Metals									
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000620	0.000529	0.000582	0.000572	<0.000010
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0012	0.0022	0.0018	0.0017	<0.0010
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00126	0.00122	0.00129	0.00126	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0739	0.0725	0.0756	0.0729	<0.00010
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0312	0.0317	0.0300	0.0310	<0.00010
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<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	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.027	0.027	0.028	0.028	<0.010
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L	36.3	36.9	37.7	37.7	<0.050
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00172	0.00145	0.00184	0.00158	<0.00020
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0061	0.0061	0.0065	0.0063	<0.0010
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	13.2	12.6	13.4	12.9	<0.0050
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00588	0.0656	0.00245	0.0408	<0.00010
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000195	0.000185	0.000201	0.000205	<0.000050
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.35	4.22	4.33	4.28	<0.050
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00269	0.00268	0.00260	0.00266	<0.00020

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	MID Lake1_Mid-Depth	Near Outflow Inlake_Bottom	Near Outflow Inlake_Mid-Depth	Near Outflow Inlake_Bottom_4	JFLQC-3
				Client sampling date / time	06-Jul-2022 11:30	06-Jul-2022 09:40	06-Jul-2022 09:30	06-Jul-2022 09:45	06-Jul-2022 15:00
					YL2200852-006	YL2200852-007	YL2200852-008	YL2200852-009	YL2200852-010
					Result	Result	Result	Result	Result
Dissolved Metals									
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.29	6.30	6.32	6.35	<0.050
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L	34.2	33.2	34.8	33.5	<0.050
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0901	0.0920	0.0883	0.0922	<0.00020
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	8.85	8.47	9.23	8.96	<0.50
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<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	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000512	0.000504	0.000530	0.000516	<0.000010
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	----	<5.0	----	<5.0	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.50	µg/L	----	<0.50	----	<0.50	----
ethylbenzene	100-41-4	E611A	0.50	µg/L	----	<0.50	----	<0.50	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	----	<0.50	----	<0.50	----
styrene	100-42-5	E611A	0.50	µg/L	----	<0.50	----	<0.50	----
toluene	108-88-3	E611A	0.50	µg/L	----	<0.50	----	<0.50	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	----	<0.40	----	<0.40	----
xylene, o-	95-47-6	E611A	0.30	µg/L	----	<0.30	----	<0.30	----
xylenes, total	1330-20-7	E611A	0.50	µg/L	----	<0.50	----	<0.50	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	----	93.9	----	95.6	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	MID Lake1_Mid-Depth	Near Outflow Inlake_Bottom	Near Outflow Inlake_Mid-Depth	Near Outflow Inlake_Bottom_4	JFLQC-3
				Client sampling date / time	06-Jul-2022 11:30	06-Jul-2022 09:40	06-Jul-2022 09:30	06-Jul-2022 09:45	06-Jul-2022 15:00
Analyte	CAS Number	Method	LOR	Unit	YL2200852-006	YL2200852-007	YL2200852-008	YL2200852-009	YL2200852-010
					Result	Result	Result	Result	Result
Volatile Organic Compounds Surrogates									
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	----	100	----	99.9	----
Hydrocarbons									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	----	<100	----	<100	----
F2 (C10-C16)	----	E601	300	µg/L	----	<300	----	<300	----
F3 (C16-C34)	----	E601	300	µg/L	----	<300	----	<300	----
F4 (C34-C50)	----	E601	300	µg/L	----	<300	----	<300	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	----	<100	----	<100	----
F1-BTEX	----	EC580	100	µg/L	----	<100	----	<100	----
VPHw	----	EC580A	100	µg/L	----	<100	----	<100	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	----	83.9	----	87.0	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	----	86.0	----	79.3	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **YL2200852**	Page	:
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Kathy Qin	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	: 21482915	Date Samples Received	: 07-Jul-2022 10:05
PO	: ----	Issue Date	: 20-Jul-2022 16:34
C-O-C number	: ----		
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 10		
No. of samples analysed	: 10		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- 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.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Anions and Nutrients	QC-560480-001	----	ammonia, total (as N)	7664-41-7	E298	0.0336 mg/L B	0.005 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Physical Tests	QC-559133-002	----	alkalinity, phenolphthalein (as CaCO3)	----	E290	130 % LCS-H	75.0-125%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	Description
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.

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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) Near Outflow Inlake_Bottom	E567	06-Jul-2022	13-Jul-2022	28 days	7 days	✓	13-Jul-2022	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) Near Outflow Inlake_Bottom_4	E567	06-Jul-2022	13-Jul-2022	28 days	7 days	✓	13-Jul-2022	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) Northwest Bay North_Bottom	E567	06-Jul-2022	13-Jul-2022	28 days	7 days	✓	13-Jul-2022	40 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Inflow to NW Bay 2	E298	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) JFLQC-3	E298	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MID Lake1_Bottom	E298	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MID Lake1_Mid-Depth	E298	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Near Outflow Inlake_Bottom	E298	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Near Outflow Inlake_Bottom_4	E298	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Near Outflow Inlake_Mid-Depth	E298	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Northwest Bay North_Bottom	E298	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Northwest Bay North_Mid-Depth	E298	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Outflow	E298	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE Inflow to NW Bay 2	E235.Cl-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE JFLQC-3	E235.Cl-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE MID Lake1_Bottom	E235.Cl-L	06-Jul-2022	----	----	----		12-Jul-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE MID Lake1_Mid-Depth	E235.Cl-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE Near Outflow Inlake_Bottom	E235.Cl-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE Near Outflow Inlake_Bottom_4	E235.Cl-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE Near Outflow Inlake_Mid-Depth	E235.Cl-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE Northwest Bay North_Bottom	E235.Cl-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE Northwest Bay North_Mid-Depth	E235.Cl-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE Outflow	E235.Cl-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE Inflow to NW Bay 2	E235.F-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE JFLQC-3	E235.F-L	06-Jul-2022	----	----	----		12-Jul-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE MID Lake1_Bottom	E235.F-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE MID Lake1_Mid-Depth	E235.F-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE Near Outflow Inlake_Bottom	E235.F-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE Near Outflow Inlake_Bottom_4	E235.F-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE Near Outflow Inlake_Mid-Depth	E235.F-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE Northwest Bay North_Bottom	E235.F-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE Northwest Bay North_Mid-Depth	E235.F-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE Outflow	E235.F-L	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Inflow to NW Bay 2	E235.NO3-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times Rec*	*Holding Times Actual*	*Eval*	*Analysis Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE JFLQC-3	E235.NO3-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MID Lake1_Bottom	E235.NO3-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MID Lake1_Mid-Depth	E235.NO3-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Near Outflow Inlake_Bottom	E235.NO3-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Near Outflow Inlake_Bottom_4	E235.NO3-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Near Outflow Inlake_Mid-Depth	E235.NO3-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Northwest Bay North_Bottom	E235.NO3-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Northwest Bay North_Mid-Depth	E235.NO3-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Outflow	E235.NO3-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Inflow to NW Bay 2	E235.NO2-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE JFLQC-3	E235.NO2-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MID Lake1_Bottom	E235.NO2-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MID Lake1_Mid-Depth	E235.NO2-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Near Outflow Inlake_Bottom	E235.NO2-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Near Outflow Inlake_Bottom_4	E235.NO2-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Near Outflow Inlake_Mid-Depth	E235.NO2-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Northwest Bay North_Bottom	E235.NO2-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Northwest Bay North_Mid-Depth	E235.NO2-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Outflow	E235.NO2-L	06-Jul-2022	----	----	----		12-Jul-2022	3 days	6 days	× EHT
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Inflow to NW Bay 2	E392	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE JFLQC-3	E392	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE MID Lake1_Bottom	E392	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE MID Lake1_Mid-Depth	E392	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Near Outflow Inlake_Bottom	E392	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Near Outflow Inlake_Bottom_4	E392	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Near Outflow Inlake_Mid-Depth	E392	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Northwest Bay North_Bottom	E392	06-Jul-2022	----	----	----		12-Jul-2022	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 Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Northwest Bay North_Mid-Depth	E392	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Outflow	E392	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Inflow to NW Bay 2	E235.SO4	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE JFLQC-3	E235.SO4	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MID Lake1_Bottom	E235.SO4	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MID Lake1_Mid-Depth	E235.SO4	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Near Outflow Inlake_Bottom	E235.SO4	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Near Outflow Inlake_Bottom_4	E235.SO4	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Near Outflow Inlake_Mid-Depth	E235.SO4	06-Jul-2022	----	----	----		12-Jul-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE Northwest Bay North_Bottom	E235.SO4	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Northwest Bay North_Mid-Depth	E235.SO4	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Outflow	E235.SO4	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) Inflow to NW Bay 2	E375-T	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) JFLQC-3	E375-T	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) MID Lake1_Bottom	E375-T	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) MID Lake1_Mid-Depth	E375-T	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) Near Outflow Inlake_Bottom	E375-T	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) Near Outflow Inlake_Bottom_4	E375-T	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) Near Outflow Inlake_Mid-Depth	E375-T	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) Northwest Bay North_Bottom	E375-T	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) Northwest Bay North_Mid-Depth	E375-T	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) Outflow	E375-T	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) Inflow to NW Bay 2	E366	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) JFLQC-3	E366	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) MID Lake1_Bottom	E366	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) MID Lake1_Mid-Depth	E366	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) Near Outflow Inlake_Bottom	E366	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Near Outflow Inlake_Bottom_4	E366	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Near Outflow Inlake_Mid-Depth	E366	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Northwest Bay North_Bottom	E366	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Northwest Bay North_Mid-Depth	E366	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Outflow	E366	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
Inflow to NW Bay 2	E372-U	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
JFLQC-3	E372-U	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
MID Lake1_Bottom	E372-U	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
MID Lake1_Mid-Depth	E372-U	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Near Outflow Inlake_Bottom	E372-U	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Near Outflow Inlake_Bottom_4	E372-U	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Near Outflow Inlake_Mid-Depth	E372-U	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Northwest Bay North_Bottom	E372-U	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Northwest Bay North_Mid-Depth	E372-U	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Outflow	E372-U	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Inflow to NW Bay 2	E509	06-Jul-2022	14-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) JFLQC-3	E509	06-Jul-2022	14-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MID Lake1_Bottom	E509	06-Jul-2022	14-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MID Lake1_Mid-Depth	E509	06-Jul-2022	14-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Near Outflow Inlake_Bottom	E509	06-Jul-2022	14-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Near Outflow Inlake_Bottom_4	E509	06-Jul-2022	14-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Near Outflow Inlake_Mid-Depth	E509	06-Jul-2022	14-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Northwest Bay North_Bottom	E509	06-Jul-2022	14-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Northwest Bay North_Mid-Depth	E509	06-Jul-2022	14-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Outflow	E509	06-Jul-2022	14-Jul-2022	----	----		14-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Inflow to NW Bay 2	E421	06-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) JFLQC-3	E421	06-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MID Lake1_Bottom	E421	06-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MID Lake1_Mid-Depth	E421	06-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Near Outflow Inlake_Bottom	E421	06-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Near Outflow Inlake_Bottom_4	E421	06-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Near Outflow Inlake_Mid-Depth	E421	06-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Northwest Bay North_Bottom	E421	06-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Northwest Bay North_Mid-Depth	E421	06-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Outflow	E421	06-Jul-2022	12-Jul-2022	----	----		12-Jul-2022	180 days	6 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) Near Outflow Inlake_Bottom	E601	06-Jul-2022	12-Jul-2022	14 days	6 days	✓	13-Jul-2022	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: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
Near Outflow Inlake_Bottom_4	E601	06-Jul-2022	12-Jul-2022	14 days	6 days	✓	13-Jul-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
Northwest Bay North_Bottom	E601	06-Jul-2022	12-Jul-2022	14 days	6 days	✓	13-Jul-2022	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
Near Outflow Inlake_Bottom	E581.VH+F1	06-Jul-2022	15-Jul-2022	----	----		16-Jul-2022	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
Near Outflow Inlake_Bottom_4	E581.VH+F1	06-Jul-2022	15-Jul-2022	----	----		16-Jul-2022	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
Northwest Bay North_Bottom	E581.VH+F1	06-Jul-2022	15-Jul-2022	----	----		16-Jul-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
Inflow to NW Bay 2	E358-L	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
JFLQC-3	E358-L	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
MID Lake1_Bottom	E358-L	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
MID Lake1_Mid-Depth	E358-L	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	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 Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) Near Outflow Inlake_Bottom	E358-L	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) Near Outflow Inlake_Bottom_4	E358-L	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) Near Outflow Inlake_Mid-Depth	E358-L	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) Northwest Bay North_Bottom	E358-L	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) Northwest Bay North_Mid-Depth	E358-L	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) Outflow	E358-L	06-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	28 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE JFLQC-3	E290	06-Jul-2022	----	----	----		12-Jul-2022	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Inflow to NW Bay 2	E290	06-Jul-2022	----	----	----		13-Jul-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MID Lake1_Bottom	E290	06-Jul-2022	----	----	----		13-Jul-2022	14 days	7 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE MID Lake1_Mid-Depth	E290	06-Jul-2022	----	----	----		13-Jul-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Near Outflow Inlake_Bottom	E290	06-Jul-2022	----	----	----		13-Jul-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Near Outflow Inlake_Bottom_4	E290	06-Jul-2022	----	----	----		12-Jul-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Near Outflow Inlake_Mid-Depth	E290	06-Jul-2022	----	----	----		12-Jul-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Northwest Bay North_Bottom	E290	06-Jul-2022	----	----	----		13-Jul-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Northwest Bay North_Mid-Depth	E290	06-Jul-2022	----	----	----		13-Jul-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Outflow	E290	06-Jul-2022	----	----	----		13-Jul-2022	14 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE JFLQC-3	E100	06-Jul-2022	----	----	----		12-Jul-2022	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE Inflow to NW Bay 2	E100	06-Jul-2022	----	----	----		13-Jul-2022	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* Preparation Date	Holding Times Rec	Holding Times Actual	Eval	*Analysis* Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE MID Lake1_Bottom	E100	06-Jul-2022	----	----	----		13-Jul-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE MID Lake1_Mid-Depth	E100	06-Jul-2022	----	----	----		13-Jul-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE Near Outflow Inlake_Bottom	E100	06-Jul-2022	----	----	----		13-Jul-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE Near Outflow Inlake_Bottom_4	E100	06-Jul-2022	----	----	----		12-Jul-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE Near Outflow Inlake_Mid-Depth	E100	06-Jul-2022	----	----	----		12-Jul-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE Northwest Bay North_Bottom	E100	06-Jul-2022	----	----	----		13-Jul-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE Northwest Bay North_Mid-Depth	E100	06-Jul-2022	----	----	----		13-Jul-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE Outflow	E100	06-Jul-2022	----	----	----		13-Jul-2022	28 days	7 days	✓
Physical Tests : pH by Meter										
HDPE JFLQC-3	E108	06-Jul-2022	----	----	----		12-Jul-2022	0.25 hrs	152 hrs	✘ EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : pH by Meter										
HDPE Near Outflow Inlake_Bottom_4	E108	06-Jul-2022	----	----	----		12-Jul-2022	0.25 hrs	157 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Near Outflow Inlake_Mid-Depth	E108	06-Jul-2022	----	----	----		12-Jul-2022	0.25 hrs	158 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Inflow to NW Bay 2	E108	06-Jul-2022	----	----	----		13-Jul-2022	0.25 hrs	171 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Outflow	E108	06-Jul-2022	----	----	----		13-Jul-2022	0.25 hrs	173 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Northwest Bay North_Bottom	E108	06-Jul-2022	----	----	----		13-Jul-2022	0.25 hrs	175 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Northwest Bay North_Mid-Depth	E108	06-Jul-2022	----	----	----		13-Jul-2022	0.25 hrs	175 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MID Lake1_Bottom	E108	06-Jul-2022	----	----	----		13-Jul-2022	0.25 hrs	176 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MID Lake1_Mid-Depth	E108	06-Jul-2022	----	----	----		13-Jul-2022	0.25 hrs	177 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Near Outflow Inlake_Bottom	E108	06-Jul-2022	----	----	----		13-Jul-2022	0.25 hrs	178 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE Inflow to NW Bay 2	E162	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE JFLQC-3	E162	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE MID Lake1_Bottom	E162	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE MID Lake1_Mid-Depth	E162	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE Near Outflow Inlake_Bottom	E162	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE Near Outflow Inlake_Bottom_4	E162	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE Near Outflow Inlake_Mid-Depth	E162	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE Northwest Bay North_Bottom	E162	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE Northwest Bay North_Mid-Depth	E162	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : TDS by Gravimetry										
HDPE Outflow	E162	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Inflow to NW Bay 2	E160	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE JFLQC-3	E160	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MID Lake1_Bottom	E160	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MID Lake1_Mid-Depth	E160	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Near Outflow Inlake_Bottom	E160	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Near Outflow Inlake_Bottom_4	E160	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Near Outflow Inlake_Mid-Depth	E160	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Northwest Bay North_Bottom	E160	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE Northwest Bay North_Mid-Depth	E160	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Outflow	E160	06-Jul-2022	----	----	----		13-Jul-2022	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE Inflow to NW Bay 2	E121	06-Jul-2022	----	----	----		13-Jul-2022	3 days	7 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE JFLQC-3	E121	06-Jul-2022	----	----	----		13-Jul-2022	3 days	7 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE MID Lake1_Bottom	E121	06-Jul-2022	----	----	----		13-Jul-2022	3 days	7 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE MID Lake1_Mid-Depth	E121	06-Jul-2022	----	----	----		13-Jul-2022	3 days	7 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE Near Outflow Inlake_Bottom	E121	06-Jul-2022	----	----	----		13-Jul-2022	3 days	7 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE Near Outflow Inlake_Bottom_4	E121	06-Jul-2022	----	----	----		13-Jul-2022	3 days	7 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE Near Outflow Inlake_Mid-Depth	E121	06-Jul-2022	----	----	----		13-Jul-2022	3 days	7 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE Northwest Bay North_Bottom	E121	06-Jul-2022	----	----	----		13-Jul-2022	3 days	7 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE Northwest Bay North_Mid-Depth	E121	06-Jul-2022	----	----	----		13-Jul-2022	3 days	7 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE Outflow	E121	06-Jul-2022	----	----	----		13-Jul-2022	3 days	7 days	× EHT
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Inflow to NW Bay 2	E508	06-Jul-2022	----	----	----		14-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) JFLQC-3	E508	06-Jul-2022	----	----	----		14-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) MID Lake1_Bottom	E508	06-Jul-2022	----	----	----		14-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) MID Lake1_Mid-Depth	E508	06-Jul-2022	----	----	----		14-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Near Outflow Inlake_Bottom	E508	06-Jul-2022	----	----	----		14-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Near Outflow Inlake_Bottom_4	E508	06-Jul-2022	----	----	----		14-Jul-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Near Outflow Inlake_Mid-Depth	E508	06-Jul-2022	----	----	----		14-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Northwest Bay North_Bottom	E508	06-Jul-2022	----	----	----		14-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Northwest Bay North_Mid-Depth	E508	06-Jul-2022	----	----	----		14-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Outflow	E508	06-Jul-2022	----	----	----		14-Jul-2022	28 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Inflow to NW Bay 2	E420	06-Jul-2022	----	----	----		13-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) JFLQC-3	E420	06-Jul-2022	----	----	----		13-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MID Lake1_Bottom	E420	06-Jul-2022	----	----	----		13-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MID Lake1_Mid-Depth	E420	06-Jul-2022	----	----	----		13-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Near Outflow Inlake_Bottom	E420	06-Jul-2022	----	----	----		13-Jul-2022	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Near Outflow Inlake_Bottom_4	E420	06-Jul-2022	----	----	----		13-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Near Outflow Inlake_Mid-Depth	E420	06-Jul-2022	----	----	----		13-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Northwest Bay North_Bottom	E420	06-Jul-2022	----	----	----		13-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Northwest Bay North_Mid-Depth	E420	06-Jul-2022	----	----	----		13-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) Outflow	E420	06-Jul-2022	----	----	----		13-Jul-2022	180 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Near Outflow Inlake_Bottom	E611A	06-Jul-2022	15-Jul-2022	----	----		16-Jul-2022	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Near Outflow Inlake_Bottom_4	E611A	06-Jul-2022	15-Jul-2022	----	----		16-Jul-2022	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Northwest Bay North_Bottom	E611A	06-Jul-2022	15-Jul-2022	----	----		16-Jul-2022	14 days	9 days	✓

