2022 Dugout Sampling Program
Clean Harbors Class 1 Waste Management Facility
Ryley, Alberta

PRESENTED TO

Clean Harbors Canada Inc.

JANUARY 30, 2023
ISSUED FOR USE
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EXECUTIVE SUMMARY

Foreword

Tetra Tech Canada Inc. (Tetra Tech) was retained by Clean Harbors Canada Inc. (Clean Harbors) to sample all in-use dugouts located within a 1.6 km radius of the Ryley Class I Hazardous Waste Facility in Ryley, Alberta.

This sampling program is required by Alberta's *Environmental Protection and Enhancement Act* (EPEA). The facility operates under Alberta Environment and Protected Areas (EPA), in accordance with EPEA Approval No. 10348-03-00 (Appendix A). The program includes the surface water testing of all in-use dugouts, as identified during the October 1996 baseline sampling program and subsequent annual events. The permit to operate defines "in-use" as stored water used for human consumption, cooking, washing, and gardening or livestock purposes. An additional four dugouts (2, 3, 4, and 19) are sampled that are slightly outside of the 1.6 km radius since they were close to the 1.6 km boundary, owned by landowners with dugouts within the 1.6 km radius and defined as "in-use."

Twenty (20) dugouts were inspected and sampled during the 2022 dugout sampling program, which is the 27th annual sampling event, including the baseline event in 1996. The baseline sampling program is detailed in the report titled *Water Sampling and Testing Program*. All annual dugout sampling has taken place in October.

Discussion and Recommendations

Analytical results of the dugout sampling program conducted in October 2022 indicate that the Ryley Class I Hazardous Waste Facility does not appear to be adversely impacting water quality in dugouts within the 1.6 km radius sampled.

Some parameters analyzed in 2022 exhibited an upward trend in concentrations in one or more dugouts relative to historical baseline values, but the majority of concentrations were within the historical ranges for those parameters.

Select parameters had historically high values or concentrations for specific parameters during the 2022 sampling and should continue to be monitored and evaluated in future sampling events.

A similar sampling program is recommended for October 2023, as part of the ongoing site permit compliance process.

Each landowner should be forwarded a copy of the water chemistry analysis report pertaining to the dugout(s) sampled on their property once the 2022 report is finalized.

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LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Clean Harbors Canada Inc. and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Clean Harbors Canada Inc. or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech Canada Inc.'s Services Agreement. Tetra Tech's Limitations on the Use of This Document are provided in Appendix B of this report.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Clean Harbors Canada Inc. (Clean Harbors) to sample all in-use dugouts located within a 1.6 km radius of the Ryley Class I Hazardous Waste Facility in Ryley, Alberta.

The sampling program is required by Alberta's *Environmental Protection and Enhancement Act* (EPEA). The facility operates under Alberta Environment and Protected Areas (EPA), in accordance with EPEA Approval No.10348-03-00 (Appendix A). The program included the surface water testing of all in-use dugouts, as identified during the baseline sampling program completed during the fall of 1996 and any additions or subtractions from subsequent annual events. The permit to operate defines "in-use" as water used for human consumption, cooking, washing, and gardening or livestock purposes. An additional four dugouts (Dugouts 2, 3, 4, and 19) are sampled that are slightly outside of the 1.6 km radius since they are close to the limit, included within similar landowner holdings and defined as "in-use."

Twenty (20) dugouts were inspected and sampled during the 2022 dugout sampling program, which is the 27th annual sampling event, including the baseline event in 1996. The baseline sampling program is detailed in the report titled *Water Sampling and Testing Program*[1]. All annual dugout sampling has taken place in October since 1996.

This report presents the field observations and analytical water quality results of the 2022 sampling program with reference to recently collected data.

2.0 FIELD SAMPLING METHODS

2.1 Landowner Summary

The contact information for each landowner and their number of dugouts in the sampling program is presented in Table A. All landowners were contacted about a week prior to the sampling event, and each will be provided with a copy of the water chemistry of their dugout(s) once this report is finalized and sent to EPA. Landowners and contact information was updated as necessary in October 2022. The location of each sampled water source and residence, if found, is indicated on Figure 1.

Table A: Landowner Information

Landowner (October 2022)	Contact Name and (Number of Dugouts)	Mailing Address	Telephone Number
D. Booth	Doyle Booth (1)	Box 185, Ryley, Alberta T0B 4A0	780.999.4577
Ewert Farms Ltd.	Mark Ewert (4)	Box 355, Ryley, Alberta T0B 4A0	780.914.5766
B.L. Lyons	Brian Lyons (4)	Box 222, Ryley, Alberta T0B 4A0	780.984.5026
T. Magneson	Terry Magneson (6)	Box 374, Ryley, Alberta T0B 4A0	780.603.1537
County of Beaver	c/o Margaret Jones (1)	Box 140, Ryley, Alberta T0B 4A0	780.663.3730 (direct 825.385.0061)
W. Winsnes	William Winsnes (1)	Box 74, Ryley, Alberta T0B 4A0 SW8-50-17-W4M	780.699.4009
G. Balash	George and Rose Balash (3)	Box 291, St Paul, Alberta T0A 3AO gsbfarm@gmail.com	780.646.2001

[1]Tetra Tech. 1996. Water Sampling and Testing Program.

2.2 Sampling Procedure

The water samples were collected on October 18 and 19, 2022 by two Tetra Tech personnel. A Health and Safety Plan was completed and reviewed prior to initiating sampling. Twenty (20) dugouts were sampled at seven properties, and 22 samples were collected: one from each dugout, plus two duplicate samples. Subsamples were collected from the four corners of each respective dugout at 0.20 m to 0.30 m below surface and about 2 metres from the dugout edge and submitted as an equal-weighted composite sample. Care was taken not to disturb bank or bed sediments in the sampling area.

All samples were obtained using standard procedures that minimized potential for contamination during collection, handling, preservation, and transportation to ensure representative samples were collected and tested. Table B contains a summary of the information gathered during the sampling program, including sample name, legal land description and relative dugout location with locations on Figure 1. The lands containing Dugout 12 (Magneson D.3) have been purchased by Clean Harbors and will be noted as such in future monitoring reports. All dugouts were photographed with representative photos presented in Appendix E.

Table B: Sample Location Information

Sample	Sample Name	Legal Land Description (W4M)	Dugout Location
1	Booth D.1	NW ¼ 10-50-17	Dugout northwest of house
2	Ewert D.1	SW ¼ 15-50-17	Dugout south of center barn
3	Ewert D.2	SW ¼ 15-50-17	Extreme west dugout
4	Ewert D.3	SW ¼ 15-50-17	Extreme east dugout
5	Ewert D.4	SW ¼ 15-50-17	Southeast corner of southwest quarter of Section 15
6	Lyons D.1	SE ¼ 16-50-17	Northeast dugout on southeast quarter of Section 16
7	Lyons D.2	SE ¼ 16-50-17	Northwest dugout on southeast quarter of Section 16
8	Lyons D.3	SE ¼ 16-50-17	Southwest dugout on southeast quarter of Section 16
9	Lyons D.4	SW ¼ 16-50-17	Southwest dugout on southwest quarter of Section 16
10	Magneson D.1	SW ¼ 9-50-17	Dugout with windmill on northeast end of yard
11	Magneson D.2	SW ¼ 9-50-17	Southeast corner of northwest quarter of Section 9
12	Magneson D.3 (now on Clean Harbors owned property)	NE ¼ 9-50-17	Southwest corner of northeast quarter of Section 9, north of Clean Harbors
13	Magneson D.4	SW ¼ 9-50-17	South end of southwest quarter of Section 9, east of main house
14	Magneson D.5	SW ¼ 9-50-17	East end of southwest quarter of Section 9, west of Clean Harbors
15	Magneson D.6	SW ¼ 9-50-17	South end of southwest quarter of Section 9, north of main house
16	Beaver County D.1	NW ¼ 3-50-17	Dugout south of house, northwest quarter of Section 3
18	Beaver County D.2 (not sampled)	SW ¼ 3-50-17	Southwest quarter of Section 3, east of Highway 854
19	Winsnes D.1	SW ¼ 4-50-17	Dugout on southwest corner of southwest quarter of Section 4
20	Balash D.1	NE ¼ 5-50-17	Dugout south of west approach, northeast quarter of Section 5
21	Balash D.2	SE ¼ 8-50-17	Dugout on southeast quarter of Section 8
22	Balash D.3	SE ¼ 8-50-17	Dugout is immediately west of Balash D.2

ALS Laboratory Group (ALS) of Edmonton was the laboratory selected to perform the sample analysis and is certified by the Canadian Association of Laboratory Accreditation (CALA) for the parameters tested. ALS prepared sampling sets beforehand with bottles for each dugout to be tested. These sets included the individual sample bottles and preservatives needed to perform the analysis required by the Permit to Operate.

The following analytical parameters were tested for all dugouts and duplicate samples, as required by Approval No. 10348-03-00, Section 4.5:

- Major ions: calcium, magnesium, sodium, potassium, chloride, carbonate, bicarbonate, nitrate and sulphate
- Dissolved metals (Canadian Council of Ministers of the Environment): aluminum, arsenic, boron, barium, beryllium, cadmium, cobalt, chromium, copper, iron, lithium mercury, molybdenum, manganese, nickel, lead, antimony, tin, silver, strontium, titanium, thallium, uranium, vanadium and zinc
- pH (field and laboratory)
- Electrical conductivity (EC) (field and laboratory)
- Benzene, toluene, ethylbenzene, xylenes (BTEX)
- Petroleum hydrocarbon (PHC) fractions F1 and F2
- Total dissolved solids (TDS)
- Total suspended solids (TSS)
- Chemical oxygen demand (COD)
- Dissolved organic carbon (DOC)
- Nutrients; and
- Phenols

Analytical request forms, including chain-of-custody data, were completed by Tetra Tech when the samples were submitted to the laboratory for analysis.

In addition, field testing of the composite water sample was carried out at each dugout for the following:

- pH
- Electrical Conductivity (EC)
- Photo taken
- Visual inspection including notable sheen, colour, odour or other observations

The analytical reports for each sample collected were forwarded to Tetra Tech once the analysis was completed. The 2022 water quality analytical reports, as received from ALS, are presented in Appendix C. Table 1 summarizes the data collected in the last five years, including the 2022 sampling program for each dugout. Appendix D contains the historical dugout chemical analytical results from 1996 up to 2021 data.

2.3 Quality Control and Quality Assurance

To evaluate field sampling reproducibility, duplicate water samples were collected during the 2022 sampling event at an approximate rate of 10%. In October 2022, the duplicates were taken from Dugout 4 (Duplicate 1) and Dugout 21 (Duplicate 2) and submitted for laboratory analysis for the same suite of parameters as the original samples (Tables 2 and 3).

To analyze the field sampling and laboratory testing reproducibility, the sample-duplicate pair was evaluated using the relative percentage difference (RPD) method, involving calculation of RPD when both sample and duplicate concentrations were greater than, or equal to, five times the laboratory reporting detection limit (RDL), as shown in Equation 1 below.

Equation 1:

$$\%RPD = \left(\left| \text{sample} - \text{duplicate concentrations} \right| \text{ divided by } \overline{X} \right) \text{ multiplied by } 100$$

Where $\overline{X}$ is the average concentration of a sample and its duplicate.

Surface water quality parameters were considered as having passed the quality assurance (QA)/quality control (QC) reproducibility procedure if the RPD was less than or equal to 20%, indicating a close correlation between the sample-duplicate pair. RPD is usually used for objectively flagging data for further review, rather than for taking corrective action.

RPD values were not calculated if one or both of the sample-duplicate concentrations were less than five times the RDL. In these cases, water quality parameters were still considered as having passed the QA/QC reproducibility procedure if the other sample duplicate concentration difference was less than one RDL value.

The RPD calculations are summarized in Table 2 (Duplicate 1) and Table 3 (Duplicate 2). All but four RPD tests satisfied the requirements (all four failing tests were from Duplicate 2). The QA/QC reproducibility guidelines were not satisfied for the following parameters:

- Duplicate 2: Dissolved aluminum (36%), dissolved copper (25%), dissolved selenium (21%), and fluoride (66%)

Small variations due to variability in field sampling or laboratory analytical methods (i.e., residuals from previous analysis, etc.) can result in concentration differences that are two or three times greater than the concentration result, which results in higher RPDs which fail the requirements. However, the concentrations are similar in most cases and often have acceptable variability even though the RPD calculation may indicate otherwise. The Duplicate 2 RPD failures are limited in number (four out of 60 tests conducted), and two of the failures are marginal (RPD of 21% and 25%). Based on this fact, a limited number of failed results is within acceptable variability, and the duplicate analysis indicates the data are stable and considered reliable overall.

3.0 FINDINGS AND TREND ANALYSIS

The chemical analysis results from the dugout sampling program are reviewed for significant changes in parameters and compared to the range of results of previous sampling events, with particular focus on the past five years. The intent is not to compare results to provincial standards for acceptable water quality, but to pre-existing, baseline conditions in 1996 and identify trends, if any. High variability between years and between sites is possible and expected given only one sampling event per year and high variability in monthly and annual temperature and precipitation data. In addition, parameters at some locations have exceeded provincial water quality objectives since 1996 and are characteristic of natural conditions in the area or related to pre-existing and ongoing agricultural land

use. The objective of this work is to identify elevated levels and/or upward trends in parameters that might be sourced from the landfill through a groundwater, air or surface water pathway. Emphasis has been placed on reviewing sampling points down-gradient (generally east) of the landfill site, although the landfill site is near a local highpoint and groundwater and surface water flow may also be towards the north.

A summary of the 2022 data follows with data in Tables 1, 2 and 3. Mann-Kendall trends are summarized in Table C below and presented on Figure 2.

Environment Canada's and Alberta Agriculture and Forestry's monthly and annual precipitation data from the Elk Island National Park meteorological station were reviewed and are summarized in Table 4. The total annual precipitation in 2022 was 399.9 mm which was 57.8 mm lower than the mean annual precipitation (or 87% of average) in the region (several different stations as available) since 1996. The months of May, July and October 2022 were particularly low in 2022. The 2014, 2015, 2019, 2021, and 2022 annual precipitation data was from the Elk Island National Park meteorological station. Note that previous precipitation data (1996 to 2013) were obtained from the Tofield North Station when active. The Alberta Agriculture precipitation website[2] was updated to include more station data, so during 2016-2018, the Holden Alberta Government Drought Monitoring (AGDM) meteorological station data was utilized as it was closer to the subject site than others available. These shifts in the local reporting stations over the years are not expected to have a material impact on annual averages but may somewhat affect monthly precipitation data. Overall, there was generally lower than average precipitation in 2022 for a second consecutive year.

The two duplicate samples (Duplicate 1 from Dugout 4 and Duplicate 2 from Dugout 21) were tested for the same parameters as all other dugouts. All data is presented as follows:

A Mann-Kendall test was used as a statistical means of objectively investigating possible trends in water quality[3] for parameters analyzed for the past 3 to 26 years. The analysis indicates whether there is an upward or downward trend or, in the case where results are similar, no trend at all (normal scatter of data). The concentrations of most parameters were similar to historical concentrations or were on a downward trend. Parameters on an upward trend in specific dugouts are summarized in Table C.

Table C: Dugouts with Parameters in Upward Trends

Parameter	Dugouts with Upward Trends	Upward Trends Explanation
Alkalinity	1, 2, 3, 4, 8, 9, 10, 14, 15, and 16	All dugout concentrations are within the historical range except dugout 2 which had its highest alkalinity concentration in 2022 compared to historical values
Aluminum	1, 2, 3, 4, 6, 7, 19, 20, 21, and 22	All dugout concentrations are within the historical range
Ammonia (Ammonia as N)	1, 2, 3, 6, 7, 8, 9, 10, 19, and 20	All dugout concentrations are within the historical range except dugout 7 which had its highest ammonia concentration in 2022 compared to historical values
Antimony	2, 3, 4, 5, 6, 7, 8, 9, 13, 15, 16, 20, and 22	All dugout concentrations are within the historical range except dugout 2 which had its highest antimony concentration in 2022 compared to historical values
Arsenic	1, 2, 3, 4, 5, 10, 11, 14, 16, 20, and 22	The dugout concentrations are within the historical range except dugouts 2 and 14, which had their highest arsenic concentration in 2022 compared to historical values. Several dugouts continue to show relatively high arsenic concentrations in 2022

[2] http://www.agriculture.alberta.ca/acis/alberta-weather-data-viewer.jsp

[3] Harmancioglu, B. Nilgun, et al. 2010. Environmental Data Management. Water Science and Technology Library

Table C: Dugouts with Parameters in Upward Trends

Parameter	Dugouts with Upward Trends	Upward Trends Explanation
Barium	19 and 21	All dugout concentrations are within the historical range
Bicarbonate	1, 2, 3, 4, 5, 8, 9, 10, 14, 16, and 21	All dugout concentrations are within the historical range
Boron	1, 3, 4, 5, 7, 8, 9, 10, 12, 14, 16, and 20	All dugout concentrations are within the historical ranges except dugouts 10 and 12 which had their highest boron concentrations in 2022 compared to historical values
Cadmium	2, 7, 8, 9, 10, 12, 13, 14, 16, 19, and 22	The concentrations of most dugouts have been gradually increasing since 1996.
Calcium	2, 3, 4, 5, 8, 10, 12, 14, 16, 19, 20, 21, and 22	All dugout concentrations are within the historical ranges except dugouts 10 and 21 which had their highest calcium concentrations in 2022 compared to historical values
Carbonate	3, 10, 14, 15, and 16	All dugout concentrations are within the historical ranges
Chemical Oxygen Demand (COD)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 14, 15, 20, 21, and 22	All dugout concentrations are within the historical ranges expect dugouts 2, 4, and 20 which had their highest COD concentrations in 2022 compared to historical values
Chloride	2, 3, 4, 10, 12, 14, 19, 20, 21, and 22	The concentrations of dugouts 2, 3, 4, 10, 14, 19, 20, 21, and 22 have generally been gradually increasing since 1996. Dugout 10 had its highest chloride concentration in 2022 compared to historical values
Chromium	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 16, 20, and 22	All chromium concentrations were below the laboratory RDL in 2022
Cobalt	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 16, 19, 20, 21, and 22	All dugout concentrations are generally within the historical ranges
Copper	1, 4, 16, 19, 20, 21, and 22	All dugout concentrations are generally within the historical ranges
DOC	1, 3, 4, 7, 8, 9, 10,14, 20, and 22	All dugout concentrations are within the historical ranges except dugouts 4 and 20 which had their highest DOC concentrations in 2022 compared to historical values
EC	2, 3, 4, 5, 8, 10, 14, 16, 20, 21, and 22	All dugout concentrations are within the historical ranges except dugout 10 which had its highest EC reading in 2022 compared to historical values
Fluoride	4, 10, and 16	Dugout 10 had its highest fluoride concentration in 2022 compared to historical values
Hardness as $CaCO_3$	2, 3, 4, 5, 8, 10, 12, 14, 15, 16, 19, 20, 21, and 22	All dugout concentrations are within the historical ranges except dugout 21 which had its highest hardness concentration in 2022 compared to historical values
Iron	1, 3, 4, 6, and 7	All dugout concentrations are within the historical ranges
Lead	1, 2, 3, 4, 5, 6, 7, 9, 11, 14, 19, 20, and 22	All dugout concentrations are within the historical ranges
Lithium	3, 4, 8, 10, 16, and 22	All dugout concentrations are within the historical ranges
Magnesium	2, 3, 4, 5, 8, 9, 10, 12, 14, 15, 16, 19, 20, 21 and 22	All dugout concentrations are within the historical ranges except dugout 22 which had its highest magnesium concentration in 2022 compared to historical values
Manganese	1, 2, 3, 4, 5, 6, 7, 10, 14, 16, 20, and 21	All concentrations are within the historical ranges except dugouts 7 and 22 which had their highest manganese concentrations in 2022 compared to historical values

Table C: Dugouts with Parameters in Upward Trends

Parameter	Dugouts with Upward Trends	Upward Trends Explanation
Mercury	8	All mercury concentrations were below the laboratory RDL in 2022
Molybdenum	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 16, 19, 20, 21, and 22	All dugout concentrations are within the historical ranges except dugouts 12 and 19 which had their highest molybdenum concentrations in 2022 compared to historical values
Nickel	4, 8, 10, 12, and 19	All dugout concentrations are within the historical ranges
Nitrate (as NO_3-N)	1, 2, 3, 7, 8, 9, 10, 16, 19, and 20	All dugout concentrations are within the historical ranges
Nitrate and Nitrate (as N)	2, 3, 7, 8, 9, 10, 16, 19, and 20	All dugout concentrations are within the historical ranges
Nitrite (as NO_2-N)	1, 3, 5, 7, 9, 16, and 19	All dugout concentrations are within the historical ranges
pH	10, 14, 15, and 16	All dugout concentrations are within the historical ranges except dugouts 14 and 15 which had their highest pH values in 2022 compared to historical values
Phosphorus	1, 3, 4, 5, 7, 16, and 21	All dugout concentrations are within the historical ranges except dugouts 3, 4, 7, and 16 which had their highest phosphorus concentrations in 2022 compared to historical values
Potassium	1, 2, 3, 4, 5, 8, 9, 10, 12, 14, 15, 16, 19, 21, and 22	All dugout concentrations are within the historical ranges except for dugout 12 which had its highest potassium concentration in 2022 compared to historical values
Selenium	1, 2, 3, 4, 6, 7, 8, 9, 10, 16, and 20	All dugout concentrations are within the historical ranges except dugout 4 which had its highest selenium concentration in 2022 compared to historical values
Silver	13	The dugout concentration is within the historical range
Sodium	2, 3, 4, 5, 8, 9, 10, 14, 16, 20, 21, and 22	All dugout concentrations are within the historical range
Sulfate	5, 8, 10, 13, 15, 20, 21, and 22	All dugout concentrations are within the historical ranges except dugouts 10 and 22 which had their highest sulfate concentrations in 2022 compared to historical values
Thallium	8	The dugout concentration is within the historical range
Tin	7	The dugout concentration is within the historical range
Titanium	1, 2, 3, 4, 6, 7, 16, 19, 20, and 22	All dugout concentrations are within the historical ranges
TDS	2, 3, 4, 5, 8, 10, 12, 14, 16, 20, 21, and 22	All dugout concentrations are within the historical ranges except dugouts 10, 20, and 22 which had their highest TDS concentrations in 2022 compared to historical values
Total Kjeldahl Nitrogen	1, 3, 4, 5, 7, 8, 10, 14, and 20	All dugout concentrations are within the historical ranges
Uranium	2, 8, and 21	All dugout concentrations are within the historical ranges
Vanadium	2, 3, 4, 5, 6, 9, 10, 14, and 20	All dugout concentrations are within the historical ranges except dugouts 2 and 9 which had their highest vanadium concentrations in 2022 compared to historical values

Results of the Mann Kendall trend analysis are presented on Figure 2 in the Figures Section of this report. Only data for up-trending parameters are shown.

4.0 DISCUSSION

The dugout water levels in 2022 had recovered somewhat relative to the observed low levels reported in 2021. Photos 1 and 2 show typical water levels at dugouts 12 and 21, respectively, and photographs of each dugout were taken at the time of sampling. Sufficient water was available for sampling at all dugouts in 2022.

In general, the concentrations of most parameters analyzed in 2022 were similar, had no trend or were on a downward trend compared to past years with the exceptions as described below and in Section 3.0. The following discussion focuses on parameters with upwards trends and with 2022 data that were greater than past results.

The higher upward trend concentrations of ammonia (dugout 7), and sulfate (dugouts 10 and 22) may be attributed to elevated levels of nutrients in the surface water draining into these dugouts. Dugout 7 is adjacent to an active farmstead and dugouts 10 and 22 are adjacent to active agricultural operations.

The up-trend in concentrations of calcium (dugouts 2, 3, 4, 5, 8, 10, 12, 14, 16, 19, 20, 21, and 22), chloride (dugouts 2, 3, 4, 10, 12, 14, 19, 20, 21, and 22), magnesium (dugouts 2, 3, 4, 5, 8, 9, 10, 12, 14, 15, 16, 19, 20, 21 and 22), potassium (1, 2, 3, 4, 5, 8, 9, 10, 12, 14, 15, 16, 19, 21, and 22) and TDS (dugouts 2, 3, 4, 5, 8, 10, 12, 14, 16, 20, 21, and 22) may be attributed to the naturally saline and sodic soils in the area (solonetzic soils).

Other up-trending parameters with concentrations or values greater than the historical values include alkalinity (dugout 2), antimony (dugout 2), arsenic (dugouts 2 and 14), boron (dugouts 10 and 12), COD (dugouts 2, 4, and 20), , DOC (dugouts 4 and 20), EC (dugout 10), fluoride (dugout 10), hardness (as $CaCO_3$) (dugout 21), manganese (dugouts 7 and 22), molybdenum (dugouts 12 and 19), pH (dugouts 14 and 15), phosphorus (dugouts 3, 4, 7, and 16), selenium (dugout 4), TSS (dugouts 4 and 16), and vanadium (dugouts 2 and 9). Of these, only DOC in dugout 20 has continued to increase in concentration greater than the historical value since 2021. Tetra Tech suggests that these up-trending parameters with historically high concentrations, particularly DOC in dugout 20, be monitored closely during future sampling events. Some concentration increases could be expected in 2022 given the lower than average annual regional precipitation for two consecutive years which may have resulted in lower water levels in the dugouts and therefore increased concentrations of some parameters.

The assessment of parameters analyzed does not indicate off-site impacts from the Ryley Class I landfill site to these dugouts through groundwater, surface water or air pathways within a 1.6 km radius study area which includes the 20 dugouts sampled in 2022.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Analytical results of the dugout sampling program conducted in October 2022 indicate that the Ryley Class I Hazardous Waste Facility does not appear to be adversely impacting water quality in dugouts within a 1.6 km radius.

Some parameters analyzed in 2022 exhibited an upward trend in concentrations in one or more dugouts relative to historical baseline values, but the majority of concentrations were within the historical ranges for those parameters.

Select parameters had historically high values or concentrations for specific parameters during the 2022 sampling and should continue to be monitored and evaluated in future sampling events.

A similar sampling program is recommended for October 2023, as part of the ongoing site permit compliance process.

Each landowner should be forwarded a copy of the water chemistry analysis report pertaining to the dugout(s) sampled on their property once the 2022 report is finalized.

6.0 CLOSURE

We trust this report meets your present requirements. Should you have any questions or comments, please contact the undersigned at your convenience.

Respectfully submitted,
Tetra Tech Canada Inc.

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The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

TABLES

Table 1.1: Chemical Analytical Results

Sample ID:		**Booth D.1**				
Site Number:		**1**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	98	84	82	95	96
Ammonia-N	mg/L	0.565	<0.050	<0.050	0.051	0.117
Total Kjeldahl Nitrogen	mg/L	4.70	2.51	2.75	3.45	3.52
Dissolved Organic Carbon	mg/L	29.9	22.9	19.9	28.9	23.5
Phenols	mg/L	0.0019	0.0075	0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	10.6	18.2	41.2
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0056	0.0021	0.0036	0.0049	0.0041
Antimony	mg/L	0.00029	0.00020	0.00016	0.00034	<0.00010
Arsenic	mg/L	0.00703	0.00484	0.00583	0.00809	0.00297
Barium	mg/L	0.0714	0.0614	0.0612	0.0471	0.0992
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020
Boron	mg/L	0.049	0.047	0.025	0.037	0.023
Cadmium	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00050
Cobalt	mg/L	0.00045	0.00035	0.00030	0.00051	0.00029
Copper	mg/L	0.00049	0.00053	0.00040	0.00147	0.0002
Iron	mg/L	0.028	0.121	0.179	0.041	<0.030
Lead	mg/L	<0.000050	0.000072	0.000055	0.000071	<0.000050
Lithium	mg/L	0.0446	0.0327	0.0335	0.0456	0.0192
Manganese	mg/L	0.00864	0.00250	0.00783	0.00753	0.08
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000113
Molybdenum	mg/L	0.000989	0.000853	0.000611	0.00117	0.000419
Nickel	mg/L	0.00279	0.00353	0.00304	0.00382	0.00277
Selenium	mg/L	0.000143	0.000115	0.000156	0.000096	0.00017
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	0.000016	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00049	0.00059	0.00089	0.00077	<0.00030
Uranium	mg/L	0.000784	0.000578	0.000578	0.000824	0.000245
Vanadium	mg/L	0.00135	0.00076	0.00072	0.00221	0.00092
Zinc	mg/L	<0.0010	<0.0010	<0.0010	0.0018	<0.0010
Routine Water						
Ion Balance	%	107	103	94.7	106	102
Bicarbonate	mg/L	345	328	358	424	291
Chloride	mg/L	54.6	46.3	40.2	55.0	49.2
Carbonate	mg/L	7.6	<5.0	6.4	7.2	<1.0
Conductivity (EC)	uS/cm	845	714	712	808	651
Calcium	mg/L	14.7	21.5	20.4	13.9	45.5
Potassium	mg/L	15.1	12.5	13.2	16.4	14.2
Magnesium	mg/L	11.7	10.8	9.69	11.5	16.2
Sodium	mg/L	156	128	120	181	74.6
Sulfate	mg/L	43.0	43.4	26.6	28.0	42.4
Phosphorus	mg/L	0.276	0.211	0.466	0.148	0.525
pH in H_20	pH	8.49	8.36	8.42	8.48	8.24
TDS (Calculated)	mg/L	472	428	413	522	423
Nitrate	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	<0.022	<0.022	<0.022	<0.022	<0.050
Hardness as $CaCO_3$	mg/L	84.9	98.2	90.8	82.1	180
Alkalinity (total as $CaCO_3$)	mg/L	295	276	304	360	238
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.146	0.284	0.270	0.406	0.162
Field Data						
pH in H_20	pH	11.1	8.4	8.27	9.57	8.23
Conductivity (EC)	uS/cm	858	80	758	507	803

Notes:
"-" Not required under previous permit

Table 1.2: Chemical Analytical Results

Sample ID:		**Ewert D.1**				
Site Number:		**2**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	53	79	78	99	153
Ammonia-N	mg/L	3.79	<0.050	<0.050	0.122	0.0625
Total Kjeldahl Nitrogen	mg/L	5.64	2.70	3.08	2.26	3.8
Dissolved Organic Carbon	mg/L	21.6	22.2	21.1	33.7	45.3
Phenols	mg/L	0.0018	0.0101	<0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	10.6	8.0	35.8
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0303	0.0349	0.0059	0.109	0.0179
Antimony	mg/L	<0.00010	0.00025	0.00021	0.00052	0.00051
Arsenic	mg/L	0.00165	0.0137	0.00823	0.0103	0.0164
Barium	mg/L	0.118	0.0449	0.0508	0.0812	0.0401
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020
Boron	mg/L	0.046	0.040	0.028	0.035	0.041
Cadmium	mg/L	<0.0000050	0.0000070	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	0.00011	<0.00010	<0.00010	0.00018	<0.00050
Cobalt	mg/L	0.00065	0.00062	0.00046	0.00117	0.00067
Copper	mg/L	0.00081	0.00271	0.00065	0.00389	0.00143
Iron	mg/L	0.166	0.077	0.032	0.086	0.063
Lead	mg/L	0.000113	0.000076	<0.000050	0.000082	0.000097
Lithium	mg/L	0.0263	0.0222	0.0236	0.0399	0.0366
Manganese	mg/L	0.192	0.0138	0.00492	0.00745	0.0287
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00136	0.00198	0.000868	0.00316	0.00196
Nickel	mg/L	0.00389	0.00321	0.00290	0.00698	0.00434
Selenium	mg/L	0.000169	0.000258	0.000172	0.000373	0.000435
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	0.000017	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.0029	0.00517	0.00055	0.00368	0.00229
Uranium	mg/L	0.00123	0.00138	0.00101	0.00290	0.00253
Vanadium	mg/L	0.00067	0.00299	0.00158	0.00442	0.00499
Zinc	mg/L	<0.0010	0.0011	<0.0010	0.0042	<0.0010
Routine Water						
Ion Balance	%	102	100	96.9	106	106
Bicarbonate	mg/L	319	304	367	551	375
Chloride	mg/L	30.8	32.9	34.5	56.7	60.1
Carbonate	mg/L	8.2	38.3	16.4	14.3	135
Conductivity (EC)	uS/cm	758	675	732	1110	1340
Calcium	mg/L	26.0	21.5	22.6	22.4	19
Potassium	mg/L	19.9	16.0	20.3	26.7	23.5
Magnesium	mg/L	12.8	10.2	12.0	14.9	16.1
Sodium	mg/L	109	124	121	255	295
Sulfate	mg/L	65.3	24.3	28.9	103	118
Phosphorus	mg/L	0.065	0.628	0.745	0.408	0.578
pH in H20	pH	8.49	9.16	8.69	8.59	9.75
TDS (Calculated)	mg/L	429	417	436	764	897
Nitrate	mg/L	0.072	0.047	<0.020	0.021	<0.020
Nitrite	mg/L	<0.010	0.013	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	0.072	0.06	<0.022	<0.022	<0.050
Hardness as $CaCO_3$	mg/L	118	95.7	106	117	114
Alkalinity (total as $CaCO_3$)	mg/L	275	313	328	475	532
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.154	0.372	0.276	0.523	0.435
Field Data						
pH in H_20	pH	8.7	EF	8.94	9.35	10.06
Conductivity (EC)	uS/cm	776	829	777	344.6	1388

Notes:

"-" Not required under previous permit

"EF" Equipment malfunction

Table 1.3: Chemical Analytical Results

Sample ID:		**Ewert D.2**				
Site Number:		**3**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	127	92	119	133	124
Ammonia-N	mg/L	0.113	0.254	1.13	0.67	0.0393
Total Kjeldahl Nitrogen	mg/L	5.07	3.01	4.86	4.98	4.24
Dissolved Organic Carbon	mg/L	44.0	28.2	31.3	42.5	37.8
Phenols	mg/L	0.0018	0.0068	<0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	13.6	93	53.8
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0317	0.0334	0.0316	0.032	0.009
Antimony	mg/L	0.00038	0.00020	0.00025	0.00064	0.00022
Arsenic	mg/L	0.00803	0.00619	0.00841	0.0153	0.0113
Barium	mg/L	0.0439	0.0364	0.0509	0.0929	0.0252
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020
Boron	mg/L	0.039	0.034	0.011	0.024	0.03
Cadmium	mg/L	0.0000154	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	0.00011	0.00013	0.00019	0.00013	<0.00050
Cobalt	mg/L	0.00063	0.00061	0.00125	0.00153	0.00088
Copper	mg/L	0.00234	0.00127	0.00082	0.00197	0.00088
Iron	mg/L	0.054	0.256	0.545	0.079	0.112
Lead	mg/L	0.00010	0.000164	0.000215	0.000102	0.000089
Lithium	mg/L	0.0323	0.0261	0.0291	0.0399	0.0232
Manganese	mg/L	0.0131	0.00377	0.264	0.0538	0.0343
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.0010	0.000761	0.000587	0.00204	0.000878
Nickel	mg/L	0.00423	0.00630	0.00565	0.0086	0.00503
Selenium	mg/L	0.000319	0.000366	0.000326	0.000582	0.00038
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	0.000016	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00375	0.00694	0.00693	0.00346	0.00114
Uranium	mg/L	0.00159	0.000775	0.000892	0.00274	0.000777
Vanadium	mg/L	0.00513	0.00218	0.00226	0.0084	0.00363
Zinc	mg/L	<0.0010	<0.0010	<0.0010	0.0027	<0.0010
Routine Water						
Ion Balance	%	107	105	94.9	97.5	109
Bicarbonate	mg/L	433	407	498	662	393
Chloride	mg/L	35.7	33.3	45.9	62.2	40.2
Carbonate	mg/L	11.9	<5.0	12.6	19.9	23.8
Conductivity (EC)	uS/cm	885	844	1220	1590	922
Calcium	mg/L	17.1	25.8	30.1	44.0	28.3
Potassium	mg/L	20.5	19.0	23.5	28.9	19.3
Magnesium	mg/L	11.2	13.4	16.6	23.8	13.6
Sodium	mg/L	179	157	222	317	180
Sulfate	mg/L	46.2	77.3	193	284	80.2
Phosphorus	mg/L	0.542	0.576	1.19	1.14	1.43
pH in H20	pH	8.57	8.29	8.49	8.61	8.92
TDS (Calculated)	mg/L	535	531	789	1110	617
Nitrate	mg/L	<0.020	0.388	0.099	0.034	<0.020
Nitrite	mg/L	<0.010	0.029	0.057	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	<0.022	0.416	0.156	0.034	<0.050
Hardness as $CaCO_3$	mg/L	88.8	120	144	208	127
Alkalinity (total as $CaCO_3$)	mg/L	375	339	429	576	362
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.194	0.292	0.274	0.466	0.305
Field Data						
pH in H_20	pH	11.3	6.49	8.17	8.94	9.19
Conductivity (EC)	uS/cm	950	104.3	1322	986	943

Notes:

"-" Not required under previous permit

Table 1.4: Chemical Analytical Results

Sample ID:		**Ewert D.3**				
Site Number:		**4**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	78	106	116	115	164
Ammonia-N	mg/L	0.655	<0.050	<0.050	0.60	0.07
Total Kjeldahl Nitrogen	mg/L	3.31	3.22	3.45	4.27	4.87
Dissolved Organic Carbon	mg/L	38.0	28.3	29.0	38.2	45.9
Phenols	mg/L	0.0018	0.0058	<0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	7.6	8.0	37.8
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0673	0.0107	0.0155	0.0129	0.0111
Antimony	mg/L	0.00016	0.00016	0.00018	0.00025	0.00016
Arsenic	mg/L	0.0032	0.0031	0.00513	0.0077	0.00691
Barium	mg/L	0.0656	0.0418	0.0342	0.0468	0.0208
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020
Boron	mg/L	0.035	0.039	0.025	0.032	0.039
Cadmium	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	0.00018	0.00017	0.00023	0.00011	<0.00050
Cobalt	mg/L	0.00095	0.00036	0.00075	0.00080	0.00106
Copper	mg/L	0.00163	0.00163	0.0010	0.00255	0.00091
Iron	mg/L	0.848	1.01	1.66	0.269	0.586
Lead	mg/L	0.000389	0.000211	0.000278	0.000189	0.000136
Lithium	mg/L	0.0153	0.0125	0.0142	0.0173	0.0116
Manganese	mg/L	0.194	0.00879	0.0441	0.114	0.146
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000956	0.000489	0.000407	0.00143	0.000938
Nickel	mg/L	0.00396	0.00281	0.00314	0.00375	0.00468
Selenium	mg/L	0.000192	0.000188	0.000206	0.000252	0.000277
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	0.000032	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00499	0.00168	0.00266	0.00249	0.00124
Uranium	mg/L	0.000531	0.000262	0.000262	0.000768	0.000332
Vanadium	mg/L	0.00193	0.00144	0.00194	0.00358	0.0029
Zinc	mg/L	<0.0010	<0.0010	<0.0010	0.0017	0.0012
Routine Water						
Ion Balance	%	105	103	94.7	102	110
Bicarbonate	mg/L	308	290	338	426	291
Chloride	mg/L	64.6	56.2	73.5	99.8	68
Carbonate	mg/L	<5.0	<5.0	5.3	<5.0	2.5
Conductivity (EC)	uS/cm	708	622	750	894	696
Calcium	mg/L	23.4	22.5	19.5	25.5	20.7
Potassium	mg/L	22.0	14.2	15.7	21.0	18.9
Magnesium	mg/L	10.9	10.7	10.2	11.5	10.9
Sodium	mg/L	114	103	126	173	124
Sulfate	mg/L	19.1	14.3	15.8	13.4	17.2
Phosphorus	mg/L	0.523	0.605	1.08	0.701	1.46
pH in H_20	pH	8.05	7.98	8.39	8.40	8.38
TDS (Calculated)	mg/L	406	364	432	560	457
Nitrate	mg/L	0.198	0.027	<0.020	0.103	<0.020
Nitrite	mg/L	<0.010	0.010	<0.010	0.016	<0.010
Nitrate and Nitrite (as N)	mg/L	0.198	0.037	<0.022	0.119	<0.050
Hardness as $CaCO_3$	mg/L	103	100	90.7	111	96.6
Alkalinity (total as $CaCO_3$)	mg/L	252	238	286	358	243
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.102	0.169	0.178	0.322	0.249
Field Data						
pH in H_20	pH	9.9	EF	8.34	8.60	8.53
Conductivity (EC)	uS/cm	971	803	793	275.9	716

Notes:

"-" Not required under previous permit

"EF" Equipment malfunction

Table 1.5: Chemical Analytical Results

Sample ID:		**Ewert D.4**				
Site Number:		**5**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	86	92	75	124	114
Ammonia-N	mg/L	0.120	<0.050	0.235	0.51	0.0678
Total Kjeldahl Nitrogen	mg/L	2.91	3.61	3.64	5.41	4.27
Dissolved Organic Carbon	mg/L	38.0	22.7	23.0	35.9	28.3
Phenols	mg/L	0.0015	0.0076	0.0012	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	33.8	69	40.2
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	0.77	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0194	0.0015	0.0425	0.0782	0.0645
Antimony	mg/L	0.00025	0.00015	0.00035	0.00057	0.00031
Arsenic	mg/L	0.0114	0.00313	0.00692	0.00694	0.00625
Barium	mg/L	0.0588	0.0528	0.0823	0.102	0.0589
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020
Boron	mg/L	0.050	0.042	0.018	0.034	0.042
Cadmium	mg/L	0.0000196	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	0.00013	0.00012	<0.00050
Cobalt	mg/L	0.00094	0.00043	0.00113	0.00146	0.00093
Copper	mg/L	0.00102	0.00054	0.00123	0.00282	0.00078
Iron	mg/L	0.087	0.026	0.353	0.059	0.113
Lead	mg/L	0.00010	<0.000050	0.000273	0.000078	0.000093
Lithium	mg/L	0.0247	0.016	0.0128	0.0207	0.0162
Manganese	mg/L	0.00626	0.00080	0.0246	0.00707	0.0131
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.0019	0.00118	0.00177	0.00312	0.00205
Nickel	mg/L	0.00569	0.00406	0.00732	0.00852	0.00442
Selenium	mg/L	0.000299	0.000217	0.00037	0.000469	0.000305
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	0.000015	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00219	<0.00030	0.00991	0.00321	0.00314
Uranium	mg/L	0.001	0.000602	0.00121	0.00245	0.0013
Vanadium	mg/L	0.00251	<0.00050	0.0018	0.00225	0.00153
Zinc	mg/L	<0.0010	<0.0010	<0.0010	0.0039	<0.0010
Routine Water						
Ion Balance	%	115	102	96.8	100	112
Bicarbonate	mg/L	398	356	312	494	364
Chloride	mg/L	21.7	18	12.9	20.5	15.2
Carbonate	mg/L	<5.0	6.6	<5.0	9.8	14.9
Conductivity (EC)	uS/cm	713	624	796	878	718
Calcium	mg/L	19.1	23.9	28.5	29.5	22.2
Potassium	mg/L	14.8	14.5	15.3	19.6	16.7
Magnesium	mg/L	13.3	13.3	13.4	17.1	15.2
Sodium	mg/L	141	103	118	168	136
Sulfate	mg/L	15.1	20.2	136	80.9	42.3
Phosphorus	mg/L	0.493	0.225	0.591	0.105	0.301
pH in H_20	pH	8.32	8.44	8.37	8.50	8.75
TDS (Calculated)	mg/L	424	375	482	583	472
Nitrate	mg/L	<0.020	<0.020	<0.020	<0.020	0.032
Nitrite	mg/L	<0.010	<0.010	0.011	<0.010	0.013
Nitrate and Nitrite (as N)	mg/L	<0.022	<0.022	<0.022	<0.022	<0.050
Hardness as $CaCO_3$	mg/L	102	114	126	144	118
Alkalinity (total as $CaCO_3$)	mg/L	331	303	263	422	324
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.396	0.499	0.379	0.736	0.481
Field Data						
pH in H_20	pH	10.4	EF	8.10	9.00	9.23
Conductivity (EC)	uS/cm	780	788	829	551	739

Notes:

"-" Not required under previous permit

"EF" Equipment malfunction

Table 1.6: Chemical Analytical Results

Sample ID:		**Lyons D.1**				
Site Number:		**6**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**18-Oct-2022**
Chem. O_2 Demand	mg/L	78	89	98	93	95
Ammonia-N	mg/L	0.063	0.575	0.191	0.054	0.021
Total Kjeldahl Nitrogen	mg/L	2.89	3.01	3.13	3.19	2.44
Dissolved Organic Carbon	mg/L	28.0	24.7	25.0	29.7	27.1
Phenols	mg/L	0.0013	0.0087	<0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	5.2	23.6	16.6
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.015	0.0306	0.0366	0.0034	0.0023
Antimony	mg/L	0.00022	0.00017	0.00017	0.00024	0.00015
Arsenic	mg/L	0.00522	0.00531	0.00537	0.00773	0.00591
Barium	mg/L	0.0495	0.0421	0.0372	0.0330	0.0286
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020
Boron	mg/L	0.050	0.029	<0.010	0.023	0.056
Cadmium	mg/L	0.0000172	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	0.00011	0.0002	0.00028	<0.00010	<0.00050
Cobalt	mg/L	0.00063	0.00038	0.00065	0.00078	0.00057
Copper	mg/L	0.00071	0.00063	0.00060	0.00119	0.00044
Iron	mg/L	0.136	0.958	0.677	0.016	0.042
Lead	mg/L	0.000112	0.000229	0.000149	<0.000050	<0.000050
Lithium	mg/L	0.0136	0.0074	0.0076	0.0128	0.0103
Manganese	mg/L	0.0135	0.00866	0.223	0.00485	0.0169
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00112	0.00076	0.000751	0.00132	0.000992
Nickel	mg/L	0.00414	0.00361	0.00335	0.00336	0.00338
Selenium	mg/L	0.000273	0.000212	0.000251	0.000271	0.000256
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	0.000017	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00113	0.00329	0.00355	0.00031	<0.00030
Uranium	mg/L	0.000909	0.000234	0.00025	0.000932	0.000393
Vanadium	mg/L	0.00256	0.00205	0.00227	0.00399	0.00245
Zinc	mg/L	<0.0010	0.0016	<0.0010	0.0022	0.0014
Routine Water						
Ion Balance	%	110	101	95.7	95.0	106.0
Bicarbonate	mg/L	270	217	210	325	228
Chloride	mg/L	20.6	12.9	13.1	18.3	24.2
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	9.7
Conductivity (EC)	uS/cm	519	405	439	586	535
Calcium	mg/L	22.3	18.6	16.9	29.8	23.6
Potassium	mg/L	21.7	17.1	13.6	18.1	17.4
Magnesium	mg/L	8.55	8.46	7.41	10.8	9.12
Sodium	mg/L	84.3	51	59.0	84.7	76.7
Sulfate	mg/L	22.3	15	36.4	48.8	30.4
Phosphorus	mg/L	0.520	1.38	1.23	0.589	1.15
pH in H_20	pH	8.17	7.91	8.06	8.30	8.72
TDS (Calculated)	mg/L	313	232	250	368	331
Nitrate	mg/L	<0.020	0.429	<0.020	<0.020	<0.020
Nitrite	mg/L	<0.010	0.045	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	<0.022	0.474	<0.022	<0.022	<0.050
Hardness as $CaCO_3$	mg/L	90.9	81.3	72.7	119	96.5
Alkalinity (total as $CaCO_3$)	mg/L	222	178	172	268	203
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.104	0.155	0.140	0.256	0.201
Field Data						
pH in H_20	pH	10.4	EF	7.69	9.13	8.62
Conductivity (EC)	uS/cm	566	496	953	355.1	535

Notes:
"-" Not required under previous permit
"EF" Equipment malfunction

Table 1.7: Chemical Analytical Results

Sample ID:		**Lyons D.2**				
Site Number:				**7**		
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**18-Oct-2022**
Chem. O_2 Demand	mg/L	70	83	76	182	87
Ammonia-N	mg/L	1.17	0.414	0.236	0.090	1.330
Total Kjeldahl Nitrogen	mg/L	4.37	2.58	2.67	9.30	3.66
Dissolved Organic Carbon	mg/L	25.0	23.4	20.8	46.8	33.5
Phenols	mg/L	0.0018	0.0075	0.0017	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	3.4	43.5	8.6
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0643	0.0613	0.0189	0.0176	0.0049
Antimony	mg/L	0.00021	0.00012	0.00014	0.00025	0.00014
Arsenic	mg/L	0.00407	0.00497	0.00461	0.00725	0.00513
Barium	mg/L	0.0655	0.0649	0.0240	0.0357	0.034
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020
Boron	mg/L	0.044	0.022	<0.010	0.032	0.05
Cadmium	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000065	<0.0000050
Chromium	mg/L	0.00028	0.00018	0.00016	0.00011	<0.00050
Cobalt	mg/L	0.00079	0.00049	0.00025	0.00081	0.00069
Copper	mg/L	0.00116	0.00083	0.00095	0.00233	0.00046
Iron	mg/L	0.275	1.51	0.472	0.046	0.145
Lead	mg/L	0.000218	0.000281	0.000087	0.000056	<0.000050
Lithium	mg/L	0.0137	0.0071	0.0070	0.0113	0.0101
Manganese	mg/L	0.122	0.0361	0.0155	0.0101	0.162
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00102	0.00063	0.000745	0.00176	0.000826
Nickel	mg/L	0.00453	0.00341	0.00326	0.00415	0.00279
Selenium	mg/L	0.00023	0.000212	0.000249	0.000257	0.000192
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	0.000018	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	0.00012	<0.00010
Titanium	mg/L	0.00545	0.00488	0.00214	0.00090	0.00062
Uranium	mg/L	0.000787	0.000266	0.000275	0.00114	0.000342
Vanadium	mg/L	0.0023	0.00206	0.00214	0.00444	0.0021
Zinc	mg/L	<0.0010	0.0018	<0.0010	0.0046	<0.0010
Routine Water						
Ion Balance	%	109	97.4	98.6	105	103
Bicarbonate	mg/L	278	232	202	289	270
Chloride	mg/L	21.4	15.6	13.0	17.9	21.6
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	<1.0
Conductivity (EC)	uS/cm	536	435	409	515	549
Calcium	mg/L	24.9	17.4	16.9	26.2	22.5
Potassium	mg/L	21.8	18.5	15.5	21.3	19.7
Magnesium	mg/L	8.34	7.74	6.42	9.62	8.64
Sodium	mg/L	79.7	56.5	54.3	82.2	74.4
Sulfate	mg/L	15.7	14.5	24.9	32.8	22.6
Phosphorus	mg/L	0.580	1.13	1.09	0.865	1.20
pH in H_20	pH	8.24	8.11	8.12	8.25	8.06
TDS (Calculated)	mg/L	310	246	230	333	346
Nitrate	mg/L	0.316	0.396	<0.020	0.047	0.045
Nitrite	mg/L	<0.010	0.042	0.013	<0.010	0.02
Nitrate and Nitrite (as N)	mg/L	0.316	0.437	<0.022	0.047	0.065
Hardness as $CaCO_3$	mg/L	96.5	75.3	68.6	105	91.8
Alkalinity (total as $CaCO_3$)	mg/L	228	190	165	237	222
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.118	0.176	0.139	0.236	0.233
Field Data						
pH in H_20	pH	9.3	10.73	7.81	9.07	7.93
Conductivity (EC)	uS/cm	589	529	923	173	541

Notes:

"-" Not required under previous permit

Table 1.8: Chemical Analytical Results

Sample ID:		Lyons D.3				
Site Number:		8				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**18-Oct-2022**
Chem. O_2 Demand	mg/L	171	105	116	378	125
Ammonia-N	mg/L	0.186	<0.050	0.286	2.13	0.0994
Total Kjeldahl Nitrogen	mg/L	8.83	3.66	4.93	18.0	4.0
Dissolved Organic Carbon	mg/L	41.4	30.9	30.8	108	45.7
Phenols	mg/L	0.0021	0.0137	<0.0010	<0.003	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	52.8	1040	56.2
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0563	0.0192	0.0175	1.28	0.0064
Antimony	mg/L	0.00096	0.0003	0.00046	0.00131	0.00052
Arsenic	mg/L	0.00277	0.00261	0.00407	0.00556	0.00575
Barium	mg/L	0.108	0.0461	0.0697	0.185	0.0423
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	0.00011	<0.000020
Boron	mg/L	0.035	0.027	0.014	0.060	0.033
Cadmium	mg/L	0.000031	0.0000068	<0.0000050	0.0000423	0.0000081
Chromium	mg/L	0.00058	0.00010	0.00011	0.00163	<0.00050
Cobalt	mg/L	0.00183	0.00161	0.00247	0.00303	0.00136
Copper	mg/L	0.00582	0.00484	0.00425	0.00613	0.0028
Iron	mg/L	0.046	0.064	0.050	3.00	<0.030
Lead	mg/L	0.000076	0.000051	<0.000050	0.00289	<0.000050
Lithium	mg/L	0.028	0.0166	0.015	0.0234	0.0213
Manganese	mg/L	0.00185	0.00279	0.0179	0.166	0.00573
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000088	<0.0000050
Molybdenum	mg/L	0.0144	0.00452	0.00583	0.0316	0.0103
Nickel	mg/L	0.0151	0.0112	0.0125	0.0195	0.0136
Selenium	mg/L	0.00113	0.000684	0.000967	0.00153	0.001
Silver	mg/L	<0.000010	<0.000010	<0.000010	0.000018	<0.000010
Thallium	mg/L	0.000021	<0.000010	<0.000010	0.000016	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.0040	0.00244	0.00282	0.0326	0.00081
Uranium	mg/L	0.01	0.00318	0.00422	0.0213	0.00628
Vanadium	mg/L	0.00126	0.00110	0.00171	0.00605	0.00182
Zinc	mg/L	<0.0010	0.0017	<0.0010	0.0108	<0.0010
Routine Water						
Ion Balance	%	113	103	97.1	86.0	102.0
Bicarbonate	mg/L	409	413	426	557	481
Chloride	mg/L	48.4	22.3	17.5	66.3	26.5
Carbonate	mg/L	12.7	14.5	15.7	<5.0	15.6
Conductivity (EC)	uS/cm	1420	978	816	1470	1240
Calcium	mg/L	37.6	41.3	31.8	31.8	34.4
Potassium	mg/L	29.2	22.2	20.9	26.6	24.4
Magnesium	mg/L	23.1	24.6	17.1	14.5	23.4
Sodium	mg/L	270	149	126	262	216
Sulfate	mg/L	280	138	60.5	306	200
Phosphorus	mg/L	0.737	0.290	0.447	0.228	0.251
pH in H_20	pH	8.57	8.60	8.60	8.31	8.61
TDS (Calculated)	mg/L	906	615	500	985	824
Nitrate	mg/L	0.689	<0.020	0.079	0.096	<0.020
Nitrite	mg/L	<0.010	<0.010	0.020	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	0.689	<0.022	0.099	0.096	<0.050
Hardness as $CaCO_3$	mg/L	189	204	150	139	182
Alkalinity (total as $CaCO_3$)	mg/L	357	362	376	460	420
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.478	0.472	0.616	1.62	0.876
Field Data						
pH in H_20	pH	10.1	7.24	8.54	8.58	8.53
Conductivity (EC)	uS/cm	1488	1198	861	845	1238

Notes:

"-" Not required under previous permit

Table 1.9: Chemical Analytical Results

Sample ID:		**Lyons D.4**				
Site Number:		**9**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**18-Oct-2022**
Chem. O_2 Demand	mg/L	221	137	137	258	236
Ammonia-N	mg/L	1.82	0.397	0.888	0.43	0.134
Total Kjeldahl Nitrogen	mg/L	10.3	4.26	4.02	9.10	6.67
Dissolved Organic Carbon	mg/L	74.0	42.9	43.2	85.3	79.1
Phenols	mg/L	0.0019	0.0088	0.0013	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	61.0	96	40.4
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0911	0.0764	0.125	0.221	0.0145
Antimony	mg/L	0.00058	0.00024	0.00024	0.00117	0.00052
Arsenic	mg/L	0.00685	0.00314	0.00702	0.00526	0.0122
Barium	mg/L	0.0935	0.0406	0.0370	0.153	0.052
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020
Boron	mg/L	0.040	0.024	0.011	0.053	0.045
Cadmium	mg/L	0.0000297	0.0000099	<0.0000050	0.0000115	0.0000157
Chromium	mg/L	0.00033	0.00031	0.00035	0.00048	<0.00050
Cobalt	mg/L	0.0022	0.00060	0.00092	0.00232	0.00161
Copper	mg/L	0.00383	0.00123	0.00083	0.00522	0.00299
Iron	mg/L	0.168	0.922	1.32	0.068	0.121
Lead	mg/L	0.000125	0.000283	0.000366	0.000096	0.000076
Lithium	mg/L	0.0339	0.016	0.0156	0.0362	0.0266
Manganese	mg/L	0.0927	0.00266	0.0884	0.0828	<0.0050
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00662	0.00164	0.000964	0.0136	0.00296
Nickel	mg/L	0.0132	0.00455	0.00468	0.0139	0.0105
Selenium	mg/L	0.000795	0.000262	0.000408	0.000441	0.000688
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	0.000019	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.0104	0.00661	0.0117	0.00754	0.002
Uranium	mg/L	0.00446	0.000924	0.000664	0.0113	0.00227
Vanadium	mg/L	0.00393	0.00222	0.00294	0.00398	0.00652
Zinc	mg/L	<0.0010	0.0024	<0.0010	0.0022	<0.0010
Routine Water						
Ion Balance	%	112	101	102	98.8	108
Bicarbonate	mg/L	564	442	375	734	633
Chloride	mg/L	48.6	22.9	21.0	77.8	20.2
Carbonate	mg/L	<5.0	<5.0	<5.0	20.2	17.2
Conductivity (EC)	uS/cm	1050	734	639	1430	1040
Calcium	mg/L	28.6	22.2	23.5	36.5	37.8
Potassium	mg/L	43.5	26.8	28.1	61.4	32.4
Magnesium	mg/L	16.5	12.7	11.6	21.0	19.4
Sodium	mg/L	197	121	94.5	264	188
Sulfate	mg/L	28.9	5.32	3.99	81.2	3.8
Phosphorus	mg/L	1.89	0.614	2.71	0.315	0.885
pH in H_20	pH	8.29	8.23	8.39	8.59	8.58
TDS (Calculated)	mg/L	644	431	373	936	715
Nitrate	mg/L	0.157	0.336	0.141	2.56	<0.020
Nitrite	mg/L	<0.010	0.030	0.058	0.050	<0.010
Nitrate and Nitrite (as N)	mg/L	0.157	0.365	0.20	2.61	<0.050
Hardness as $CaCO_3$	mg/L	139	108	106	178	174
Alkalinity (total as $CaCO_3$)	mg/L	466	363	316	635	548
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.39	0.369	0.307	1.20	0.71
Field Data						
pH in H_20	pH	10.2	6.14	8.08	8.60	8.20
Conductivity (EC)	uS/cm	1133	897	666	68	1060

Notes:

"-" Not required under previous permit

Table 1.10: Chemical Analytical Results

Sample ID:		Magneson D.1				
Site Number:		10				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	268	339	280	272	245
Ammonia-N	mg/L	0.123	0.104	0.166	0.26	0.422
Total Kjeldahl Nitrogen	mg/L	10.4	11.0	9.55	8.70	8.71
Dissolved Organic Carbon	mg/L	91.0	102	85.6	84.0	80.6
Phenols	mg/L	0.0017	0.0084	<0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	4.4	10.6	22.8
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.302	0.039	0.187	0.583	0.0607
Antimony	mg/L	0.00059	0.0005	0.00054	0.00072	<0.0020
Arsenic	mg/L	0.0181	0.0175	0.0169	0.0225	0.0222
Barium	mg/L	0.0720	0.0701	0.0728	0.0553	0.0332
Beryllium	mg/L	<0.00020	<0.00020	<0.00020	<0.00050	<0.00040
Boron	mg/L	0.091	0.091	0.097	0.125	0.226
Cadmium	mg/L	0.000056	0.00005	0.000024	0.000031	<0.00010
Chromium	mg/L	0.00115	0.00092	0.00097	0.00109	<0.010
Cobalt	mg/L	0.00608	0.0051	0.00494	0.00628	0.00545
Copper	mg/L	0.0521	0.0255	0.0184	0.0301	0.0318
Iron	mg/L	1.41	1.08	1.40	0.887	<0.60
Lead	mg/L	0.00118	0.00105	0.00131	0.00091	<0.0010
Lithium	mg/L	0.0639	0.0537	0.0541	0.0777	0.0776
Manganese	mg/L	0.333	0.587	0.621	0.521	0.359
Mercury	mg/L	<0.0000050	0.0000086	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00457	0.00327	0.00339	0.00439	0.00541
Nickel	mg/L	0.0293	0.0243	0.0200	0.0255	0.0244
Selenium	mg/L	0.00099	0.00080	0.00087	0.00105	0.00102
Silver	mg/L	<0.000020	<0.000020	<0.000020	<0.000050	<0.00020
Thallium	mg/L	0.000023	<0.000020	<0.000020	<0.000050	<0.00020
Tin	mg/L	<0.00020	<0.00020	<0.00020	<0.00050	<0.0020
Titanium	mg/L	0.0552	0.00886	0.0281	0.0271	0.00841
Uranium	mg/L	0.00196	0.00185	0.00221	0.00292	0.0031
Vanadium	mg/L	0.0154	0.0131	0.0122	0.0189	0.0166
Zinc	mg/L	0.0071	0.0076	0.0063	0.0103	<0.020
Routine Water						
Ion Balance	%	103	102	98.1	97.9	101
Bicarbonate	mg/L	617	609	578	707	650
Chloride	mg/L	197	202	217	281	287
Carbonate	mg/L	17.9	16.1	22.7	24.1	34.6
Conductivity (EC)	uS/cm	2150	2150	2230	2690	2810
Calcium	mg/L	51.1	51.7	56.8	74.9	75.5
Potassium	mg/L	127	135	116	152	146
Magnesium	mg/L	26.9	31.0	31.9	43.5	42.1
Sodium	mg/L	327	326	347	426	460
Sulfate	mg/L	252	284	363	480	512
Phosphorus	mg/L	8.88	8.91	7.55	7.01	6.31
pH in H_20	pH	8.54	8.52	8.60	8.61	8.78
TDS (Calculated)	mg/L	1310	1350	1440	1830	1980
Nitrate	mg/L	0.958	1.12	0.85	1.07	<0.10
Nitrite	mg/L	<0.020	<0.020	0.062	0.018	<0.050
Nitrate and Nitrite (as N)	mg/L	0.958	1.12	0.91	1.09	<0.112
Hardness as $CaCO_3$	mg/L	238	257	273	366	362
Alkalinity (total as $CaCO_3$)	mg/L	536	526	512	620	591
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.129	0.297	0.310	0.365	0.416
Field Data						
pH in H_20	pH	10.2	9.73	8.63	8.77	8.79
Conductivity (EC)	uS/cm	2290	2.66	2390	278	2850

Notes:

"-" Not required under previous permit

Table 1.11: Chemical Analytical Results

Sample ID:		Magneson D.2				
Site Number:		11				
Date Sampled:	Units	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021	19-Oct-2022
Chem. O_2 Demand	mg/L	160	114	196	Dry	224
Ammonia-N	mg/L	0.137	0.063	<0.050		0.1
Total Kjeldahl Nitrogen	mg/L	6.13	3.46	7.09		7.23
Dissolved Organic Carbon	mg/L	60.0	33.5	54.6		67.7
Phenols	mg/L	0.0028	0.0142	0.0010		<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	345		56.8
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	Dry	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050		<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050		<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050		<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050		<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071		<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050		<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10		<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10		<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10		<0.10
Dissolved Metals						
Aluminium	mg/L	0.217	0.168	0.0606	Dry	0.0338
Antimony	mg/L	0.00024	0.00018	0.00026		0.00039
Arsenic	mg/L	0.0137	0.00332	0.00542		0.00544
Barium	mg/L	0.0136	0.0524	0.0423		0.045
Beryllium	mg/L	<0.00010	<0.00010	<0.00010		<0.000020
Boron	mg/L	0.036	0.024	0.031		0.03
Cadmium	mg/L	0.0000249	0.0000153	0.0000129		0.000007
Chromium	mg/L	0.00053	0.00034	0.00035		<0.00050
Cobalt	mg/L	0.00070	0.00057	0.00124		0.00222
Copper	mg/L	0.00276	0.00211	0.00224		0.00314
Iron	mg/L	0.197	1.43	0.683		0.222
Lead	mg/L	0.000151	0.000582	0.000394		0.000162
Lithium	mg/L	0.0124	0.0104	0.0118		0.0183
Manganese	mg/L	0.0111	0.00213	0.0308		0.00785
Mercury	mg/L	<0.0000050	0.000005	<0.0000050		<0.0000050
Molybdenum	mg/L	0.00352	0.00111	0.00138		0.00643
Nickel	mg/L	0.00544	0.00512	0.00635		0.0116
Selenium	mg/L	0.000474	0.000263	0.000417		0.000663
Silver	mg/L	<0.000010	<0.000010	<0.000010		<0.000010
Thallium	mg/L	0.000018	<0.000010	<0.000010		<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010		<0.00010
Titanium	mg/L	0.0158	0.0141	0.00792		0.00166
Uranium	mg/L	0.00188	0.000954	0.00203		0.00497
Vanadium	mg/L	0.0122	0.00364	0.00603		0.00476
Zinc	mg/L	<0.0010	0.0015	<0.0010		<0.0010
Routine Water						
Ion Balance	%	107	102	100	Dry	111
Bicarbonate	mg/L	332	296	338		464
Chloride	mg/L	48.5	19.2	27.6		28.7
Carbonate	mg/L	12.7	<5.0	<5.0		13.2
Conductivity (EC)	uS/cm	760	516	625		837
Calcium	mg/L	19.9	20.8	21.0		34.2
Potassium	mg/L	39.1	32.9	33.5		48.4
Magnesium	mg/L	8.43	9.31	9.13		14
Sodium	mg/L	128	69.1	91.7		138
Sulfate	mg/L	21.6	5.44	14.5		9.38
Phosphorus	mg/L	2.28	1.21	2.61		0.836
pH in H_20	pH	8.68	8.19	8.39		8.62
TDS (Calculated)	mg/L	442	303	369		584
Nitrate	mg/L	<0.020	0.253	<0.020		<0.020
Nitrite	mg/L	<0.010	<0.010	<0.010		<0.010
Nitrate and Nitrite (as N)	mg/L	<0.022	0.253	<0.022		<0.050
Hardness as $CaCO_3$	mg/L	84.4	90.3	90.0		143
Alkalinity (total as $CaCO_3$)	mg/L	293	242	285		403
Hydroxide	mg/L	<5	<5.0	<5.0		<1.0
Fluoride	mg/L	0.284	0.228	0.252		0.482
Field Data						
pH in H_20	pH	11.4	10.3	8.42	Dry	8.78
Conductivity (EC)	uS/cm	786	650	662		858

Notes:

"-" Not required under previous permit

Table 1.12: Chemical Analytical Results

Sample ID:		**Magneson D.3 (now on Clean Harbors' property)**				
Site Number:		**12**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**18-Oct-2022**
Chem. O_2 Demand	mg/L	Not analyzed	119	48	12	74
Ammonia-N	mg/L		<0.050	<0.050	<0.050	0.0335
Total Kjeldahl Nitrogen	mg/L		3.49	2.02	0.57	2.37
Dissolved Organic Carbon	mg/L		17.9	15.1	8.3	23.3
Phenols	mg/L		0.0136	<0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L		-	19.2	7.4	39
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	Not analyzed	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L		<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L		<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L		<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L		<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L		<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L		<0.00050	<0.00050	<0.00050	<0.00050
F1 (C6-C10)	mg/L		<0.10	<0.10	<0.10	<0.10
F1 - BTEX	mg/L		<0.10	<0.10	<0.10	<0.10
F2 - (>C10-C16)	mg/L		<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	Not analyzed	0.0033	0.0088	0.0125	0.0024
Antimony	mg/L		0.00029	0.00029	0.00028	0.00036
Arsenic	mg/L		0.00194	0.00169	0.00105	0.00256
Barium	mg/L		0.0773	0.053	0.0364	0.0954
Beryllium	mg/L		<0.00010	<0.00010	<0.00010	<0.000020
Boron	mg/L		0.060	0.062	0.05	0.084
Cadmium	mg/L		0.0000188	<0.0000050	0.0000153	0.0000201
Chromium	mg/L		0.00016	<0.00010	0.00029	<0.00050
Cobalt	mg/L		0.00052	0.00022	<0.00010	0.00028
Copper	mg/L		0.00242	0.0011	0.00276	0.00121
Iron	mg/L		0.015	0.013	<0.010	<0.030
Lead	mg/L		<0.000050	<0.000050	<0.000050	<0.000050
Lithium	mg/L		0.0409	0.0411	0.0202	0.0498
Manganese	mg/L		0.00123	0.00125	0.00067	<0.0050
Mercury	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L		0.0254	0.0234	0.0364	0.0434
Nickel	mg/L		0.0203	0.0146	0.00476	0.0171
Selenium	mg/L		0.000304	0.000259	0.000246	0.000414
Silver	mg/L		<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L		<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L		<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L		<0.00030	0.00105	<0.00030	<0.00030
Uranium	mg/L		0.00247	0.00265	0.00127	0.00322
Vanadium	mg/L		0.00262	0.00154	0.00122	0.0024
Zinc	mg/L		0.0028	<0.0010	0.0044	0.0012
Routine Water						
Ion Balance	%	Not analyzed	102	95.2	98.5	106
Bicarbonate	mg/L		268	282	117	261
Chloride	mg/L		14.7	13.6	49.9	12.9
Carbonate	mg/L		<5.0	5.0	<5.0	3.4
Conductivity (EC)	uS/cm		960	947	772	992
Calcium	mg/L		49.1	41.3	43.7	35.5
Potassium	mg/L		13.6	12.2	3.22	14.6
Magnesium	mg/L		17.4	16.1	13.5	16.8
Sodium	mg/L		139	144	109	162
Sulfate	mg/L		252	253	235	252
Phosphorus	mg/L		0.185	0.081	<0.050	0.122
pH in H_20	pH		8.38	8.40	7.87	8.39
TDS (Calculated)	mg/L		623	625	478	656
Nitrate	mg/L		0.029	<0.020	<0.020	<0.020
Nitrite	mg/L		<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L		0.029	<0.022	<0.022	<0.050
Hardness as CaCO3	mg/L		194	169	165	158
Alkalinity (total as CaCO3)	mg/L		227	240	95.6	219
Hydroxide	mg/L		<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L		0.465	0.450	0.459	0.825
Field Data						
pH in H_20	pH	Not analyzed	11.68	8.36	8.48	8.28
Conductivity (EC)	uS/cm		1203	1017	483	1010

Notes:

"-" Not required under previous permit

Table 1.13: Chemical Analytical Results

Sample ID:		**Magneson D.4**				
Site Number:		**13**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	960	1370	1300	3420	1100
Ammonia-N	mg/L	0.409	2.85	2.02	<2.5	1.63
Total Kjeldahl Nitrogen	mg/L	39.4	43.7	42.6	122	42.1
Dissolved Organic Carbon	mg/L	329	415	295	1070	277
Phenols	mg/L	<0.01	0.0116	0.0013	0.0054	0.0018
Total Suspended Solids (TSS)	mg/L	-	-	24.4	1660	12.6
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.145	0.080	0.0915	0.167	0.273
Antimony	mg/L	0.00082	0.00064	0.00074	0.0021	0.00091
Arsenic	mg/L	0.0327	0.0275	0.0310	0.0841	0.0347
Barium	mg/L	0.383	0.166	0.195	0.436	0.15
Beryllium	mg/L	<0.00050	<0.00050	<0.0005	<0.001	<0.00010
Boron	mg/L	0.267	0.204	0.223	0.46	0.211
Cadmium	mg/L	0.000064	0.000079	0.000036	0.000131	0.0000275
Chromium	mg/L	0.00482	0.00285	0.00373	0.0077	0.00337
Cobalt	mg/L	0.00594	0.00794	0.00817	0.0157	0.0113
Copper	mg/L	0.0069	0.0093	0.0103	0.0364	0.00685
Iron	mg/L	3.26	1.99	3.63	7.34	3.93
Lead	mg/L	0.00422	0.00304	0.00391	0.00584	0.0031
Lithium	mg/L	0.128	0.0902	0.0902	0.33	0.096
Manganese	mg/L	1.39	0.748	0.882	1.8	0.77
Mercury	mg/L	<0.000050	<0.000050	<0.0000050	<0.000050	<0.0000050
Molybdenum	mg/L	0.00333	0.00193	0.00371	0.0242	0.00656
Nickel	mg/L	0.0350	0.0350	0.0394	0.0967	0.0435
Selenium	mg/L	0.00159	0.00142	0.00184	0.00626	0.00155
Silver	mg/L	0.00009	<0.000050	<0.000050	0.00012	0.000059
Thallium	mg/L	<0.000050	<0.000050	<0.000050	<0.00010	<0.000050
Tin	mg/L	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050
Titanium	mg/L	0.0716	0.0444	0.0700	0.1030	0.0586
Uranium	mg/L	0.00295	0.00214	0.00303	0.0119	0.00323
Vanadium	mg/L	0.0277	0.0286	0.0276	0.0466	0.024
Zinc	mg/L	0.0247	0.032	0.0233	0.041	0.0165
Routine Water						
Ion Balance	%	101	110	96.9	96.2	83.8
Bicarbonate	mg/L	1580	1310	1430	3440	1560
Chloride	mg/L	894	603	668	3040	831
Carbonate	mg/L	87.5	47.6	64.6	522	74.9
Conductivity (EC)	uS/cm	6470	4570	4960	16400	5,390
Calcium	mg/L	118	84.2	82.2	109	101
Potassium	mg/L	717	634	602	2420	696
Magnesium	mg/L	84.4	71.6	69.2	262	80
Sodium	mg/L	844	596	655	2840	596
Sulfate	mg/L	637	361	530	2940	715
Phosphorus	mg/L	31.3	26.9	26.8	34.8	26.2
pH in H_20	pH	8.73	8.64	8.68	9.12	8.74
TDS (Calculated)	mg/L	4160	3040	3380	11000	4,190
Nitrate	mg/L	0.33	0.570	0.26	<0.20	0.15
Nitrite	mg/L	<0.050	0.083	0.073	<0.10	1.73
Nitrate and Nitrite (as N)	mg/L	0.33	0.65	0.33	<0.22	1.88
Hardness as $CaCO_3$	mg/L	642	505	490	1350	582
Alkalinity (total as $CaCO_3$)	mg/L	1440	1150	1280	3690	1400
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	<0.1	<0.10	1.19	0.27	0.940
Field Data						
pH in H_20	pH	10.4	9.81	8.59	9.36	8.68
Conductivity (EC)	uS/cm	2230	6.83	5430	5513	5580

Notes:

"-" Not required under previous permit

Table 1.14: Chemical Analytical Results

Sample ID:		**Magneson D.5**				
Site Number:		**14**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	243	370	380	670	282
Ammonia-N	mg/L	0.455	0.600	0.210	0.370	0.158
Total Kjeldahl Nitrogen	mg/L	10.0	13.9	14.6	23	9.6
Dissolved Organic Carbon	mg/L	88.0	100	100	171	84.6
Phenols	mg/L	0.0025	0.0071	<0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	73.0	359.0	63.8
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0245	0.0182	0.0145	1.21	0.0676
Antimony	mg/L	0.00101	0.00073	0.00059	0.00079	0.00104
Arsenic	mg/L	0.019	0.0155	0.0168	0.0221	0.0242
Barium	mg/L	0.0764	0.0337	0.0317	0.0979	0.0817
Beryllium	mg/L	<0.00020	<0.00020	<0.00020	<0.00050	<0.000040
Boron	mg/L	<0.020	0.048	0.059	0.079	0.031
Cadmium	mg/L	0.000019	0.000012	<0.000010	0.000026	0.0000161
Chromium	mg/L	0.00025	0.00055	0.00051	0.00153	<0.0010
Cobalt	mg/L	0.00364	0.00428	0.00328	0.0032	0.00241
Copper	mg/L	0.0052	0.00527	0.00426	0.004	0.00187
Iron	mg/L	0.070	0.277	0.178	1.38	0.083
Lead	mg/L	0.00011	0.00037	0.00017	0.00235	0.00014
Lithium	mg/L	0.0576	0.0533	0.050	0.079	0.0597
Manganese	mg/L	0.00515	0.220	0.218	0.342	0.0226
Mercury	mg/L	<0.0000050	0.0000063	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.0110	0.00592	0.00596	0.016	0.0238
Nickel	mg/L	0.0232	0.0225	0.0181	0.0228	0.0205
Selenium	mg/L	0.00078	0.00088	0.00096	0.00121	0.00074
Silver	mg/L	<0.000020	<0.000020	<0.000020	<0.000050	<0.000020
Thallium	mg/L	<0.00002	<0.000020	<0.000020	<0.000050	<0.000020
Tin	mg/L	<0.00020	<0.00020	<0.00020	<0.00050	<0.00020
Titanium	mg/L	0.00511	0.00459	0.00431	0.0411	0.0048
Uranium	mg/L	0.00351	0.0023	0.00191	0.00347	0.00441
Vanadium	mg/L	0.0188	0.0269	0.0142	0.0189	0.0153
Zinc	mg/L	<0.0020	0.004	0.0039	0.0088	<0.0020
Routine Water						
Ion Balance	%	99.5	104	99.7	75.6	97.9
Bicarbonate	mg/L	932	850	795	1440	769
Chloride	mg/L	145	175	207	476	230
Carbonate	mg/L	37.6	21.7	40.1	107	80.5
Conductivity (EC)	uS/cm	2030	2120	2230	3780	2500
Calcium	mg/L	35.6	50.3	45.7	83.3	51
Potassium	mg/L	67.2	119	122	137	113
Magnesium	mg/L	18.2	35.9	30.6	41.6	29.2
Sodium	mg/L	391	353	370	572	461
Sulfate	mg/L	71.6	162	185	333	319
Phosphorus	mg/L	2.99	10.1	12.5	2.17	2.05
pH in H_20	pH	8.66	8.53	8.78	8.89	9.11
TDS (Calculated)	mg/L	1230	1340	1390	2460	1760
Nitrate	mg/L	<0.040	0.557	0.19	<0.20	<0.10
Nitrite	mg/L	<0.020	<0.020	0.065	<0.10	<0.050
Nitrate and Nitrite (as N)	mg/L	<0.045	0.557	0.25	<0.22	<0.112
Hardness as $CaCO_3$	mg/L	164	273	240	379	248
Alkalinity (total as $CaCO_3$)	mg/L	827	733	719	1360	765
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.512	0.180	0.480	1.010	0.979
Field Data						
pH in H_20	pH	10.6	11.75	8.81	9.13	9.31
Conductivity (EC)	uS/cm	2140	2.78	2300	2551	2520

Notes:

"-" Not required under previous permit

Table 1.15: Chemical Analytical Results

Sample ID:		**Magneson D.6**				
Site Number:		**15**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	125	125	88	148	127
Ammonia-N	mg/L	<0.050	<0.050	<0.050	0.28	0.0747
Total Kjeldahl Nitrogen	mg/L	4.58	4.16	3.27	2.55	4.17
Dissolved Organic Carbon	mg/L	43.0	33.1	26.6	39	39.7
Phenols	mg/L	0.0021	0.013	<0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	11.2	14.2	32
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0151	0.0051	0.0136	0.0211	0.0041
Antimony	mg/L	0.00113	0.00086	0.00067	0.00107	0.00088
Arsenic	mg/L	0.019	0.0134	0.0139	0.0337	0.0209
Barium	mg/L	0.0302	0.0512	0.0370	0.0465	0.0212
Beryllium	mg/L	<0.00020	<0.00020	<0.00020	<0.00050	<0.000040
Boron	mg/L	0.301	0.237	0.230	0.302	0.239
Cadmium	mg/L	0.000018	0.000012	<0.000010	<0.000025	<0.000010
Chromium	mg/L	<0.00020	<0.00020	<0.00020	<0.00050	<0.0010
Cobalt	mg/L	0.00089	0.00075	0.0011	0.00084	0.00069
Copper	mg/L	0.00103	0.00174	0.00085	0.0013	0.0008
Iron	mg/L	0.037	0.023	0.082	<0.050	<0.060
Lead	mg/L	<0.00010	<0.00010	<0.00010	<0.00025	<0.00010
Lithium	mg/L	0.13	0.0978	0.088	0.148	0.128
Manganese	mg/L	0.00962	0.00599	0.172	0.505	0.0308
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00211	0.00179	0.00128	0.00099	0.00151
Nickel	mg/L	0.0067	0.0082	0.0059	0.007	0.0050
Selenium	mg/L	0.00032	0.00029	0.00027	0.00029	0.000297
Silver	mg/L	<0.000020	<0.000020	<0.000020	<0.000050	<0.000020
Thallium	mg/L	<0.00002	<0.000020	<0.000020	<0.000050	<0.000020
Tin	mg/L	<0.00020	<0.00020	<0.00020	<0.00050	<0.00020
Titanium	mg/L	0.00146	0.00134	0.00232	<0.0015	<0.00060
Uranium	mg/L	0.00442	0.00507	0.0040	0.0036	0.00437
Vanadium	mg/L	0.0042	0.0063	0.0026	0.004	0.0035
Zinc	mg/L	0.0020	<0.0020	<0.0020	<0.0050	0.0021
Routine Water						
Ion Balance	%	98.7	101	101	93	95.8
Bicarbonate	mg/L	538	520	427	577	417
Chloride	mg/L	359	286	294	453	358
Carbonate	mg/L	14.5	16.6	11.2	12.7	28.1
Conductivity (EC)	uS/cm	4070	3120	3050	4140	3760
Calcium	mg/L	41.7	97.9	91.4	83.6	67.4
Potassium	mg/L	29.8	34.1	26.6	40.2	33.1
Magnesium	mg/L	58.5	56.6	57.8	82.8	66.7
Sodium	mg/L	794	558	510	823	726
Sulfate	mg/L	1120	818	772	1380	1210
Phosphorus	mg/L	0.486	0.745	0.582	1.25	0.625
pH in H_20	pH	8.47	8.52	8.48	8.47	8.84
TDS (Calculated)	mg/L	2680	2120	1970	2920	2730
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
Nitrate and Nitrite (as N)	mg/L	<0.11	<0.101	<0.11	<0.11	<0.112
Hardness as $CaCO_3$	mg/L	345	478	466	550	443
Alkalinity (total as $CaCO_3$)	mg/L	465	454	369	494	389
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.22	0.35	0.290	0.380	0.382
Field Data						
pH in H_20	pH	10.9	9.48	8.37	8.55	9.02
Conductivity (EC)	uS/cm	4140	3.82	3170	2705	3770

Notes:

"-" Not required under previous permit

Table 1.16: Chemical Analytical Results

Sample ID:		**Beaver D.1**				
Site Number:				**16**		
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	66	93	84	114	185
Ammonia-N	mg/L	1.10	0.071	0.200	2.200	0.49
Total Kjeldahl Nitrogen	mg/L	4.27	2.46	3.01	2.38	8.06
Dissolved Organic Carbon	mg/L	25.6	28.1	26.2	36.8	42.7
Phenols	mg/L	0.0023	0.0099	<0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	8.0	12.0	161
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0064	0.0036	0.0039	0.0218	0.0046
Antimony	mg/L	0.00024	0.00022	0.00027	0.00057	0.00042
Arsenic	mg/L	0.00455	0.00586	0.00534	0.0131	0.0114
Barium	mg/L	0.0833	0.0489	0.0504	0.0955	0.0243
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020
Boron	mg/L	0.051	0.039	0.020	0.041	0.058
Cadmium	mg/L	<0.0000050	0.0000056	<0.0000050	0.0000066	<0.0000050
Chromium	mg/L	<0.00010	0.00013	0.00014	0.00016	<0.00050
Cobalt	mg/L	0.00094	0.00038	0.00050	0.00136	0.00111
Copper	mg/L	0.00057	0.00071	0.00037	0.00154	0.00077
Iron	mg/L	0.026	0.049	0.125	0.032	0.032
Lead	mg/L	<0.000050	<0.000050	<0.000050	0.000059	<0.000050
Lithium	mg/L	0.0329	0.0308	0.0262	0.0443	0.0343
Manganese	mg/L	0.387	0.00491	0.134	0.494	0.409
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00153	0.00067	0.00047	0.00268	0.00168
Nickel	mg/L	0.00697	0.00493	0.00347	0.00754	0.00695
Selenium	mg/L	0.000284	0.000205	0.000184	0.000491	0.000302
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	0.000015	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00086	0.00069	0.00114	0.00121	0.00052
Uranium	mg/L	0.00225	0.00115	0.000827	0.00362	0.0021
Vanadium	mg/L	0.00363	0.00324	0.00251	0.00877	0.00761
Zinc	mg/L	<0.0010	<0.0010	<0.0010	0.0044	0.0011
Routine Water						
Ion Balance	%	103	109	98.5	98	104.0
Bicarbonate	mg/L	451	464	479	714	550
Chloride	mg/L	237	182	150	274	234
Carbonate	mg/L	7.9	6.7	7.4	22.8	13.3
Conductivity (EC)	uS/cm	1780	1490	1400	2010	1830
Calcium	mg/L	67.2	53.7	45.5	75	73.8
Potassium	mg/L	19.6	19.1	15.3	25.4	20.9
Magnesium	mg/L	28.5	28.2	21.0	34.7	32.3
Sodium	mg/L	275	266	233	367	312
Sulfate	mg/L	163	131	116	173	170
Phosphorus	mg/L	0.464	1.41	1.68	1.3	2.21
pH in H_20	pH	8.39	8.37	8.42	8.58	8.52
TDS (Calculated)	mg/L	1020	915	824	1230	1180
Nitrate	mg/L	0.299	<0.020	<0.020	0.153	<0.020
Nitrite	mg/L	<0.010	<0.010	0.017	0.149	<0.010
Nitrate and Nitrite (as N)	mg/L	0.299	<0.022	<0.022	0.302	<0.050
Hardness as $CaCO_3$	mg/L	285	250	200	330	317
Alkalinity (total as $CaCO_3$)	mg/L	383	392	405	623	473
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.129	0.208	0.179	0.398	0.356
Field Data						
pH in H_20	pH	9.6	10.32	8.15	8.53	8.68
Conductivity (EC)	uS/cm	1875	1940	1458	1307	1878

Notes:

"-" Not required under previous permit

Table 1.18: Chemical Analytical Results

Sample ID:		Beaver D.2				
Site Number:		18				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	35	158	106	Not monitored	Not monitored
Ammonia-N	mg/L	<0.050	<0.050	0.183		
Total Kjeldahl Nitrogen	mg/L	1.71	4.19	3.29		
Dissolved Organic Carbon	mg/L	21.6	39.2	27.5		
Phenols	mg/L	0.0019	0.0081	0.0018		
Total Suspended Solids (TSS)	mg/L	-	-	12.4		
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	Not monitored	Not monitored
Toluene	mg/L	<0.00050	<0.00050	<0.00050		
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050		
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050		
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050		
Xylenes	mg/L	<0.00071	<0.00071	<0.00071		
Styrene	mg/L	<0.0005	<0.00050	<0.00050		
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10		
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10		
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10		
Dissolved Metals						
Aluminium	mg/L	0.0034	0.0035	0.0195	Not monitored	Not monitored
Antimony	mg/L	0.00027	0.00021	0.00015		
Arsenic	mg/L	0.00107	0.00247	0.00172		
Barium	mg/L	0.0924	0.0716	0.0934		
Beryllium	mg/L	<0.00020	<0.00020	<0.00010		
Boron	mg/L	0.024	0.053	0.017		
Cadmium	mg/L	0.000018	<0.000010	<0.0000050		
Chromium	mg/L	<0.0002	<0.00020	0.00019		
Cobalt	mg/L	0.0101	0.00040	0.00062		
Copper	mg/L	0.00127	0.00049	0.00027		
Iron	mg/L	0.064	0.111	0.505		
Lead	mg/L	<0.00010	<0.00010	0.000172		
Lithium	mg/L	0.0698	0.0423	0.0294		
Manganese	mg/L	5.26	0.00533	0.713		
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050		
Molybdenum	mg/L	0.00304	0.00095	0.000111		
Nickel	mg/L	0.0113	0.0042	0.00261		
Selenium	mg/L	0.00013	0.00018	0.000429		
silver	mg/L	<0.000020	<0.000020	<0.000010		
Thallium	mg/L	0.000022	<0.000020	<0.000010		
Tin	mg/L	<0.00020	<0.00020	<0.00010		
Titanium	mg/L	<0.00060	<0.0006	0.00065		
Uranium	mg/L	0.0197	0.000974	0.000385		
Vanadium	mg/L	<0.0010	0.0013	<0.00050		
Zinc	mg/L	0.0064	<0.0020	0.0028		
Routine Water						
Ion Balance	%	109	107	97.1	Not monitored	Not monitored
Bicarbonate	mg/L	558	784	598		
Chloride	mg/L	688	285	235		
Carbonate	mg/L	<5.0	<5.0	5.0		
Conductivity (EC)	uS/cm	3810	2120	1690		
Calcium	mg/L	298	109	75.3		
Potassium	mg/L	26.1	26.1	15.2		
Magnesium	mg/L	87.2	43.8	25.2		
Sodium	mg/L	498	330	256		
Sulfate	mg/L	592	78.4	61.2		
Phosphorus	mg/L	0.243	1.02	0.732		
pH in H_20	pH	8.18	8.10	8.33		
TDS (Calculated)	mg/L	2460	1260	968		
Nitrate	mg/L	<0.10	<0.040	<0.020		
Nitrite	mg/L	<0.050	0.022	0.013		
Nitrate and Nitrite (as N)	mg/L	<0.11	<0.045	<0.022		
Hardness as $CaCO_3$	mg/L	1100	453	292		
Alkalinity (total as $CaCO_3$)	mg/L	457	643	499		
Hydroxide	mg/L	<5	<5.0	<5.0		
Fluoride	mg/L	0.15	0.273	0.229		
Field Data						
pH in H_20	pH	8.3	9.89	7.95	Not monitored	Not monitored
Conductivity (EC)	uS/cm	3960	2.62	1801		

Notes:

"-" Not required under previous permit

Table 1.19: Chemical Analytical Results

Sample ID:		Winsnes D.1				
Site Number:		19				
Date Sampled:	Units	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021	19-Oct-2022
Chem. O_2 Demand	mg/L	92	75	83	73	80
Ammonia-N	mg/L	0.058	<0.050	0.251	0.71	0.061
Total Kjeldahl Nitrogen	mg/L	4.01	2.52	3.99	1.4	3.03
Dissolved Organic Carbon	mg/L	27.3	24.2	21.7	24.9	24.1
Phenols	mg/L	0.0026	0.0077	<0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	13.0	11.2	20.6
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0085	0.0017	0.0022	0.0096	0.0037
Antimony	mg/L	0.00030	0.0002	0.00029	0.00037	0.00023
Arsenic	mg/L	0.00574	0.00471	0.00454	0.00579	0.00529
Barium	mg/L	0.0623	0.0412	0.0729	0.0779	0.0592
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020
Boron	mg/L	0.037	0.039	0.029	0.044	0.034
Cadmium	mg/L	0.0000168	<0.0000050	<0.0000050	0.0000071	<0.0000050
Chromium	mg/L	0.00011	<0.00010	<0.00010	0.00011	<0.00050
Cobalt	mg/L	0.00055	0.00035	0.00062	0.00056	0.00051
Copper	mg/L	0.00043	0.00027	0.00026	0.00177	0.00042
Iron	mg/L	0.038	0.011	0.041	0.034	<0.030
Lead	mg/L	0.000061	<0.000050	<0.000050	0.000055	<0.000050
Lithium	mg/L	0.0279	0.0235	0.0169	0.0247	0.0213
Manganese	mg/L	0.0371	0.00135	0.0111	0.136	<0.0050
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000512	0.000602	0.000589	0.000873	0.000873
Nickel	mg/L	0.00316	0.00287	0.00304	0.00361	0.0029
Selenium	mg/L	0.000206	0.000204	0.000192	0.000263	0.000169
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	0.000015	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00093	<0.0003	<0.00030	0.00041	<0.00030
Uranium	mg/L	0.00159	0.00116	0.00136	0.00194	0.00143
Vanadium	mg/L	0.00163	0.00094	0.00166	0.00184	0.00166
Zinc	mg/L	<0.0010	<0.0010	<0.0010	0.013	0.0011
Routine Water						
Ion Balance	%	107	104	107	97.4	106
Bicarbonate	mg/L	469	416	359	370	305
Chloride	mg/L	58.7	71.6	76.8	103	89.1
Carbonate	mg/L	<5.0	10.8	7.6	<5.0	18.4
Conductivity (EC)	uS/cm	1070	1060	1020	1120	1070
Calcium	mg/L	26.8	39.2	44.7	33.1	35.9
Potassium	mg/L	15.8	15.7	12.7	16.5	15.8
Magnesium	mg/L	21.3	23.7	24.1	26.9	25.2
Sodium	mg/L	197	174	164	179	180
Sulfate	mg/L	92.4	106	123	166	160
Phosphorus	mg/L	0.339	0.263	0.425	0.306	0.249
pH in H_20	pH	8.36	8.51	8.46	8.32	8.86
TDS (Calculated)	mg/L	648	646	630	709	698
Nitrate	mg/L	<0.020	0.025	0.064	0.035	<0.020
Nitrite	mg/L	<0.010	0.014	0.025	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	<0.022	0.039	0.089	0.035	<0.050
Hardness as $CaCO_3$	mg/L	155	195	211	193	193
Alkalinity (total as $CaCO_3$)	mg/L	393	359	307	307	280
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.16	0.292	0.229	0.304	0.263
Field Data						
pH in H_20	pH	10.7	10.44	8.50	8.57	9.22
Conductivity (EC)	uS/cm	1123	1306	1049	608	1098

Notes:
"-" Not required under previous permit

Table 1.20: Chemical Analytical Results

Sample ID:		**Balash D.1**				
Site Number:		**20**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	61	79	75	65	96
Ammonia-N	mg/L	<0.050	0.824	0.356	1.32	0.117
Total Kjeldahl Nitrogen	mg/L	1.73	3.35	3.20	1.46	3.52
Dissolved Organic Carbon	mg/L	21.5	25.3	24.1	25.1	23.5
Phenols	mg/L	0.0018	0.0052	<0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	34.8	8.2	41.2
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0046	0.0052	0.0128	0.0067	0.0041
Antimony	mg/L	0.00016	0.00013	0.00017	0.00011	<0.00010
Arsenic	mg/L	0.00218	0.00283	0.00274	0.00397	0.00297
Barium	mg/L	0.104	0.0997	0.0979	0.116	0.0992
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020
Boron	mg/L	0.033	0.028	<0.010	<0.010	0.023
Cadmium	mg/L	0.0000237	0.0000063	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	0.00013	0.00012	0.00016	0.00011	<0.00050
Cobalt	mg/L	0.00053	0.00031	0.00027	0.00057	0.00029
Copper	mg/L	0.00027	0.00026	0.00023	0.0011	0.0002
Iron	mg/L	0.185	0.815	0.739	0.302	<0.030
Lead	mg/L	0.000067	0.000071	0.000138	0.0001	<0.000050
Lithium	mg/L	0.0237	0.0178	0.017	0.0241	0.0192
Manganese	mg/L	0.0629	0.00851	0.0070	0.6550	0.08
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000113
Molybdenum	mg/L	0.00061	0.00039	0.000304	0.000301	0.000419
Nickel	mg/L	0.00305	0.00293	0.00282	0.00257	0.00277
Selenium	mg/L	0.00018	0.000188	0.000245	0.00019	0.00017
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	0.000024	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00053	0.00095	0.00216	0.00063	<0.00030
Uranium	mg/L	0.000372	0.000199	0.000235	0.000194	0.000245
Vanadium	mg/L	0.00071	0.00095	0.00087	0.00062	0.00092
Zinc	mg/L	<0.0010	<0.0010	<0.0010	0.0029	<0.0010
Routine Water						
Ion Balance	%	108	106	105	92.3	102
Bicarbonate	mg/L	269	277	259	322	291
Chloride	mg/L	37.6	43.9	55.5	63	49.2
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	<1.0
Conductivity (EC)	uS/cm	569	574	654	696	651
Calcium	mg/L	35.2	43.6	45.2	49.8	45.5
Potassium	mg/L	17.8	14.8	10.6	13.7	14.2
Magnesium	mg/L	16.3	15.8	16.8	16.7	16.2
Sodium	mg/L	66.1	57.3	74.3	67.1	74.6
Sulfate	mg/L	23.8	12.1	47.5	36.6	42.4
Phosphorus	mg/L	0.106	0.463	0.552	0.454	0.463
pH in H_20	pH	8.19	8.13	8.09	8.28	8.24
TDS (Calculated)	mg/L	329	324	378	406	423
Nitrate	mg/L	<0.020	0.037	0.053	<0.020	<0.020
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	<0.022	0.037	0.053	<0.022	<0.050
Hardness as $CaCO_3$	mg/L	155	174	182	193	180
Alkalinity (total as $CaCO_3$)	mg/L	220	227	213	265	238
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.101	0.199	0.154	0.219	0.162
Field Data						
pH in H_20	pH	10.3	9.26	7.73	7.81	8.23
Conductivity (EC)	uS/cm	600	714	681	450.9	673

Notes:

"-" Not required under previous permit

Table 1.21: Chemical Analytical Results

Sample ID:		**Balash D.2**				
Site Number:		**21**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**21-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	112	93	130	175	148
Ammonia-N	mg/L	0.090	<0.050	0.072	0.26	0.0622
Total Kjeldahl Nitrogen	mg/L	4.39	2.75	4.86	2.69	5.08
Dissolved Organic Carbon	mg/L	32.4	29.5	35.3	56.8	36.7
Phenols	mg/L	0.0018	0.0093	<0.0010	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	29.6	53	55.8
BTEX, F1 (C6-C10) and F2(>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0177	0.0071	0.0118	0.0035	0.0069
Antimony	mg/L	0.00061	0.00024	0.0003	0.00053	0.00039
Arsenic	mg/L	0.00898	0.00575	0.0064	0.0155	0.00898
Barium	mg/L	0.114	0.0766	0.0595	0.103	0.114
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000040
Boron	mg/L	0.021	0.05	<0.010	<0.010	0.048
Cadmium	mg/L	0.0000199	<0.0000050	<0.0000050	<0.0000050	<0.000010
Chromium	mg/L	0.00014	<0.00010	0.00014	<0.00010	<0.0010
Cobalt	mg/L	0.00158	0.00056	0.00090	0.00198	0.00147
Copper	mg/L	0.00202	0.00071	0.00061	0.0025	0.00158
Iron	mg/L	0.037	0.038	0.138	0.016	<0.060
Lead	mg/L	0.00006	<0.000050	0.000061	<0.000050	<0.00010
Lithium	mg/L	0.0595	0.0419	0.0311	0.0589	0.049
Manganese	mg/L	0.00528	0.00437	0.0204	0.0227	0.286
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00298	0.000719	0.000283	0.00164	0.00129
Nickel	mg/L	0.0072	0.00398	0.00343	0.00751	0.00614
Selenium	mg/L	0.000366	0.000201	0.000239	0.000475	0.000267
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000020
Thallium	mg/L	0.000017	<0.000010	<0.000010	<0.000010	<0.000020
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020
Titanium	mg/L	0.00333	0.00134	0.00587	0.00049	<0.00060
Uranium	mg/L	0.00437	0.0021	0.00127	0.00338	0.00362
Vanadium	mg/L	0.00433	0.0018	0.00266	0.00815	0.0042
Zinc	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020
Routine Water						
Ion Balance	%	105	106	115	107	100
Bicarbonate	mg/L	429	435	472	671	494
Chloride	mg/L	304	244	311	537	393
Carbonate	mg/L	<5.0	<5.0	8.3	25.7	30.1
Conductivity (EC)	uS/cm	1710	1580	1800	2580	2410
Calcium	mg/L	46.7	69.8	61.4	86.6	105
Potassium	mg/L	28.5	22.6	37.7	47.2	39.3
Magnesium	mg/L	45.7	47.4	47.2	74.1	69.9
Sodium	mg/L	254	210	295	442	331
Sulfate	mg/L	67.1	104	57.2	92.7	300
Phosphorus	mg/L	0.654	0.755	1.50	0.72	0.928
pH in H_20	pH	8.30	8.22	8.41	8.61	8.73
TDS (Calculated)	mg/L	960	912	1050	1430	1570
Nitrate	mg/L	<0.020	<0.020	<0.020	0.031	<0.020
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	<0.022	<0.022	<0.022	0.031	<0.050
Hardness as $CaCO_3$	mg/L	305	369	348	521	550
Alkalinity (total as $CaCO_3$)	mg/L	356	357	400	593	456
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.188	0.184	0.131	0.324	0.234
Field Data						
pH in H_20	pH	10.7	9.22	8.07	8.86	8.8
Conductivity (EC)	uS/cm	1198	1960	1869	799	2470

Notes:

"-" Not required under previous permit

Table 1.22: Chemical Analytical Results

Sample ID:		**Balash D.3**				
Site Number:		**22**				
Date Sampled:	**Units**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**	**22-Oct-2021**	**19-Oct-2022**
Chem. O_2 Demand	mg/L	101	535	127	186	156
Ammonia-N	mg/L	0.055	0.075	0.059	1.32	0.109
Total Kjeldahl Nitrogen	mg/L	3.57	17.0	4.78	3.25	5.13
Dissolved Organic Carbon	mg/L	34.2	31.2	44.0	55.4	48
Phenols	mg/L	0.0012	0.0067	0.0014	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	27.4	434	32
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00030
Xylene (o)	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00040
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00050
Styrene	mg/L	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0455	0.0165	0.0065	0.641	0.0111
Antimony	mg/L	0.00029	0.00019	0.00022	0.00037	<0.00020
Arsenic	mg/L	0.00555	0.0057	0.00519	0.00704	0.00847
Barium	mg/L	0.0659	0.0437	0.0434	0.107	0.0503
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.000040
Boron	mg/L	0.031	0.033	<0.010	<0.010	<0.02
Cadmium	mg/L	0.0000172	<0.0000050	<0.0000050	0.0000152	<0.000010
Chromium	mg/L	0.00012	0.00014	0.00014	0.00078	<0.0010
Cobalt	mg/L	0.00099	0.00101	0.00050	0.00166	0.00085
Copper	mg/L	0.00118	0.00101	<0.00020	0.00283	0.00074
Iron	mg/L	0.130	0.898	0.182	1.06	<0.060
Lead	mg/L	0.00012	0.000139	<0.000050	0.000967	<0.00010
Lithium	mg/L	0.0158	0.013	0.023	0.0343	0.0267
Manganese	mg/L	0.0104	0.410	0.00827	0.288	0.0551
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00183	0.000865	0.000193	0.00154	0.000922
Nickel	mg/L	0.00364	0.00233	0.00188	0.00503	0.00269
Selenium	mg/L	0.000252	0.000201	0.000168	0.000324	0.000208
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000020
Thallium	mg/L	0.000017	<0.000010	<0.000010	<0.000010	<0.000020
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020
Titanium	mg/L	0.00854	0.00139	0.00118	0.0211	<0.00060
Uranium	mg/L	0.00247	0.000959	0.000561	0.00331	0.00175
Vanadium	mg/L	0.00229	0.0018	0.00107	0.0054	0.0032
Zinc	mg/L	<0.0010	0.0012	<0.0010	0.0074	<0.0020
Routine Water						
Ion Balance	%	110	107	117	94.7	99.6
Bicarbonate	mg/L	290	264	408	607	334
Chloride	mg/L	222	246	294	515	469
Carbonate	mg/L	<5.0	<5.0	<5.0	15.7	37.8
Conductivity (EC)	uS/cm	1190	1230	1640	2450	2350
Calcium	mg/L	37.5	45.1	53.5	81.9	70.7
Potassium	mg/L	32.8	26.0	37.1	45.5	39.4
Magnesium	mg/L	26.7	29.2	40.4	55.6	57.4
Sodium	mg/L	177	173	269	359	359
Sulfate	mg/L	20.6	37.4	43.3	93.9	244
Phosphorus	mg/L	0.283	2.55	1.28	0.334	0.840
pH in H_20	pH	8.25	7.99	8.32	8.5	9.04
TDS (Calculated)	mg/L	660	687	941	1470	1490
Nitrate	mg/L	<0.020	<0.020	<0.020	0.039	0.024
Nitrite	mg/L	<0.010	<0.010	<0.010	0.011	<0.010
Nitrate and Nitrite (as N)	mg/L	<0.022	<0.022	<0.022	0.05	<0.050
Hardness as $CaCO_3$	mg/L	204	233	300	433	413
Alkalinity (total as $CaCO_3$)	mg/L	238	217	339	524	337
Hydroxide	mg/L	<5	<5.0	<5.0	<5.0	<1.0
Fluoride	mg/L	0.113	0.028	0.117	0.279	0.189
Field Data						
pH in H_20	pH	10.5	9.67	8.01	7.84	9.33
Conductivity (EC)	uS/cm	1274	1545	1687	849.1	2430

Notes:

"-" Not required under previous permit

Table 2: Duplicate 1 Chemical Analytical Results

		Sample ID:	EWERT D.3			
		Site Number:	EWERT D.3	DUPLICATE 1	% RPD	Pass/ Fail (>20%)
		Date Sampled:	19-Oct-2022	19-Oct-2022		
Parameter	**Units**	**RDL**				
Chem. O_2 Demand	mg/L	10	164	159	-	Pass
Ammonia-N	mg/L	0.05	0.073	0.0969	-	Pass
Total Kjeldahl Nitrogen	mg/L	0.2	4.87	4.79	-	Pass
Dissolved Organic Carbon	mg/L	1	45.9	47.8	4%	Pass
Phenols	mg/L	0.001	<0.0010	<0.0010	-	Pass
Total Suspended Solids (TSS)	mg/L	3	37.8	35.2	7%	Pass
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	0.0005	<0.00050	<0.00050	-	Pass
Toluene	mg/L	0.0005	<0.00050	<0.00050	-	Pass
Ethylbenzene	mg/L	0.0005	<0.00050	<0.00050	-	Pass
Xylenes (m & p)	mg/L	0.0005	<0.00030	<0.00030	-	Pass
Xylene (o)	mg/L	0.0005	<0.00040	<0.00040	-	Pass
Xylenes	mg/L	0.00071	<0.00050	<0.00050	-	Pass
Styrene	mg/L	0.0005	<0.00050	<0.00050	-	Pass
F1 (C_6-C_{10})	mg/L	0.1	<0.10	<0.10	-	Pass
F1 (C_6-C_{10}) - BTEX	mg/L	0.1	<0.10	<0.10	-	Pass
F2 - (C_{10}-C_{16})	mg/L	0.1	<0.10	<0.10	-	Pass
Dissolved Metals						
Aluminium	mg/L	0.001	0.0111	0.0103	7%	Pass
Antimony	mg/L	0.0001	0.00016	0.00015	-	Pass
Arsenic	mg/L	0.0001	0.00691	0.00701	1%	Pass
Barium	mg/L	0.0001	0.0208	0.0215	3%	Pass
Beryllium	mg/L	0.0001	<0.000020	<0.000020	-	Pass
Boron	mg/L	0.01	0.039	0.034	-	Pass
Cadmium	mg/L	0.000005	<0.0000050	<0.0000050	-	Pass
Chromium	mg/L	0.0001	<0.00050	<0.00050	-	Pass
Cobalt	mg/L	0.0001	0.00106	0.00106	0%	Pass
Copper	mg/L	0.0002	0.00091	0.00087	4%	Pass
Iron	mg/L	0.01	0.586	0.637	8%	Pass
Lead	mg/L	0.00005	0.000136	0.000149	9%	Pass
Lithium	mg/L	0.001	0.0116	0.0115	0.9%	Pass
Manganese	mg/L	0.0001	0.146	0.15400	5%	Pass
Mercury	mg/L	0.000005	<0.000005	<0.0000050	-	Pass
Molybdenum	mg/L	0.00005	0.000938	0.000895	5%	Pass
Nickel	mg/L	0.0005	0.00468	0.00467	0%	Pass
Selenium	mg/L	0.00005	0.000277	0.000304	9%	Pass
silver	mg/L	0.00001	<0.000010	<0.000010	-	Pass
Thallium	mg/L	0.00001	<0.000010	<0.000010	-	Pass
Tin	mg/L	0.0001	<0.00010	<0.00010	-	Pass
Titanium	mg/L	0.0003	0.00124	0.00124	0%	Pass
Uranium	mg/L	0.00001	0.000332	0.000324	2%	Pass
Vanadium	mg/L	0.0005	0.0029	0.00295	2%	Pass
Zinc	mg/L	0.001	0.0012	0.0021	-	Pass
Routine Water						
Bicarbonate	mg/L	5	291	292	0%	Pass
Chloride	mg/L	0.5	68	69.1	2%	Pass
Carbonate	mg/L	5	2.5	2.9	-	Pass
Conductivity (EC)	uS/cm	2	696	692	1%	Pass
Calcium	mg/L	0.5	20.7	21.7	5%	Pass
Potassium	mg/L	0.5	18.9	19.6	4%	Pass
Magnesium	mg/L	0.1	10.9	10.5	4%	Pass
Sodium	mg/L	1	124	124	0%	Pass
Sulfate	mg/L	0.3	17.2	17.8	3%	Pass
Phosphorus	mg/L	0.05	1.46	1.44	1%	Pass
pH in H_20	pH	0.1	8.38	8.41	0%	Pass
TDS (Calculated)	mg/L	10	457	462	1%	Pass
Nitrate	mg/L	0.02	<0.020	<0.020	-	Pass
Nitrite	mg/L	0.01	<0.010	<0.010	-	Pass
Nitrate and Nitrite (as N)	mg/L	0.022	<0.050	<0.050	-	Pass
Hardness as $CaCO_3$	mg/L	N/A	96.6	97.4	1%	Pass
Alkalinity (total as $CaCO_3$)	mg/L	2	243	244.0	0%	Pass
Hydroxide	mg/L	5	<1.0	<1.0	-	Pass
Fluoride	mg/L	0.02	0.249	0.27	8%	Pass

Notes:
RDL - Reportable detection limit
RPD - Relative Percentage Difference calculated as RPD(%)=(|V1-V2|)/[(V1+V2)/2])*100 where V1,V2 = concentrations of parent and duplicate sample, respectively.
"-" Indicates RPD not calculated. RPDs have only been calculated where a concentration is greater than 5 times the RDL
N/A - Not applicable
Shaded- RPD value greater than 20%

Table 3: Duplicate 2 Chemical Analytical Results

		Sample ID:	BALASH D.2			
		Site Number:	BALASH D.2	DUPLICATE 2	% RPD	Pass/ Fail (>20%)
		Date Sampled:	19-Oct-2022	19-Oct-2022		
Parameter	**Units**	**RDL**				
Chem. O_2 Demand	mg/L	10	148	152	3%	Pass
Ammonia-N	mg/L	0.005	0.0622	0.06	9%	Pass
Total Kjeldahl Nitrogen	mg/L	0.2	5.08	5.39	6%	Pass
Dissolved Organic Carbon	mg/L	0.5	36.7	38.4	5%	Pass
Phenols	mg/L	0.001	<0.0010	<0.0010	-	Pass
Total Suspended Solids (TSS)	mg/L	3	55.8	52.6	6%	Pass
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	0.0005	<0.00050	<0.00050	-	Pass
Toluene	mg/L	0.0005	<0.00050	<0.00050	-	Pass
Ethylbenzene	mg/L	0.0005	<0.00050	<0.00050	-	Pass
Xylenes (m & p)	mg/L	0.0003	<0.00030	<0.00030	-	Pass
Xylene (o)	mg/L	0.0004	<0.00040	<0.00040	-	Pass
Xylenes	mg/L	0.0005	<0.00050	<0.00050	-	Pass
Styrene	mg/L	0.0005	<0.00050	<0.00050	-	Pass
F1 (C_6-C_{10})	mg/L	0.1	<0.10	<0.10	-	Pass
F1 (C_6-C_{10}) - BTEX	mg/L	0.1	<0.10	<0.10	-	Pass
F2 - (C_{10}-C_{16})	mg/L	0.1	<0.10	<0.10	-	Pass
Dissolved Metals						
Aluminium	mg/L	0.001	0.0069	0.0099	36%	Fail
Antimony	mg/L	0.0001	0.00039	0.00037	5%	Pass
Arsenic	mg/L	0.0001	0.00898	0.00888	1%	Pass
Barium	mg/L	0.0001	0.114	0.112	2%	Pass
Beryllium	mg/L	0.00002	<0.000040	<0.000040	-	Pass
Boron	mg/L	0.01	0.048	0.049	2%	Pass
Cadmium	mg/L	0.000005	<0.000010	<0.000010	-	Pass
Chromium	mg/L	0.0005	<0.0010	<0.0010	-	Pass
Cobalt	mg/L	0.0001	0.00147	0.00144	2%	Pass
Copper	mg/L	0.0002	0.00158	0.00123	25%	Fail
Iron	mg/L	0.03	<0.060	<0.060	-	Pass
Lead	mg/L	0.00005	<0.00010	<0.00010	-	Pass
Lithium	mg/L	0.001	0.049	0.0505	3%	Pass
Manganese	mg/L	0.005	0.286	0.304	6%	Pass
Mercury	mg/L	0.000005	<0.000005	<0.0000050	-	Pass
Molybdenum	mg/L	0.00005	0.00129	0.00123	5%	Pass
Nickel	mg/L	0.0005	0.00614	0.00544	12%	Pass
Selenium	mg/L	0.00005	0.000267	0.000328	21%	Fail
Silver	mg/L	0.00001	<0.000020	<0.000020	-	Pass
Thallium	mg/L	0.00001	<0.000020	<0.000020	-	Pass
Tin	mg/L	0.0001	<0.00020	<0.00020	-	Pass
Titanium	mg/L	0.0003	<0.00060	<0.00060	-	Pass
Uranium	mg/L	0.00001	0.00362	0.00369	2%	Pass
Vanadium	mg/L	0.0005	0.0042	0.00431	3%	Pass
Zinc	mg/L	0.001	<0.0020	<0.0020	-	Pass
Routine Water						
Bicarbonate	mg/L	1	494	524	6%	Pass
Chloride	mg/L	0.5	393	396	1%	Pass
Carbonate	mg/L	1	30.1	31.7	5%	Pass
Conductivity (EC)	uS/cm	2	2410	2450	2%	Pass
Calcium	mg/L	0.05	105	106	1%	Pass
Potassium	mg/L	0.05	39.3	39.1	1%	Pass
Magnesium	mg/L	0.005	69.9	70.1	0%	Pass
Sodium	mg/L	0.05	331	333	1%	Pass
Sulfate	mg/L	0.3	300	299	0%	Pass
Phosphorus	mg/L	0.05	0.928	0.916	1%	Pass
pH in H_20	pH	0.1	8.73	8.73	0%	Pass
TDS (Calculated)	mg/L	1	1570	1590	1%	Pass
Nitrate	mg/L	0.02	<0.020	<0.10	-	Pass
Nitrite	mg/L	0.01	<0.010	<0.050	-	Pass
Nitrate and Nitrite (as N)	mg/L	0.05	<0.050	<0.112	-	Pass
Hardness as $CaCO_3$	mg/L	0.5	550	553	1%	Pass
Alkalinity (total as $CaCO_3$)	mg/L	2	456	482	6%	Pass
Hydroxide	mg/L	1	<1.0	<1.0	-	Pass
Fluoride	mg/L	0.02	0.23	0.464	66%	Fail