Legend & Qualifier Definitions

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

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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	558646	2	34	5.8	5.0	✓
Ammonia by Fluorescence	E298	560480	1	16	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	565013	1	12	8.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	558642	2	11	18.1	5.0	✓
Conductivity in Water	E100	558643	2	34	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	561783	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	558237	1	15	6.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	560481	1	10	10.0	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	558641	2	10	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	558635	2	33	6.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	558636	2	36	5.5	5.0	✓
pH by Meter	E108	558644	2	37	5.4	5.0	✓
Reactive Silica by Colourimetry	E392	559494	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	558634	2	36	5.5	5.0	✓
TDS by Gravimetry	E162	560676	1	14	7.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	560482	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	561746	2	32	6.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	558589	1	18	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	560478	1	12	8.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	560479	1	13	7.6	5.0	✓
TSS by Gravimetry	E160	560670	1	13	7.6	5.0	✓
Turbidity by Nephelometry	E121	560164	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	565012	1	10	10.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	558646	2	34	5.8	5.0	✓
Ammonia by Fluorescence	E298	560480	1	16	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	565013	1	12	8.3	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	558679	1	5	20.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	558642	2	11	18.1	5.0	✓
Conductivity in Water	E100	558643	2	34	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	561783	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	558237	1	15	6.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	560481	1	10	10.0	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	558641	2	10	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	558635	2	33	6.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	558636	2	36	5.5	5.0	✓
Oil & Grease by Gravimetry	E567	560940	1	9	11.1	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
pH by Meter	E108	558644	2	37	5.4	5.0	✓
Reactive Silica by Colourimetry	E392	559494	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	558634	2	36	5.5	5.0	✓
TDS by Gravimetry	E162	560676	1	14	7.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	560482	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	561746	2	32	6.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	558589	1	18	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	560478	1	12	8.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	560479	1	13	7.6	5.0	✓
TSS by Gravimetry	E160	560670	1	13	7.6	5.0	✓
Turbidity by Nephelometry	E121	560164	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	565012	1	10	10.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	558646	2	34	5.8	5.0	✓
Ammonia by Fluorescence	E298	560480	1	16	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	565013	1	12	8.3	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	558679	1	5	20.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	558642	2	11	18.1	5.0	✓
Conductivity in Water	E100	558643	2	34	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	561783	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	558237	1	15	6.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	560481	1	10	10.0	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	558641	2	10	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	558635	2	33	6.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	558636	2	36	5.5	5.0	✓
Oil & Grease by Gravimetry	E567	560940	1	9	11.1	5.0	✓
Reactive Silica by Colourimetry	E392	559494	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	558634	2	36	5.5	5.0	✓
TDS by Gravimetry	E162	560676	1	14	7.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	560482	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	561746	2	32	6.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	558589	1	18	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	560478	1	12	8.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	560479	1	13	7.6	5.0	✓
TSS by Gravimetry	E160	560670	1	13	7.6	5.0	✓
Turbidity by Nephelometry	E121	560164	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	565012	1	10	10.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	560480	1	16	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	565013	1	12	8.3	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Chloride in Water by IC (Low Level)	E235.Cl-L	558642	2	11	18.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	561783	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	558237	1	15	6.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	560481	1	10	10.0	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	558641	2	10	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	558635	2	33	6.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	558636	2	36	5.5	5.0	✓
Reactive Silica by Colourimetry	E392	559494	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	558634	2	36	5.5	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	560482	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	561746	2	32	6.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	558589	1	18	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	560478	1	12	8.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	560479	1	13	7.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	565012	1	10	10.0	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
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
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.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 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.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC (Low Level)	E235.Cl-L 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 (Low Level)	E235.F-L 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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Reactive Silica by Colourimetry	E392 Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
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.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples 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
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.
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 PHCs - F2-F4 by GC-FID	E601 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4).
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.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as $CaCO_3$), from total Ca/Mg" is calculated from the sum of total 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. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
TDS in Water (Calculation) Using APHA Analyte List	EC103.APHA Vancouver - Environmental	Water	APHA 1030E	Total DIssolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis).
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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
Oil & Grease Extraction for Gravimetry	EP567 Vancouver - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **YL2200852**	Page	: 1 of 22
Client	: Golder Associates Ltd.	Laboratory	: Yellowknife - Environmental
Contact	: Kathy Qin	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	: 21482915	Date Samples Received	: 07-Jul-2022 10:05
PO	: ----	Date Analysis Commenced	: 12-Jul-2022
C-O-C number	: ----	Issue Date	: 20-Jul-2022 16:34
Sampler	: ----		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 10		
No. of samples analysed	: 10		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
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General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

Laboratory 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: 558643)											
VA22B5800-001	Anonymous	conductivity	----	E100	2.0	µS/cm	103	102	0.585%	10%	----
Physical Tests (QC Lot: 558644)											
VA22B5800-001	Anonymous	pH	----	E108	0.10	pH units	7.85	7.85	0.00%	4%	----
Physical Tests (QC Lot: 558646)											
VA22B5800-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	40.6	39.6	2.49%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	40.6	39.6	2.49%	20%	----
Physical Tests (QC Lot: 559132)											
VA22B5646-012	Anonymous	pH	----	E108	0.10	pH units	5.47	5.47	0.00%	4%	----
Physical Tests (QC Lot: 559133)											
VA22B5646-012	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 559134)											
VA22B5646-012	Anonymous	conductivity	----	E100	2.0	µS/cm	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 560164)											
YL2200824-003	Anonymous	turbidity	----	E121	0.10	NTU	15.0	16.2	7.70%	15%	----
Physical Tests (QC Lot: 560670)											
VA22B5853-006	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 560676)											
VA22B5853-005	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	202	233	14.0%	20%	----
Anions and Nutrients (QC Lot: 558634)											
VA22B5793-004	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	12.6	12.6	0.100%	20%	----
Anions and Nutrients (QC Lot: 558635)											
VA22B5793-004	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 558636)											

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Anions and Nutrients (QC Lot: 558636) - continued											
VA22B5793-004	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: 558641)											
YL2200852-001	Outflow	fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.088	0.088	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 558642)											
YL2200852-001	Outflow	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	62.2	62.2	0.0319%	20%	----
Anions and Nutrients (QC Lot: 559139)											
VA22B5382-005	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 559140)											
VA22B5382-005	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: 559141)											
VA22B5382-005	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	<0.30	<0.30	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 559143)											
YL2200852-008	Near Outflow Inlake_Mid-Depth	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	61.9	61.9	0.0827%	20%	----
Anions and Nutrients (QC Lot: 559144)											
YL2200852-008	Near Outflow Inlake_Mid-Depth	fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.082	0.083	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 559494)											
YL2200819-003	Anonymous	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 560478)											
YL2200839-001	Anonymous	nitrogen, total	7727-37-9	E366	0.060	mg/L	2.32	2.33	0.507%	20%	----
Anions and Nutrients (QC Lot: 560479)											
YL2200839-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0205	0.0204	0.0978%	20%	----
Anions and Nutrients (QC Lot: 560480)											
YL2200839-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.437	0.452	3.44%	20%	----
Anions and Nutrients (QC Lot: 560482)											
YL2200852-001	Outflow	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0204	0.0201	1.04%	20%	----
Organic / Inorganic Carbon (QC Lot: 560481)											
YL2200852-001	Outflow	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	13.5	13.8	1.82%	20%	----
Total Metals (QC Lot: 558589)											
YL2200854-002	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 558589) - continued											
YL2200854-002	Anonymous	boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 561746)											
CG2208870-016	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 561747)											
YL2200852-002	Inflow to NW Bay 2	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 558237)											
YL2200829-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0014	0.0015	0.00007	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00121	0.00119	1.63%	20%	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0725	0.0713	1.68%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0326	0.0327	0.316%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	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	0.027	0.027	0.0004	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	35.6	35.6	0.246%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00144	0.00140	0.00004	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		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	0.0061	0.0060	0.00009	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	12.7	12.5	1.50%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.102	0.0973	4.54%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000188	0.000188	0.000000005	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.15	4.10	1.28%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00255	0.00246	3.75%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	0.000059	0.000009	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.39	6.24	2.44%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	33.4	32.6	2.40%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0924	0.0886	4.12%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	8.52	8.72	2.32%	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	<0.000010	<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	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 558237) - continued											
YL2200829-001	Anonymous	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	0.000491	0.000480	2.22%	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	<0.0010	<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: 561783)											
YL2200789-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 565013)											
KS2202474-001	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: 565012)											
KS2202474-001	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: 558643)						
conductivity	----	E100	1	µS/cm	1.2	----
Physical Tests (QCLot: 558646)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 559133)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 559134)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 560164)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 560670)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 560676)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 558634)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 558635)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 558636)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 558641)						
fluoride	16984-48-8	E235.F-L	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 558642)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 559139)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 559140)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 559141)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 559143)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 559144)						
fluoride	16984-48-8	E235.F-L	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 559494)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 560478)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 560479)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 560480)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	# 0.0336	B
Anions and Nutrients (QCLot: 560482)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 560481)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 558589)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 558589) - continued						
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 561746)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 561747)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 558237)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 558237) - continued						
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 561783)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 560940)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 565013)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 565013) - continued						
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: 558679)						
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: 565012)						
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----

Qualifiers

Qualifier	*Description*
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 558643)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	104	90.0	110	----
Physical Tests (QCLot: 558644)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 558646)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	96.2	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Physical Tests (QCLot: 559132)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 559133)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	# 130	75.0	125	LCS-H
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Physical Tests (QCLot: 559134)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.2	90.0	110	----
Physical Tests (QCLot: 560164)									
turbidity	----	E121	0.1	NTU	200 NTU	98.0	85.0	115	----
Physical Tests (QCLot: 560670)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	91.0	85.0	115	----
Physical Tests (QCLot: 560676)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 558634)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 558635)									
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: 558636)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 558641)									
fluoride	16984-48-8	E235.F-L	0.01	mg/L	1 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 558642)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 559139)									
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: 559140)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Anions and Nutrients (QCLot: 559140) - continued									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.5	90.0	110	----
Anions and Nutrients (QCLot: 559141)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 559143)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 559144)									
fluoride	16984-48-8	E235.F-L	0.01	mg/L	1 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 559494)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 560478)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 560479)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	91.5	80.0	120	----
Anions and Nutrients (QCLot: 560480)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.2	85.0	115	----
Anions and Nutrients (QCLot: 560482)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	91.8	80.0	120	----
Organic / Inorganic Carbon (QCLot: 560481)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	103	80.0	120	----
Total Metals (QCLot: 558589)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	93.8	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	108	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	97.3	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	95.6	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	99.5	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	100	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	98.8	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.7	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.8	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	107	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	97.2	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	95.7	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	96.1	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	98.7	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	101	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Total Metals (QCLot: 558589) - continued									
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	98.8	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	94.0	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.0	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	105	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	93.6	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	101	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	96.7	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	97.8	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.2	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	102	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	104	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	97.4	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	106	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	91.6	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	99.5	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	95.2	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.1	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	87.7	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	106	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	97.6	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	93.5	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
Total Metals (QCLot: 561746)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	96.2	80.0	120	----
Total Metals (QCLot: 561747)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	95.7	80.0	120	----
Dissolved Metals (QCLot: 558237)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	106	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	90.2	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	92.8	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	90.6	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Dissolved Metals (QCLot: 558237) - continued									
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.3	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	97.7	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	116	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	97.5	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	98.9	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	106	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.0	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	101	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	97.4	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	108	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	95.9	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	107	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	105	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	96.0	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	98.8	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.8	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	90.6	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.0	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	92.3	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	96.0	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	97.0	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	97.9	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	93.5	80.0	120	----
Aggregate Organics (QCLot: 560940)									
oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	94.4	70.0	130	----
Volatile Organic Compounds (QCLot: 565013)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 565013) - continued									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	113	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	109	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	112	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	117	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	112	70.0	130	----
Hydrocarbons (QCLot: 558679)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	107	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	98.1	70.0	130	----
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	114	70.0	130	----
Hydrocarbons (QCLot: 565012)									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	113	70.0	130	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	113	70.0	130	----

Qualifiers

Qualifier	Description
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.

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: 558634)										
VA22B5793-005	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 558635)										
VA22B5793-005	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.60 mg/L	2.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 558636)										
VA22B5793-005	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.500 mg/L	0.5 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 558641)										
YL2200852-002	Inflow to NW Bay 2	fluoride	16984-48-8	E235.F-L	1.00 mg/L	1 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 558642)										
YL2200852-002	Inflow to NW Bay 2	chloride	16887-00-6	E235.Cl-L	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 559139)										
VA22B5640-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.63 mg/L	2.5 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 559140)										
VA22B5640-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.505 mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 559141)										
VA22B5640-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	106 mg/L	100 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 559143)										
YL2200852-009	Near Outflow Inlake_Bottom_4	chloride	16887-00-6	E235.Cl-L	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 559144)										
YL2200852-009	Near Outflow Inlake_Bottom_4	fluoride	16984-48-8	E235.F-L	1.02 mg/L	1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 559494)										
YL2200821-001	Anonymous	silicate (as SiO2)	7631-86-9	E392	10.1 mg/L	10 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 560478)										
YL2200848-001	Anonymous	nitrogen, total	7727-37-9	E366	ND mg/L	4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 560479)										
YL2200844-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0426 mg/L	0.05 mg/L	85.1	70.0	130	----
Anions and Nutrients (QCLot: 560480)										
YL2200844-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B

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: 560482)										
YL2200852-002	Inflow to NW Bay 2	phosphorus, total dissolved	7723-14-0	E375-T	0.0502 mg/L	0.05 mg/L	100	70.0	130	----
Organic / Inorganic Carbon (QCLot: 560481)										
YL2200852-002	Inflow to NW Bay 2	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 558589)										
YL2200854-001	Anonymous	aluminum, total	7429-90-5	E420	0.171 mg/L	0.2 mg/L	85.7	70.0	130	----
		antimony, total	7440-36-0	E420	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0183 mg/L	0.02 mg/L	91.7	70.0	130	----
		barium, total	7440-39-3	E420	0.0184 mg/L	0.02 mg/L	92.1	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0106 mg/L	0.01 mg/L	106	70.0	130	----
		boron, total	7440-42-8	E420	0.090 mg/L	0.1 mg/L	89.5	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00390 mg/L	0.004 mg/L	97.4	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0104 mg/L	0.01 mg/L	104	70.0	130	----
		chromium, total	7440-47-3	E420	0.0370 mg/L	0.04 mg/L	92.4	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0186 mg/L	0.02 mg/L	93.0	70.0	130	----
		copper, total	7440-50-8	E420	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		iron, total	7439-89-6	E420	1.87 mg/L	2 mg/L	93.6	70.0	130	----
		lead, total	7439-92-1	E420	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		lithium, total	7439-93-2	E420	0.0990 mg/L	0.1 mg/L	99.0	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0182 mg/L	0.02 mg/L	91.0	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		nickel, total	7440-02-0	E420	0.0367 mg/L	0.04 mg/L	91.8	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.66 mg/L	10 mg/L	96.6	70.0	130	----
		potassium, total	7440-09-7	E420	3.67 mg/L	4 mg/L	91.8	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0180 mg/L	0.02 mg/L	90.2	70.0	130	----
		selenium, total	7782-49-2	E420	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
		silicon, total	7440-21-3	E420	9.22 mg/L	10 mg/L	92.2	70.0	130	----
		silver, total	7440-22-4	E420	0.00417 mg/L	0.004 mg/L	104	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	19.6 mg/L	20 mg/L	98.0	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		thallium, total	7440-28-0	E420	0.00388 mg/L	0.004 mg/L	96.9	70.0	130	----
		thorium, total	7440-29-1	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 558589) - continued										
YL2200854-001	Anonymous	tin, total	7440-31-5	E420	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		titanium, total	7440-32-6	E420	0.0343 mg/L	0.04 mg/L	85.7	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		uranium, total	7440-61-1	E420	0.00412 mg/L	0.004 mg/L	103	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0922 mg/L	0.1 mg/L	92.2	70.0	130	----
		zinc, total	7440-66-6	E420	0.368 mg/L	0.4 mg/L	92.0	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0447 mg/L	0.04 mg/L	112	70.0	130	----
Total Metals (QCLot: 561746)										
CG2208870-017	Anonymous	mercury, total	7439-97-6	E508	0.0000918 mg/L	0.0001 mg/L	91.8	70.0	130	----
Total Metals (QCLot: 561747)										
YL2200852-003	Northwest Bay North_Bottom	mercury, total	7439-97-6	E508	0.0000928 mg/L	0.0001 mg/L	92.8	70.0	130	----
Dissolved Metals (QCLot: 558237)										
YL2200829-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.205 mg/L	0.2 mg/L	103	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	ND mg/L	0.02 mg/L	ND	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0376 mg/L	0.04 mg/L	93.9	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00865 mg/L	0.01 mg/L	86.5	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.087 mg/L	0.1 mg/L	87.0	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00412 mg/L	0.004 mg/L	103	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	0.00961 mg/L	0.01 mg/L	96.1	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		iron, dissolved	7439-89-6	E421	2.00 mg/L	2 mg/L	100.0	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0187 mg/L	0.02 mg/L	93.5	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0983 mg/L	0.1 mg/L	98.3	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	0.0205 mg/L	0.02 mg/L	103	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.7 mg/L	10 mg/L	107	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report - Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Dissolved Metals (QCLot: 558237) - continued										
YL2200829-002	Anonymous	selenium, dissolved	7782-49-2	E421	0.0410 mg/L	0.04 mg/L	103	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.72 mg/L	10 mg/L	97.2	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00371 mg/L	0.004 mg/L	92.7	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	20.8 mg/L	20 mg/L	104	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0392 mg/L	0.04 mg/L	98.0	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00352 mg/L	0.004 mg/L	88.0	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0167 mg/L	0.02 mg/L	83.5	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0397 mg/L	0.04 mg/L	99.3	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0186 mg/L	0.02 mg/L	92.8	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00374 mg/L	0.004 mg/L	93.4	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.384 mg/L	0.4 mg/L	96.1	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
Dissolved Metals (QCLot: 561783)										
YL2200789-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000922 mg/L	0.0001 mg/L	92.2	70.0	130	----
Volatile Organic Compounds (QCLot: 565013)										
KS2202474-001	Anonymous	benzene	71-43-2	E611A	89.1 µg/L	100 µg/L	89.1	60.0	140	----
		ethylbenzene	100-41-4	E611A	90.5 µg/L	100 µg/L	90.5	60.0	140	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	84.4 µg/L	100 µg/L	84.4	60.0	140	----
		styrene	100-42-5	E611A	93.8 µg/L	100 µg/L	93.8	60.0	140	----
		toluene	108-88-3	E611A	86.9 µg/L	100 µg/L	86.9	60.0	140	----
		xylene, m+p-	179601-23-1	E611A	185 µg/L	200 µg/L	92.4	60.0	140	----
		xylene, o-	95-47-6	E611A	92.6 µg/L	100 µg/L	92.6	60.0	140	----
Hydrocarbons (QCLot: 565012)										
KS2202474-002	Anonymous	F1 (C6-C10)	----	E581.VH+F1	4520 µg/L	6310 µg/L	71.7	60.0	140	----
		VHw (C6-C10)	----	E581.VH+F1	4470 µg/L	6310 µg/L	70.8	60.0	140	----

Qualifiers

Qualifier	*Description*
MS-B	*Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.*

ALS

CHAIN OF CUSTODY

ALS Laboratory

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Tamara Derkowski DATE/TIME: 7 July 2022 8:30	DATE/TIME:	[signature] JULY 07/22 DATE/TIME: 9:54	DATE/TIME:

CLIENT: Golder Associates Ltd.
PROJECT: Jackfish NTPC
SITE:
PURCHASE ORDER NO.:
PROJECT MANAGER: Kathy Qin CONTACT PH: 587-969-6141
SAMPLER: Tamara Derkowski SAMPLER MOBILE: 867-446-4757
EMAIL REPORTS TO: Kathy_Qin@golder.com; alison_humphries@golder.com; GAL_equis@golder.com

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)
☐ Standard TAT (List due date): √
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NC YL21-GOLD100-008 (updated in April 2022)
EQuIS facility code: 183527250
Project Number: 21482915
EMAIL INVOICE TO: Laurence_bonin@golder.com; Kathy_Qin@golder.co

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt 8.9 C
Other comments:

SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY SAMPLE	SAMPLE DETAILS Solid(S) Water(W) Sample identification (This description will appear on the report)	DATE / TIME (dd-mm-yyyy)	MATRIX	TOTAL CONTAINERS	Standard Parameters Suite	Organics parameter suite	Additional Information (Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc)
1	OUTFLOW	6 July 2022 15:20	W	7	X		All dissolved parameters filtered in field;
~~2~~	~~INFLOW TO NW BAY 1~~		~~W~~		~~X~~		metals preserved in field
3	INFLOW TO NW BAY 2	6 July 2022 16:50	W	7	X		
4	NORTHWEST BAY NORTH_Bottom	6 July 2022 12:55	W	13	X	X	
5	NORTHWEST BAY NORTH_Mid-depth	6 July 2022 12:45	W	7	X		
6	MID LAKE 1_ Bottom	6 July 2022 11:40	W	7	X		
7	MID LAKE 1_Mid-depth	6 July 2022 11:30	W	7	X		
~~8~~	~~EMD DISCHARGE INLAKE_Bottom~~		~~W~~		~~X~~		
~~9~~	~~EMD DISCHARGE INLAKE_Mid-depth~~		~~W~~		~~X~~		
~~10~~	~~SOUTHWEST BAY_Bottom~~		~~W~~		~~X~~		
~~11~~	~~SOUTHWEST BAY_Mid-depth~~		~~W~~		~~X~~		
12	NEAR OUTFLOW INLAKE_Bottom	6 July 2022 9:40	W	13	X	X	
13	NEAR OUTFLOW INLAKE_Mid-depth	6 July 2022 9:30	W	7	X		
14	NEAR OUTFLOW INLAKE_Bottom_4	6 July 2022 9:45	W	13	X	X	
~~15~~	~~JFLQC_1~~		~~W~~		~~X~~	~~X~~	
16	JFLQC-3	6 July 2022 15:00	W	7	X		
			TOTAL	88			

Environmental Division
Yellowknife
Work Order Reference
YL2200852
Telephone : +1 867 873 5593

CHAIN OF CUSTODY

ALS Laboratory

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Tamara Derkowski		JULY 07/22	DU
DATE/TIME: 7 July 2022 8:30	DATE/TIME:	DATE/TIME: 9:54	DATE/TIME: Jul 8 1?60

CLIENT:	Golder Associates Ltd.	TURNAROUND REQUIREMENTS :	☐ Standard TAT (List due date): ✓
PROJECT:	Jackfish NTPC	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Non Standard or urgent TAT (List due date):
SITE:			
PURCHASE ORDER NO.:		ALS QUOTE NO YL21-GOLD100-008 (updated in April 2022)	
PROJECT MANAGER:	Kathy Qin	CONTACT PH: 587-969-6141	EQuIS facility code: 183527250
SAMPLER:	Tamara Derkowski	SAMPLER MOBILE: 867-446-4757	Project Number: 21482915
EMAIL REPORTS TO:	Kathy_Qin@golder.com; alison_humphries@golder.com; GAL_equis@golder.com	EMAIL INVOICE TO:	Laurence_bonin@golder.com; Kathy_Qin@golder.co

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:	8.9 °C		
Other comments:	9°C		

SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY — SAMPLE	SAMPLE DETAILS — Sample identification (This description will appear on the report)	DATE / TIME (dd-mm-yyyy)	MATRIX: Solid(S) Water(W)	TOTAL CONTAINERS	Standard Parameters Suite	Organics parameter suite	Additional Information (Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.)
1	OUTFLOW	6 July 2022 15:20	W	7	x		All dissolved parameters
[redacted]							filtered in field;
3	INFLOW TO NW BAY 2	6 July 2022 16:50	W	7	x		metals preserved in field
4	NORTHWEST BAY NORTH_Bottom	6 July 2022 12:55	W	13	x	x	
5	NORTHWEST BAY NORTH_Mid-depth	6 July 2022 12:45	W	7	x		
6	MID LAKE 1_Bottom	6 July 2022 11:40	W	7	x		
7	MID LAKE 1_Mid-depth	6 July 2022 11:30	W	7	x		
[redacted]							
12	NEAR OUTFLOW INLAKE_Bottom	6 July 2022 9:40	W	13	x	x	
13	NEAR OUTFLOW INLAKE_Mid-depth	6 July 2022 9:30	W	7	x		
14	NEAR OUTFLOW INLAKE_Bottom_4	6 July 2022 9:45	W	13	x	x	
[redacted]							
16	JFLQC-3	6 July 2022 15:00	W	7	x		
			TOTAL	88			

Environmental Division
Yellowknife
Work Order Reference
YL2200852

Telephone : +1 867 873 5593

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **YL2201326**	Page	: 1 of 18
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Kathy Qin	Account Manager	: Oliver Gregg
Address	: 9 - 4905 48th Street Yellowknife NT Canada X1A 3S3	Address	: 314 Old Airport Road, Unit 116 Yellowknife NT Canada X1A 3T3
Telephone	: ----	Telephone	: 1 867 446 5593
Project	: 21482915	Date Samples Received	: 26-Aug-2022 10:02
PO	: ----	Date Analysis Commenced	: 30-Aug-2022
C-O-C number	: ----	Issue Date	: 09-Sep-2022 12:40
Sampler	: Nathan Hoeve; Bernadette Weaver		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 13		
No. of samples analysed	: 13		

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*
Ann Joby	Lab Assistant	Metals, Burnaby, British Columbia
Anshim Anshim	Lab Assistant	Metals, Burnaby, British Columbia
Benjamin Oke	Lab Assistant	Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Qammar Almas	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

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

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

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
DTS	*Dissolved Sulfur concentration exceeds total. Negative bias on Total Sulfur suspected due to presence of volatile sulfur species lost during digestion.*
DTSE	*Dissolved Se concentration exceeds total. Positive bias on D-Se suspected due to signal enhancement from volatile selenium species. Contact ALS if an alternative test to address this interference is needed.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	EMD DISCHARGE INLAKE_Bottom
				Client sampling date / time	25-Aug-2022 15:30	25-Aug-2022 15:20	25-Aug-2022 12:00	25-Aug-2022 11:50	24-Aug-2022 15:15
					YL2201326-001	YL2201326-002	YL2201326-003	YL2201326-004	YL2201326-005
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	106	103	114	103	112
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	7.4	9.4	<1.0	9.8	<1.0
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	3.7	4.7	<1.0	4.9	<1.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	113	112	114	113	112
conductivity	----	E100	2.0	µS/cm	446	443	446	448	446
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	149	146	146	148	148
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	146	145	146	145	143
pH	----	E108	0.10	pH units	8.47	8.50	7.77	8.52	8.20
solids, total dissolved [TDS]	----	E162	10	mg/L	290	267	272	295	292
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	252	251	247	253	252
solids, total suspended [TSS]	----	E160	3.0	mg/L	9.7	9.1	7.1	8.1	6.0
turbidity	----	E121	0.10	NTU	9.13	8.96	5.99	8.78	8.00
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0087	0.0074	0.443	0.0084	0.0084
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	61.7	61.6	59.9	61.7	61.6
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.086	0.088	0.086	0.084	0.084
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L	1.06	1.10	1.44	1.21	1.15
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0442	0.0296	0.0757	0.0410	0.0497
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0131	<0.0200	0.0663 RRV	0.0120	0.0126
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	13.3	13.3	13.2	13.2	13.2
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	25.6	25.6	23.9	25.6	25.3
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	11.3	11.2	12.7	11.8	11.9
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0125	0.0082	0.0068	0.0056	0.0084

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	EMD DISCHARGE INLAKE_Bottom
				Client sampling date / time	25-Aug-2022 15:30	25-Aug-2022 15:20	25-Aug-2022 12:00	25-Aug-2022 11:50	24-Aug-2022 15:15
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	YL2201326-001	YL2201326-002	YL2201326-003	YL2201326-004	YL2201326-005
					Result	Result	Result	Result	Result
Total Metals									
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00125	0.00124	0.00097	0.00123	0.00122
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0744	0.0760	0.0717	0.0745	0.0742
barium, total	7440-39-3	E420	0.00010	mg/L	0.0314	0.0319	0.0398	0.0317	0.0320
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	0.031	0.029	0.028	0.028	0.028
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L	37.7	37.0	38.0	37.2	36.8
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L	0.00160	0.00161	0.00111	0.00160	0.00459
iron, total	7439-89-6	E420	0.010	mg/L	0.014	<0.010	0.067	<0.010	0.016
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0089	0.0082	0.0077	0.0075	0.0073
magnesium, total	7439-95-4	E420	0.0050	mg/L	12.5	12.8	12.4	12.6	12.5
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0451	0.0454	0.594	0.0450	0.122
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000175	0.000193	0.000154	0.000187	0.000179
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	0.055	0.100	<0.050	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L	4.05	4.14	4.14	4.05	4.05
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00265	0.00287	0.00263	0.00284	0.00272
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
silicon, total	7440-21-3	E420	0.10	mg/L	6.73	6.74	6.64	6.70	6.55
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	0.000011	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L	34.4	35.2	33.9	34.3	34.2
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0914	0.0911	0.0921	0.0900	0.0903
sulfur, total	7704-34-9	E420	0.50	mg/L	8.79	9.10	7.54	9.20	8.70

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	EMD DISCHARGE INLAKE_Bottom
				Client sampling date / time	25-Aug-2022 15:30	25-Aug-2022 15:20	25-Aug-2022 12:00	25-Aug-2022 11:50	24-Aug-2022 15:15
					YL2201326-001	YL2201326-002	YL2201326-003	YL2201326-004	YL2201326-005
					Result	Result	Result	Result	Result
Total Metals									
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000516	0.000529	0.000421	0.000511	0.000502
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0044	0.0046	0.0045	0.0047	0.0042
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00120	0.00120	0.00067	0.00120	0.00116
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0751	0.0753	0.0675	0.0755	0.0759
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0301	0.0297	0.0392	0.0307	0.0326
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<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	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.027	0.028	0.028	0.027	0.028
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L	37.9	37.2	38.2	37.7	37.6
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00136	0.00140	0.00066	0.00145	0.00124
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0.060	<0.010	<0.010
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0062	0.0058	0.0058	0.0058	0.0060
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	13.2	13.0	12.2	13.2	13.2
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00144	0.00147	0.547	0.00087	0.0846

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	EMD DISCHARGE INLAKE_Bottom
				Client sampling date / time	25-Aug-2022 15:30	25-Aug-2022 15:20	25-Aug-2022 12:00	25-Aug-2022 11:50	24-Aug-2022 15:15
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**YL2201326-001**	**YL2201326-002**	**YL2201326-003**	**YL2201326-004**	**YL2201326-005**
					Result	Result	Result	Result	Result
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000168	0.000174	0.000116	0.000171	0.000166
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050 [RRV]	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.13	4.17	4.24	4.22	4.38
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00268	0.00254	0.00252	0.00270	0.00267
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0.000480 [DTSE]	0.000058	0.000056
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.48	6.52	6.63	6.74	6.45
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000050 [DLM]	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L	33.5	33.8	32.1	34.5	34.2
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0910	0.0908	0.0850	0.0895	0.0898
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	9.68	9.43	16.4 [DTS]	9.80	9.34
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<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	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000558	0.000555	0.000469	0.000566	0.000560
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	<5.0	----	----	----	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.50	µg/L	<0.50	----	----	----	----
ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	----	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	NORTHWEST BAY NORTH_Bottom	NORTHWEST BAY NORTH_Mid-depth	MID LAKE 1_Bottom	MID LAKE 1_Mid-depth	EMD DISCHARGE INLAKE_Bottom
				Client sampling date / time	25-Aug-2022 15:30	25-Aug-2022 15:20	25-Aug-2022 12:00	25-Aug-2022 11:50	24-Aug-2022 15:15
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	YL2201326-001	YL2201326-002	YL2201326-003	YL2201326-004	YL2201326-005
					Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]									
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	----	----	----	----
styrene	100-42-5	E611A	0.50	µg/L	<0.50	----	----	----	----
toluene	108-88-3	E611A	0.50	µg/L	<0.50	----	----	----	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	----	----	----	----
xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	----	----	----	----
xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	----	----	----	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	109	----	----	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	101	----	----	----	----
Hydrocarbons									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----	----	----	----
F2 (C10-C16)	----	E601	300	µg/L	<300	----	----	----	----
F3 (C16-C34)	----	E601	300	µg/L	<300	----	----	----	----
F4 (C34-C50)	----	E601	300	µg/L	<300	----	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----	----	----	----
F1-BTEX	----	EC580	100	µg/L	<100	----	----	----	----
VPHw	----	EC580A	100	µg/L	<100	----	----	----	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	95.4	----	----	----	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	107	----	----	----	----

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

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	NEAR OUTFLOW INLAKE_Bottom	NEAR OUTFLOW INLAKE_Mid-depth
				Client sampling date / time	24-Aug-2022 15:05	25-Aug-2022 10:00	25-Aug-2022 09:50	25-Aug-2022 14:10	25-Aug-2022 14:00
					YL2201326-006	YL2201326-007	YL2201326-008	YL2201326-009	YL2201326-010
					Result	Result	Result	Result	Result
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	104	104	103	104	103
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	9.2	9.0	9.8	9.0	9.6
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	4.6	4.5	4.9	4.5	4.8
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	113	112	113	112	112
conductivity	----	E100	2.0	µS/cm	447	442	444	446	446
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	151	148	152	148	156
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	146	147	146	146	143
pH	----	E108	0.10	pH units	8.46	8.49	8.53	8.49	8.51
solids, total dissolved [TDS]	----	E162	10	mg/L	296	300	280	274	297
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	255	252	255	253	256
solids, total suspended [TSS]	----	E160	3.0	mg/L	8.4	7.4	7.8	9.3	9.9
turbidity	----	E121	0.10	NTU	8.18	8.81	8.50	8.85	8.51
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0072	0.0081	0.0089	0.0104	0.0097
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	61.9	62.1	61.8	62.0	62.0
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.086	0.081	0.086	0.082	0.085
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L	1.15	1.08	1.14	1.18	1.17
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0467	0.0443	0.0470	0.0468	0.0474
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0133	0.0126	0.0126	0.0119	0.0122
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	13.2	13.3	13.2	13.3	13.3
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	25.6	25.8	25.7	25.6	25.6
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	11.7	11.9	12.9	11.8	11.7
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0096	0.0105	0.0091	0.0084	0.0083