Notes:
RDL - Reportable detection limit
RPD - Relative Percentage Difference calculated as RPD(%)=(|V1-V2|)/[(V1+V2)/2])*100 where V1,V2 = concentrations of parent and duplicate sample, respectively.
"-" Indicates RPD not calculated. RPDs have only been calculated where a concentration is greater than 5 times the RDL
N/A - Not applicable
Shaded- RPD value greater than 20%

Table 4: Historical and 2022 Precipitation Data - Total Precipitation (mm)

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total Annual
1996	23	16	18	32.3	29.4	91.8	119.5	106.6	98.8	16.6	68.2	32.2	**652.4**
1997	11.1	12	24.5	27.7	50.7	143.3	52.3	71.4	96.6	31.6	7.2	4.5	**532.9**
1998	23	0	12.4	35.2	32.8	99.6	73	32.8	53.8	16.4	17.8	30	**426.8**
1999	64	4	19	19.6	64.8	21.6	123.8	60.8	11.4	9.4	14.6	12	**425**
2000	17.5	5	32	24	55.3	73.7	118	32.8	56.6	1	6.5	10	**432.4**
2001	1	5.8	6.5	0.8	55.2	94.2	260.2	8.4	37.4	23.4	34.5	6	**533.4**
2002	6	3.5	26	29.4	11.6	35.8	40	70	15.2	39.7	12	3	**292.2**
2003	39.7	19	20	46.9	64.3	110	80.8	40.8	27.2	23	19	8	**498.7**
2004	30.5	4	43	22.8	57.5	37.3	131.4	67.3	44.8	31.2	0	34.3	**504.1**
2005	10	5	35.5	18.6	43.6	95.3	82.8	59.3	24.4	18	3	14	**409.5**
2006	6	33	40	7.2	72.4	54.3	52.8	47.6	90.2	39.2	45	19.8	**507.5**
2007	7	23	5	46.9	51.5	78.8	59	59.1	9	5.8	9.6	27	**381.7**
2008	20.5	9	13.5	63.6	39	64.9	70.9	27.8	41.2	2.8	9	35	**397.2**
2009	22	9	24	32.7	7.6	20.6	67.6	19.2	5.8	31.1	8.6	41.5	**289.7**
2010	17	4	5	70.8	70	73.2	109	41.8	43.6	8.7	14	34	**491.1**
2011	69	20.5	8	14.4	6.8	146.6	113.4	61	12.4	14.8	19.2	16	**502.1**
2012	9	21.5	23	46.6	64.2	58.8	152.4	93.2	24.7	33.4	43	52	**621.8**
2013	39.5	10.5	31	17	23.9	96.6	101.4	71.6	4	9.8	61	41.5	**507.8**
2014	8.7	10.2	5.8	75.8	42.3	98.4	120.1	13.9	34.1	10.8	42.4	5.5	**468**
2015	19.8	24.9	31.3	16.5	37.3	59.7	108.6	10.3	71.1	22.7	17.4	3.5	**423.1**
2016	26.3	7.6	15.6	7.4	104	64.6	77.3	38.4	10.5	31.4	12.7	12	**407.8**
2017	10.2	1.9	5.9	45.9	56.5	32.4	44.5	41.3	27.1	25.2	2.4	5.7	**299**
2018	20.3	14.3	18.4	24.3	42.4	75.0	85.2	59.5	39.4	18.0	17.1	17.3	**431.2**
2019	26.8	18.6	7.1	29.6	49	155.8	153.7	31	43.7	27.3	25.3	11.1	**579**
2020	23.6	33	18.8	6	93.5	121.4	121.9	68.4	4.9	14.7	45.5	4.9	**556.6**
2021	10.8	12.2	7.3	13.2	65.5	38.9	25.3	63.5	22.4	9.1	21.1	39.2	**328.5**
2022	39.1	14.8	39.2	30	29	109.3	35	34.4	10.6	6.5	32.4	19.6	**399.9**
Mean	**22.3**	**12.7**	**19.8**	**29.8**	**48.9**	**79.7**	**95.6**	**49.3**	**36.6**	**19.3**	**22.2**	**20.0**	**457.7**

1. Denotes - Based on Incomplete Data so annual total is not reliable.
2. Data collected from Elk Island National Park Station (2014-2015, 2019-2022), Holden AGDM Stations (2016-2018) and Tofield North (1996-2013)
3. Link to 1996-2013, 2014-2015, 2019-2022 Data: http://climate.weather.gc.ca/historical_data/search_historic_data_e.html
4. Link to 2016-2018 data: http://agriculture.alberta.ca/acis/alberta-weather-data-viewer.jsp

FIGURES

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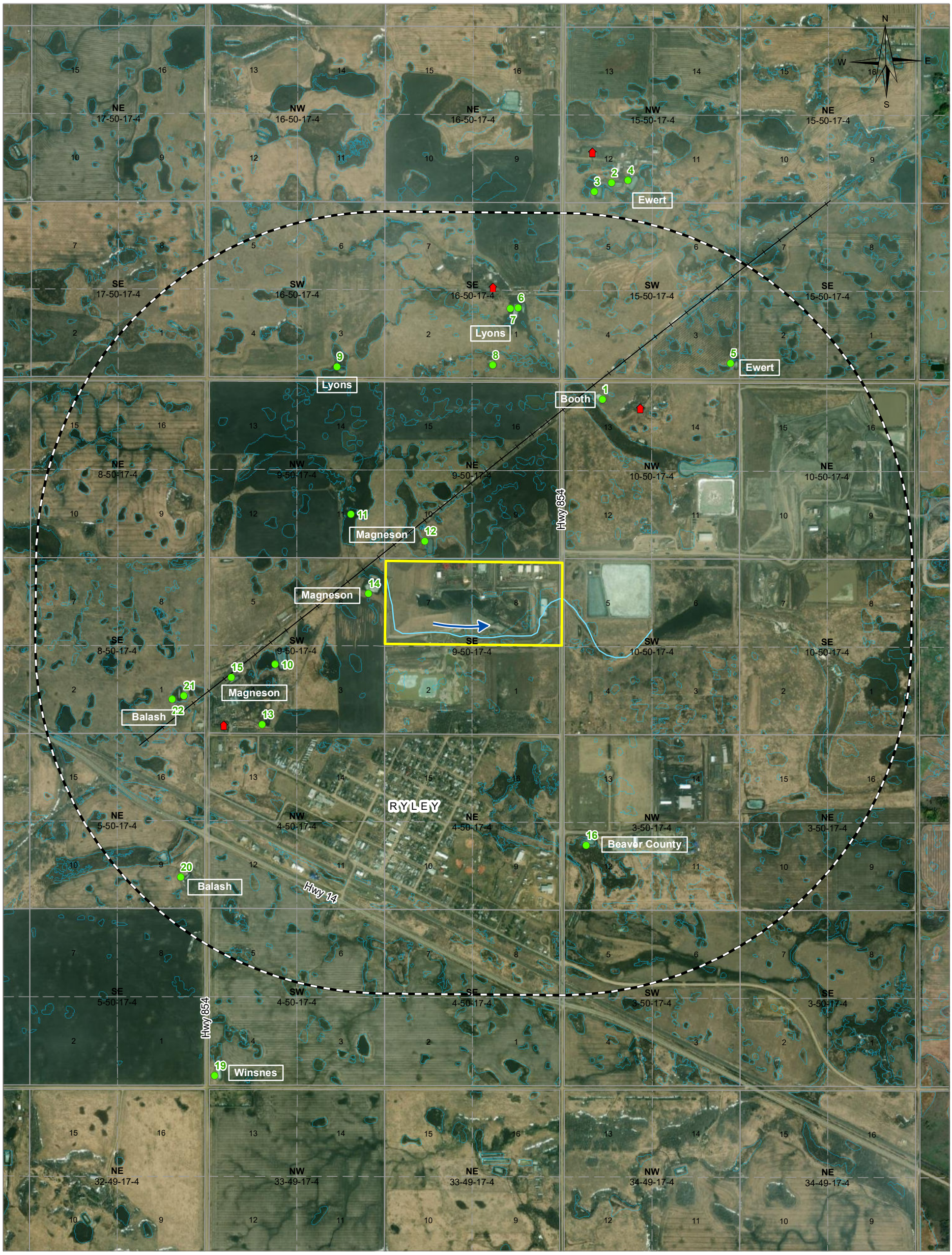


LEGEND

- Rural Residence
- Water Sample Location
- Site Outline
- 1.6 km Buffer
- Abandoned Railway Bed (Approximate Centreline)
- Bible Creek (Approximate Centreline)
- Bible Creek Flow Direction
- Potential Wetland

NOTES
Base data source: ESRI, CanVec (50,000) & ESRD
Imagery provided by ESRI; Maxar (2017)

STATUS
ISSUED FOR USE

2022 DUGOUT SAMPLING PROGRAM
CLASS 1 WASTE MANAGEMENT FACILITY
RYLEY, AB

Dugout Sampling Location Plan

PROJECTION	DATUM	CLIENT
UTM Zone 12	NAD83	CleanHarbors

Scale: 1:17,000
300 150 0 300
Metres

TETRA TECH

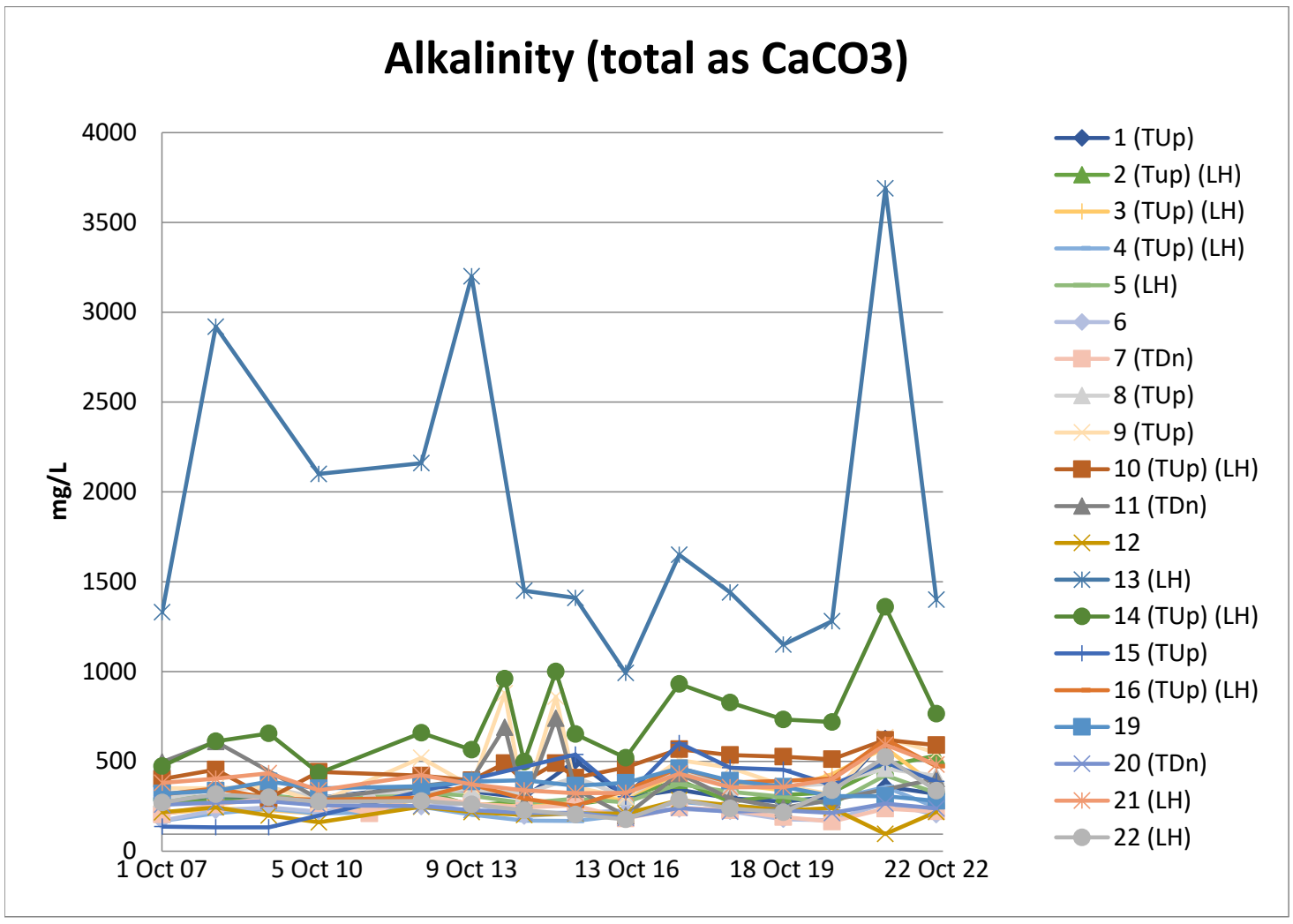
FILE NO. SWOP04592-01_Fig01_SamplingPlan.mxd

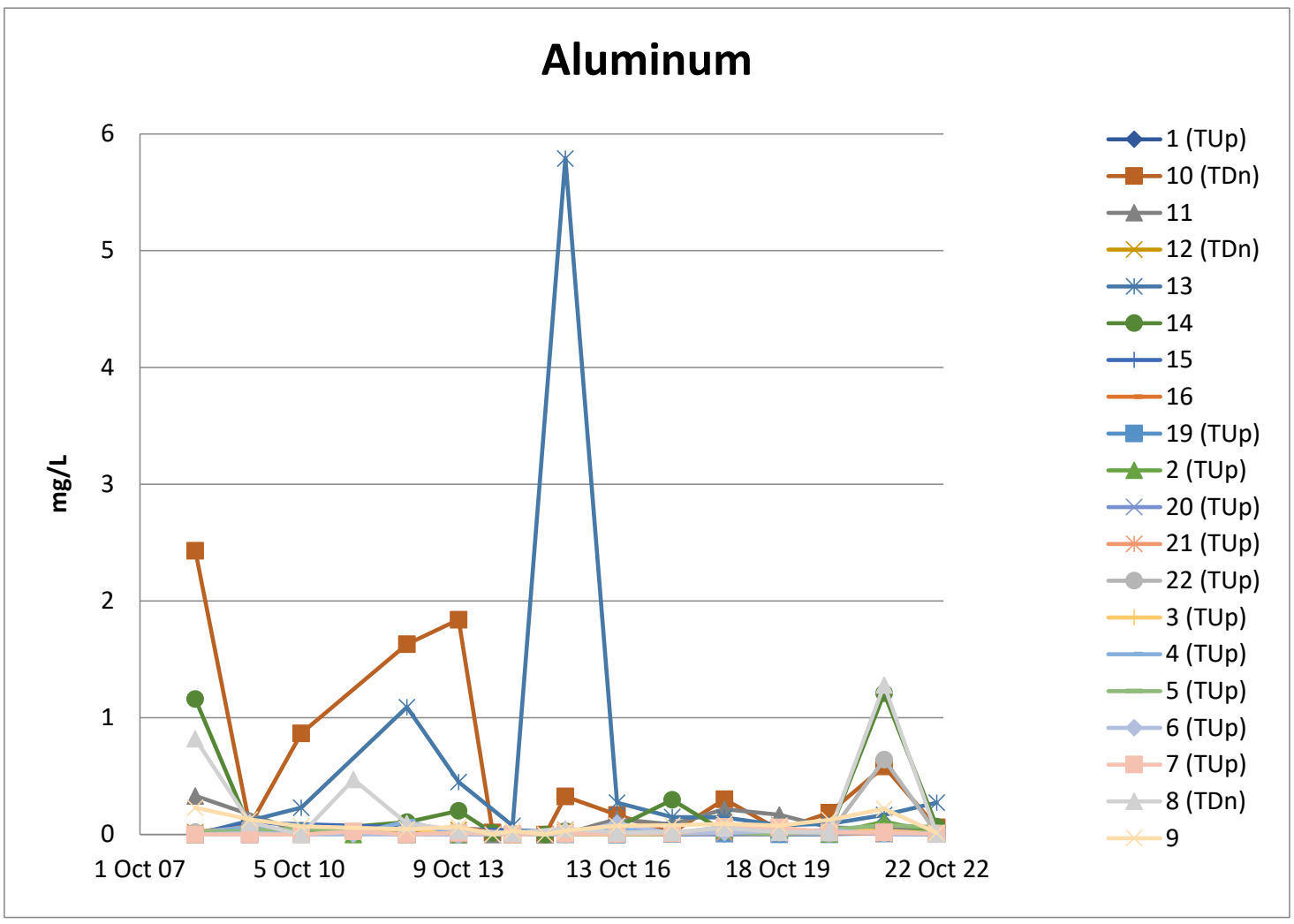
OFFICE	DWN	CKD	APVD	REV
Tt-EDM	DS	SL	BF	0

DATE	PROJECT NO.
January 11, 2023	SWM.SWOP04592-01

Figure 1

Figure 2: Trend Charts





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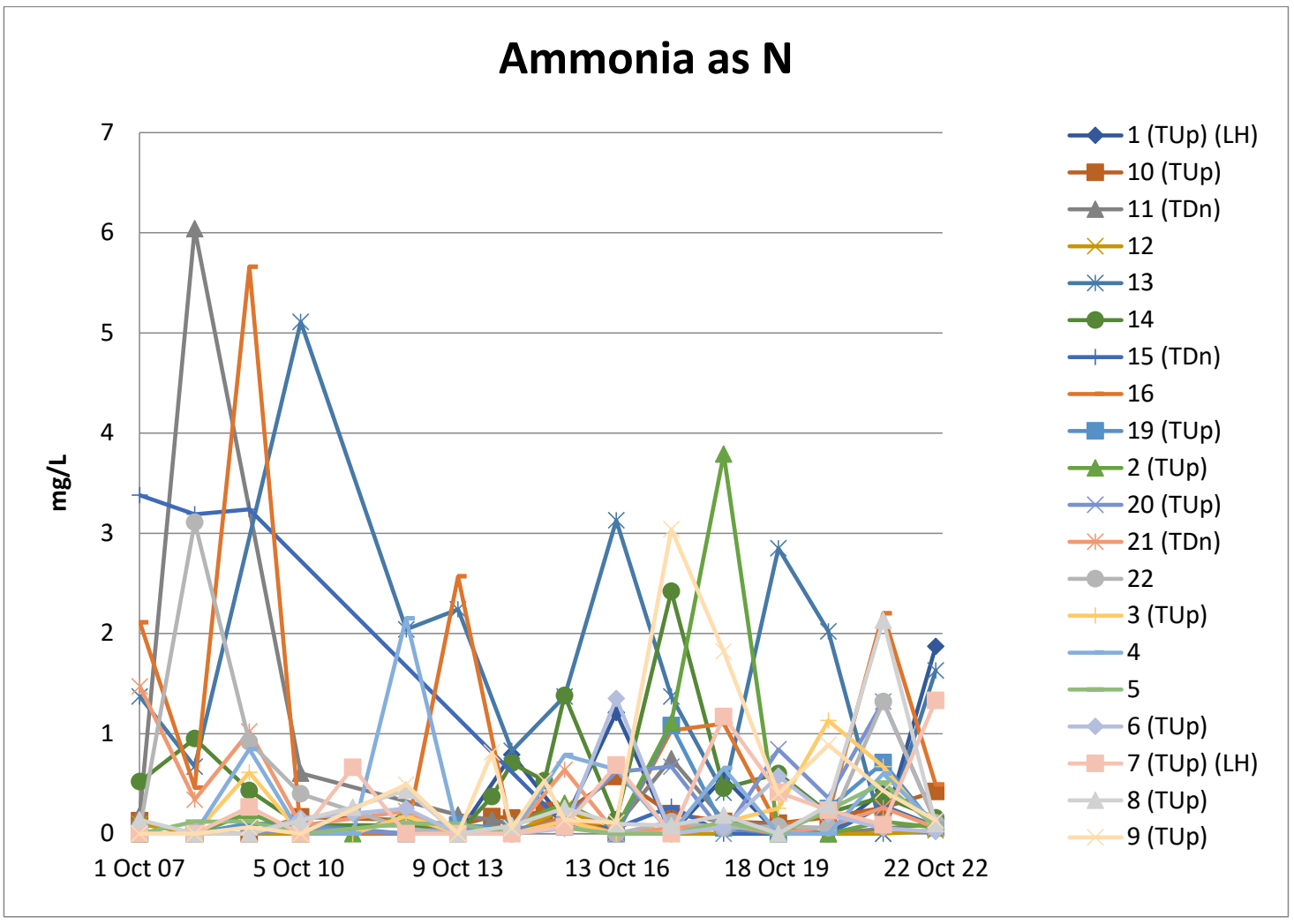

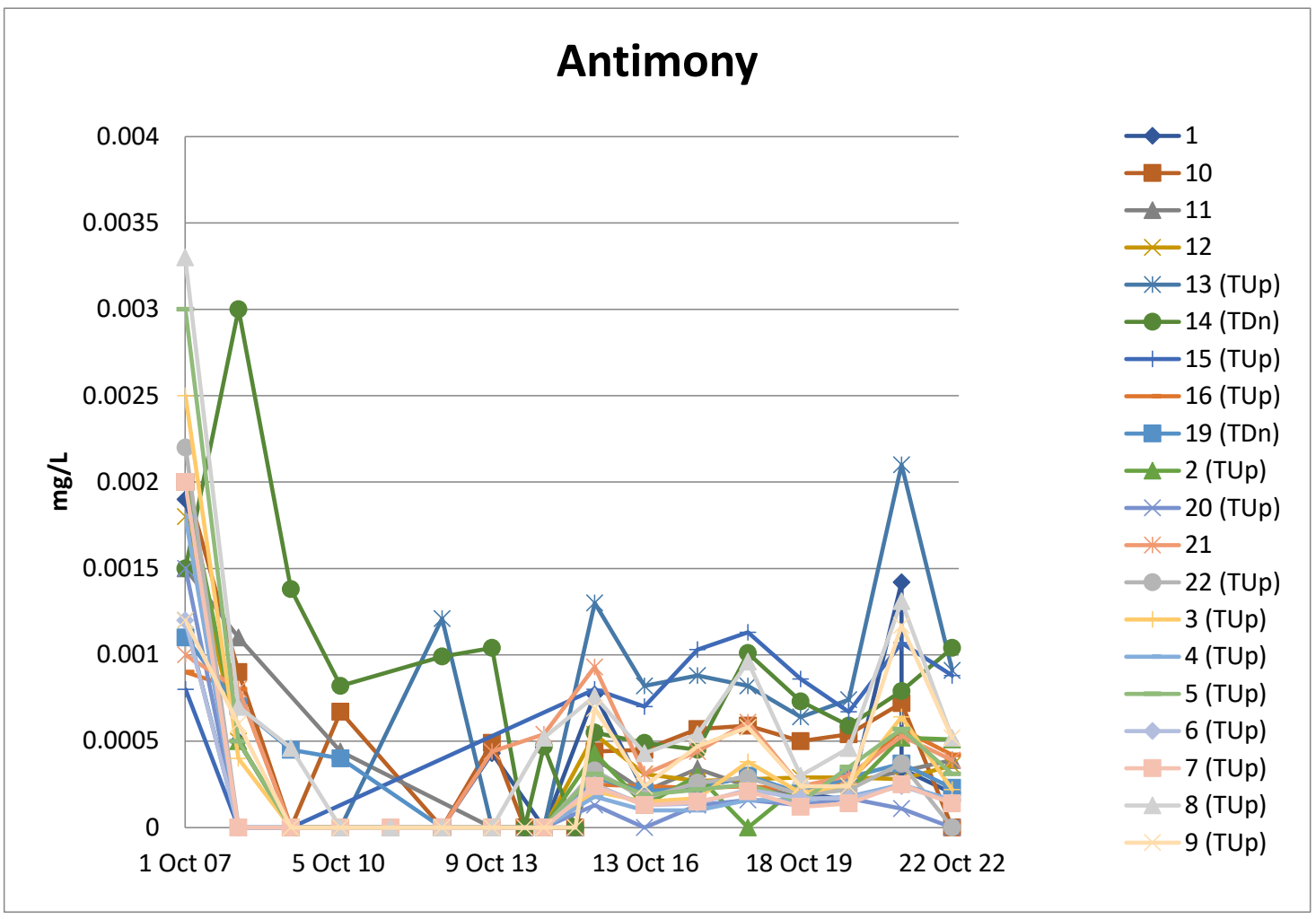

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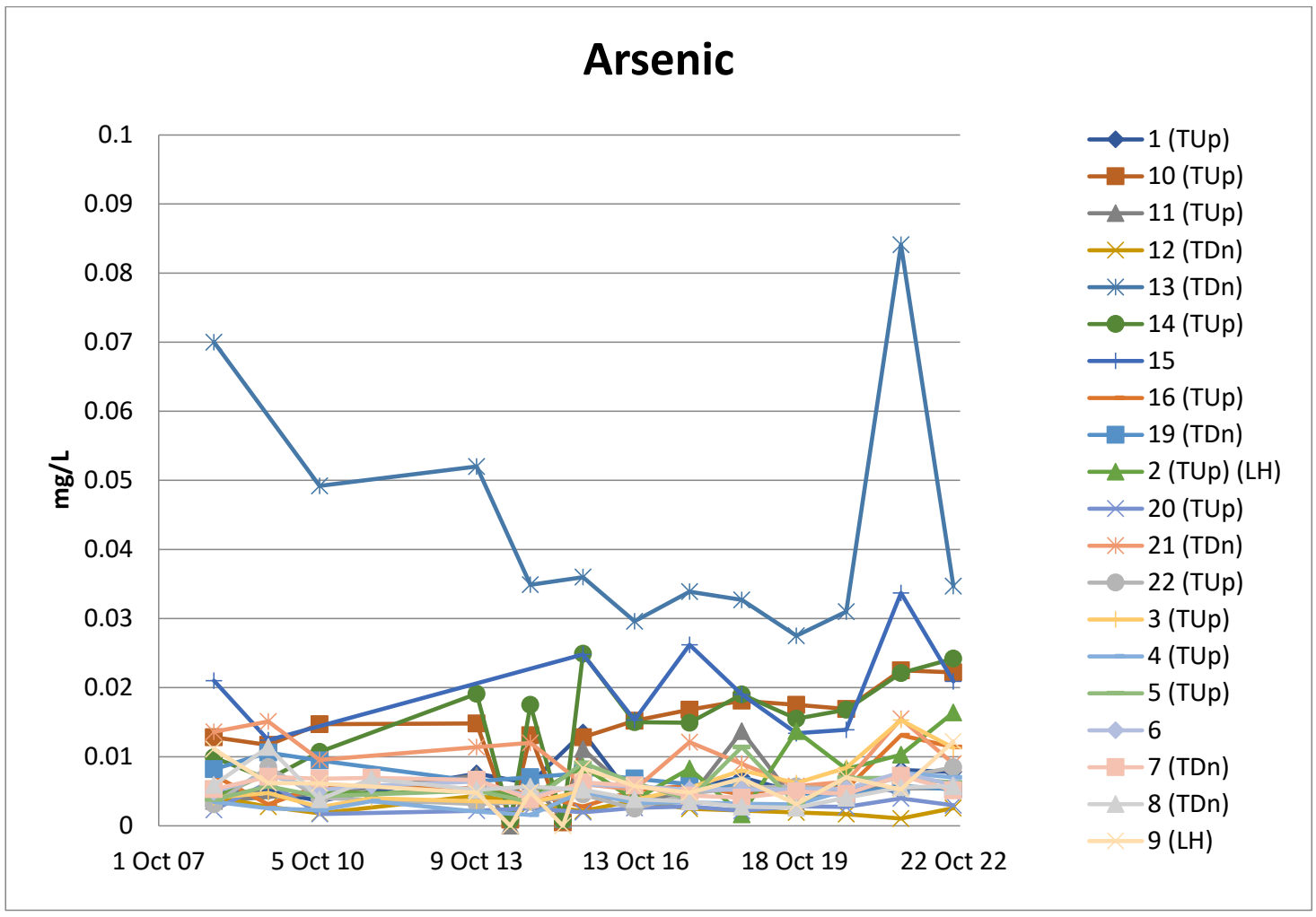

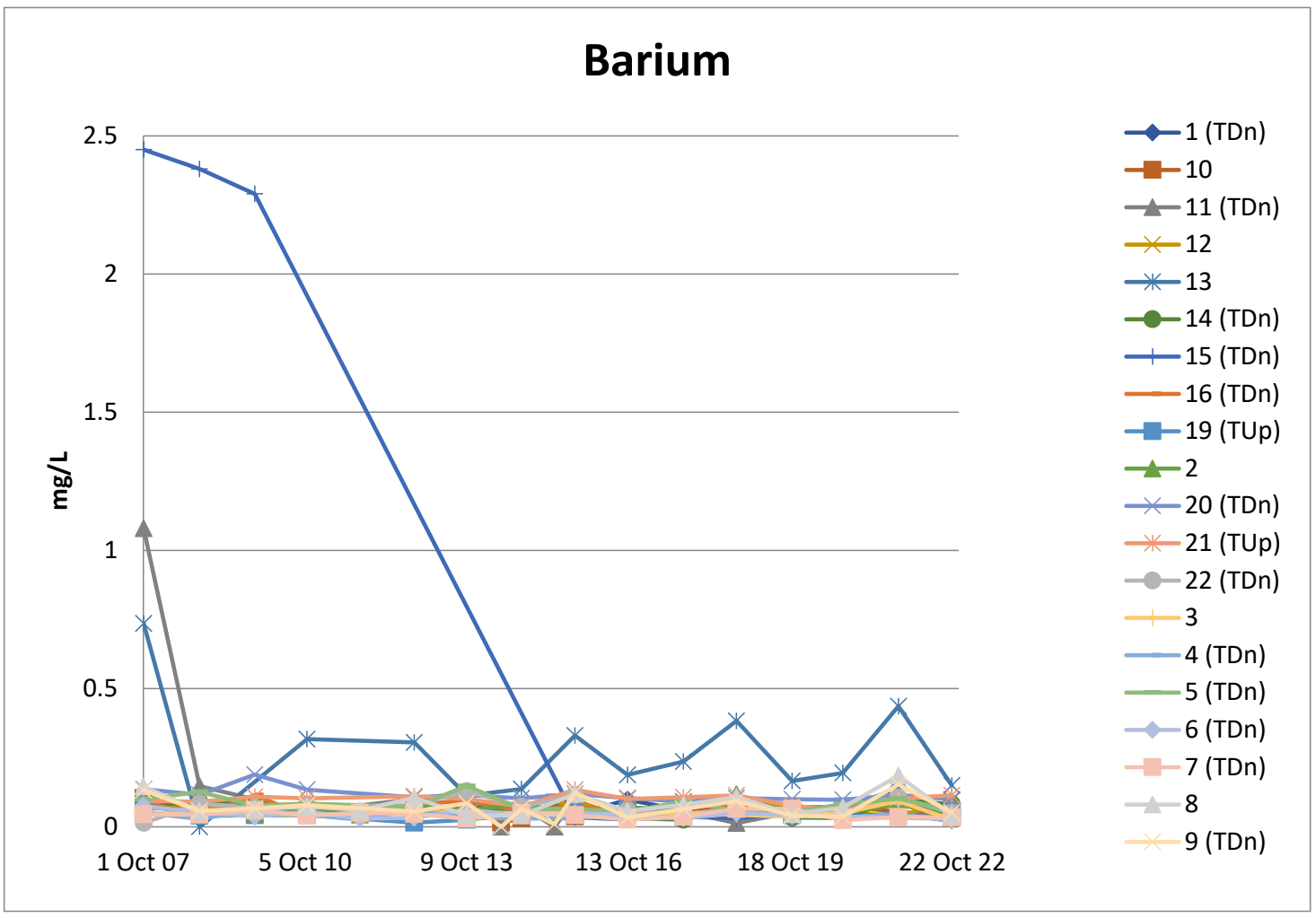

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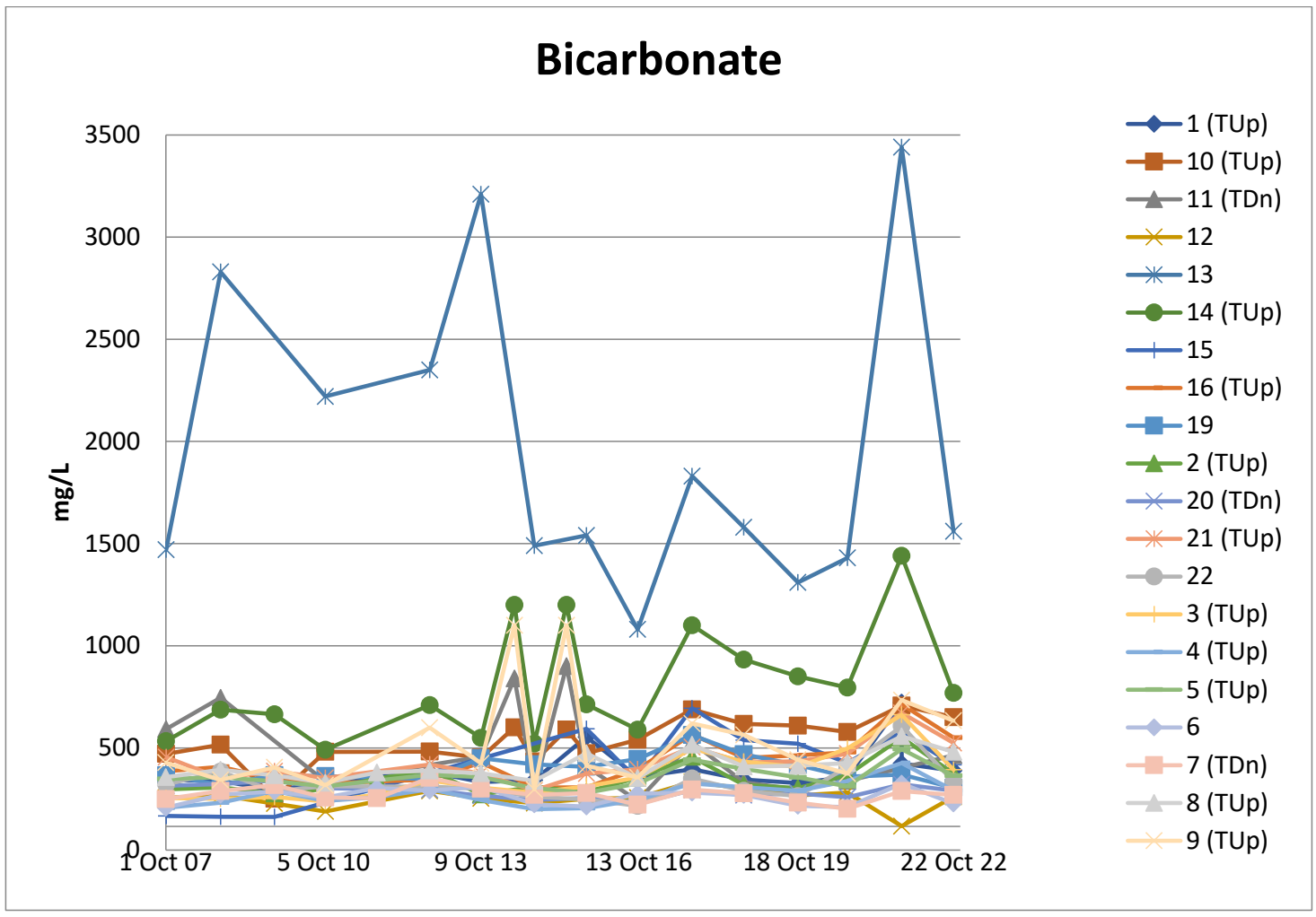

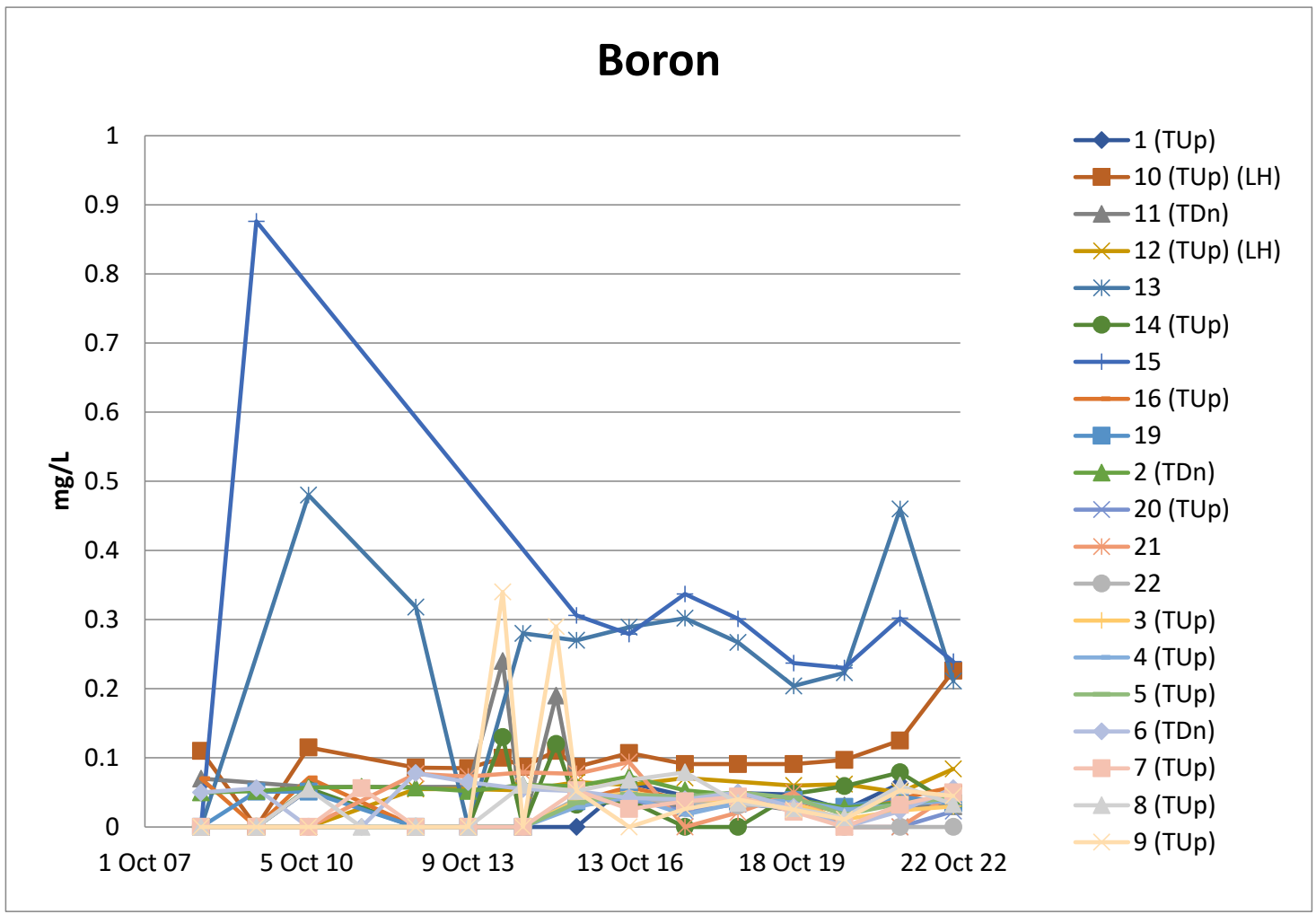

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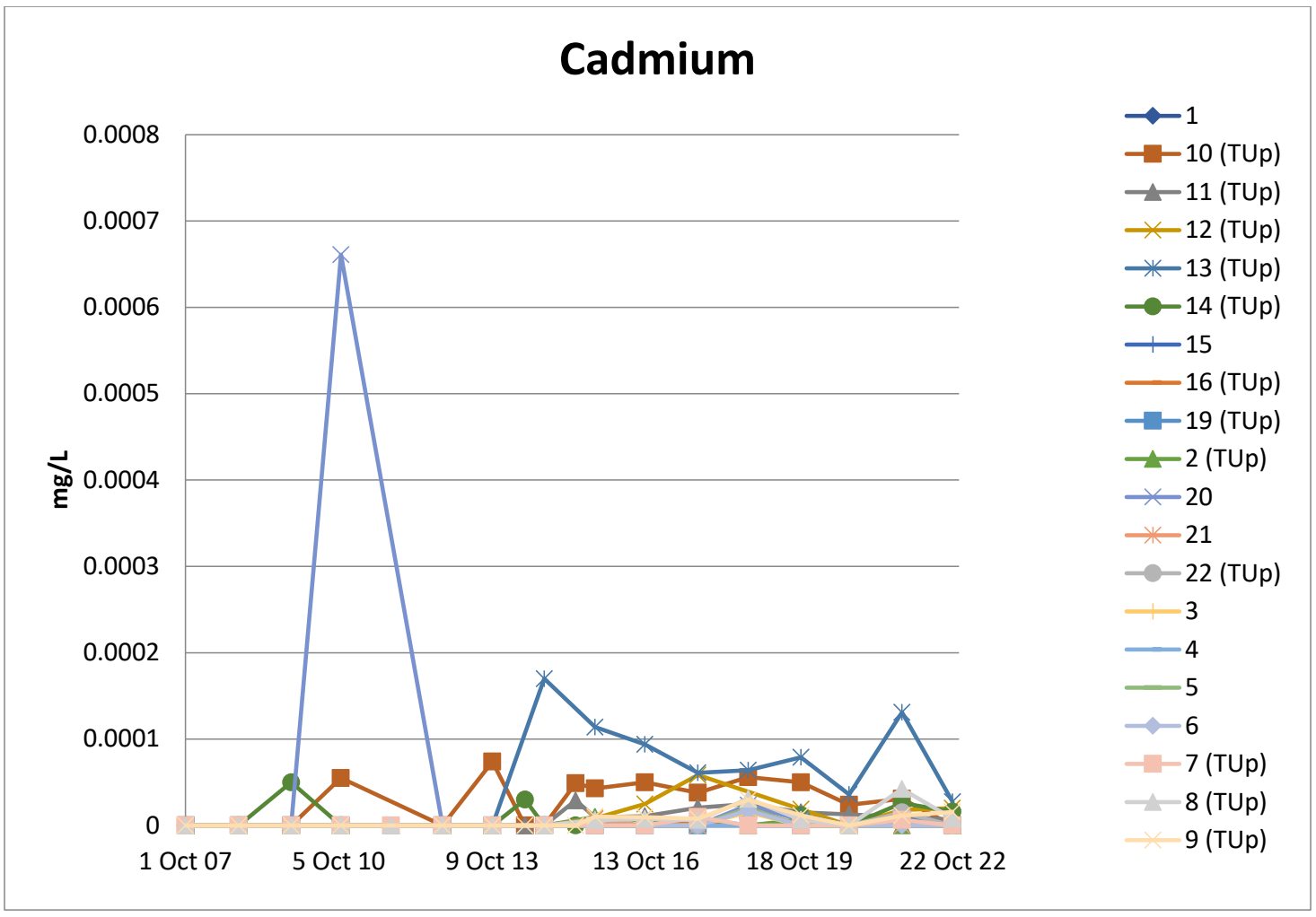

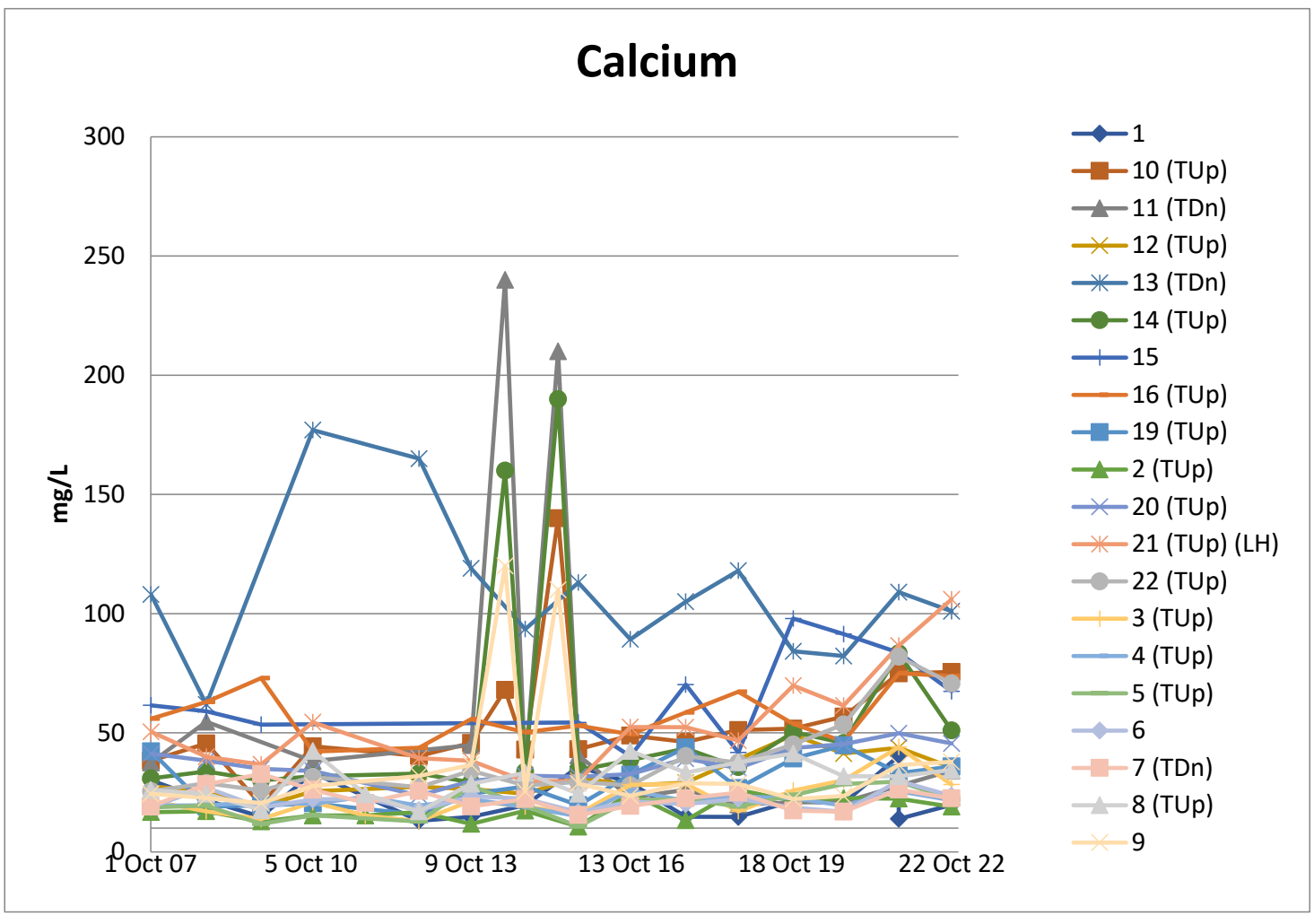

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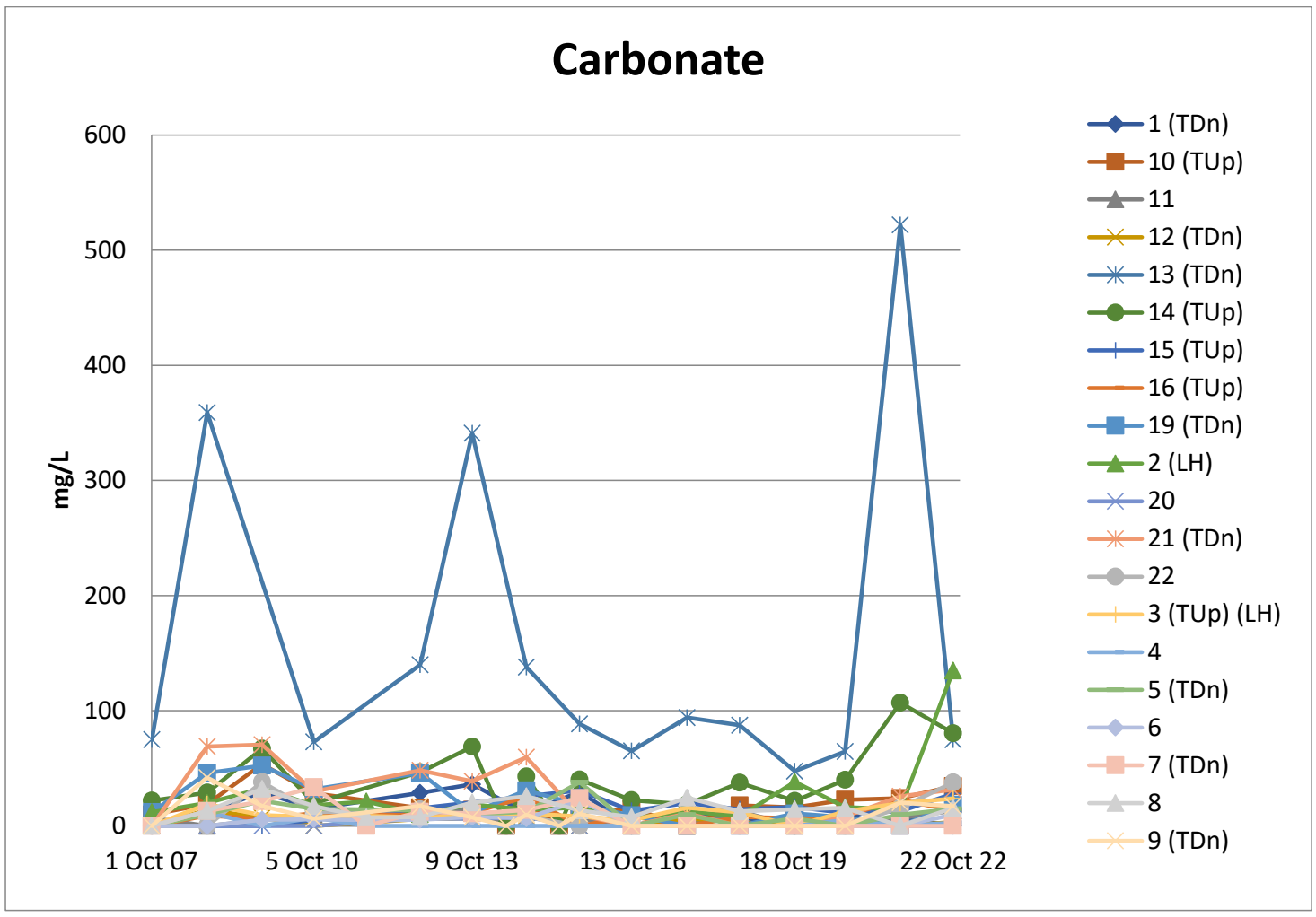

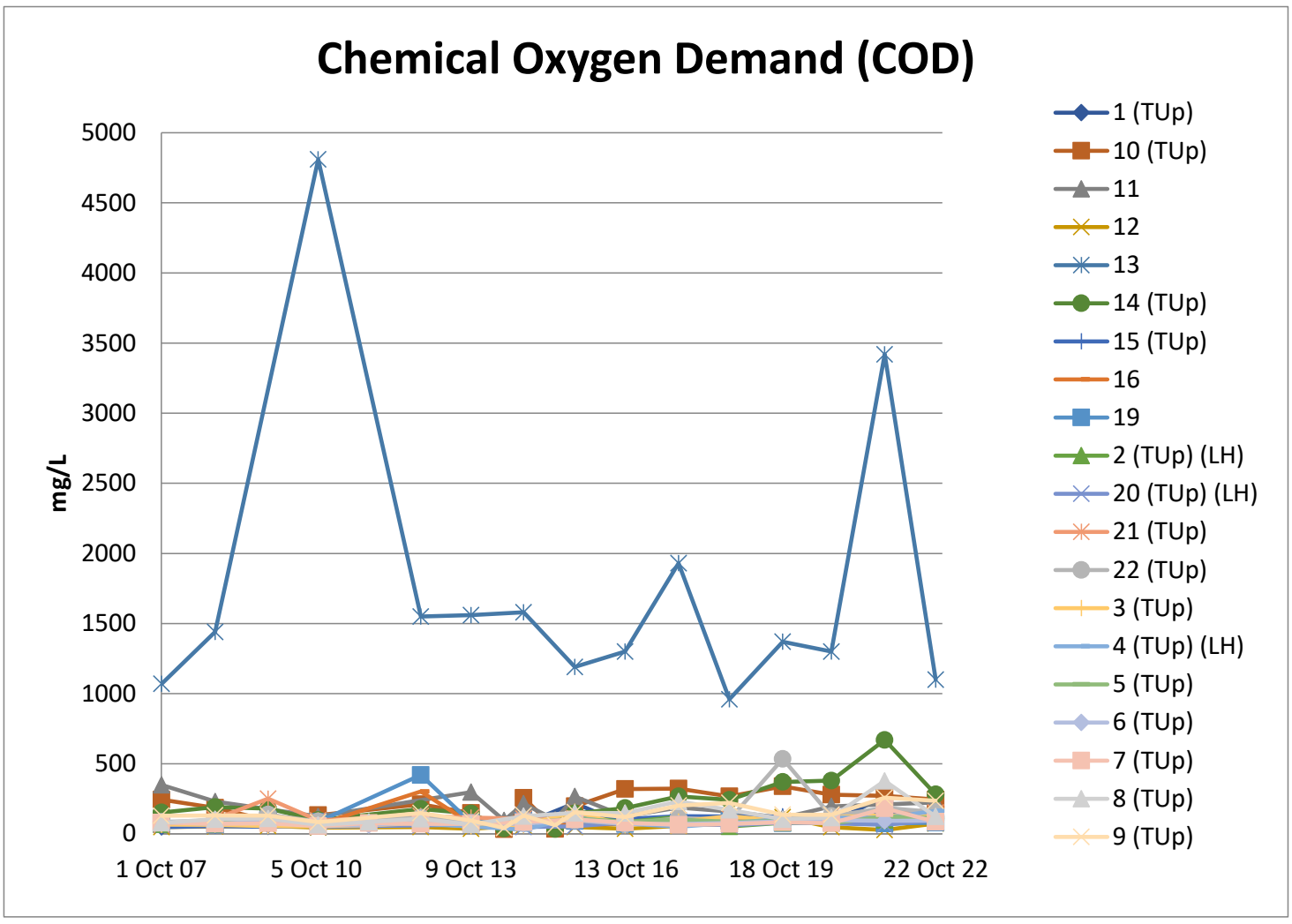

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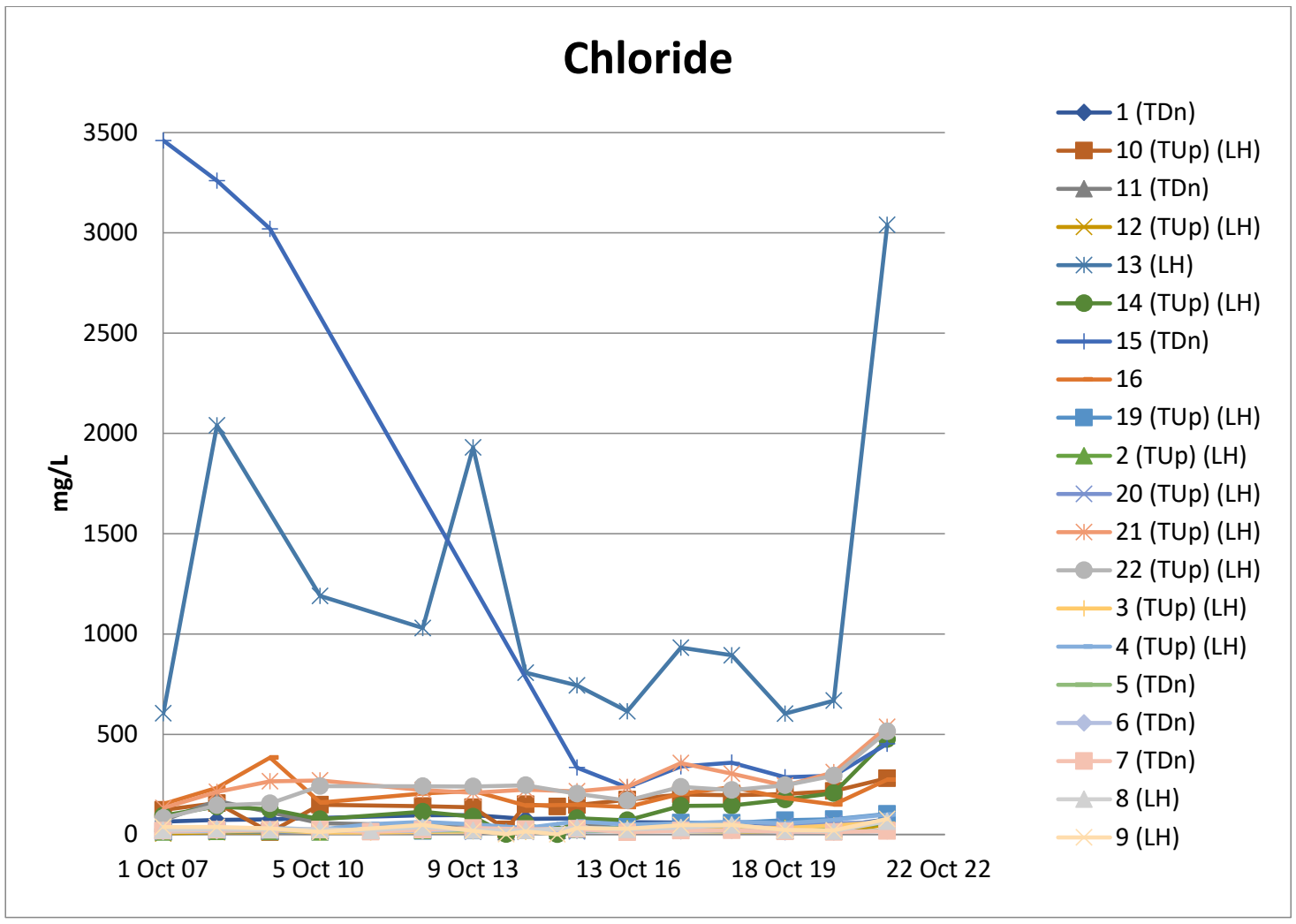

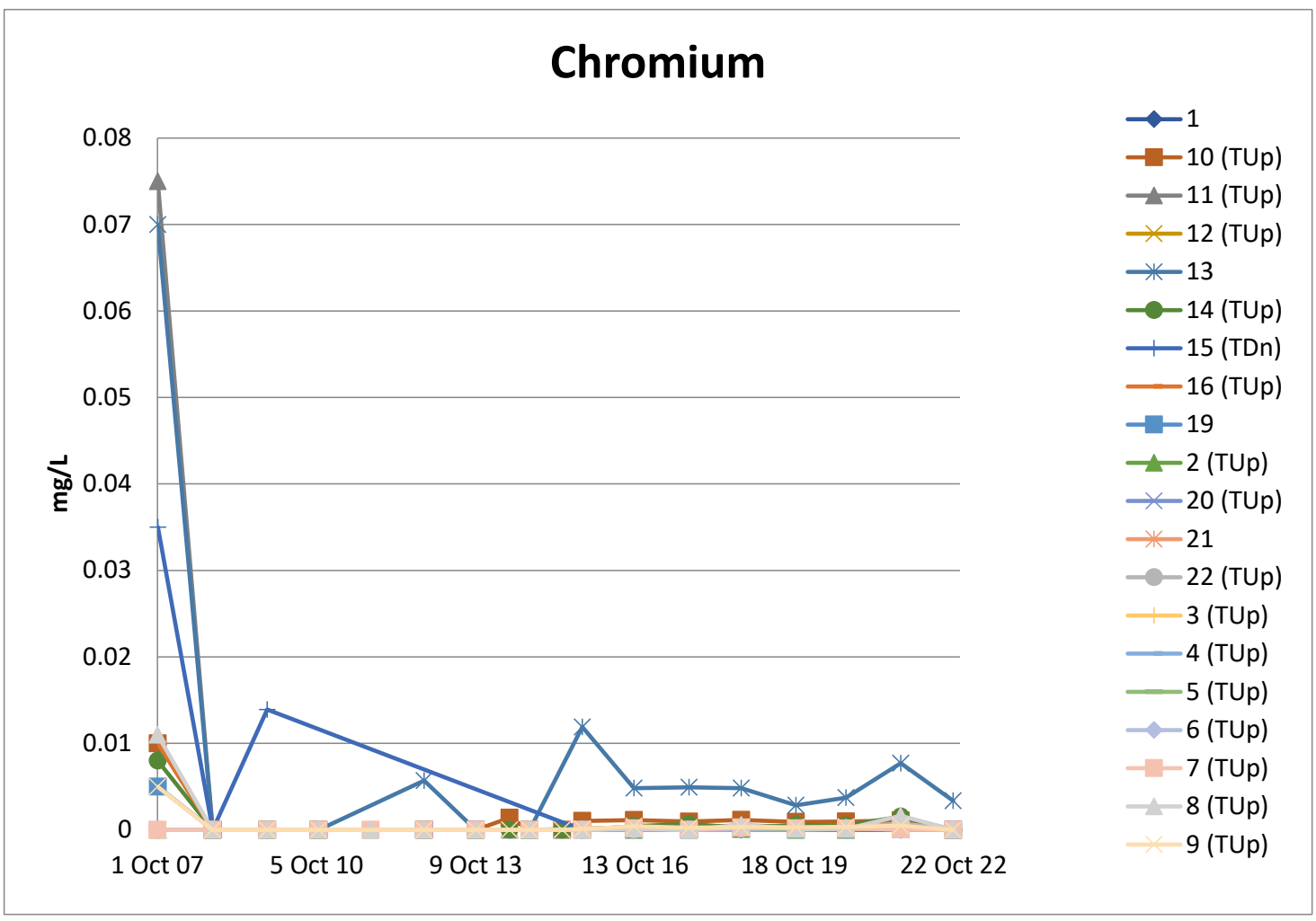

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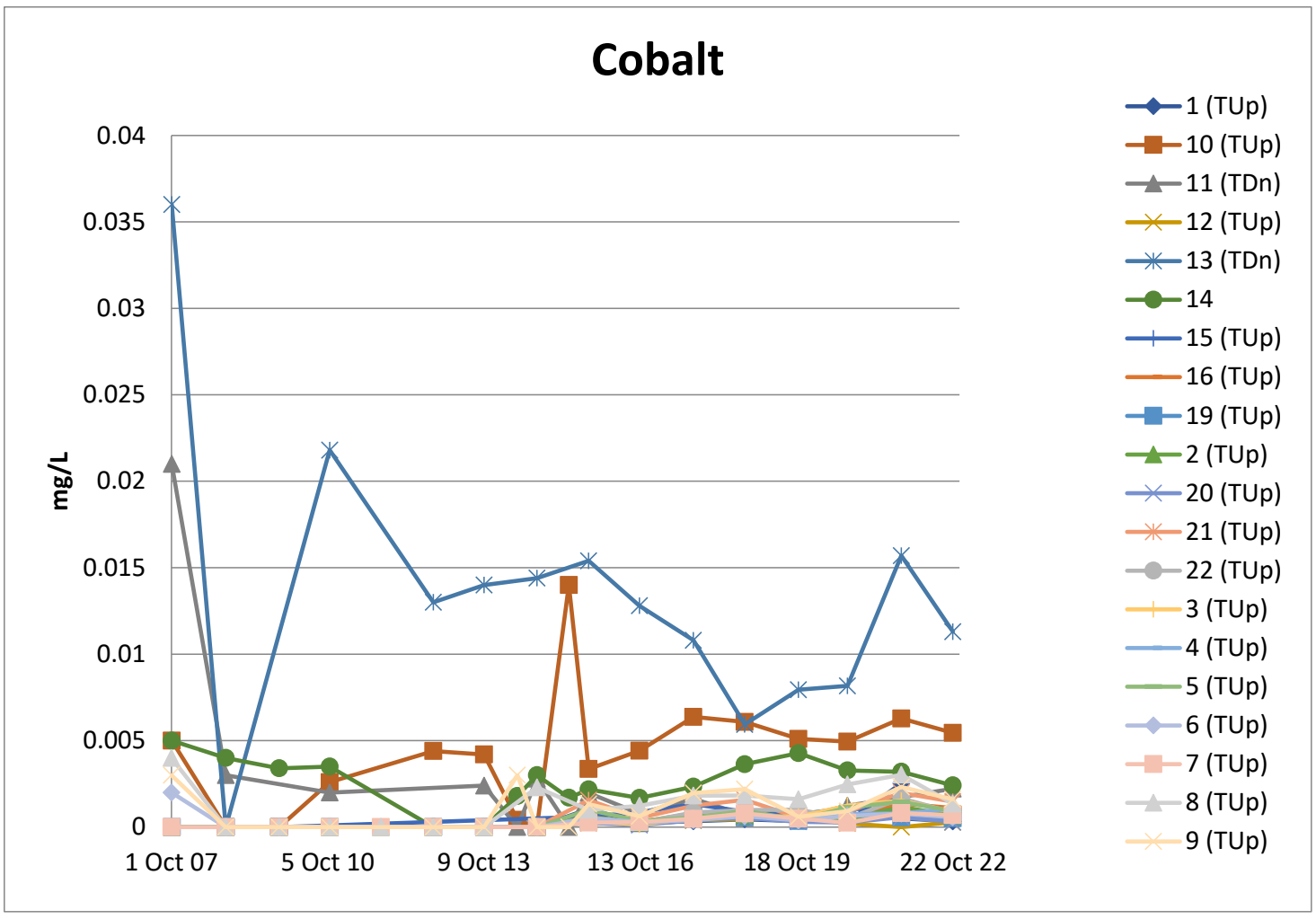

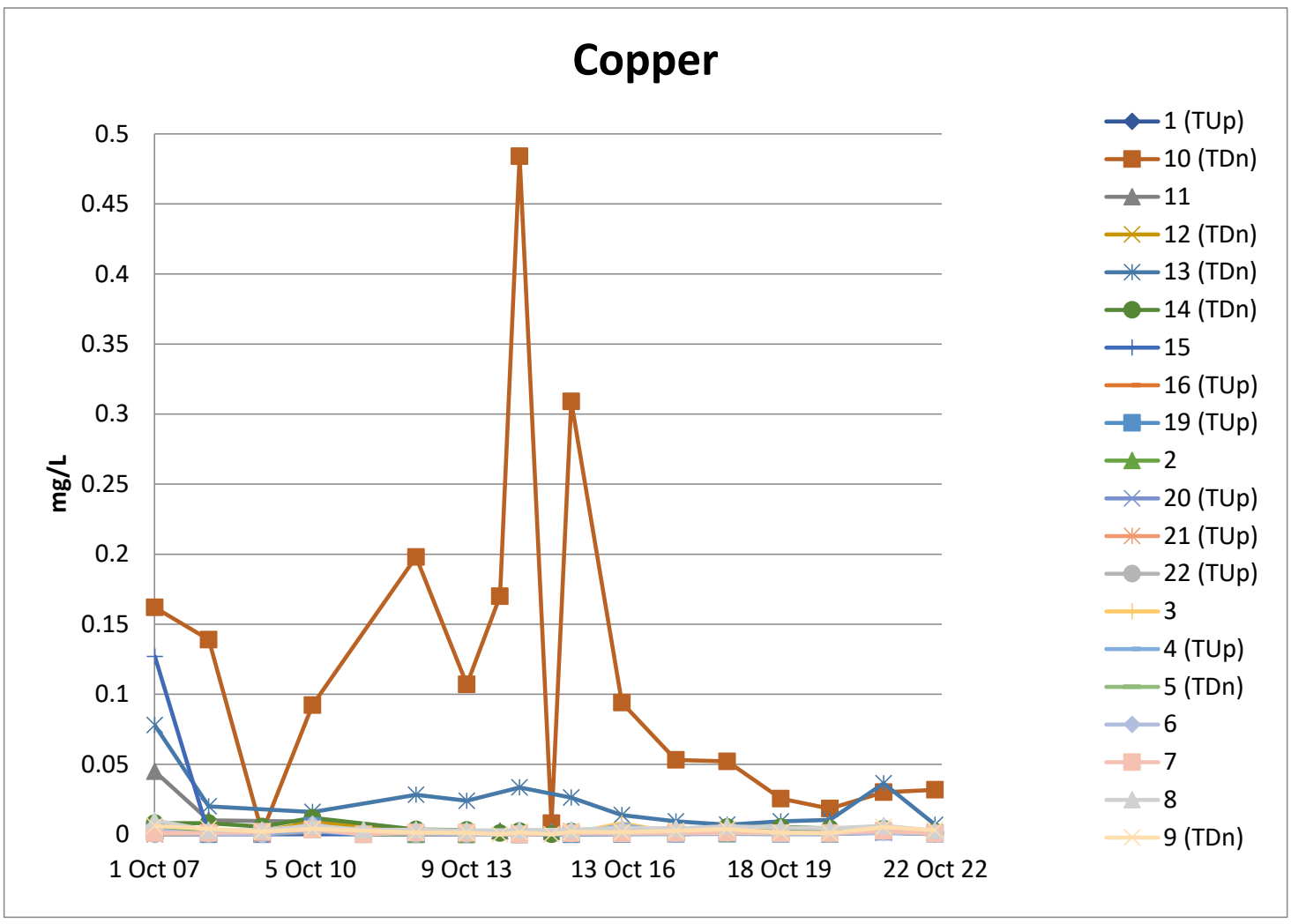

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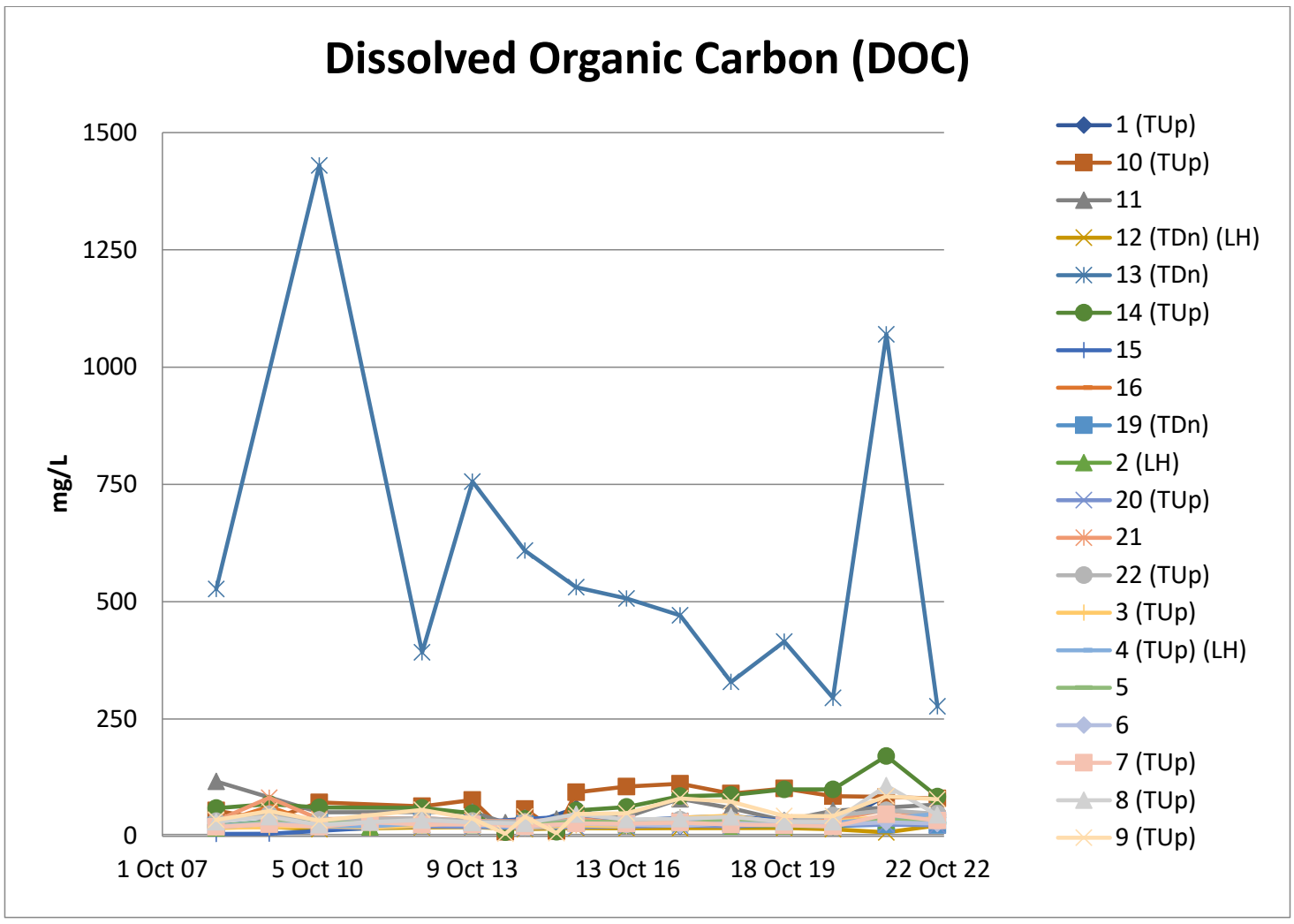