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	NEAR OUTFLOW INLAKE_Bottom	NEAR OUTFLOW INLAKE_Mid-depth
				Client sampling date / time	24-Aug-2022 15:05	25-Aug-2022 10:00	25-Aug-2022 09:50	25-Aug-2022 14:10	25-Aug-2022 14:00
					YL2201326-006	**YL2201326-007**	**YL2201326-008**	**YL2201326-009**	**YL2201326-010**
					Result	Result	Result	Result	Result
Total Metals									
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00125	0.00126	0.00125	0.00125	0.00122
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0745	0.0742	0.0739	0.0742	0.0745
barium, total	7440-39-3	E420	0.00010	mg/L	0.0315	0.0319	0.0316	0.0316	0.0318
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	0.028	0.028	0.029	0.029	0.027
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L	37.7	37.9	37.9	37.5	36.3
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L	0.00161	0.00157	0.00155	0.00154	0.00162
iron, total	7439-89-6	E420	0.010	mg/L	0.014	0.012	<0.010	0.013	<0.010
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0072	0.0080	0.0071	0.0068	0.0067
magnesium, total	7439-95-4	E420	0.0050	mg/L	12.6	12.8	12.4	12.7	12.7
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0711	0.0448	0.0443	0.0762	0.0556
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000191	0.000196	0.000197	0.000198	0.000178
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	0.00053	<0.00050	0.00050	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L	4.06	4.11	4.08	4.05	4.06
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00275	0.00276	0.00282	0.00262	0.00282
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000070	<0.000050	<0.000050	0.000059	<0.000050
silicon, total	7440-21-3	E420	0.10	mg/L	6.83	6.73	6.41	6.56	6.40
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L	34.4	34.4	33.8	34.4	34.5
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0914	0.0926	0.0922	0.0918	0.0874
sulfur, total	7704-34-9	E420	0.50	mg/L	9.25	9.29	8.61	9.45	9.20

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	NEAR OUTFLOW INLAKE_Bottom	NEAR OUTFLOW INLAKE_Mid-depth
				Client sampling date / time	24-Aug-2022 15:05	25-Aug-2022 10:00	25-Aug-2022 09:50	25-Aug-2022 14:10	25-Aug-2022 14:00
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**YL2201326-006**	**YL2201326-007**	**YL2201326-008**	**YL2201326-009**	**YL2201326-010**
					Result	Result	Result	Result	Result
Total Metals									
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000528	0.000524	0.000542	0.000503	0.000500
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0042	0.0048	0.0044	0.0045	0.0045
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00118	0.00122	0.00120	0.00121	0.00116
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0758	0.0753	0.0756	0.0756	0.0755
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0308	0.0305	0.0307	0.0320	0.0297
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<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	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.028	0.027	0.028	0.027	0.029
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L	38.7	37.1	39.6	37.6	40.2
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00136	0.00141	0.00146	0.00142	0.00144
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0060	0.0185 DTC	0.0061	0.0060	0.0062
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	13.3	13.4	13.0	13.1	13.4
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0291	0.00153	0.00154	0.0157	0.00140

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

				Client sample ID	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	NEAR OUTFLOW INLAKE_Bottom	NEAR OUTFLOW INLAKE_Mid-depth
				Client sampling date / time	24-Aug-2022 15:05	25-Aug-2022 10:00	25-Aug-2022 09:50	25-Aug-2022 14:10	25-Aug-2022 14:00
Analyte	CAS Number	Method	LOR	Unit	YL2201326-006	YL2201326-007	YL2201326-008	YL2201326-009	YL2201326-010
					Result	Result	Result	Result	Result
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000178	0.000176	0.000174	0.000175	0.000167
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.28	4.28	4.31	4.38	4.25
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00266	0.00268	0.00272	0.00274	0.00256
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000051	0.000055	0.000050	0.000067	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.59	6.52	6.59	6.63	6.53
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L	34.6	34.3	34.6	34.8	34.7
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0920	0.0901	0.0899	0.0896	0.0863
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	9.41	9.29	9.37	9.38	9.84
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<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	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000562	0.000562	0.000582	0.000545	0.000561
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	----	----	----	<5.0	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.50	µg/L	----	----	----	<0.50	----
ethylbenzene	100-41-4	E611A	0.50	µg/L	----	----	----	<0.50	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	EMD DISCHARGE INLAKE_Mid-depth	SOUTHWEST BAY_Bottom	SOUTHWEST BAY_Mid-depth	NEAR OUTFLOW INLAKE_Bottom	NEAR OUTFLOW INLAKE_Mid-depth
				Client sampling date / time	24-Aug-2022 15:05	25-Aug-2022 10:00	25-Aug-2022 09:50	25-Aug-2022 14:10	25-Aug-2022 14:00
Analyte	CAS Number	Method	LOR	Unit	YL2201326-006	YL2201326-007	YL2201326-008	YL2201326-009	YL2201326-010
					Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]									
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	----	----	----	<0.50	----
styrene	100-42-5	E611A	0.50	µg/L	----	----	----	<0.50	----
toluene	108-88-3	E611A	0.50	µg/L	----	----	----	<0.50	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	----	----	----	<0.40	----
xylene, o-	95-47-6	E611A	0.30	µg/L	----	----	----	<0.30	----
xylenes, total	1330-20-7	E611A	0.50	µg/L	----	----	----	<0.50	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	----	----	----	108	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	----	----	----	99.9	----
Hydrocarbons									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	----	----	----	<100	----
F2 (C10-C16)	----	E601	300	µg/L	----	----	----	<300	----
F3 (C16-C34)	----	E601	300	µg/L	----	----	----	<300	----
F4 (C34-C50)	----	E601	300	µg/L	----	----	----	<300	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	----	----	----	<100	----
F1-BTEX	----	EC580	100	µg/L	----	----	----	<100	----
VPHw	----	EC580A	100	µg/L	----	----	----	<100	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	----	----	----	96.2	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	----	----	----	96.8	----

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

Analytical Results

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

				Client sample ID	NORTHWEST BAY NORTH_Bottom _4	JFLQC_1	JFLQC_2	----	----
				Client sampling date / time	25-Aug-2022 14:20	24-Aug-2022 08:45	25-Aug-2022 11:25	----	----
Analyte	CAS Number	Method	LOR	Unit	YL2201326-011	YL2201326-012	YL2201326-013	--------	--------
					Result	Result	Result	----	----
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	103	<1.0	<1.0	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	8.6	<1.0	<1.0	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	----	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	4.3	<1.0	<1.0	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	111	<1.0	<1.0	----	----
conductivity	----	E100	2.0	µS/cm	442	<2.0	<2.0	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	148	<0.60	<0.60	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	148	<0.60	<0.60	----	----
pH	----	E108	0.10	pH units	8.49	5.45	5.44	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	274	<10	<10	----	----
solids, total dissolved [TDS], calculated (APHA)	----	EC103.APHA	1.0	mg/L	251	<1.0	<1.0	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L	7.5	<3.0	<3.0	----	----
turbidity	----	E121	0.10	NTU	8.51	<0.10	<0.10	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0090	<0.0050	<0.0050	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	62.0	<0.10	<0.10	----	----
fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.083	<0.010	<0.010	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	<0.0050	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	<0.0051	<0.0051	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L	1.09	<0.030	<0.030	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0448	<0.0020	<0.0020	----	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0148	<0.0020	<0.0020	----	----
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	13.3	<0.50	<0.50	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	25.7	<0.30	<0.30	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	11.8	<0.50	<0.50	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0138	0.0044 RRV	<0.0030	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY NORTH_Bottom _4	JFLQC_1	JFLQC_2	----	----
Client sampling date / time					25-Aug-2022 14:20	24-Aug-2022 08:45	25-Aug-2022 11:25	----	----
					YL2201326-011	YL2201326-012	YL2201326-013	--------	--------
					Result	Result	Result	----	----
Total Metals									
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00127	<0.00010	<0.00010	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0751	<0.00010	<0.00010	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0313	0.00069 RRV	<0.00010	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.029	<0.010	<0.010	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	37.8	<0.050	<0.050	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00159	<0.00050	<0.00050	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.017	<0.010	<0.010	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0069	<0.0010	<0.0010	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	12.9	<0.0050	<0.0050	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0467	<0.00010	<0.00010	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000192	<0.000050	<0.000050	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00051	<0.00050	<0.00050	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	<0.050	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	4.10	<0.050	<0.050	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00282	<0.00020	<0.00020	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	6.59	<0.10	<0.10	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
sodium, total	7440-23-5	E420	0.050	mg/L	35.2	<0.050	<0.050	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.0927	<0.00020	<0.00020	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	8.63	<0.50	<0.50	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY NORTH_Bottom _4	JFLQC_1	JFLQC_2	----	----
				Client sampling date / time	25-Aug-2022 14:20	24-Aug-2022 08:45	25-Aug-2022 11:25	----	----
					YL2201326-011	**YL2201326-012**	**YL2201326-013**	--------	--------
					Result	Result	Result	----	----
Total Metals									
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00035	<0.00030	<0.00030	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000524	<0.000010	<0.000010	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	<0.0030	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0042	0.0019 RRV	<0.0010	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00114	<0.00010	<0.00010	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0764	<0.00010	<0.00010	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0312	0.00041 RRV	<0.00010	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	<0.000100	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.028	<0.010	<0.010	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	38.4	<0.050	<0.050	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00137	<0.00020	<0.00020	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0060	<0.0010	<0.0010	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	12.6	<0.0050	<0.0050	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00197	<0.00010	<0.00010	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	NORTHWEST BAY NORTH_Bottom _4	JFLQC_1	JFLQC_2	----	----
				Client sampling date / time	25-Aug-2022 14:20	24-Aug-2022 08:45	25-Aug-2022 11:25	----	----
					YL2201326-011	YL2201326-012	YL2201326-013	--------	--------
					Result	Result	Result	----	----
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000173	<0.000050	<0.000050	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.27	<0.050	<0.050	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00271	<0.00020	<0.00020	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.49	<0.050	<0.050	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	33.2	<0.050	<0.050	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0843	<0.00020	<0.00020	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	9.63	<0.50	<0.50	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000545	<0.000010	<0.000010	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0.0049 RRV	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	----	----
Aggregate Organics									
oil & grease (gravimetric)	----	E567	5.0	mg/L	<5.0	<5.0	----	----	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	----	----	----
ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	NORTHWEST BAY NORTH_Bottom _4	JFLQC_1	JFLQC_2	----	----
				Client sampling date / time	25-Aug-2022 14:20	24-Aug-2022 08:45	25-Aug-2022 11:25	----	----
Analyte	CAS Number	Method	LOR	Unit	YL2201326-011	YL2201326-012	YL2201326-013	--------	--------
					Result	Result	Result	----	----
Volatile Organic Compounds [Fuels]									
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	----	----	----
styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	----	----	----
toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	----	----	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	----	----	----
xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	----	----	----
xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	<0.50	----	----	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	108	109	----	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	100	101	----	----	----
Hydrocarbons									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	----	----	----
F2 (C10-C16)	----	E601	300	µg/L	<300	<300	----	----	----
F3 (C16-C34)	----	E601	300	µg/L	<300	<300	----	----	----
F4 (C34-C50)	----	E601	300	µg/L	<300	<300	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	----	----	----
F1-BTEX	----	EC580	100	µg/L	<100	<100	----	----	----
VPHw	----	EC580A	100	µg/L	<100	<100	----	----	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	96.4	93.6	----	----	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	108	100	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **YL2201326**	Page	: 1 of 44
Client	: **Golder Associates Ltd.**	Laboratory	: Yellowknife - Environmental
Contact	: Kathy Qin	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	: 21482915	Date Samples Received	: 26-Aug-2022 10:02
PO	: ----	Issue Date	: 09-Sep-2022 12:40
C-O-C number	: ----		
Sampler	: Nathan Hoeve; Bernadette Weaver		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 13		
No. of samples analysed	: 13		

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

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- 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.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Physical Tests	QC-MRG2-624203001	----	alkalinity, bicarbonate (as CaCO3)	----	E290	1.9 mg/L B	1.5 mg/L	Blank result exceeds permitted value
Physical Tests	QC-MRG2-624203001	----	alkalinity, total (as CaCO3)	----	E290	1.9 mg/L B	1.5 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Dissolved Metals	QC-624073-002	----	silver, dissolved	7440-22-4	E421	76.7 % MES	80.0-120%	Recovery less than lower control limit