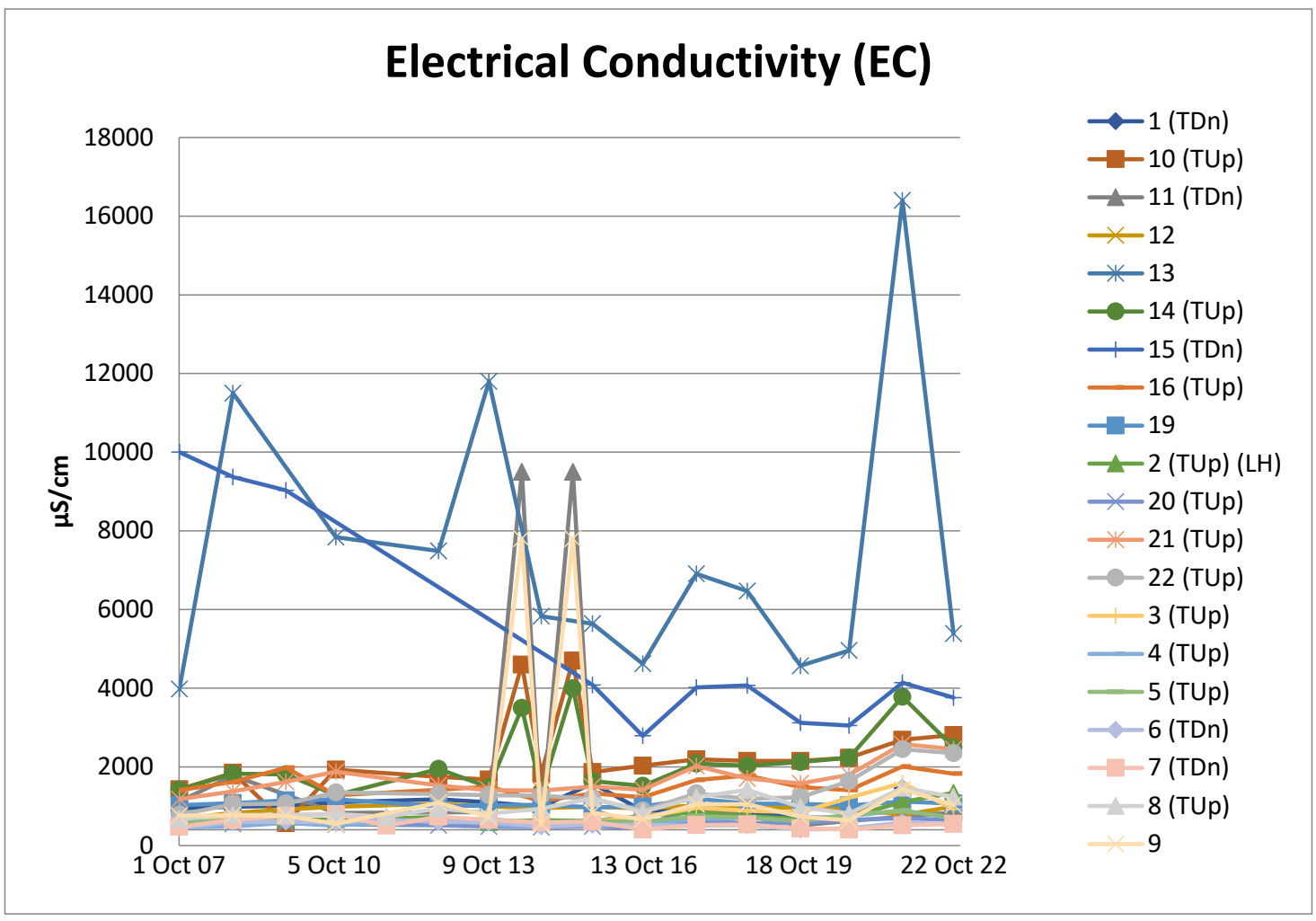

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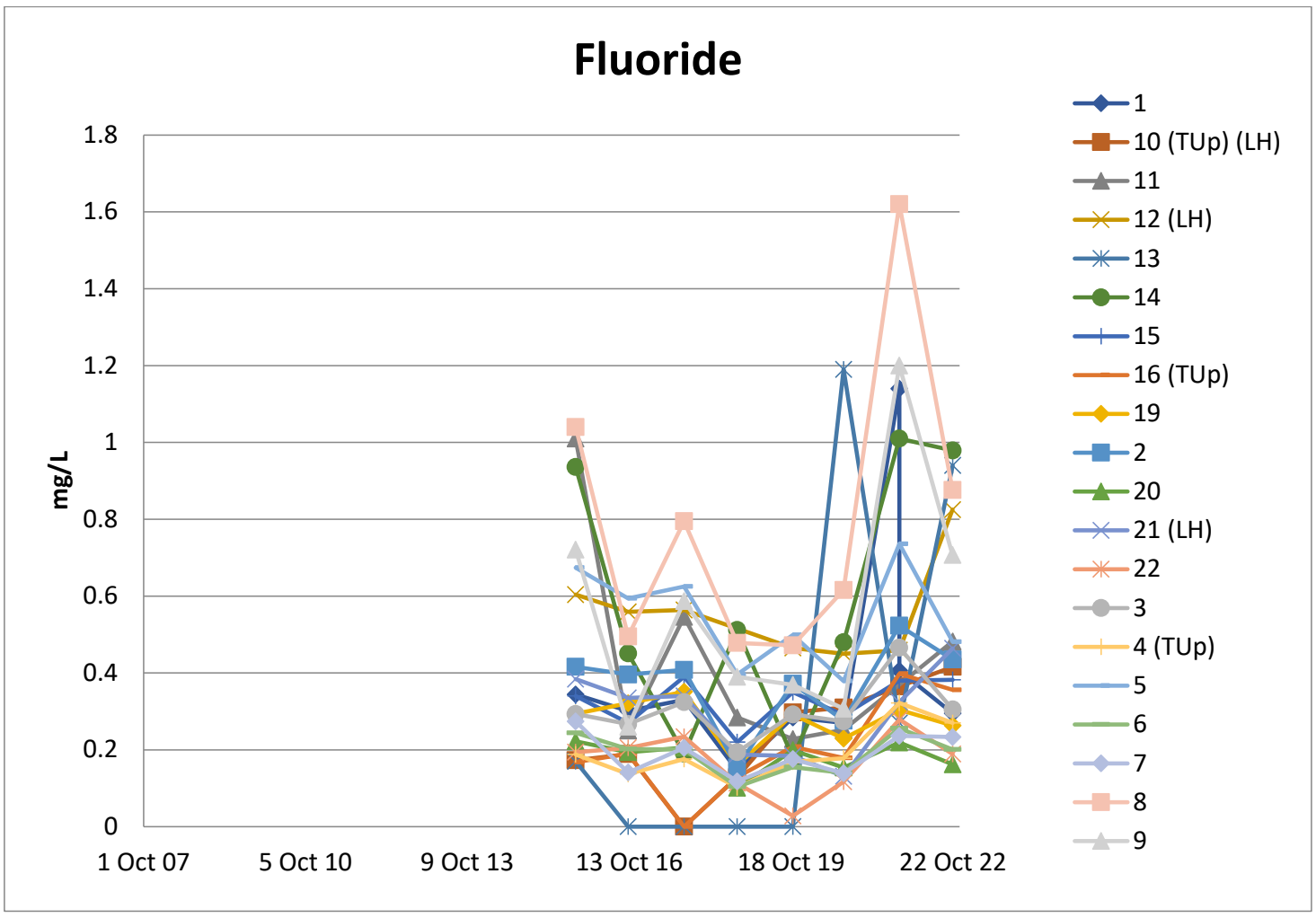

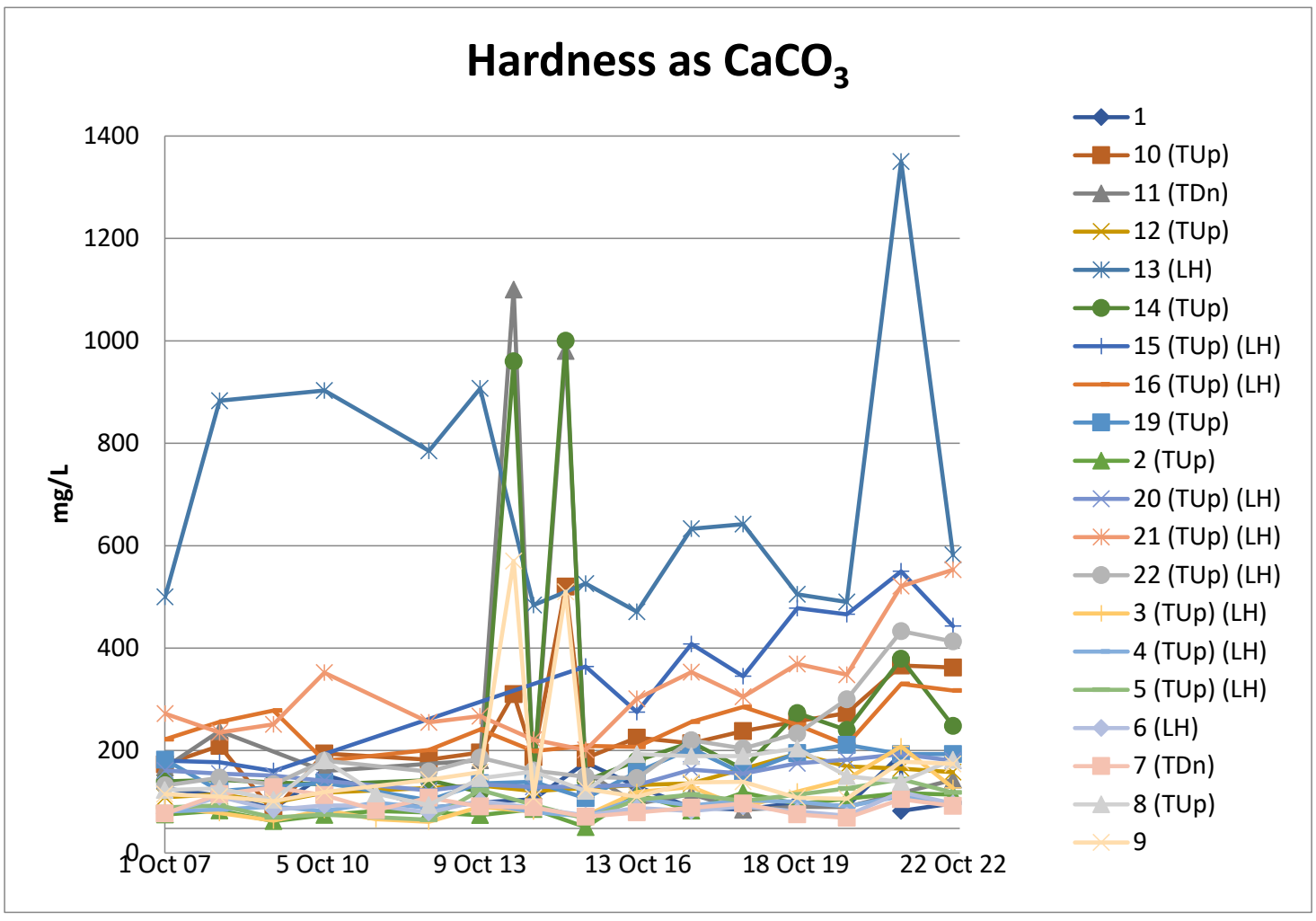

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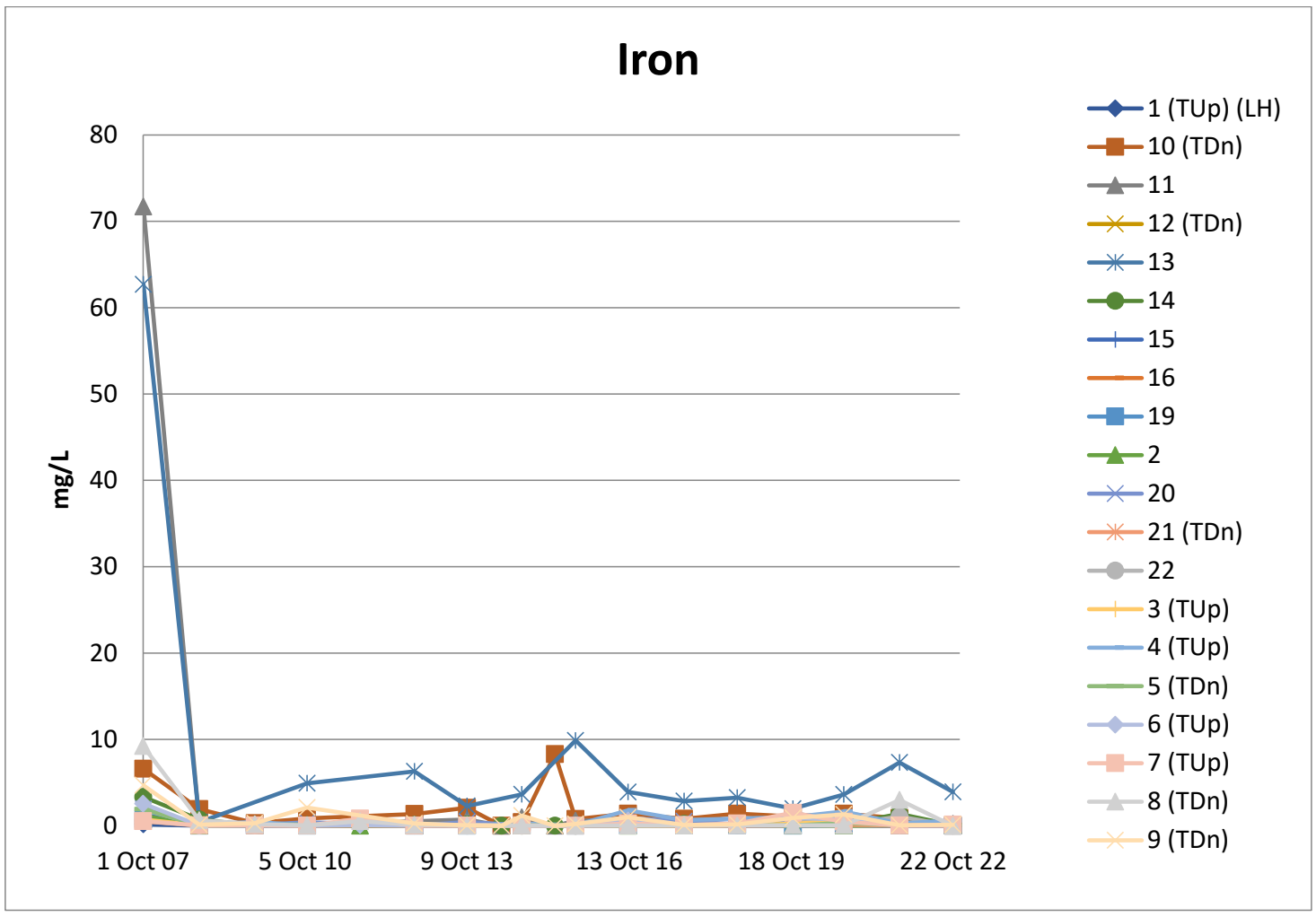

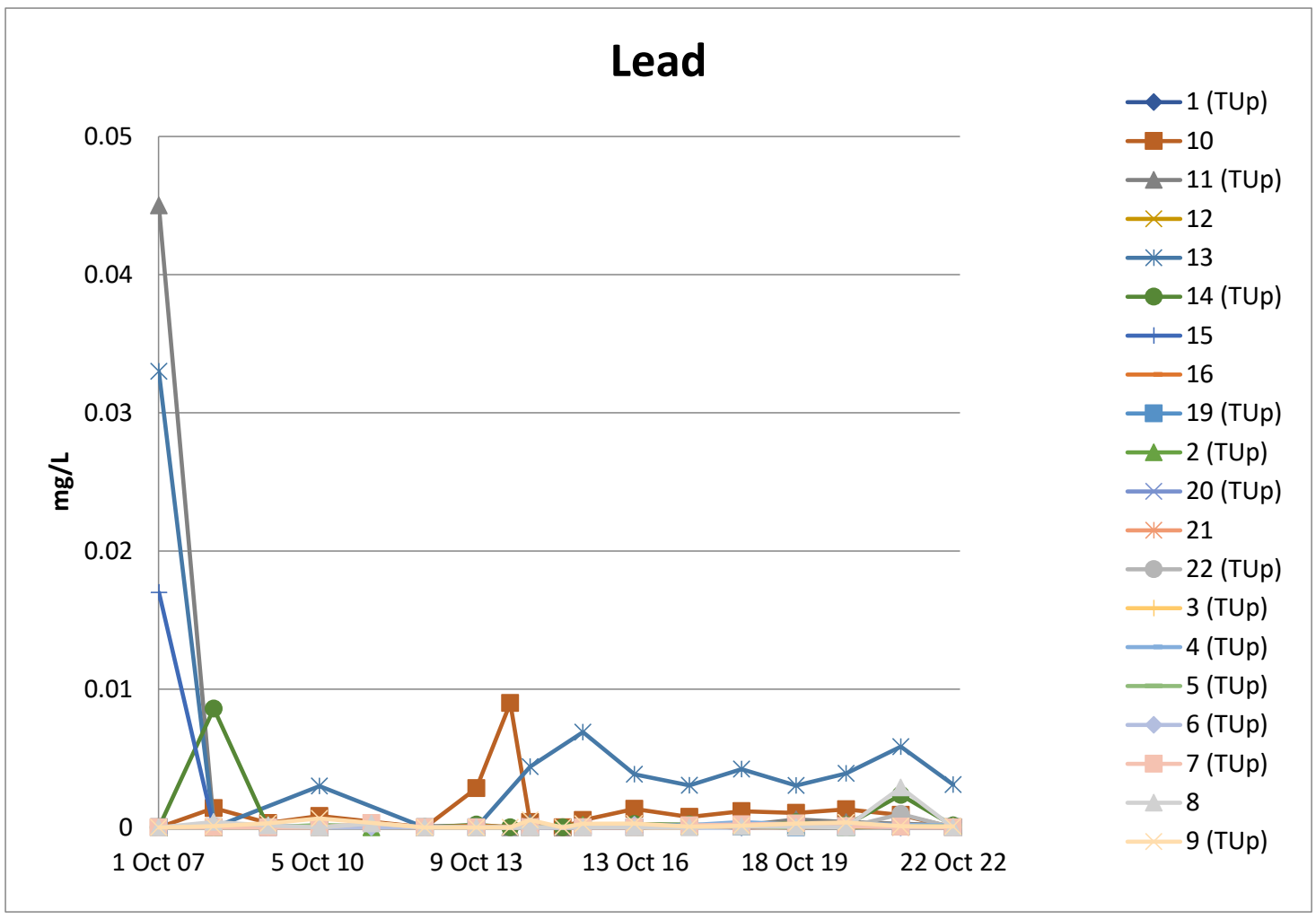

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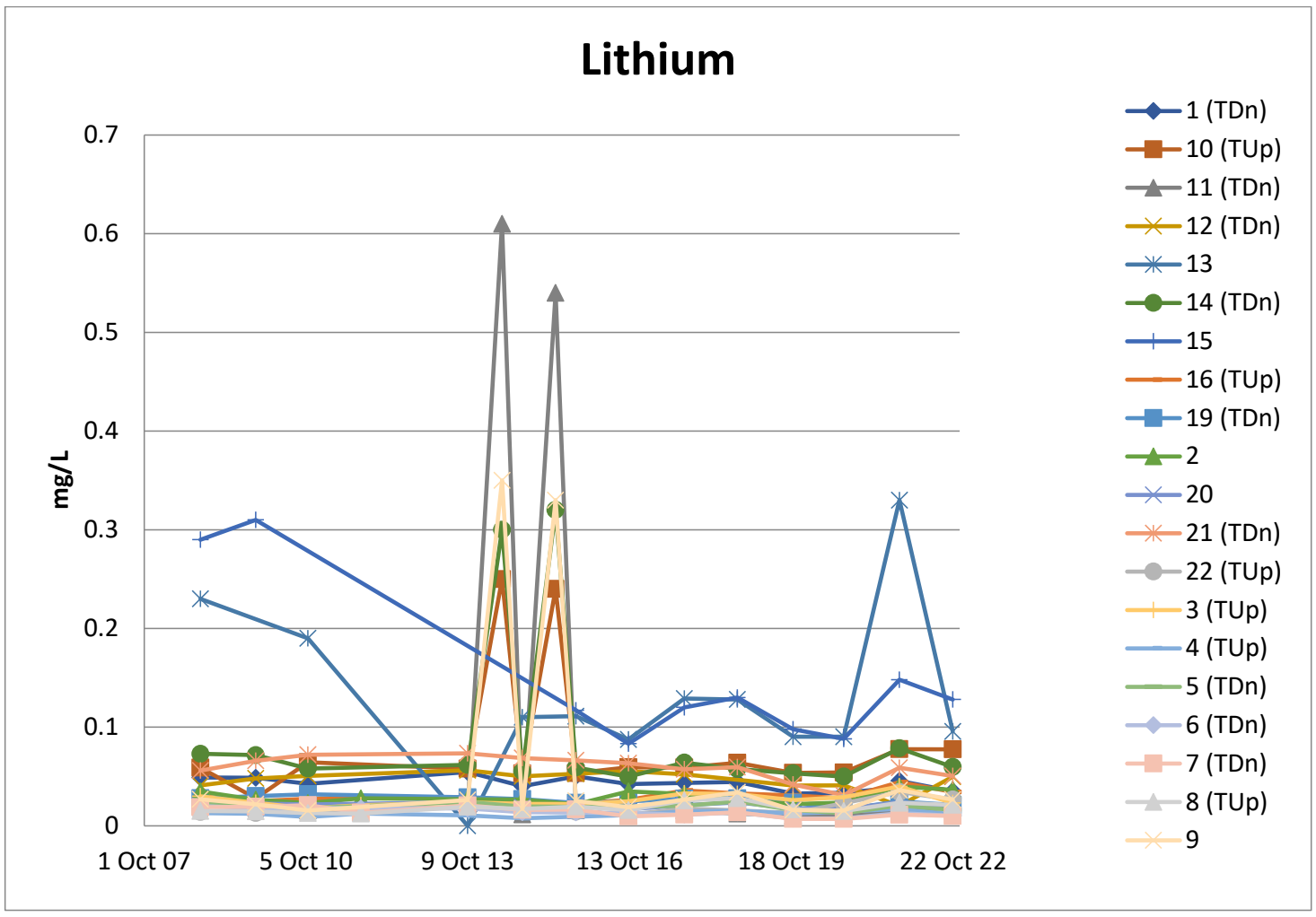

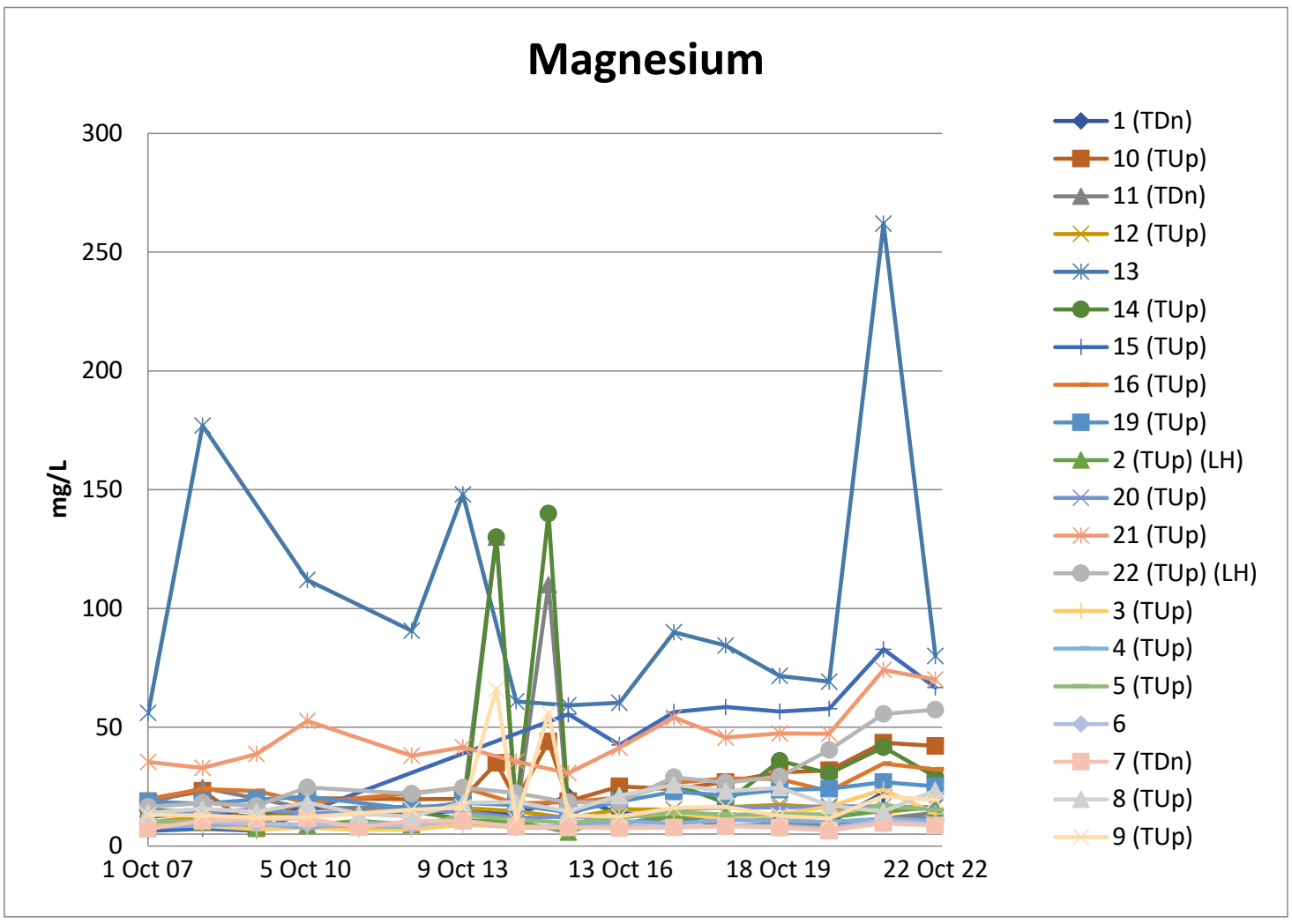

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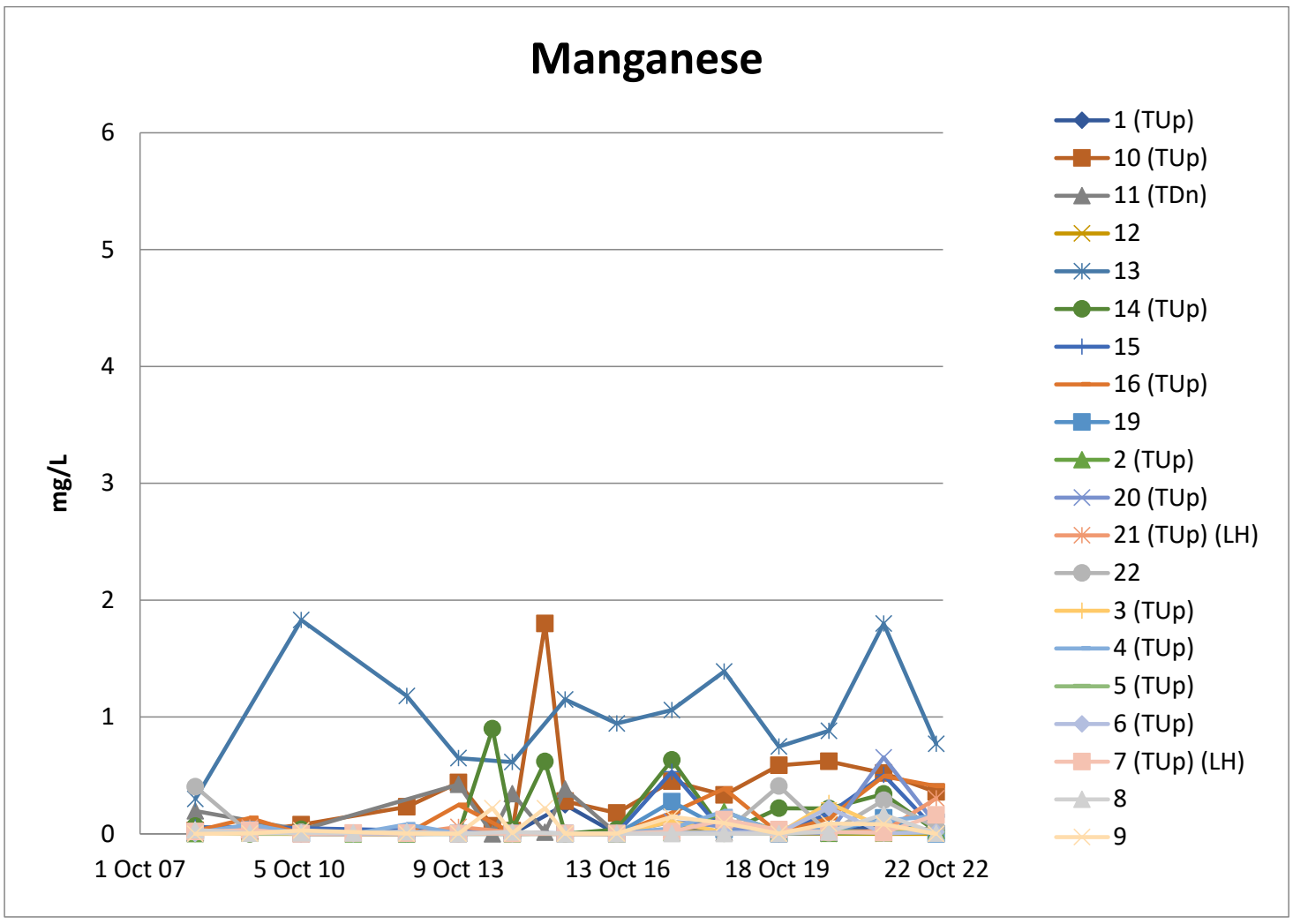

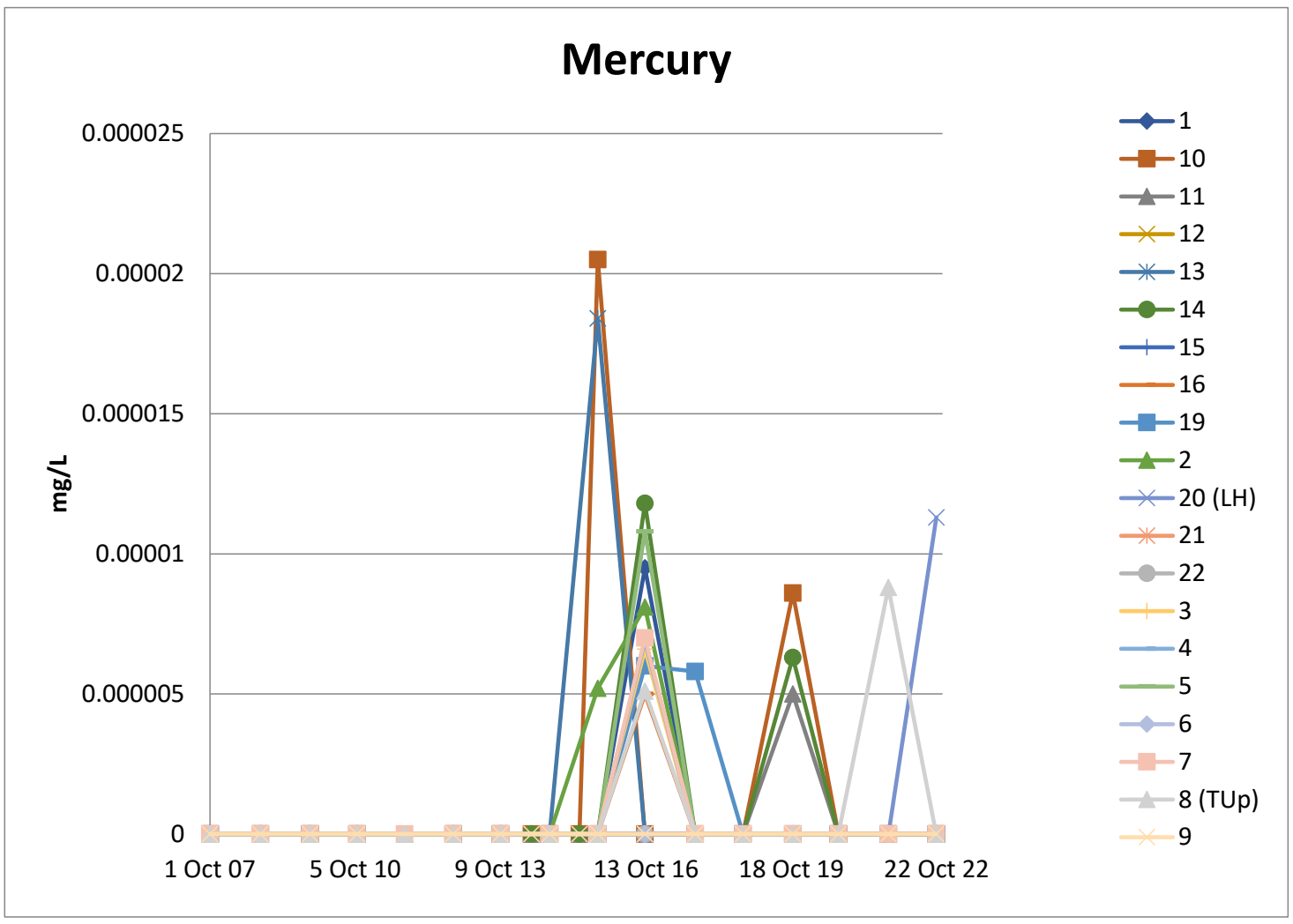

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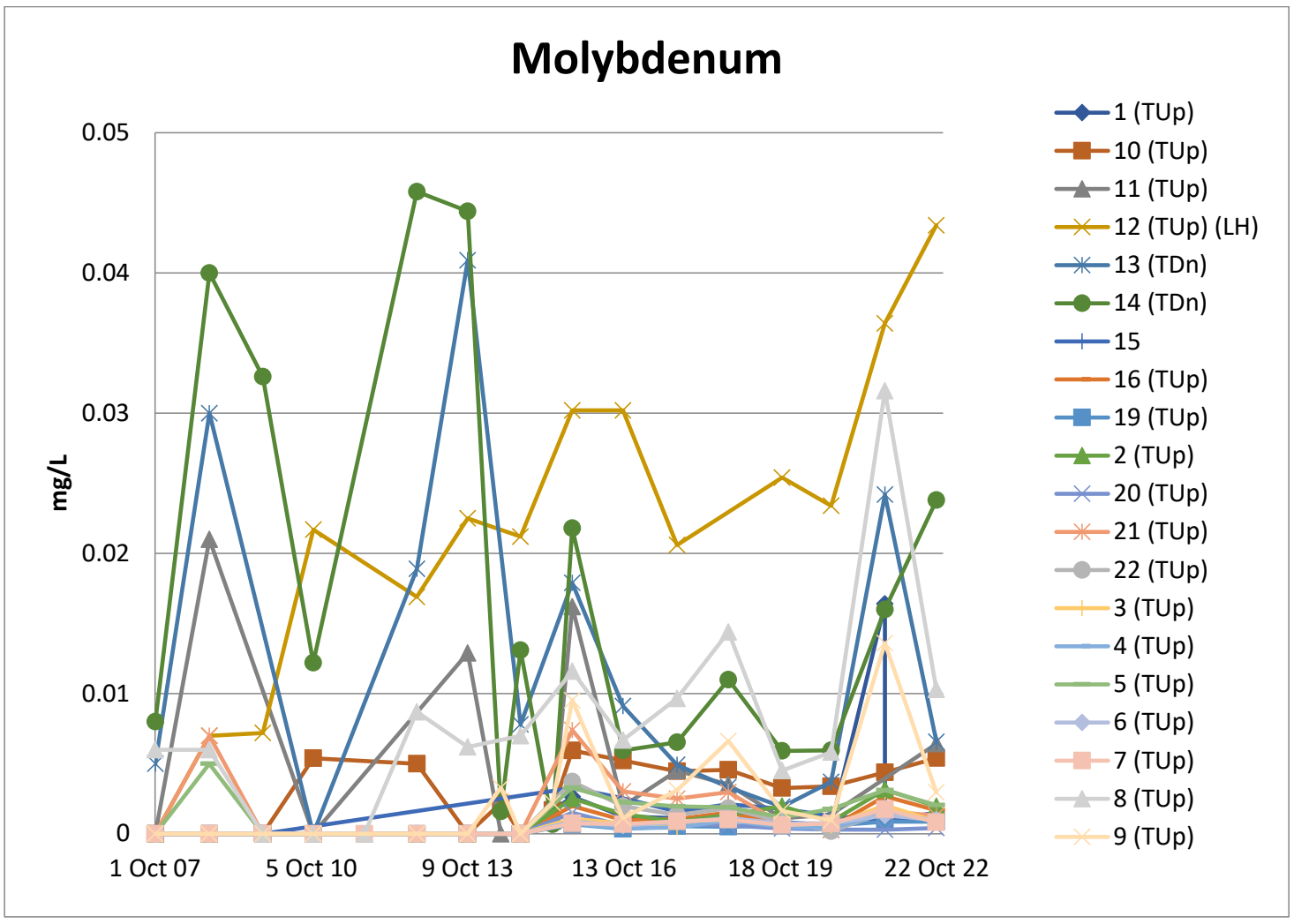