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

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	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) JFLQC_1	E567	24-Aug-2022	03-Sep-2022	28 days	10 days	✓	03-Sep-2022	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) NEAR OUTFLOW INLAKE_Bottom	E567	25-Aug-2022	03-Sep-2022	28 days	9 days	✓	03-Sep-2022	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) NORTHWEST BAY NORTH_Bottom	E567	25-Aug-2022	03-Sep-2022	28 days	9 days	✓	03-Sep-2022	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) NORTHWEST BAY NORTH_Bottom_4	E567	25-Aug-2022	03-Sep-2022	28 days	9 days	✓	03-Sep-2022	40 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) JFLQC_2	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MID LAKE 1_Bottom	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MID LAKE 1_Mid-depth	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom_4	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Bottom	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Mid-depth	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) JFLQC_1	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE JFLQC_2	E235.Cl-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE MID LAKE 1_Bottom	E235.Cl-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE MID LAKE 1_Mid-depth	E235.Cl-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.Cl-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E235.Cl-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom	E235.Cl-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom_4	E235.Cl-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.Cl-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.Cl-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.Cl-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.Cl-L	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.Cl-L	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE JFLQC_1	E235.Cl-L	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE JFLQC_2	E235.F-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE MID LAKE 1_Bottom	E235.F-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE MID LAKE 1_Mid-depth	E235.F-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.F-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	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: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E235.F-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom	E235.F-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom_4	E235.F-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.F-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.F-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.F-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.F-L	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.F-L	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC (Low Level)										
HDPE JFLQC_1	E235.F-L	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	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: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE JFLQC_2	E235.NO3-L	25-Aug-2022	30-Aug-2022	3 days	5 days	✗ EHT	30-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MID LAKE 1_Bottom	E235.NO3-L	25-Aug-2022	30-Aug-2022	3 days	5 days	✗ EHT	30-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MID LAKE 1_Mid-depth	E235.NO3-L	25-Aug-2022	30-Aug-2022	3 days	5 days	✗ EHT	30-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.NO3-L	25-Aug-2022	30-Aug-2022	3 days	5 days	✗ EHT	30-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E235.NO3-L	25-Aug-2022	30-Aug-2022	3 days	5 days	✗ EHT	30-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom	E235.NO3-L	25-Aug-2022	30-Aug-2022	3 days	5 days	✗ EHT	30-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom_4	E235.NO3-L	25-Aug-2022	30-Aug-2022	3 days	5 days	✗ EHT	30-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.NO3-L	25-Aug-2022	30-Aug-2022	3 days	5 days	✗ EHT	30-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.NO3-L	25-Aug-2022	30-Aug-2022	3 days	5 days	✗ EHT	30-Aug-2022	3 days	0 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.NO3-L	25-Aug-2022	30-Aug-2022	3 days	5 days	× EHT	30-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.NO3-L	24-Aug-2022	30-Aug-2022	3 days	6 days	× EHT	30-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.NO3-L	24-Aug-2022	30-Aug-2022	3 days	6 days	× EHT	30-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE JFLQC_1	E235.NO3-L	24-Aug-2022	30-Aug-2022	3 days	6 days	× EHT	30-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE JFLQC_2	E235.NO2-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MID LAKE 1_Bottom	E235.NO2-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MID LAKE 1_Mid-depth	E235.NO2-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.NO2-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E235.NO2-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	5 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom	E235.NO2-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Bottom_4	E235.NO2-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.NO2-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Bottom	E235.NO2-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SOUTHWEST BAY_Mid-depth	E235.NO2-L	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.NO2-L	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.NO2-L	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE JFLQC_1	E235.NO2-L	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	6 days	× EHT
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE JFLQC_2	E392	25-Aug-2022	----	----	----		31-Aug-2022	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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE MID LAKE 1_Bottom	E392	25-Aug-2022	----	----	----		31-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE MID LAKE 1_Mid-depth	E392	25-Aug-2022	----	----	----		31-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NEAR OUTFLOW INLAKE_Bottom	E392	25-Aug-2022	----	----	----		31-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E392	25-Aug-2022	----	----	----		31-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NORTHWEST BAY NORTH_Bottom	E392	25-Aug-2022	----	----	----		31-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NORTHWEST BAY NORTH_Bottom_4	E392	25-Aug-2022	----	----	----		31-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE NORTHWEST BAY NORTH_Mid-depth	E392	25-Aug-2022	----	----	----		31-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE SOUTHWEST BAY_Bottom	E392	25-Aug-2022	----	----	----		31-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE SOUTHWEST BAY_Mid-depth	E392	25-Aug-2022	----	----	----		31-Aug-2022	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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE EMD DISCHARGE INLAKE_Bottom	E392	24-Aug-2022	----	----	----		31-Aug-2022	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E392	24-Aug-2022	----	----	----		31-Aug-2022	28 days	7 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE JFLQC_1	E392	24-Aug-2022	----	----	----		31-Aug-2022	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE JFLQC_2	E235.SO4	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MID LAKE 1_Bottom	E235.SO4	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MID LAKE 1_Mid-depth	E235.SO4	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NEAR OUTFLOW INLAKE_Bottom	E235.SO4	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E235.SO4	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NORTHWEST BAY NORTH_Bottom	E235.SO4	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE NORTHWEST BAY NORTH_Bottom_4	E235.SO4	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE NORTHWEST BAY NORTH_Mid-depth	E235.SO4	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SOUTHWEST BAY_Bottom	E235.SO4	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SOUTHWEST BAY_Mid-depth	E235.SO4	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EMD DISCHARGE INLAKE_Bottom	E235.SO4	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E235.SO4	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE JFLQC_1	E235.SO4	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	6 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) JFLQC_2	E375-T	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) MID LAKE 1_Bottom	E375-T	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) MID LAKE 1_Mid-depth	E375-T	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E375-T	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E375-T	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E375-T	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Bottom_4	E375-T	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E375-T	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Bottom	E375-T	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Mid-depth	E375-T	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E375-T	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E375-T	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) JFLQC_1	E375-T	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) JFLQC_2	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) MID LAKE 1_Bottom	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) MID LAKE 1_Mid-depth	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom_4	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Bottom	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Mid-depth	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E366	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E366	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) JFLQC_1	E366	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) JFLQC_2	E372-U	25-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	13 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MID LAKE 1_Bottom	E372-U	25-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	13 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MID LAKE 1_Mid-depth	E372-U	25-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	13 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E372-U	25-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	13 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E372-U	25-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	13 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E372-U	25-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	13 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Bottom_4	E372-U	25-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	13 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E372-U	25-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	13 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Bottom	E372-U	25-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	13 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SOUTHWEST BAY_Mid-depth	E372-U	25-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	13 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E372-U	24-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	14 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E372-U	24-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	14 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) JFLQC_1	E372-U	24-Aug-2022	01-Sep-2022	----	----		07-Sep-2022	28 days	14 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) JFLQC_2	E509	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MID LAKE 1_Bottom	E509	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MID LAKE 1_Mid-depth	E509	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NEAR OUTFLOW INLAKE_Bottom	E509	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NEAR OUTFLOW INLAKE_Mid-depth	E509	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NORTHWEST BAY NORTH_Bottom	E509	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NORTHWEST BAY NORTH_Bottom_4	E509	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) NORTHWEST BAY NORTH_Mid-depth	E509	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) SOUTHWEST BAY_Bottom	E509	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) SOUTHWEST BAY_Mid-depth	E509	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EMD DISCHARGE INLAKE_Bottom	E509	24-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EMD DISCHARGE INLAKE_Mid-depth	E509	24-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) JFLQC_1	E509	24-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) JFLQC_2	E421	25-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MID LAKE 1_Bottom	E421	25-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MID LAKE 1_Mid-depth	E421	25-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NEAR OUTFLOW INLAKE_Bottom	E421	25-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	8 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NEAR OUTFLOW INLAKE_Mid-depth	E421	25-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NORTHWEST BAY NORTH_Bottom	E421	25-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NORTHWEST BAY NORTH_Bottom_4	E421	25-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) NORTHWEST BAY NORTH_Mid-depth	E421	25-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SOUTHWEST BAY_Bottom	E421	25-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SOUTHWEST BAY_Mid-depth	E421	25-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) EMD DISCHARGE INLAKE_Bottom	E421	24-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) EMD DISCHARGE INLAKE_Mid-depth	E421	24-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) JFLQC_1	E421	24-Aug-2022	30-Aug-2022	----	----		01-Sep-2022	180 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NEAR OUTFLOW INLAKE_Bottom	E601	25-Aug-2022	01-Sep-2022	14 days	7 days	✓	02-Sep-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NORTHWEST BAY NORTH_Bottom	E601	25-Aug-2022	01-Sep-2022	14 days	7 days	✓	02-Sep-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NORTHWEST BAY NORTH_Bottom_4	E601	25-Aug-2022	01-Sep-2022	14 days	7 days	✓	02-Sep-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) JFLQC_1	E601	24-Aug-2022	01-Sep-2022	14 days	8 days	✓	02-Sep-2022	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NEAR OUTFLOW INLAKE_Bottom	E581.VH+F1	25-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	14 days	8 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NORTHWEST BAY NORTH_Bottom	E581.VH+F1	25-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	14 days	8 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NORTHWEST BAY NORTH_Bottom_4	E581.VH+F1	25-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	14 days	8 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) JFLQC_1	E581.VH+F1	24-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) JFLQC_2	E358-L	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	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: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) MID LAKE 1_Bottom	E358-L	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) MID LAKE 1_Mid-depth	E358-L	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NEAR OUTFLOW INLAKE_Bottom	E358-L	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NEAR OUTFLOW INLAKE_Mid-depth	E358-L	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Bottom	E358-L	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Bottom_4	E358-L	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) NORTHWEST BAY NORTH_Mid-depth	E358-L	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Bottom	E358-L	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) SOUTHWEST BAY_Mid-depth	E358-L	25-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Bottom	E358-L	24-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EMD DISCHARGE INLAKE_Mid-depth	E358-L	24-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) JFLQC_1	E358-L	24-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE JFLQC_2	E290	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MID LAKE 1_Bottom	E290	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MID LAKE 1_Mid-depth	E290	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NEAR OUTFLOW INLAKE_Bottom	E290	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E290	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NORTHWEST BAY NORTH_Bottom	E290	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE NORTHWEST BAY NORTH_Bottom_4	E290	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE NORTHWEST BAY NORTH_Mid-depth	E290	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SOUTHWEST BAY_Bottom	E290	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SOUTHWEST BAY_Mid-depth	E290	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EMD DISCHARGE INLAKE_Bottom	E290	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E290	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE JFLQC_1	E290	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE JFLQC_2	E100	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE MID LAKE 1_Bottom	E100	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	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: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : Conductivity in Water										
HDPE MID LAKE 1_Mid-depth	E100	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE NEAR OUTFLOW INLAKE_Bottom	E100	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E100	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE NORTHWEST BAY NORTH_Bottom	E100	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE NORTHWEST BAY NORTH_Bottom_4	E100	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE NORTHWEST BAY NORTH_Mid-depth	E100	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE SOUTHWEST BAY_Bottom	E100	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE SOUTHWEST BAY_Mid-depth	E100	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE EMD DISCHARGE INLAKE_Bottom	E100	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	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 Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E100	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE JFLQC_1	E100	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	6 days	✓
Physical Tests : pH by Meter										
HDPE EMD DISCHARGE INLAKE_Bottom	E108	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E108	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE JFLQC_1	E108	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE JFLQC_2	E108	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MID LAKE 1_Bottom	E108	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MID LAKE 1_Mid-depth	E108	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NEAR OUTFLOW INLAKE_Bottom	E108	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : pH by Meter										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E108	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NORTHWEST BAY NORTH_Bottom	E108	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NORTHWEST BAY NORTH_Bottom_4	E108	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE NORTHWEST BAY NORTH_Mid-depth	E108	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SOUTHWEST BAY_Bottom	E108	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SOUTHWEST BAY_Mid-depth	E108	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE EMD DISCHARGE INLAKE_Bottom	E162	24-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	×
Physical Tests : TDS by Gravimetry										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E162	24-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	×
Physical Tests : TDS by Gravimetry										
HDPE JFLQC_1	E162	24-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE										
JFLQC_2	E162	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
MID LAKE 1_Bottom	E162	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
MID LAKE 1_Mid-depth	E162	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
NEAR OUTFLOW INLAKE_Bottom	E162	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
NEAR OUTFLOW INLAKE_Mid-depth	E162	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
NORTHWEST BAY NORTH_Bottom	E162	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
NORTHWEST BAY NORTH_Bottom_4	E162	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
NORTHWEST BAY NORTH_Mid-depth	E162	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
SOUTHWEST BAY_Bottom	E162	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : TDS by Gravimetry										
HDPE SOUTHWEST BAY_Mid-depth	E162	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE EMD DISCHARGE INLAKE_Bottom	E160	24-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	×
Physical Tests : TSS by Gravimetry										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E160	24-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	×
Physical Tests : TSS by Gravimetry										
HDPE JFLQC_1	E160	24-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE JFLQC_2	E160	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MID LAKE 1_Bottom	E160	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MID LAKE 1_Mid-depth	E160	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NEAR OUTFLOW INLAKE_Bottom	E160	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E160	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Bottom	E160	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Bottom_4	E160	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE NORTHWEST BAY NORTH_Mid-depth	E160	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SOUTHWEST BAY_Bottom	E160	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SOUTHWEST BAY_Mid-depth	E160	25-Aug-2022	----	----	----		01-Sep-2022	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE JFLQC_2	E121	25-Aug-2022	----	----	----		30-Aug-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE MID LAKE 1_Bottom	E121	25-Aug-2022	----	----	----		30-Aug-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE MID LAKE 1_Mid-depth	E121	25-Aug-2022	----	----	----		30-Aug-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NEAR OUTFLOW INLAKE_Bottom	E121	25-Aug-2022	----	----	----		30-Aug-2022	3 days	5 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : Turbidity by Nephelometry										
HDPE NEAR OUTFLOW INLAKE_Mid-depth	E121	25-Aug-2022	----	----	----		30-Aug-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NORTHWEST BAY NORTH_Bottom	E121	25-Aug-2022	----	----	----		30-Aug-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NORTHWEST BAY NORTH_Bottom_4	E121	25-Aug-2022	----	----	----		30-Aug-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE NORTHWEST BAY NORTH_Mid-depth	E121	25-Aug-2022	----	----	----		30-Aug-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SOUTHWEST BAY_Bottom	E121	25-Aug-2022	----	----	----		30-Aug-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE SOUTHWEST BAY_Mid-depth	E121	25-Aug-2022	----	----	----		30-Aug-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE EMD DISCHARGE INLAKE_Bottom	E121	24-Aug-2022	----	----	----		30-Aug-2022	3 days	6 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE EMD DISCHARGE INLAKE_Mid-depth	E121	24-Aug-2022	----	----	----		30-Aug-2022	3 days	6 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE JFLQC_1	E121	24-Aug-2022	----	----	----		30-Aug-2022	3 days	6 days	× EHT