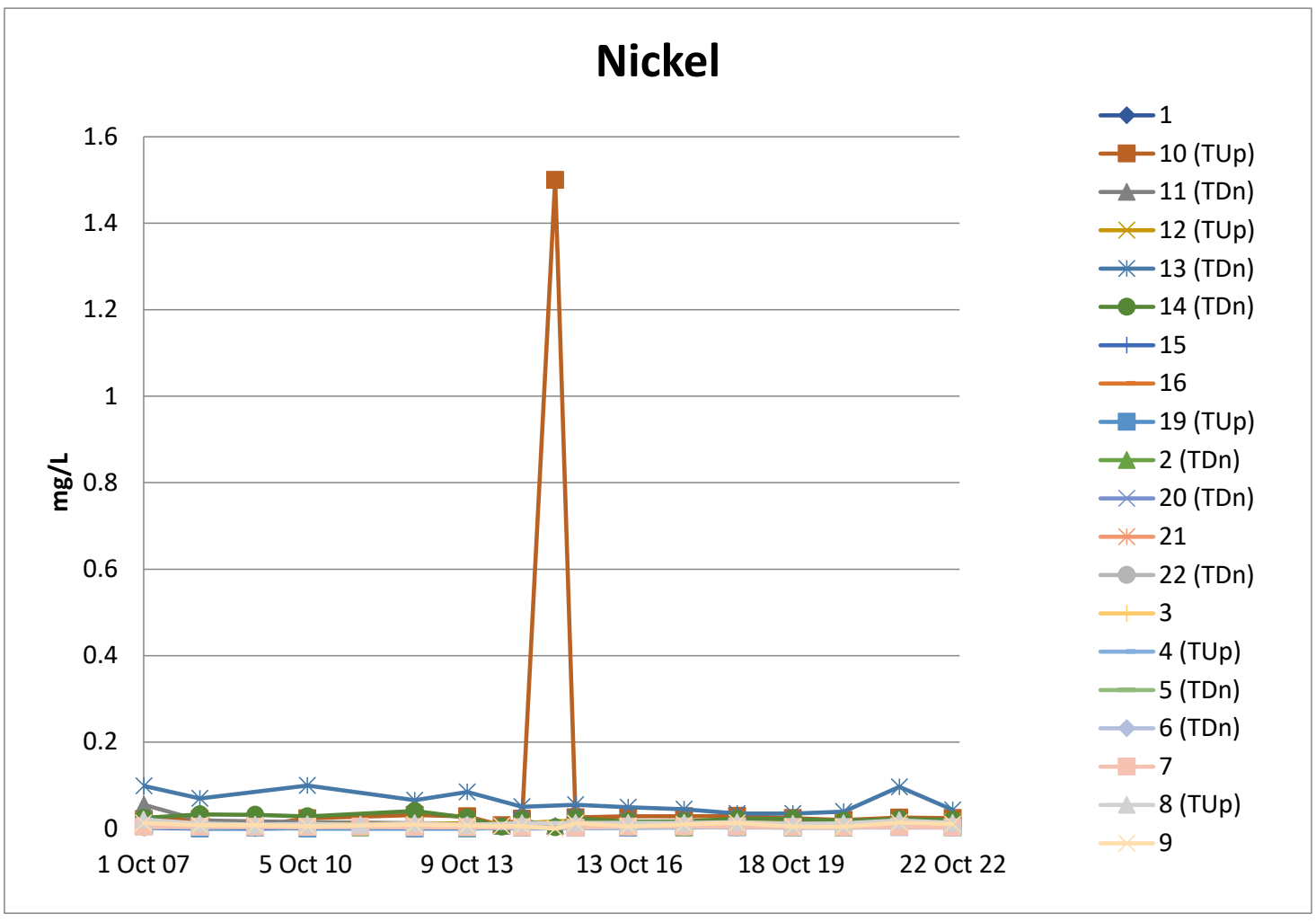

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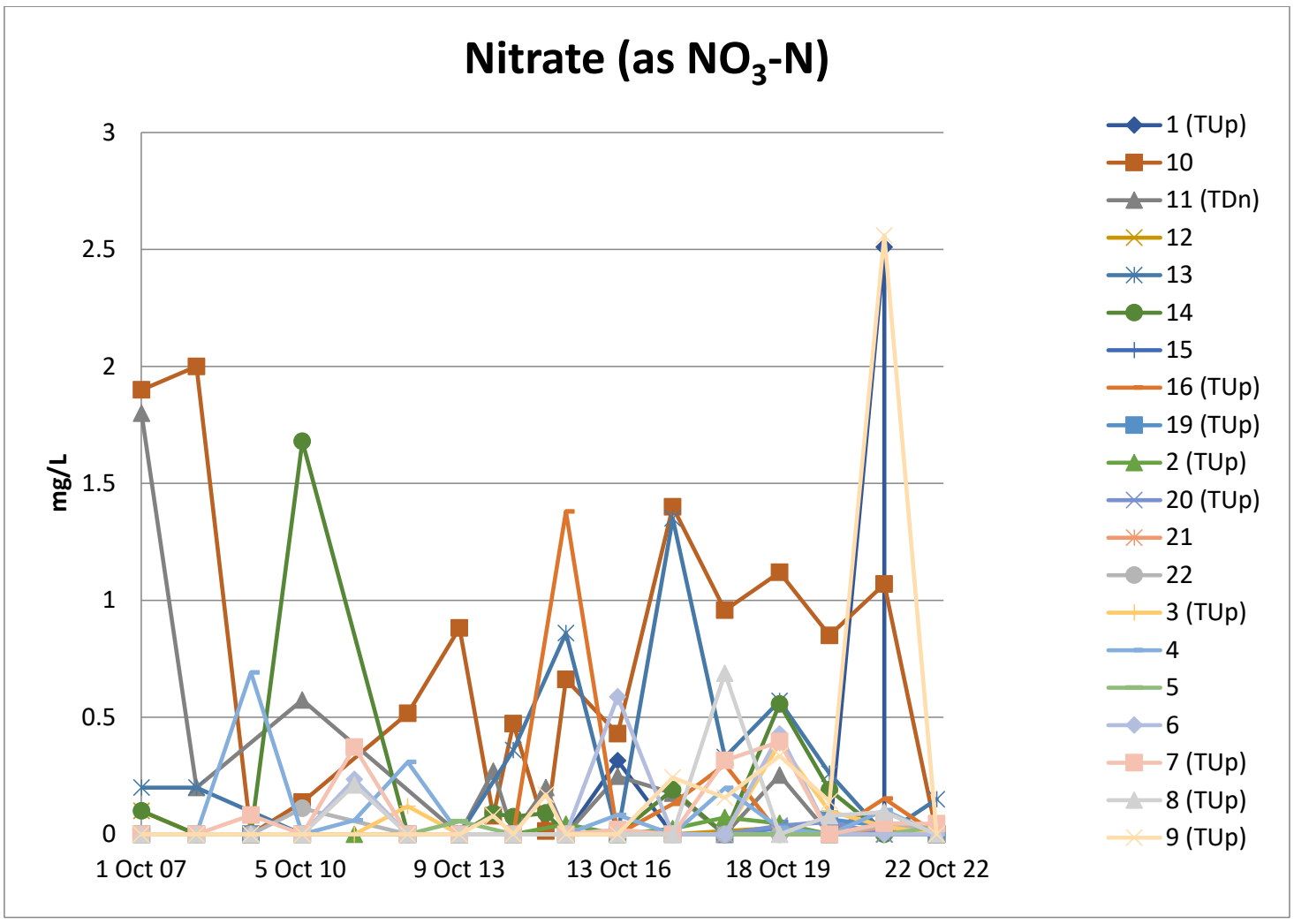

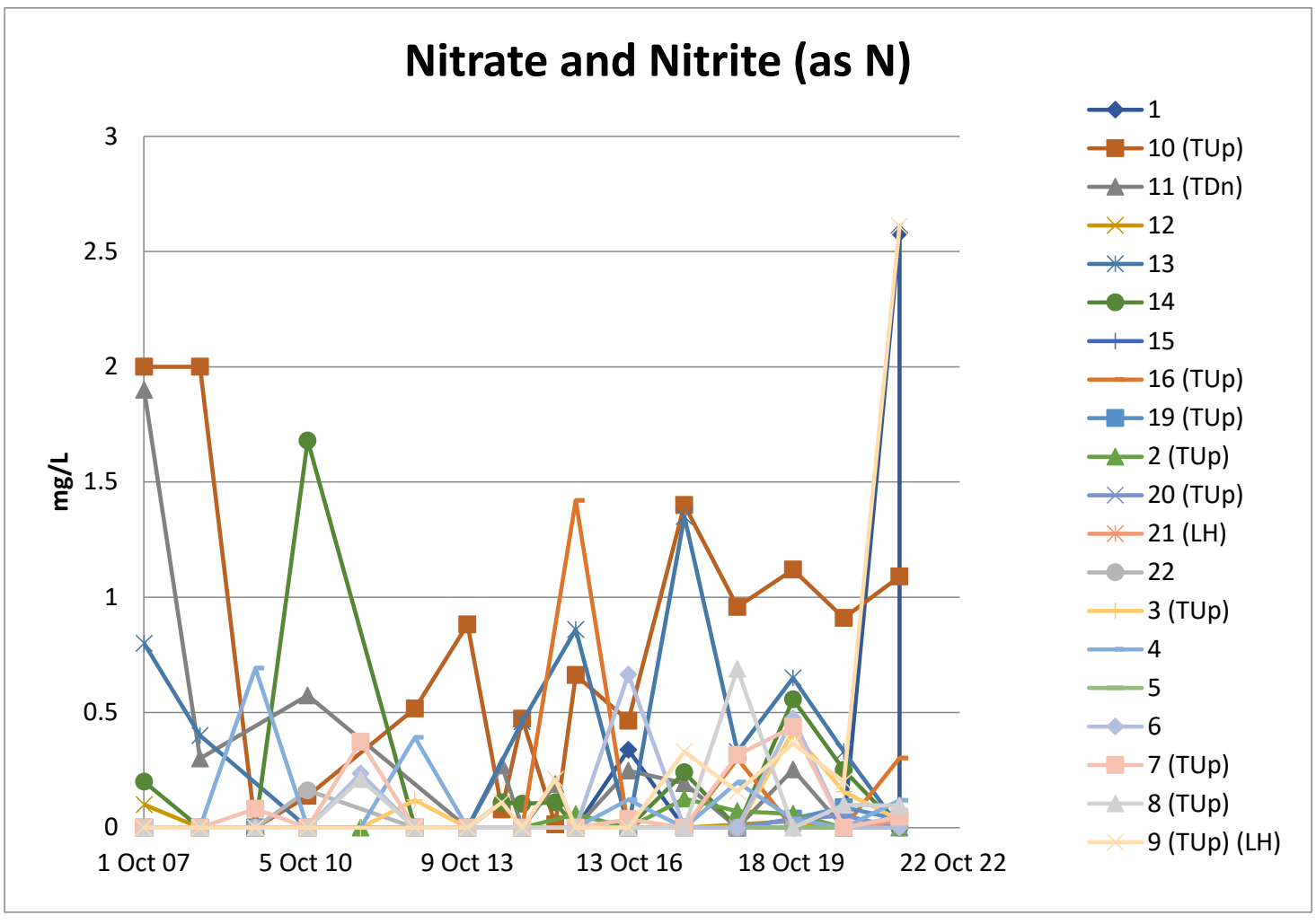

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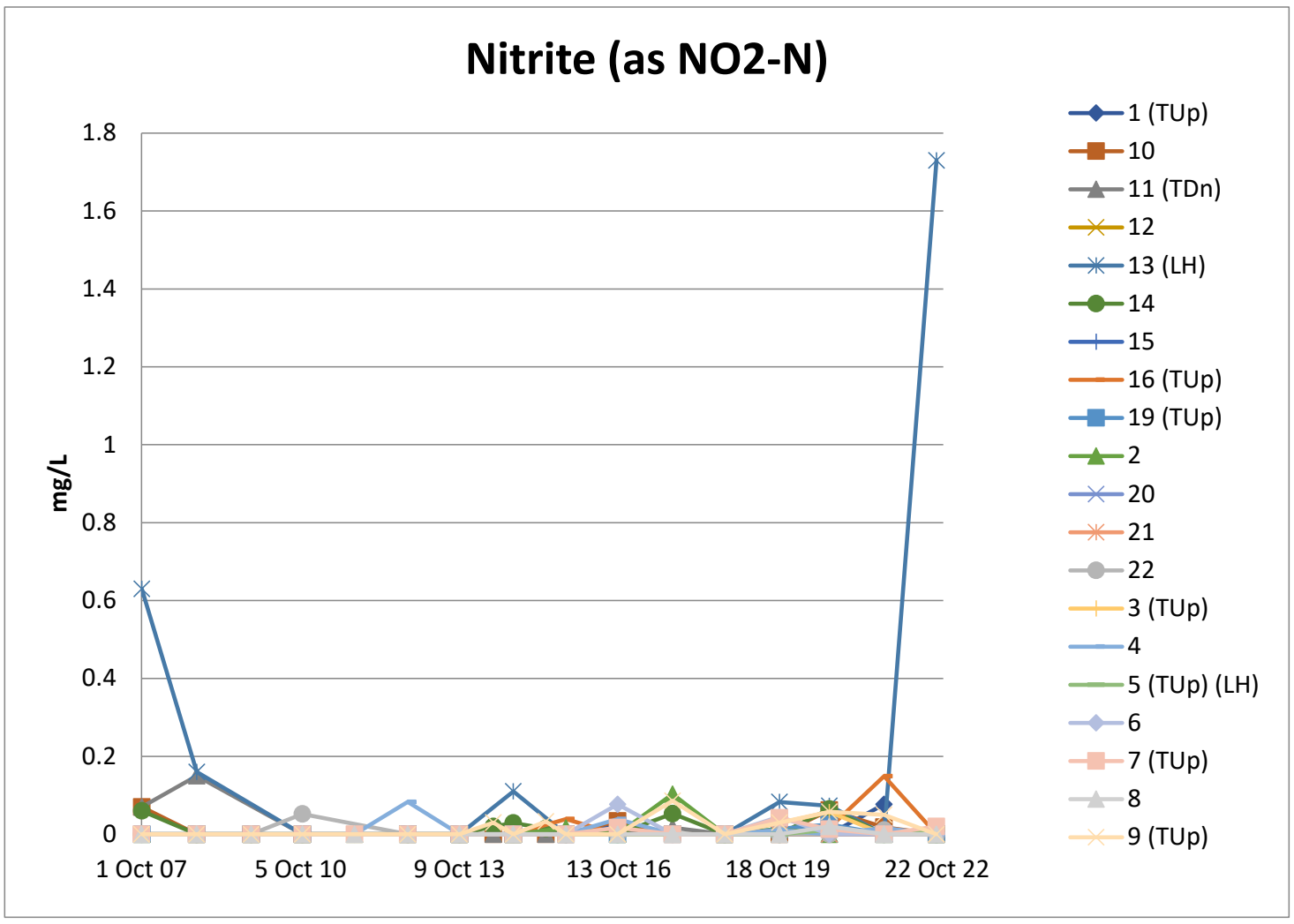

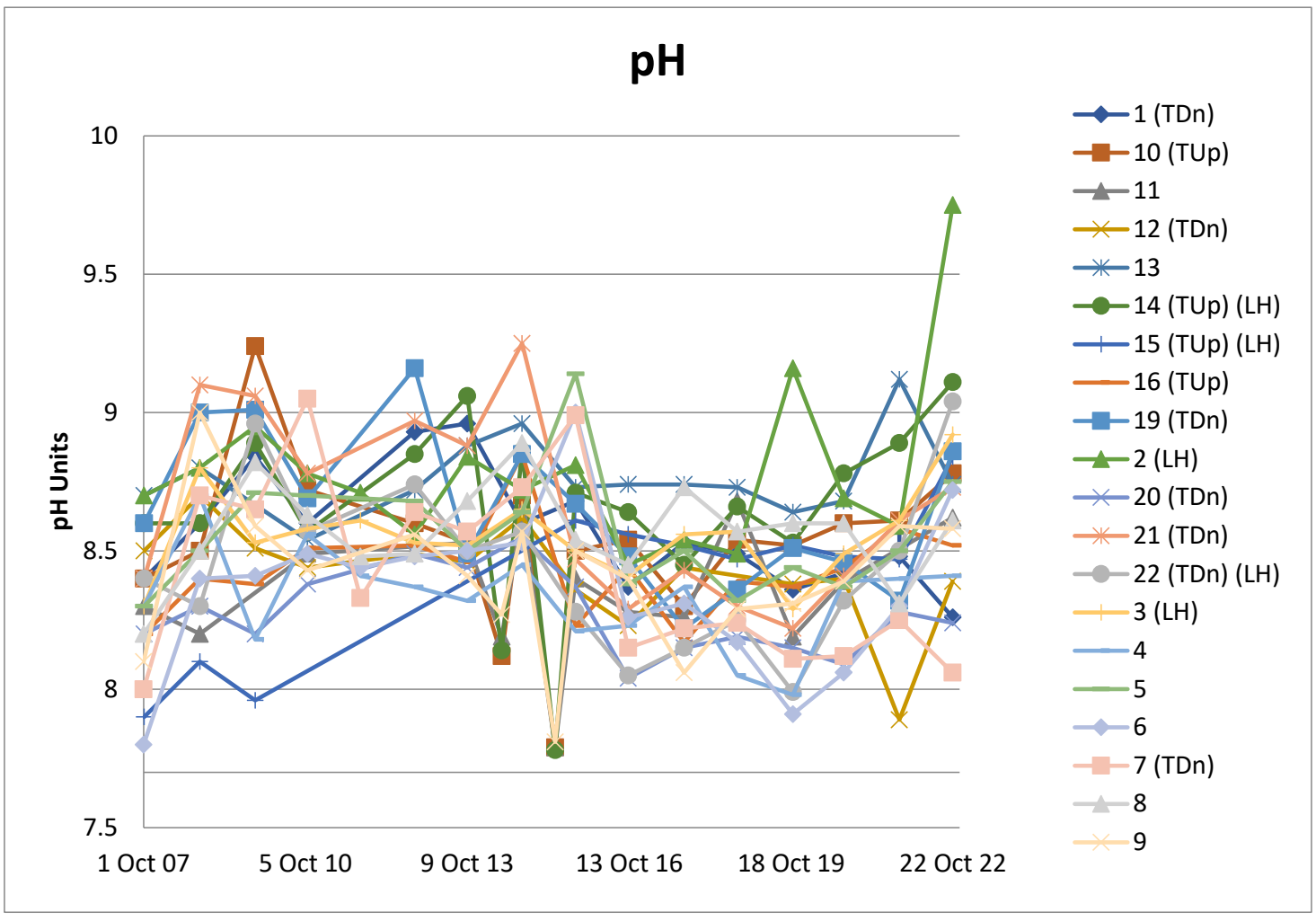

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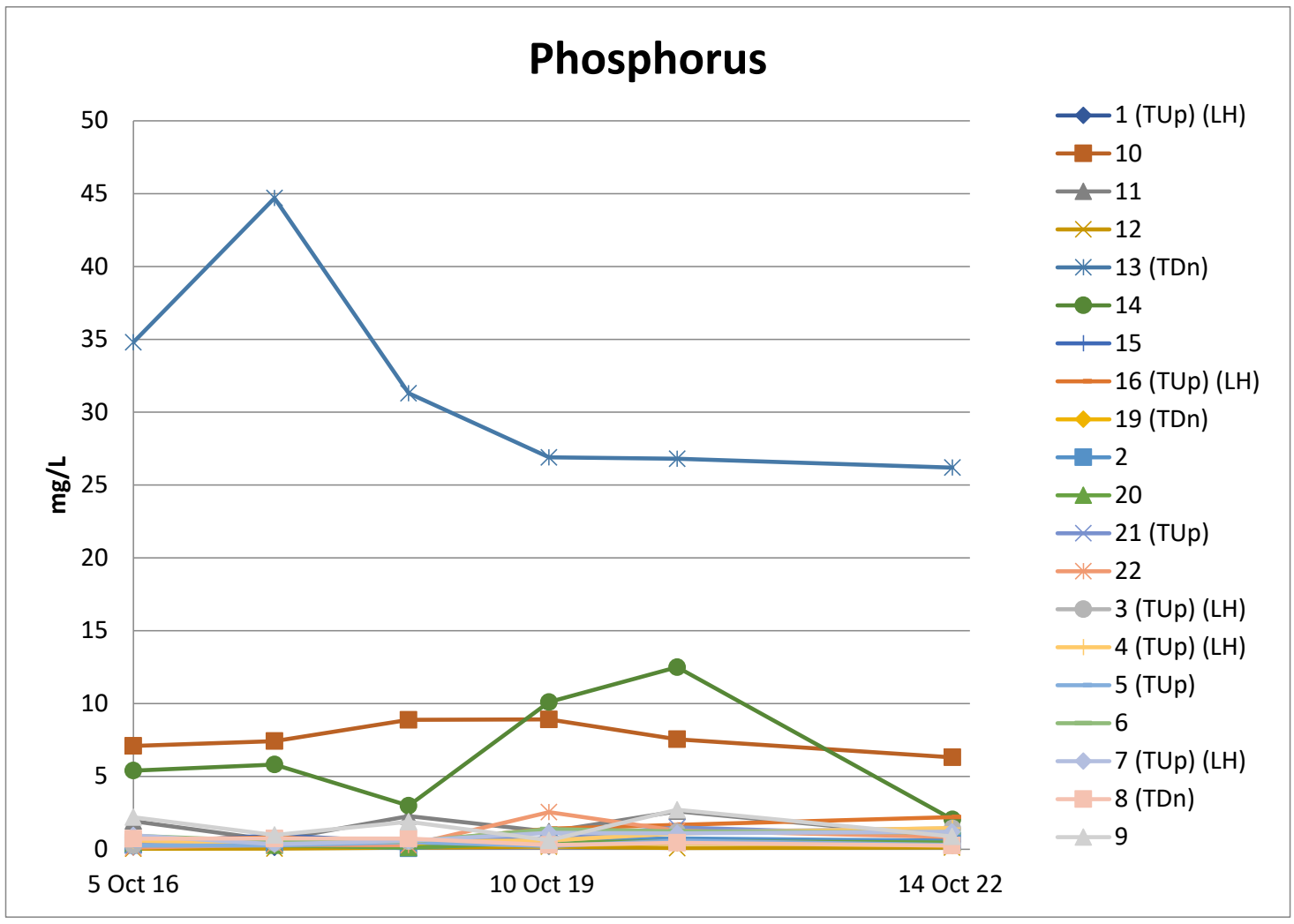

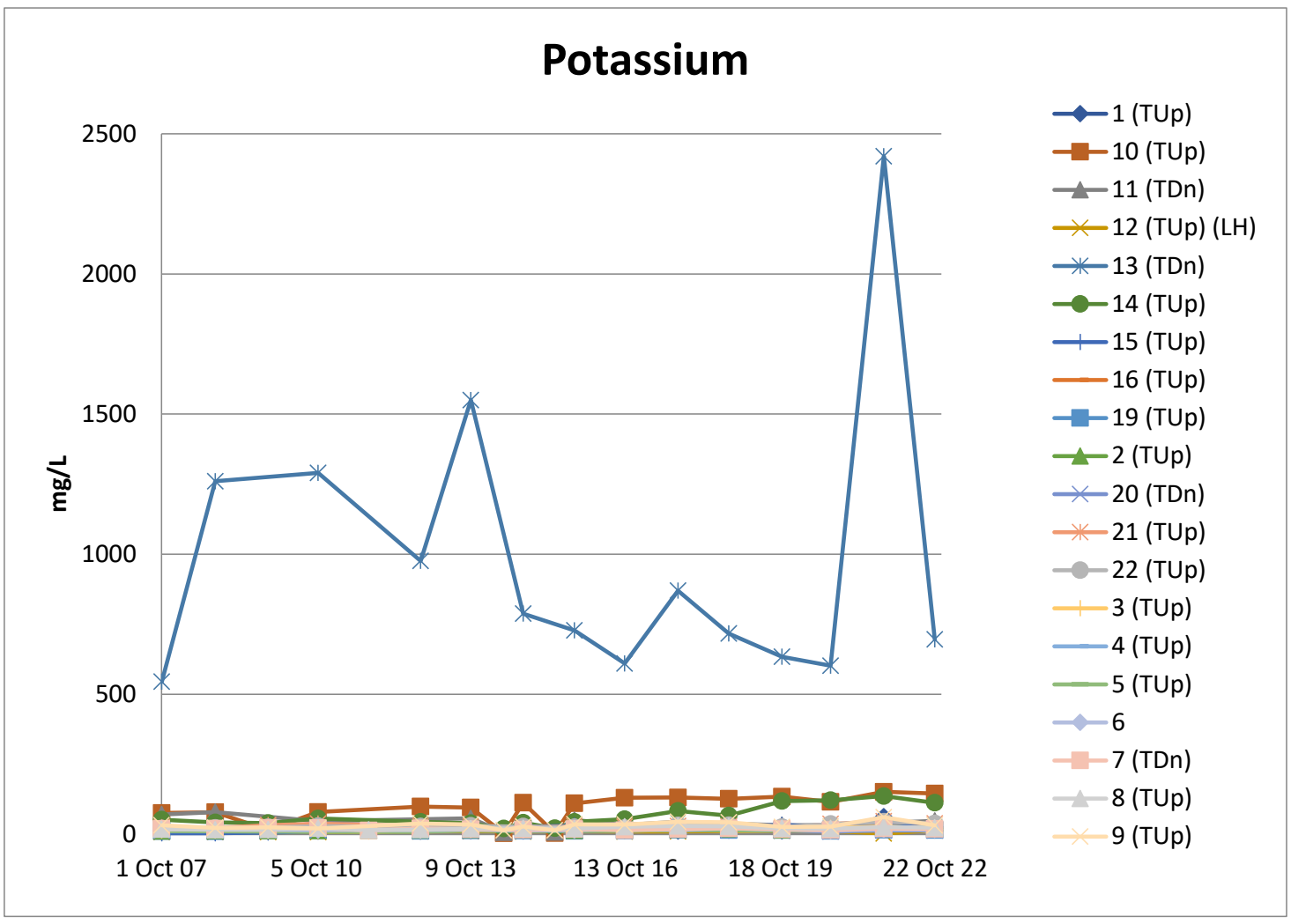

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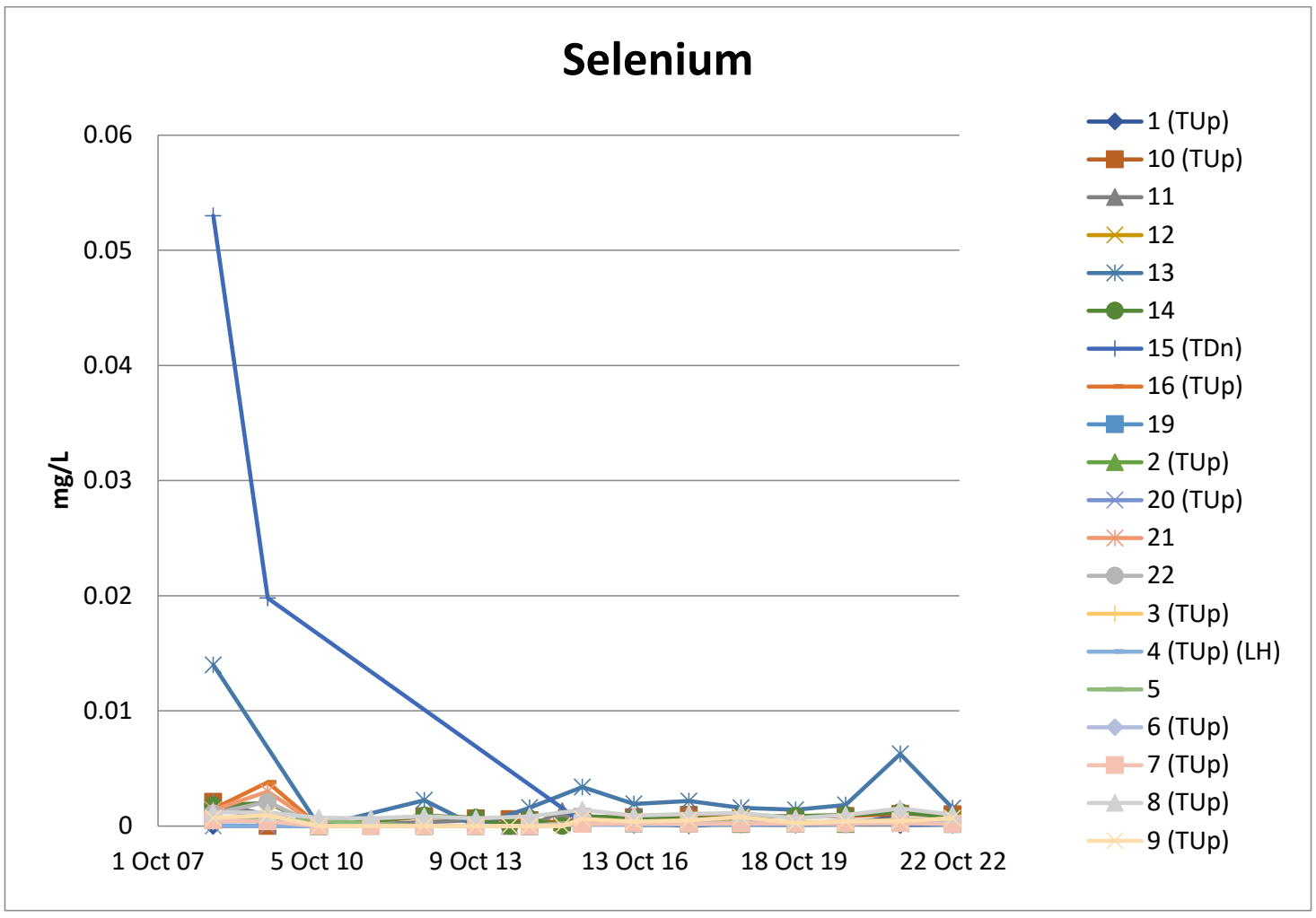

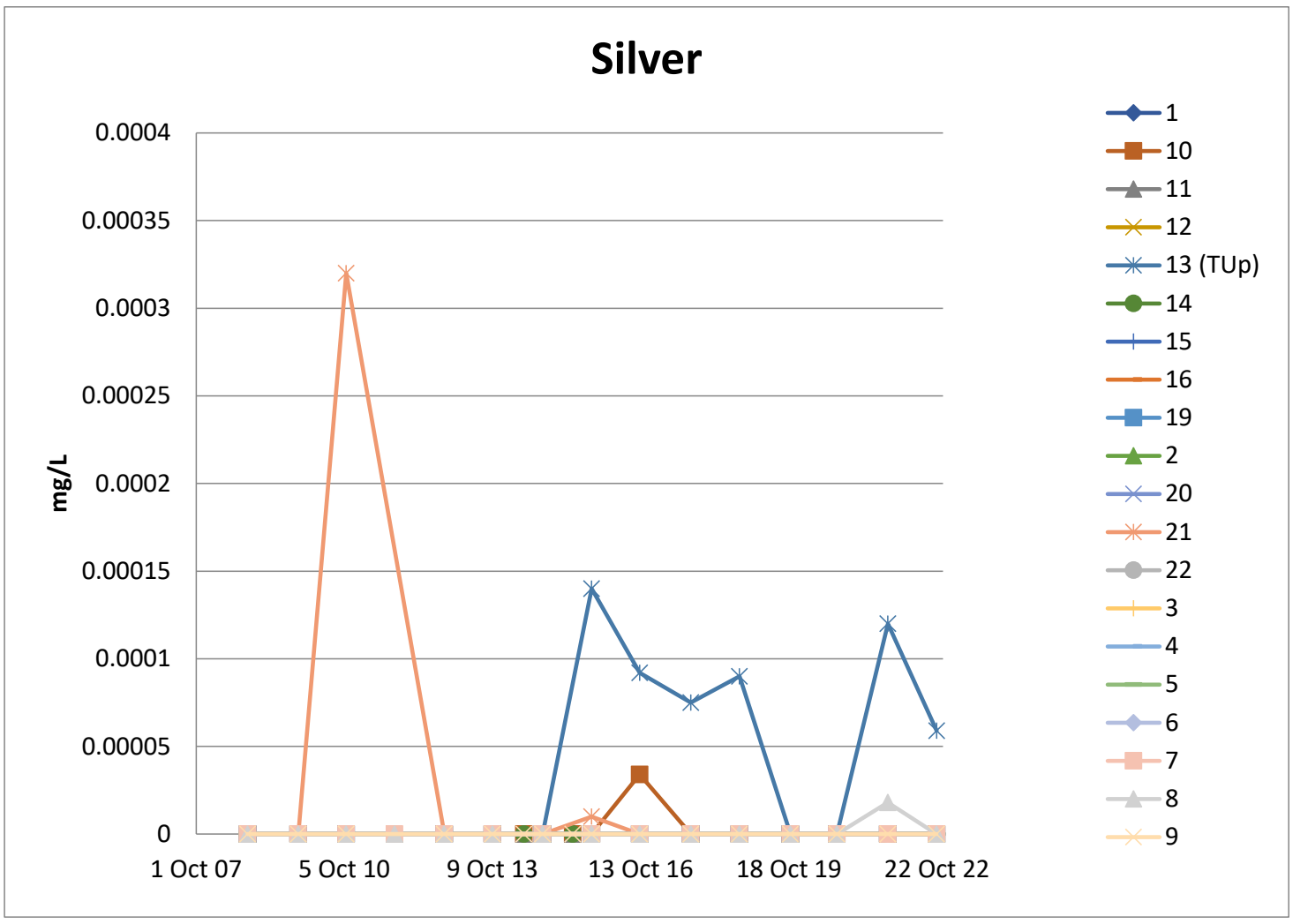

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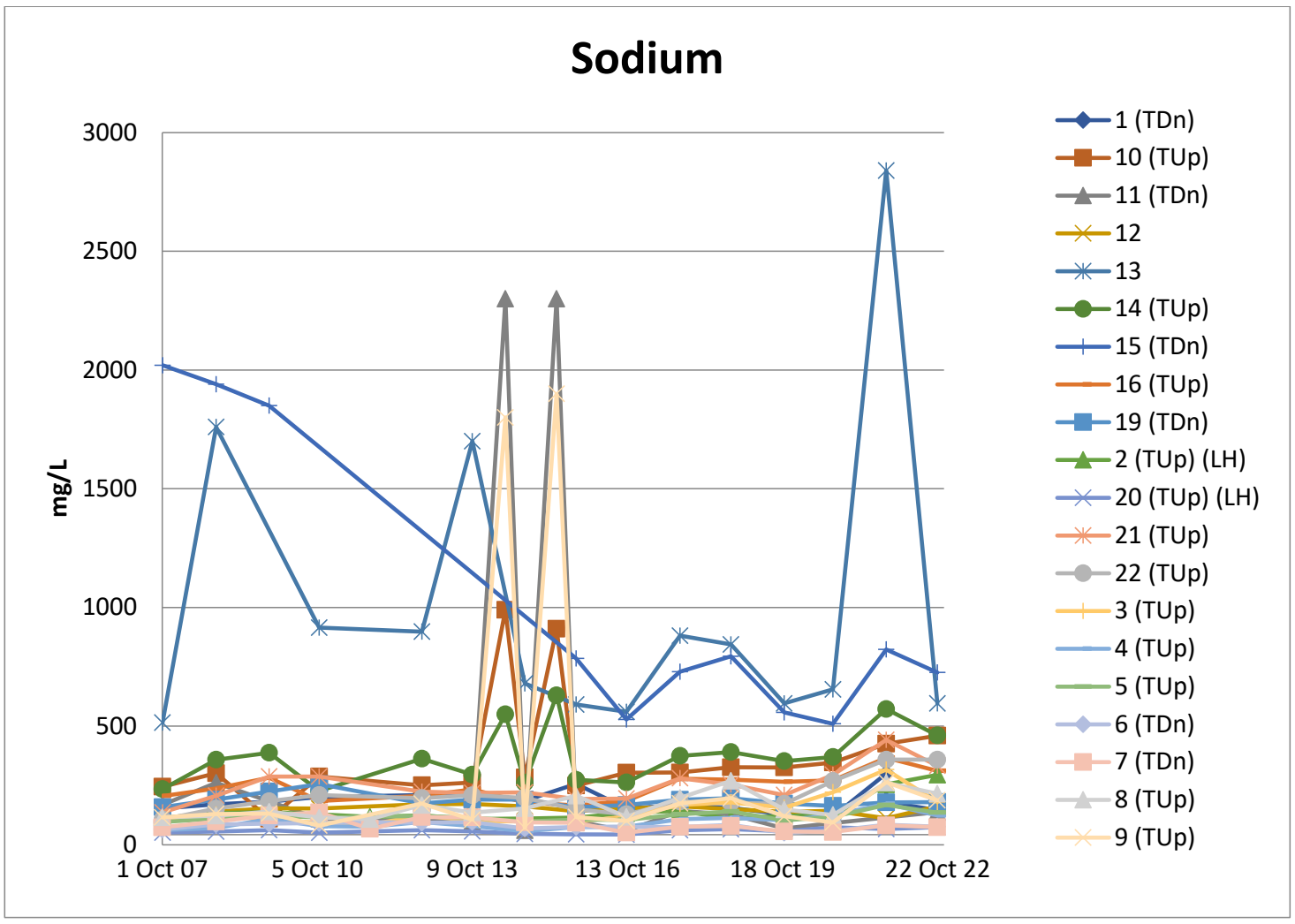