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) JFLQC_2	E508	25-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) MID LAKE 1_Bottom	E508	25-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) MID LAKE 1_Mid-depth	E508	25-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NEAR OUTFLOW INLAKE_Bottom	E508	25-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NEAR OUTFLOW INLAKE_Mid-depth	E508	25-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NORTHWEST BAY NORTH_Bottom	E508	25-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NORTHWEST BAY NORTH_Bottom_4	E508	25-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) NORTHWEST BAY NORTH_Mid-depth	E508	25-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SOUTHWEST BAY_Bottom	E508	25-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	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: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SOUTHWEST BAY_Mid-depth	E508	25-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) EMD DISCHARGE INLAKE_Bottom	E508	24-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) EMD DISCHARGE INLAKE_Mid-depth	E508	24-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) JFLQC_1	E508	24-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) JFLQC_2	E420	25-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MID LAKE 1_Bottom	E420	25-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MID LAKE 1_Mid-depth	E420	25-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NEAR OUTFLOW INLAKE_Bottom	E420	25-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NEAR OUTFLOW INLAKE_Mid-depth	E420	25-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NORTHWEST BAY NORTH_Bottom	E420	25-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NORTHWEST BAY NORTH_Bottom_4	E420	25-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) NORTHWEST BAY NORTH_Mid-depth	E420	25-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SOUTHWEST BAY_Bottom	E420	25-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SOUTHWEST BAY_Mid-depth	E420	25-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) EMD DISCHARGE INLAKE_Bottom	E420	24-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) EMD DISCHARGE INLAKE_Mid-depth	E420	24-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) JFLQC_1	E420	24-Aug-2022	30-Aug-2022	----	----		02-Sep-2022	180 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NEAR OUTFLOW INLAKE_Bottom	E611A	25-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	14 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NORTHWEST BAY NORTH_Bottom	E611A	25-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	14 days	8 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NORTHWEST BAY NORTH_Bottom_4	E611A	25-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	14 days	8 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) JFLQC_1	E611A	24-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	14 days	9 days	✓

Legend & Qualifier Definitions

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

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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	624203	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	629099	1	13	7.6	5.0	✓
BTEX by Headspace GC-MS	E611A	631682	1	11	9.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	624210	1	13	7.6	5.0	✓
Conductivity in Water	E100	624205	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	628665	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	624073	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	629095	1	14	7.1	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	624208	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	624207	1	14	7.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	624209	1	13	7.6	5.0	✓
pH by Meter	E108	624204	1	13	7.6	5.0	✓
Reactive Silica by Colourimetry	E392	627594	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	624206	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	626134	3	58	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	629098	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	627571	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	624103	2	36	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	629096	1	13	7.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	629097	1	13	7.6	5.0	✓
TSS by Gravimetry	E160	626138	3	52	5.7	5.0	✓
Turbidity by Nephelometry	E121	624562	1	15	6.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	631681	1	11	9.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	624203	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	629099	1	13	7.6	5.0	✓
BTEX by Headspace GC-MS	E611A	631682	1	11	9.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	629550	1	9	11.1	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	624210	1	13	7.6	5.0	✓
Conductivity in Water	E100	624205	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	628665	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	624073	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	629095	1	14	7.1	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	624208	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	624207	1	14	7.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	624209	1	13	7.6	5.0	✓
Oil & Grease by Gravimetry	E567	632104	1	10	10.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
pH by Meter	E108	624204	1	13	7.6	5.0	✓
Reactive Silica by Colourimetry	E392	627594	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	624206	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	626134	3	58	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	629098	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	627571	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	624103	2	36	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	629096	1	13	7.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	629097	1	13	7.6	5.0	✓
TSS by Gravimetry	E160	626138	3	52	5.7	5.0	✓
Turbidity by Nephelometry	E121	624562	1	15	6.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	631681	1	11	9.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	624203	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	629099	1	13	7.6	5.0	✓
BTEX by Headspace GC-MS	E611A	631682	1	11	9.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	629550	1	9	11.1	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	624210	1	13	7.6	5.0	✓
Conductivity in Water	E100	624205	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	628665	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	624073	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	629095	1	14	7.1	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	624208	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	624207	1	14	7.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	624209	1	13	7.6	5.0	✓
Oil & Grease by Gravimetry	E567	632104	1	10	10.0	5.0	✓
Reactive Silica by Colourimetry	E392	627594	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	624206	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	626134	3	58	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	629098	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	627571	1	20	5.0	5.0	✓
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Total Nitrogen by Colourimetry	E366	629096	1	13	7.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	629097	1	13	7.6	5.0	✓
TSS by Gravimetry	E160	626138	3	52	5.7	5.0	✓
Turbidity by Nephelometry	E121	624562	1	15	6.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	631681	1	11	9.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	629099	1	13	7.6	5.0	✓
BTEX by Headspace GC-MS	E611A	631682	1	11	9.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Chloride in Water by IC (Low Level)	E235.Cl-L	624210	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	628665	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	624073	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	629095	1	14	7.1	5.0	✓
Fluoride in Water by IC (Low Level)	E235.F-L	624208	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	624207	1	14	7.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	624209	1	13	7.6	5.0	✓
Reactive Silica by Colourimetry	E392	627594	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	624206	1	19	5.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	629098	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	627571	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	624103	2	36	5.5	5.0	✓
Total Nitrogen by Colourimetry	E366	629096	1	13	7.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	629097	1	13	7.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	631681	1	11	9.0	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
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
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.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 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.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC (Low Level)	E235.Cl-L 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 (Low Level)	E235.F-L 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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Reactive Silica by Colourimetry	E392 Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
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.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples 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
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.
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 PHCs - F2-F4 by GC-FID	E601 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4).
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 CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
TDS in Water (Calculation) Using APHA Analyte List	EC103.APHA Vancouver - Environmental	Water	APHA 1030E	Total DIssolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis).
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).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
Oil & Grease Extraction for Gravimetry	EP567 Vancouver - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **YL2201326**	Page	: 1 of 25
Client	: Golder Associates Ltd.	Laboratory	: Yellowknife - Environmental
Contact	: Kathy Qin	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	: 21482915	Date Samples Received	: 26-Aug-2022 10:02
PO	: ----	Date Analysis Commenced	: 30-Aug-2022
C-O-C number	: ----	Issue Date	: 09-Sep-2022 12:40
Sampler	: Nathan Hoeve; Bernadette Weaver		
Site	: Jackfish NTPC		
Quote number	: YL21-GOLD100-008		
No. of samples received	: 13		
No. of samples analysed	: 13		

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Ann Joby	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Anshim Anshim	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Benjamin Oke	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
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General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

Laboratory 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: 624203)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	106	103	2.48%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	7.4	8.4	1.0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	3.7	4.2	0.5	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	113	112	1.42%	20%	----
Physical Tests (QC Lot: 624204)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	pH	----	E108	0.10	pH units	8.47	8.46	0.118%	4%	----
Physical Tests (QC Lot: 624205)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	conductivity	----	E100	2.0	μS/cm	446	447	0.224%	10%	----
Physical Tests (QC Lot: 624562)											
YL2201300-021	Anonymous	turbidity	----	E121	0.10	NTU	0.49	0.45	0.04	Diff <2x LOR	----
Physical Tests (QC Lot: 626134)											
VA22C0091-009	Anonymous	solids, total dissolved [TDS]	----	E162	13	mg/L	68	66	2	Diff <2x LOR	----
Physical Tests (QC Lot: 626138)											
VA22C0245-006	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	11.2	10.8	0.4	Diff <2x LOR	----
Physical Tests (QC Lot: 628023)											
VA22C0240-005	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	2160	2220	2.83%	20%	----
Physical Tests (QC Lot: 628026)											
VA22C0240-005	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	9.0	7.8	1.2	Diff <2x LOR	----
Physical Tests (QC Lot: 629622)											
WR2200953-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 629623)											
WR2200953-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	266	253	5.00%	20%	----
Anions and Nutrients (QC Lot: 624206)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	25.6	25.6	0.140%	20%	----
Anions and Nutrients (QC Lot: 624207)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 624208)											

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Anions and Nutrients (QC Lot: 624208) - continued											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	fluoride	16984-48-8	E235.F-L	0.010	mg/L	0.086	0.088	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 624209)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	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: 624210)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	61.7	61.7	0.140%	20%	----
Anions and Nutrients (QC Lot: 627594)											
VA22C0510-001	Anonymous	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	16.1	16.1	0.0271%	20%	----
Anions and Nutrients (QC Lot: 627595)											
YL2201326-005	EMD DISCHARGE INLAKE_Bottom	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	13.2	13.2	0.186%	20%	----
Anions and Nutrients (QC Lot: 629096)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	nitrogen, total	7727-37-9	E366	0.030	mg/L	1.06	1.08	1.63%	20%	----
Anions and Nutrients (QC Lot: 629097)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0442	0.0421	4.70%	20%	----
Anions and Nutrients (QC Lot: 629098)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0131	0.0121	0.0010	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 629099)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0087	0.0093	0.0006	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 629095)											
FJ2202325-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	21.2	22.5	5.85%	20%	----
Total Metals (QC Lot: 624103)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0125	0.0146	0.0020	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00125	0.00127	1.04%	20%	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0744	0.0745	0.173%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0314	0.0320	2.04%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.031	0.030	0.001	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	37.7	37.6	0.125%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	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
Total Metals (QC Lot: 624103) - continued											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00160	0.00156	0.00004	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.014	0.016	0.001	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0089	0.0078	0.0011	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	12.5	12.6	0.618%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0451	0.0454	0.664%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000175	0.000205	0.000030	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	4.05	4.05	0.0344%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00265	0.00276	4.14%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	0.000061	0.000011	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	6.73	6.83	1.56%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	0.000014	0.000004	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	34.4	34.5	0.340%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0914	0.0919	0.582%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	8.79	9.89	11.8%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000516	0.000533	3.21%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 624325)											
VA22C0154-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0650	0.0656	0.890%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00011	<0.00010	0.000010	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.00330	0.00322	2.66%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 624325) - continued											
VA22C0154-001	Anonymous	boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	0.919	0.906	1.49%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.047	0.048	0.001	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	0.120	0.121	0.722%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00482	0.00472	2.04%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000121	0.000137	0.000016	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.149	0.145	0.004	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.18	1.17	0.926%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	0.513	0.505	1.49%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.00406	0.00410	1.03%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00058	0.00068	0.00010	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000046	0.000044	0.000001	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 627571)											
YL2201315-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 624073)											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0044	0.0044	0.00006	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00120	0.00117	2.35%	20%	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0751	0.0760	1.10%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0301	0.0304	0.967%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	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	0.027	0.028	0.0001	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	37.9	40.1	5.63%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00136	0.00145	0.00008	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		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	0.0062	0.0061	0.00009	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	13.2	13.2	0.280%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00144	0.00154	6.38%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000168	0.000158	0.000011	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.13	4.45	7.51%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00268	0.00287	6.91%	20%	----
		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	6.48	6.61	1.92%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	33.5	34.4	2.71%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0910	0.0919	1.00%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	9.68	8.85	8.86%	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	<0.000010	<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	----

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: 624073) - continued											
YL2201326-001	NORTHWEST BAY NORTH_Bottom	uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000558	0.000585	4.84%	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	<0.0010	<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: 628665)											
VA22C0272-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 628666)											
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 631682)											
VA22C0135-003	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: 631681)											
VA22C0135-003	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: 624203)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	# 1.9	B
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	# 1.9	B
Physical Tests (QCLot: 624205)						
conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 624562)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 626134)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 626138)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 628023)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 628026)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 629622)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 629623)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 624206)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 624207)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 624208)						
fluoride	16984-48-8	E235.F-L	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 624209)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 624210)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 627594)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 627595)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 629096)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 629097)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 629098)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 629099)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 629095)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 624103)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 624103) - continued						
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 624325)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 624325) - continued						
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 627571)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 624073)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 624073) - continued						
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 628665)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 628666)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 632104)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 631682)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 631682) - continued						
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: 629550)						
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: 631681)						
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----

Qualifiers

Qualifier	*Description*
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 624203)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	97.8	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	108	85.0	115	----
Physical Tests (QCLot: 624204)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 624205)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	95.5	90.0	110	----
Physical Tests (QCLot: 624562)									
turbidity	----	E121	0.1	NTU	200 NTU	103	85.0	115	----
Physical Tests (QCLot: 626134)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	109	85.0	115	----
Physical Tests (QCLot: 626138)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	96.3	85.0	115	----
Physical Tests (QCLot: 628023)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	104	85.0	115	----
Physical Tests (QCLot: 628026)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	88.7	85.0	115	----
Physical Tests (QCLot: 629622)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	98.2	85.0	115	----
Physical Tests (QCLot: 629623)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	108	85.0	115	----
Anions and Nutrients (QCLot: 624206)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 624207)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100.0	90.0	110	----
Anions and Nutrients (QCLot: 624208)									
fluoride	16984-48-8	E235.F-L	0.01	mg/L	1 mg/L	97.7	90.0	110	----
Anions and Nutrients (QCLot: 624209)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	97.3	90.0	110	----
Anions and Nutrients (QCLot: 624210)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	98.6	90.0	110	----
Anions and Nutrients (QCLot: 627594)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	99.8	85.0	115	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 627595)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	99.6	85.0	115	----
Anions and Nutrients (QCLot: 629096)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	97.2	75.0	125	----
Anions and Nutrients (QCLot: 629097)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	103	80.0	120	----
Anions and Nutrients (QCLot: 629098)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	87.1	80.0	120	----
Anions and Nutrients (QCLot: 629099)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	94.7	85.0	115	----
Organic / Inorganic Carbon (QCLot: 629095)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	95.4	80.0	120	----
Total Metals (QCLot: 624103)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	104	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	95.9	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	98.4	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	98.9	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.2	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	98.8	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	105	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	98.1	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	95.0	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	105	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.7	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	98.7	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	99.6	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	105	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Total Metals (QCLot: 624103) - continued									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.1	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	102	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	96.0	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	99.1	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.5	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	96.2	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	92.8	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	100	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	95.6	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	95.1	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	97.5	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	104	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	96.0	80.0	120	----
Total Metals (QCLot: 624325)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	97.6	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	112	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	99.2	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	93.5	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	105	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	91.9	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	92.1	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	96.6	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	98.0	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	95.6	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	97.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	97.4	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	90.2	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	105	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	98.6	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	100	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.8	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Total Metals (QCLot: 624325) - continued									
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	103	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	100	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	102	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	97.5	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	99.7	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	111	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	89.8	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	107	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	95.9	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	94.6	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	92.3	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	98.5	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	97.8	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	99.8	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	98.7	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
Total Metals (QCLot: 627571)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
Dissolved Metals (QCLot: 624073)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	106	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	99.2	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	105	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	103	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	97.8	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	99.4	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	99.7	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	94.9	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	103	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	110	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Dissolved Metals (QCLot: 624073) - continued									
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	104	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	97.0	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	112	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	99.3	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	104	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	# 76.7	80.0	120	MES
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	112	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	94.5	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.2	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	94.3	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	105	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	97.4	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	99.7	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	95.7	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	106	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	98.1	80.0	120	----
Aggregate Organics (QCLot: 632104)									
oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	92.6	70.0	130	----
Volatile Organic Compounds (QCLot: 631682)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	107	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	107	70.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Volatile Organic Compounds (QCLot: 631682) - continued									
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	106	70.0	130	----
Hydrocarbons (QCLot: 629550)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	120	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	109	70.0	130	----
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	109	70.0	130	----
Hydrocarbons (QCLot: 631681)									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	71.0	70.0	130	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	74.0	70.0	130	----

Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).

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: 624206)										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	sulfate (as SO4)	14808-79-8	E235.SO4	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 624207)										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	nitrate (as N)	14797-55-8	E235.NO3-L	2.53 mg/L	2.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 624208)										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	fluoride	16984-48-8	E235.F-L	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 624209)										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	nitrite (as N)	14797-65-0	E235.NO2-L	0.485 mg/L	0.5 mg/L	97.1	75.0	125	----
Anions and Nutrients (QCLot: 624210)										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	chloride	16887-00-6	E235.Cl-L	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 627594)										
VA22C0510-002	Anonymous	silicate (as SiO2)	7631-86-9	E392	10.0 mg/L	10 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 627595)										
YL2201326-006	EMD DISCHARGE INLAKE_Mid-depth	silicate (as SiO2)	7631-86-9	E392	ND mg/L	10 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 629096)										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 629097)										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	phosphorus, total	7723-14-0	E372-U	0.0495 mg/L	0.05 mg/L	99.0	70.0	130	----
Anions and Nutrients (QCLot: 629098)										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	phosphorus, total dissolved	7723-14-0	E375-T	0.0443 mg/L	0.05 mg/L	88.6	70.0	130	----
Anions and Nutrients (QCLot: 629099)										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	ammonia, total (as N)	7664-41-7	E298	0.103 mg/L	0.1 mg/L	103	75.0	125	----
Organic / Inorganic Carbon (QCLot: 629095)										
YL2201326-001	NORTHWEST BAY NORTH_Bottom	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 624103)										

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
Total Metals (QCLot: 624103) - continued										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	aluminum, total	7429-90-5	E420	0.193 mg/L	0.2 mg/L	96.7	70.0	130	----
		antimony, total	7440-36-0	E420	0.0199 mg/L	0.02 mg/L	99.7	70.0	130	----
		arsenic, total	7440-38-2	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0391 mg/L	0.04 mg/L	97.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00904 mg/L	0.01 mg/L	90.4	70.0	130	----
		boron, total	7440-42-8	E420	0.090 mg/L	0.1 mg/L	90.3	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00389 mg/L	0.004 mg/L	97.3	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00976 mg/L	0.01 mg/L	97.6	70.0	130	----
		chromium, total	7440-47-3	E420	0.0398 mg/L	0.04 mg/L	99.6	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0198 mg/L	0.02 mg/L	98.9	70.0	130	----
		copper, total	7440-50-8	E420	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----
		iron, total	7439-89-6	E420	1.94 mg/L	2 mg/L	96.9	70.0	130	----
		lead, total	7439-92-1	E420	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		lithium, total	7439-93-2	E420	0.0923 mg/L	0.1 mg/L	92.3	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0199 mg/L	0.02 mg/L	99.4	70.0	130	----
		nickel, total	7440-02-0	E420	0.0382 mg/L	0.04 mg/L	95.5	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.2 mg/L	10 mg/L	102	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0205 mg/L	0.02 mg/L	103	70.0	130	----
		selenium, total	7782-49-2	E420	0.0407 mg/L	0.04 mg/L	102	70.0	130	----
		silicon, total	7440-21-3	E420	9.37 mg/L	10 mg/L	93.7	70.0	130	----
		silver, total	7440-22-4	E420	0.00390 mg/L	0.004 mg/L	97.5	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	19.8 mg/L	20 mg/L	98.8	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0385 mg/L	0.04 mg/L	96.4	70.0	130	----
		thallium, total	7440-28-0	E420	0.00352 mg/L	0.004 mg/L	88.0	70.0	130	----
		thorium, total	7440-29-1	E420	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		tin, total	7440-31-5	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		titanium, total	7440-32-6	E420	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0190 mg/L	0.02 mg/L	94.8	70.0	130	----
		uranium, total	7440-61-1	E420	0.00375 mg/L	0.004 mg/L	93.7	70.0	130	----
		vanadium, total	7440-62-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Total Metals (QCLot: 624103) - continued										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	zinc, total	7440-66-6	E420	0.390 mg/L	0.4 mg/L	97.6	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
Total Metals (QCLot: 624325)										
VA22C0154-003	Anonymous	aluminum, total	7429-90-5	E420	0.190 mg/L	0.2 mg/L	95.0	70.0	130	----
		antimony, total	7440-36-0	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		barium, total	7440-39-3	E420	0.0192 mg/L	0.02 mg/L	96.2	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0367 mg/L	0.04 mg/L	91.7	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0104 mg/L	0.01 mg/L	104	70.0	130	----
		boron, total	7440-42-8	E420	0.089 mg/L	0.1 mg/L	89.1	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00381 mg/L	0.004 mg/L	95.3	70.0	130	----
		calcium, total	7440-70-2	E420	3.79 mg/L	4 mg/L	94.8	70.0	130	----
		cesium, total	7440-46-2	E420	0.0106 mg/L	0.01 mg/L	106	70.0	130	----
		chromium, total	7440-47-3	E420	0.0390 mg/L	0.04 mg/L	97.4	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0199 mg/L	0.02 mg/L	99.6	70.0	130	----
		copper, total	7440-50-8	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		iron, total	7439-89-6	E420	1.92 mg/L	2 mg/L	96.0	70.0	130	----
		lead, total	7439-92-1	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		lithium, total	7439-93-2	E420	0.0882 mg/L	0.1 mg/L	88.2	70.0	130	----
		magnesium, total	7439-95-4	E420	0.970 mg/L	1 mg/L	97.0	70.0	130	----
		manganese, total	7439-96-5	E420	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0198 mg/L	0.02 mg/L	98.9	70.0	130	----
		nickel, total	7440-02-0	E420	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.68 mg/L	10 mg/L	96.8	70.0	130	----
		potassium, total	7440-09-7	E420	4.16 mg/L	4 mg/L	104	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		selenium, total	7782-49-2	E420	0.0399 mg/L	0.04 mg/L	99.8	70.0	130	----
		silicon, total	7440-21-3	E420	9.22 mg/L	10 mg/L	92.2	70.0	130	----
		silver, total	7440-22-4	E420	0.00410 mg/L	0.004 mg/L	102	70.0	130	----
		sodium, total	7440-23-5	E420	2.04 mg/L	2 mg/L	102	70.0	130	----
		strontium, total	7440-24-6	E420	0.0223 mg/L	0.02 mg/L	112	70.0	130	----
		sulfur, total	7704-34-9	E420	19.1 mg/L	20 mg/L	95.7	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		thallium, total	7440-28-0	E420	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		thorium, total	7440-29-1	E420	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		tin, total	7440-31-5	E420	0.0189 mg/L	0.02 mg/L	94.5	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 624325) - continued										
VA22C0154-003	Anonymous	titanium, total	7440-32-6	E420	0.0385 mg/L	0.04 mg/L	96.3	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0191 mg/L	0.02 mg/L	95.3	70.0	130	----
		uranium, total	7440-61-1	E420	0.00384 mg/L	0.004 mg/L	96.0	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0991 mg/L	0.1 mg/L	99.1	70.0	130	----
		zinc, total	7440-66-6	E420	0.404 mg/L	0.4 mg/L	101	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0419 mg/L	0.04 mg/L	105	70.0	130	----
Total Metals (QCLot: 627571)										
YL2201326-001	NORTHWEST BAY NORTH_Bottom	mercury, total	7439-97-6	E508	0.0000980 mg/L	0.0001 mg/L	98.0	70.0	130	----
Dissolved Metals (QCLot: 624073)										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	aluminum, dissolved	7429-90-5	E421	0.199 mg/L	0.2 mg/L	99.4	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0199 mg/L	0.02 mg/L	99.3	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00952 mg/L	0.01 mg/L	95.2	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.092 mg/L	0.1 mg/L	92.1	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00396 mg/L	0.004 mg/L	99.0	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	0.00975 mg/L	0.01 mg/L	97.5	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0194 mg/L	0.02 mg/L	96.9	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.93 mg/L	2 mg/L	96.5	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0949 mg/L	0.1 mg/L	94.9	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	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0383 mg/L	0.04 mg/L	95.7	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	9.81 mg/L	10 mg/L	98.1	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0410 mg/L	0.04 mg/L	103	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.44 mg/L	10 mg/L	94.4	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0193 mg/L	0.02 mg/L	96.4	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: 624073) - continued										
YL2201326-002	NORTHWEST BAY NORTH_Mid-depth	sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	21.7 mg/L	20 mg/L	108	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00399 mg/L	0.004 mg/L	99.7	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0215 mg/L	0.02 mg/L	107	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00418 mg/L	0.004 mg/L	104	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.397 mg/L	0.4 mg/L	99.3	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
Dissolved Metals (QCLot: 628665)										
VA22C0272-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000944 mg/L	0.0001 mg/L	94.4	70.0	130	----
Dissolved Metals (QCLot: 628666)										
YL2201326-003	MID LAKE 1_Bottom	mercury, dissolved	7439-97-6	E509	0.0000869 mg/L	0.0001 mg/L	86.9	70.0	130	----
Volatile Organic Compounds (QCLot: 631682)										
VA22C0135-003	Anonymous	benzene	71-43-2	E611A	95.1 µg/L	100 µg/L	95.1	60.0	140	----
		ethylbenzene	100-41-4	E611A	95.8 µg/L	100 µg/L	95.8	60.0	140	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	94.4 µg/L	100 µg/L	94.4	60.0	140	----
		styrene	100-42-5	E611A	96.0 µg/L	100 µg/L	96.0	60.0	140	----
		toluene	108-88-3	E611A	91.2 µg/L	100 µg/L	91.2	60.0	140	----
		xylene, m+p-	179601-23-1	E611A	192 µg/L	200 µg/L	96.2	60.0	140	----
		xylene, o-	95-47-6	E611A	96.3 µg/L	100 µg/L	96.3	60.0	140	----
Hydrocarbons (QCLot: 631681)										
VA22C0135-004	Anonymous	F1 (C6-C10)	----	E581.VH+F1	4620 µg/L	6310 µg/L	73.2	60.0	140	----
		VHw (C6-C10)	----	E581.VH+F1	4740 µg/L	6310 µg/L	75.0	60.0	140	----

CHAIN OF CUSTODY

ALS Laboratory

RELINQUISHED BY: Nathan Hoeve	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 26-08-2022/8:30	DATE/TIME: AUG 26/22 10:02	DATE/TIME:	DATE/TIME:

CLIENT:	Golder Associates Ltd.	TURNAROUND REQUIREMENTS :	☐ Standard TAT (List due date): √
PROJECT:	Jackfish NTPC	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Non Standard or urgent TAT (List due date):
SITE:			
PURCHASE ORDER NO.:			ALS QUOTE NC YL21-GOLD100-008 (updated in April 2022)
PROJECT MANAGER:	Kathy Qin	CONTACT PH: 587-969-6141	EQuIS facility code: 183527250
SAMPLER:	Nathan Hoeve; Bernadette Weaver	SAMPLER MOBILE: 867-446-4757	Project Number: 21482915
EMAIL REPORTS TO:	kathy.qin@wsp.com; alison.humphries@wsp.com; GAL_equis@golder.com		EMAIL INVOICE TO: laurence.bonin@wsp.com; kathy.qin@wsp.com;

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt	16.5 °C		
Other comments:			

SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS	MATRIX: Solid(S) Water(W)	CONTAINER INFORMATION		ANALYSIS REQUIRED		Additional Information
SAMPLE	Sample Identification (This description will appear on the report)	DATE / TIME (dd-mm-yyyy)	MATRIX	TOTAL CONTAINERS	Standard Parameters Suite	Organics parameter suite	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
~~1~~	~~OUTFLOW~~		~~W~~		~~X~~		Not included
~~2~~	~~INFLOW TO NW BAY 1~~		~~W~~		~~X~~		Not included
~~3~~	~~INFLOW TO NW BAY 2~~		~~W~~		~~X~~		Not included
4	NORTHWEST BAY NORTH_Bottom	25-08-2022 / 15:30	W	13	X	X	
5	NORTHWEST BAY NORTH_Mid-depth	25-08-2022/15:20	W	7	X		
6	MID LAKE 1_ Bottom	25-08-2022/12:00	W	7	X		
7	MID LAKE 1_Mid-depth	25-08-2022/11:50	W	7	X		
8	EMD DISCHARGE INLAKE_Bottom	24-08-2022/15:15	W	7	X		
9	EMD DISCHARGE INLAKE_Mid-depth	24-08-2022/15:05	W	7	X		
10	SOUTHWEST BAY_Bottom	25-08-2022/10:00	W	7	X		
11	SOUTHWEST BAY_Mid-depth	25-08-2022/9:50	W	7	X		
12	NEAR OUTFLOW INLAKE_Bottom	25-08-2022/14:10	W	13	X	X	
13	NEAR OUTFLOW INLAKE_Mid-depth	25-08-2022/14:00	W	7	X		
14	NORTHWEST BAY NORTH_Bottom_4	25-08-2022/14:20	W	13	X	X	
15	JFLQC_1	24-08-2022/08:45	W	13	X	X	
16	JFLQC_2	25-08-2022/11:25	W	7	X		
		TOTAL					

Environmental Division
Yellowknife
Work Order Reference
YL2201326

Telephone : +1 867 873 5593

APPENDIX F

Fish and Fish Habitat (Excel)

This appendix is submitted electronically

wsp.com