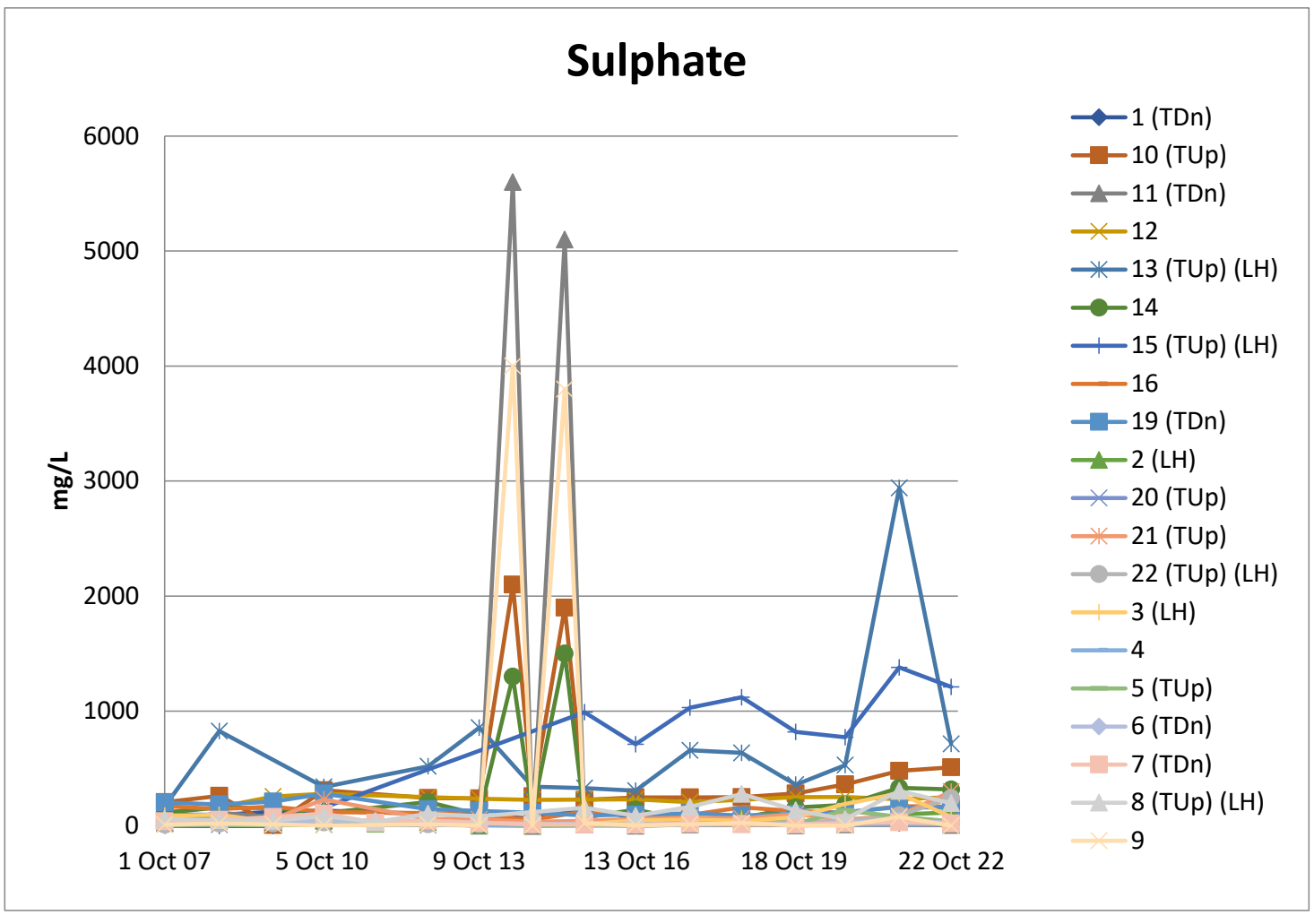

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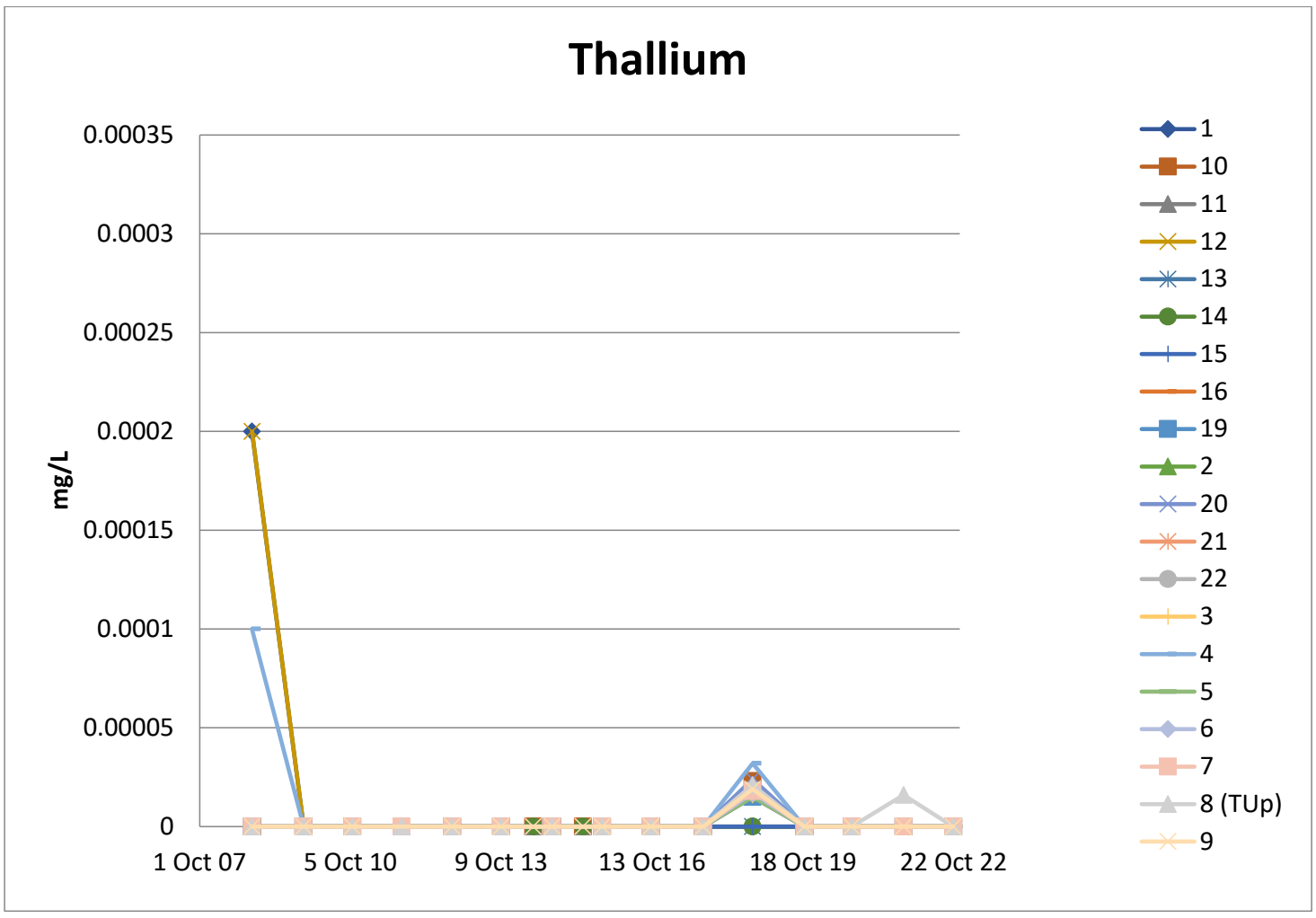

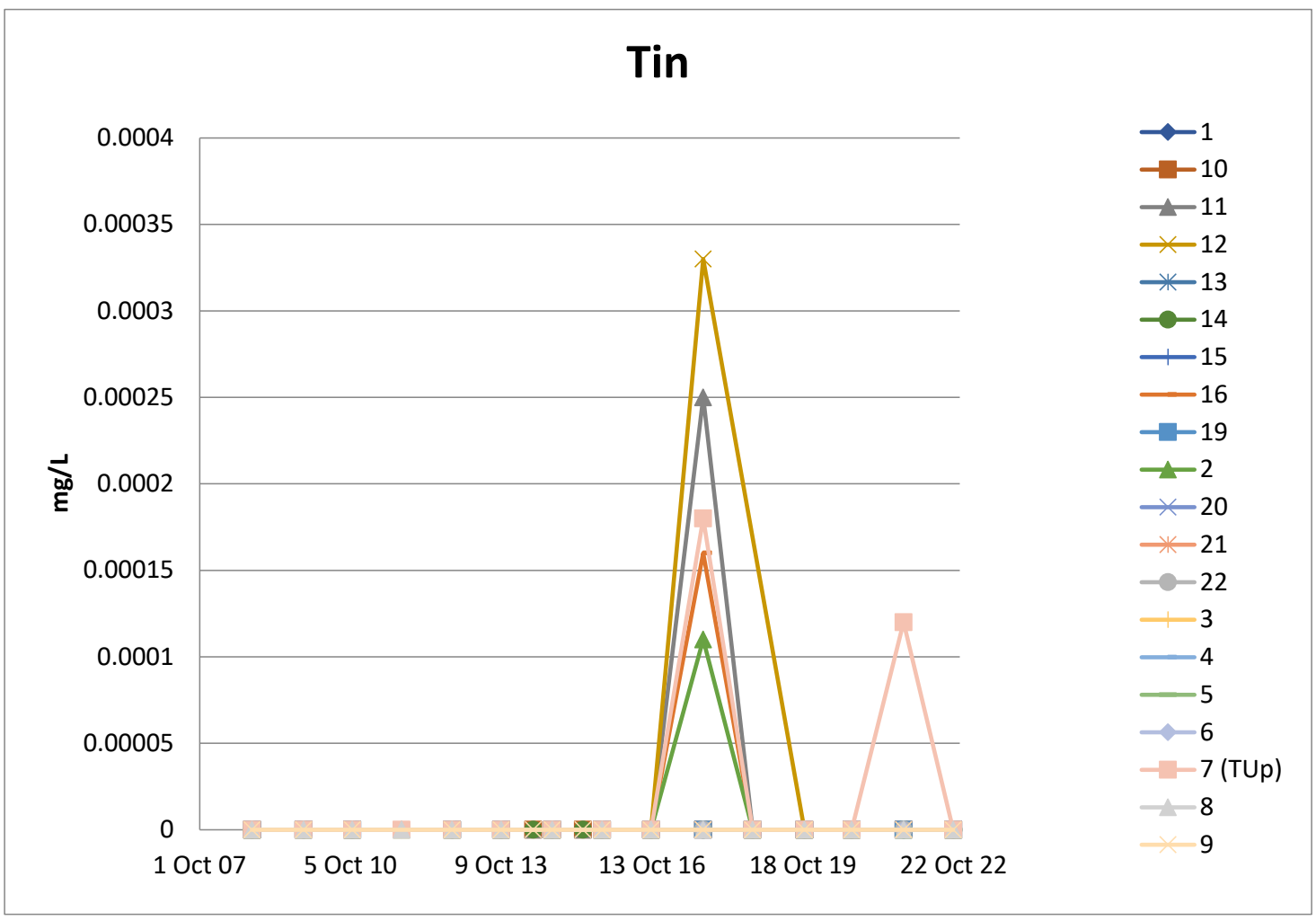

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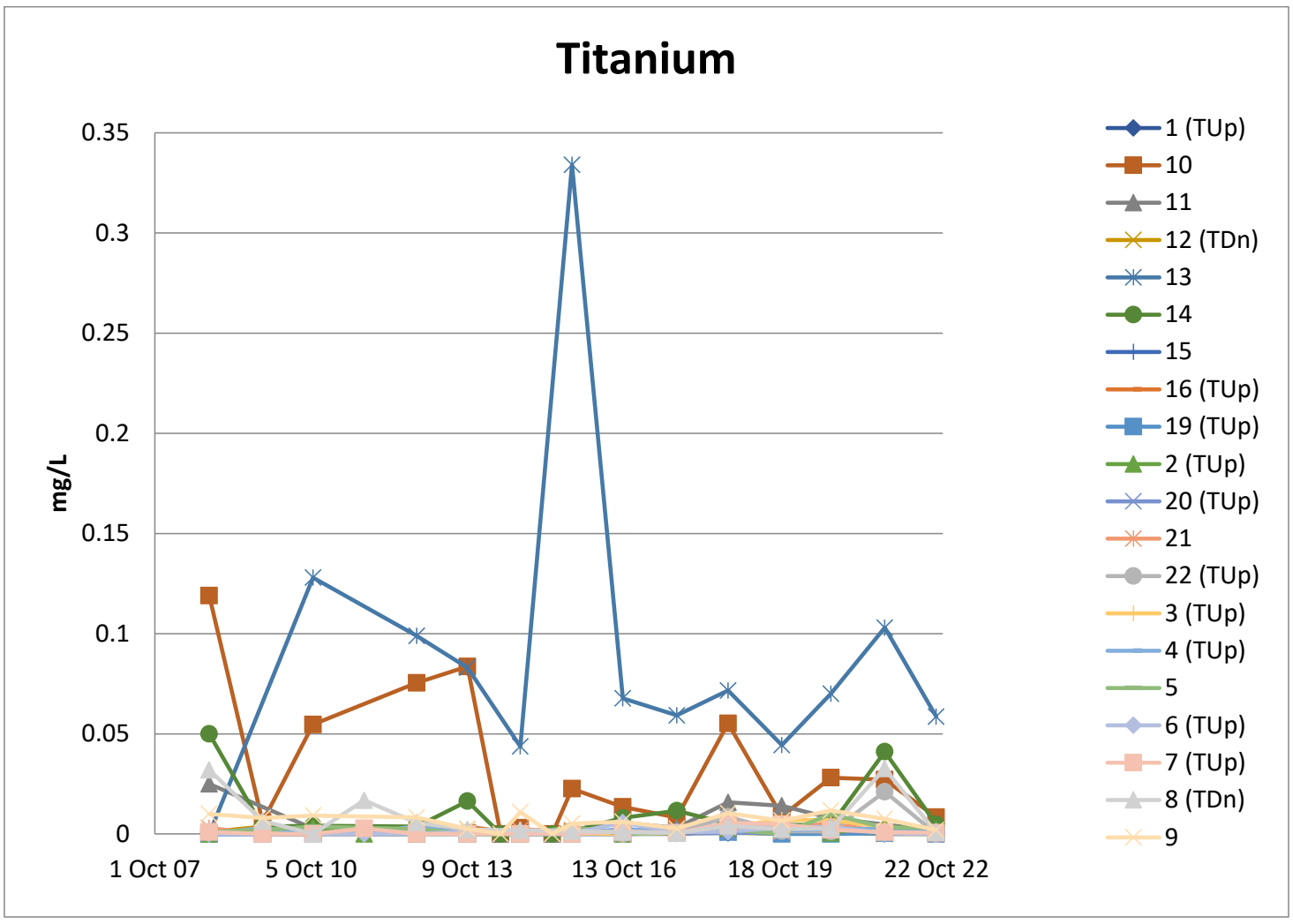

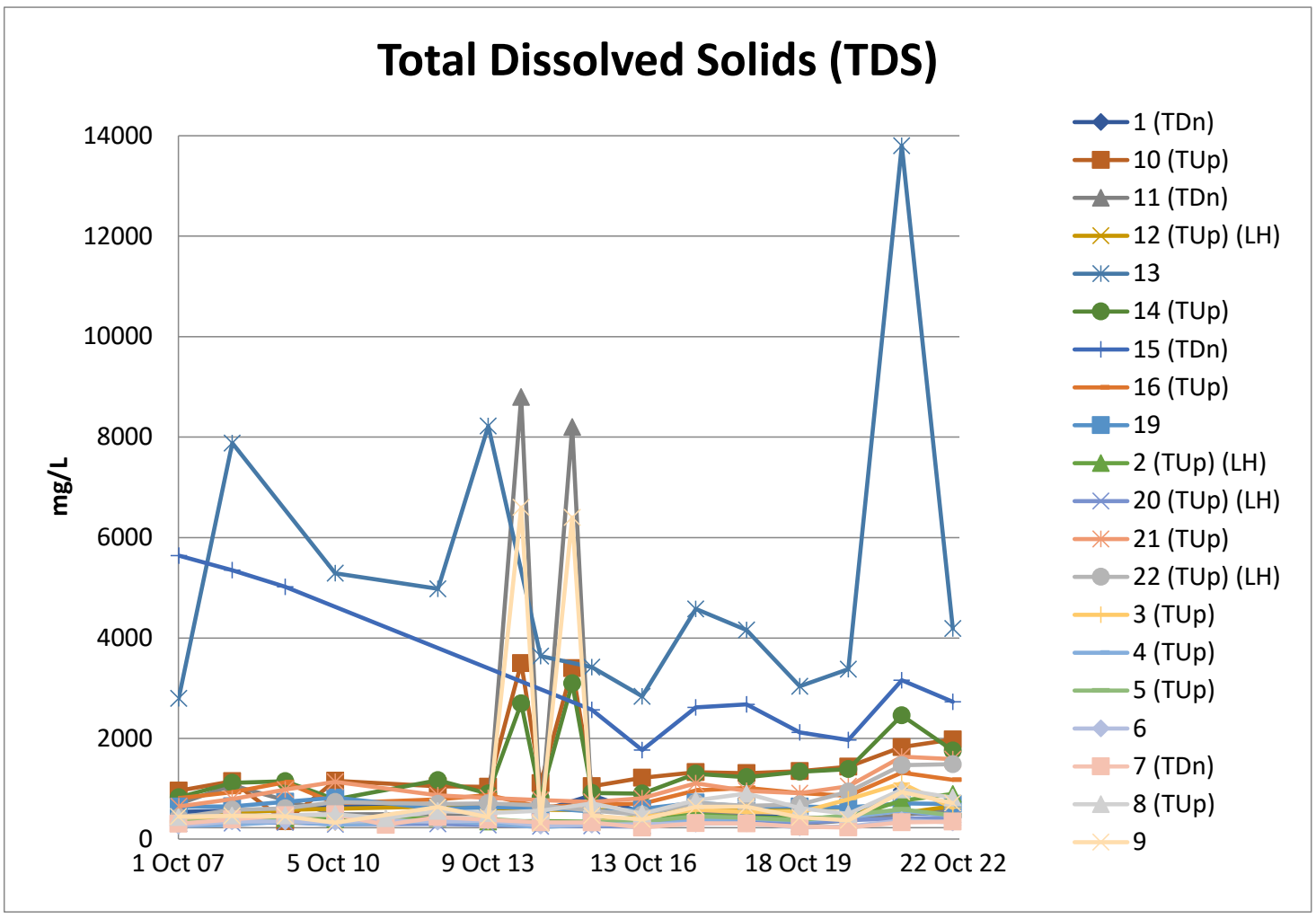

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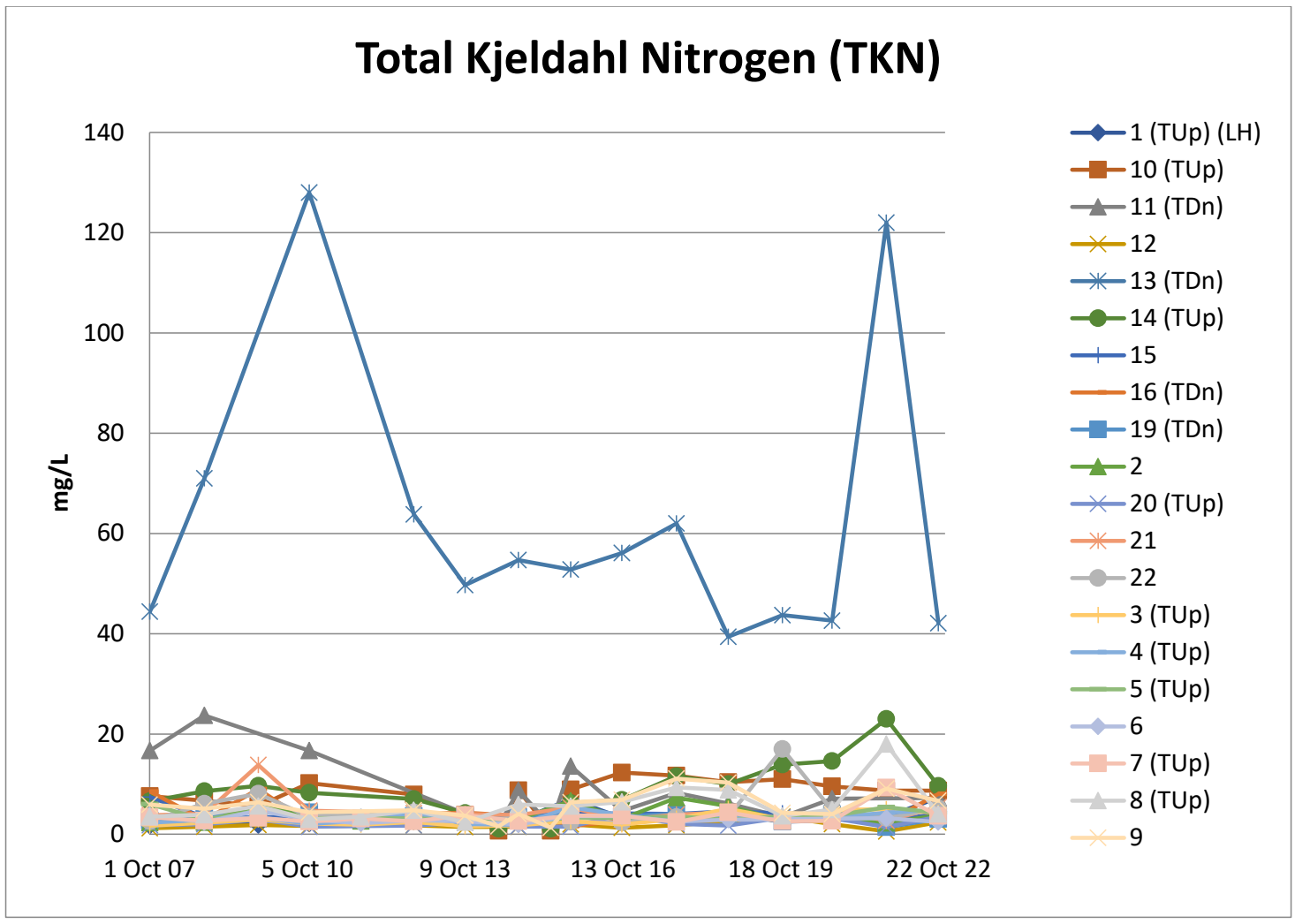

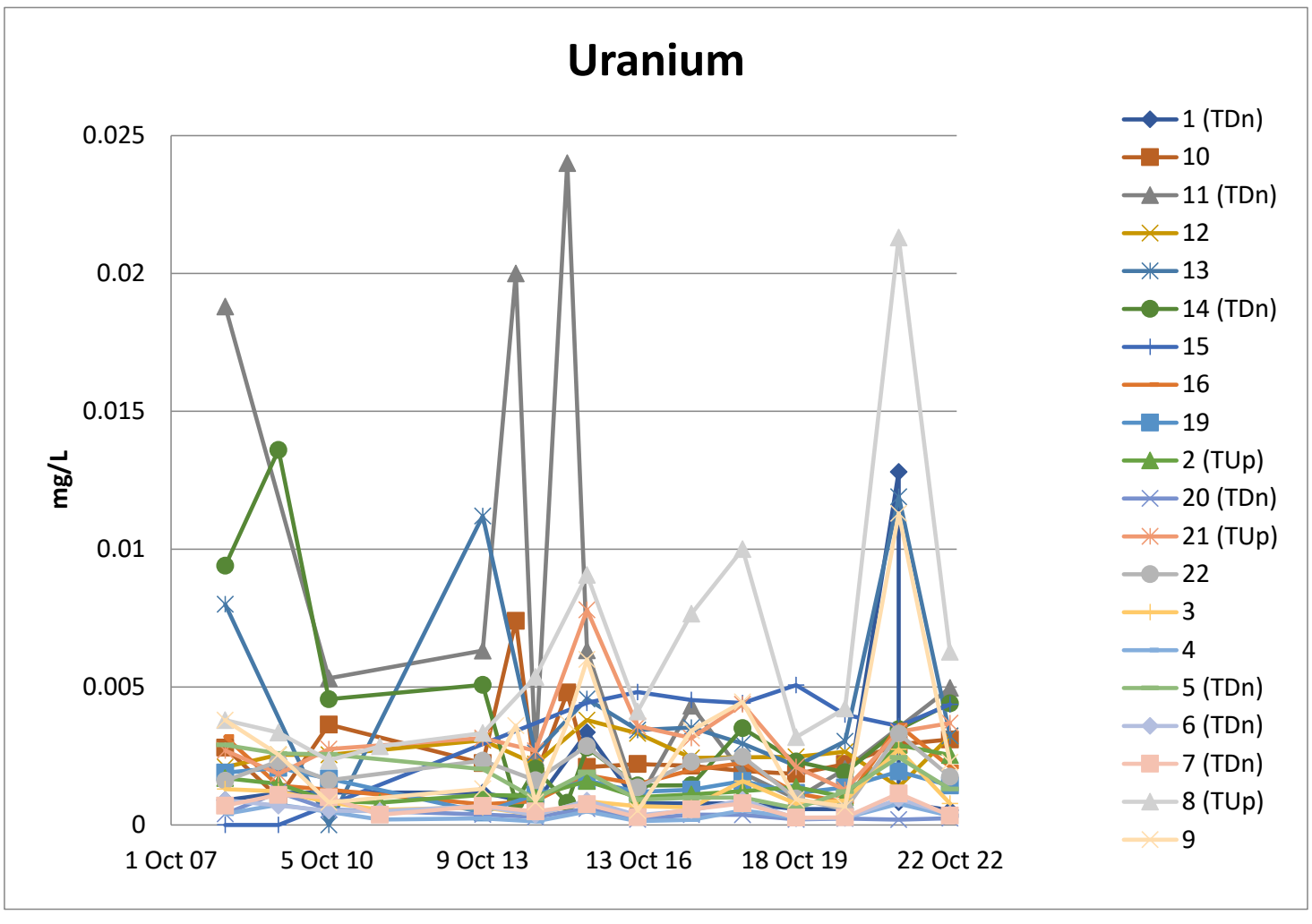

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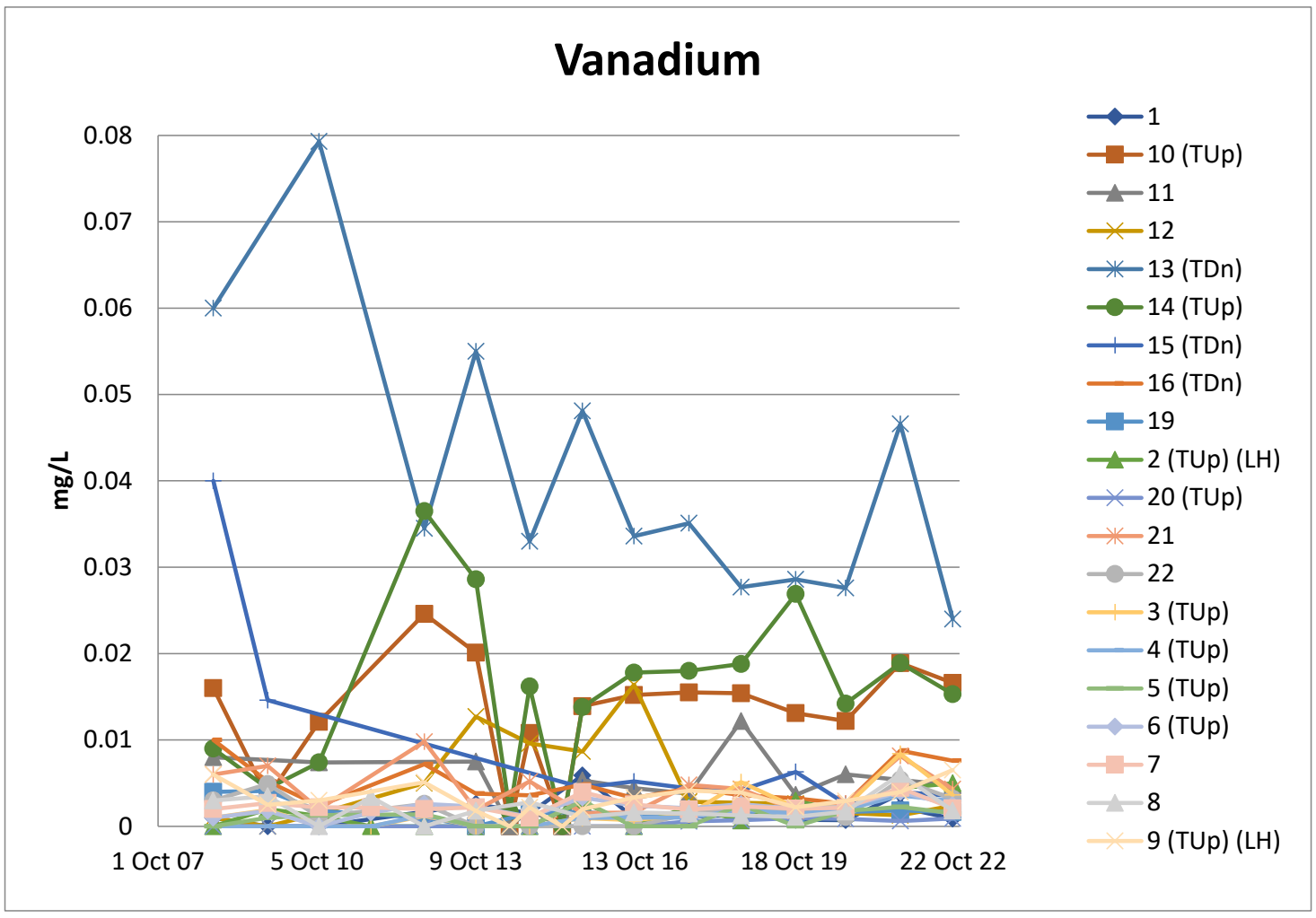

APPENDIX A

REGULATORY APPROVAL – ALBERTA ENVIRONMENT
EPEA APPROVAL NO.10348-03-00

Alberta Environment and Parks

Operations
Regulatory Approvals Centre
5 Floor, South Petroleum Plaza
9915 – 108 Street
Edmonton, Alberta T5K 2G8
Telephone: (780) 427-6311
Fax: (780) 422-0154
www.aep.alberta.ca

April 19, 2017

Michael Parker
Vice President, Canadian Environmental Compliance
Clean Harbors Canada, Inc.
4090 Telfer Road RR#1
Corunna ON NON 1G0

Dear Mr. Parker:

Re: Ryley Hazardous Waste Storage Facility and Landfill
Application No. 014-10348

Your application for a renewal of an existing approval under the *Environmental Protection and Enhancement Act* (EPEA) has been reviewed and enclosed is Approval No. 10348-03-00.

It is your responsibility to obtain any approvals, permits or licences that are required from other agencies.

The Act may provide the approval holder a right of appeal against any term or condition contained in the approval to the Alberta Environmental Appeals Board. You should note that there are strict time lines for filing an appeal dependent on the type of appeal. If you choose to appeal, please contact the office of the Registrar of Appeals, Environmental Appeals Board of Alberta, 3rd Floor, 10011 - 109 Street, Edmonton, Alberta, T5J 3S8, telephone (780) 427-6207.

If you have any questions, please contact me at (780) 415-2201 in Edmonton.

Yours truly,

A Vawter

Annette Vawter
Application Coordinator

Enclosure

cc: Weiguo Wu, Red Deer/North Saskatchewan Region - Edmonton
cc: Tetra Tech EBA Inc.
Attention: J. Paul Ruffell

Alberta Environment and Parks

APPROVAL

PROVINCE OF ALBERTA

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT
R.S.A. 2000, c.E-12, as amended.

APPROVAL NO. 10348-03-00

APPLICATION NO. 014-10348

EFFECTIVE DATE: March 31, 2017

EXPIRY DATE: March 31, 2027

APPROVAL HOLDER: Clean Harbors Canada, Inc.

ACTIVITY: **CONSTRUCTION, OPERATION AND RECLAMATION OF THE**

Ryley Industrial Waste Management Facility, consisting of a Class I and Class II Industrial Landfill and a Hazardous Waste/Recyclable Storage and Processing Facility,

IS SUBJECT TO THE ATTACHED TERMS AND CONDITIONS.

Designated Director under the Act .....
Mohammad Habib, P. Eng.

Date Signed March 31, 2017

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PART 1: DEFINITIONS

SECTION 1.1: DEFINITIONS

1.1.1 All definitions from the Act and the regulations apply except where expressly defined in this approval.

1.1.2 In all PARTS of this approval:

(a) "Act" means the *Environmental Protection and Enhancement Act*, R.S.A. 2000, c.E-12, as amended;

(b) "action leakage rate" means the leakage rate that would occur through the primary liner, based on two holes per hectare, each with a diameter of 2 mm and that is calculated to be 790L/ha/day;

(c) "active landfill area" means the portion of the landfill that has received or is receiving waste for disposal, where final cover has not been placed, and includes areas that are being used for interim management of waste prior to disposition;

(d) "active landfill life" means the period of landfill life during which waste is received for disposal at the landfill, beginning with the initial receipt of waste and ending with the start of final landfill closure activities;

(e) "AER" means Alberta Energy Regulator;

(f) "affected lands" means lands which have received substances released from the facility;

(g) "air effluent stream" means any substance in a gaseous medium released by or from a facility;

(h) "APEGA" means the Association of Professional Engineers and Geoscientists of Alberta;

(i) "application" means the written submissions from the approval holder to the Director in respect of application No. 014-10348 and any subsequent applications where amendments are issued for this approval;

(j) "application No. 005-10348" means the written submissions from the approval holder to the Director in respect of renewal application No. 005-10348;

(k) "application No. 008-10348" means the written submissions from the approval holder to the Director in respect of amendment application No. 008-10348;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(l) "application No. 012-10348" means the written submissions from the approval holder to the Director in respect of amendment application No. 012-10348;

(m) "as-built plans" means survey plans, signed and stamped by a professional registered with APEGA, that document variances from design or construction plans that were either approved or authorized according to the terms and conditions of this approval;

(n) "BTEX" means benzene, toluene, ethylbenzene and xylene;

(o) "COD" means Chemical Oxygen Demand;

(p) "composite liner" means a liner that meets the specifications in 3.1.2(b) of this approval;

(q) "container" means any portable device in which a substance is kept, including but not limited to the following:

(i) drums, barrels and pails which have a capacity greater than 18 litres but less than 210 litres,

(ii) 320 litre overpack drums, and

(iii) 1000 litre tote tanks or sacks;

(r) "cover" means soil or other approved material that is used to cover compacted wastes in a landfill cell;

(s) "day", when referring to sampling, means any sampling period of 24 consecutive hours;

(t) "decommissioning" means the dismantling and decontamination of the facility undertaken subsequent to the termination or abandonment of any activity or any part of any activity regulated under the Act, excluding the landfill cells and those infrastructure components and facilities that are required for the landfill post-closure;

(u) "decontamination" means the treatment or removal of substances from the facility and affected lands;

(v) "Director" means an employee of the Government of Alberta designated as a Director under the Act;

(w) "dismantling" means the removal of buildings, structures, process and pollution abatement equipment, vessels, storage facilities, material handling

TERMS AND CONDITIONS ATTACHED TO APPROVAL

facilities, railways, roadways, pipelines and any other installations that are being or have been used or held for or in connection with the facility;

(x) "DOC" means Dissolved Organic Carbon;

(y) "domestic wastewater" means wastewater that is the composite of liquid and water-carried wastes associated with the use of water for drinking, cooking, cleaning, washing, hygiene, sanitation or other domestic purposes, together with any infiltration and inflow wastewater, that is released into a wastewater collection system;

(z) "domestic wastewater system" means the parts of the facility that collect, store, or treat domestic wastewater from the facility;

(aa) "existing landfill cells" means Cell 1, Cell 2, Cell 3A, Cell 3B, and Cell 3C as described in application No. 005-10348;

(bb) "facility" means all buildings, structures, process and pollution abatement equipment, vessels, storage facilities, material handling facilities, roadways, railways, pipelines and other installations, the Class I and Class II industrial landfill and the HWRSP Facility, and includes the land, located on the SE 1/4 of Section 9, Township 50, Range 17, West of the 4th Meridian, that is being or has been used or held for or in connection with the Ryley Industrial Waste Management Facility;

(cc) "facility developed area" means the areas of the facility used for the storage, treatment, processing, transport, or handling of raw material, intermediate product, by-product, finished product, process chemicals, or waste material, and includes the active landfill area;

(dd) "final cover" means a designed system, natural or man-made, that is placed on the surface of a landfill or landfill cell that has reached its maximum designated waste elevation to control transmission of moisture and landfill gas, and conforms to the end use plan;

(ee) "final landfill closure" means the period of time when waste is no longer placed in the defined portion of a landfill and activities are undertaken to complete the final cover system and decommission components and facilities that are no longer required, and includes the construction of any additional components or monitoring systems that are necessary for post-closure;

(ff) "free liquids" means the liquids as determined by the US EPA SW-846 Test Method 9095B: Paint Filter Liquids Test, as specified in Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, US EPA Publication No. SW-846, as amended;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(gg) "fugitive emissions" means emissions of substances to the atmosphere other than ozone depleting substances, originating from a facility source other than a flue, vent, or stack but does not include sources which may occur due to breaks or ruptures in process equipment;

(hh) "GCL" means geosynthetic clay liner that is made of a thin layer of bentonite either bonded to a geomembrane or fixed between two sheets of geotextile;

(ii) "geomembrane" means a sheet of manufactured synthetic material designed to control migration of liquid and gas;

(jj) "grab sample" means an individual sample collected in less than 30 minutes and which is representative of the substance sampled;

(kk) "groundwater" means groundwater as defined in the *Water Act,* R.S.A. 2000, c.W-3, as amended;

(ll) "groundwater monitoring well" means a well drilled at a site to measure groundwater levels and collect groundwater samples for the purpose of physical, chemical, or biological analysis to determine the concentration of groundwater constituents;

(mm) "HDPE" means High Density Polyethylene;

(nn) "HWRSP Facility" means the Hazardous Waste/Recyclable Storage and Processing Facility as described in the application for storage, processing and transfer of hazardous wastes and hazardous recyclables and which includes the Maintenance Shop, and is an integral part of the facility;

(oo) "hydraulic conductivity" means the ease with which water can be transported through a material

(pp) "hydrocarbon" means a chemical compound that consists entirely of hydrogen and carbon;

(qq) "ISO/IEC 17025" means the international standard, developed and published by International Organization for Standardization (ISO), specifying management and technical requirements for laboratories;

(rr) "incompatible waste" means waste materials which could cause dangerous reactions from direct contact with one another;

(ss) "industrial wastewater" means the composite of liquid wastes and water-carried wastes, any portion of which results from any industrial process carried on at the HWRSP Facility;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(tt) "landfill" means the Class I and Class II industrial landfill as described in the application and which includes the waste stabilization area, and is an integral part of the facility;

(uu) "landfill cell" means a designed area of a landfill comprised of an excavation or earthen structure in which waste is enclosed;

(vv) "landfill cell closure" means the construction of a final cover for landfill cell including placement of previously conserved top soil and upper subsoil and re-vegetation as required for the intended future use of the landfill;

(ww) "landfill gas" means a mixture of gases generated by the microbial decomposition of and chemical reactions between wastes in a landfill;

(xx) "lateral expansion" means an expansion of landfill cell boundaries beyond the approved area;

(yy) "leachate" means a liquid that has been in contact with waste in the landfill cell and has undergone chemical or physical changes;

(zz) "leachate collection system" means a system that gathers leachate so that it may be removed from a landfill, and includes a permeable drainage material, a network of perforated pipes and sumps or manholes from where leachate can be removed;

(aaa) "leak detection liquid" means any liquid collected within the leak detection system;

(bbb) "leak detection system" means a system that gathers liquid between a primary liner and a secondary liner system, and consists of a permeable drainage material, a network of perforated pipes and sumps or manholes from where the liquid can be removed;

(ccc) "liner" means a continuous layer of synthetic material or compacted natural clay placed beneath and at the sides of a landfill cell that is compatible with the waste and restricts the migration of leachate, or landfill gas, or both;

(ddd) "local environmental authority" means the Department of Environment and Parks, in the Province of Alberta, or the agency that has the equivalent responsibilities for any jurisdiction outside the Province;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(eee) "major ions" means the following:

Calcium	Carbonate
Magnesium	Bicarbonate
Sodium	Chloride
Potassium	Sulfate

(fff) "maximum acceptable leachate head" means the maximum depth of leachate above the lowest part of the primary liner, not including the sumps or leachate collection pipe trenches, and is:

(i) 1.0 m in each of the existing landfill cells, and

(ii) 0.3 m in each of the new landfill cells

during active landfill life, landfill cell closure, final landfill closure, and post-closure;

(ggg) "maximum designated waste elevation" means the maximum elevation of waste in metres above sea level that can be disposed of at the landfill prior to construction of final cover, and is 714 metres;

(hhh) "metals" means the following:

Aluminum, dissolved	Chromium, dissolved (hexavalent)	Nickel, dissolved
Antimony, dissolved	Cobalt, dissolved	Selenium, dissolved
Arsenic, dissolved	Copper, dissolved	Silver, dissolved
Barium, dissolved	Lead, dissolved	Thallium, dissolved
Boron, dissolved	Manganese, dissolved	Tin, dissolved
Cadmium, dissolved	Mercury, total	Uranium, dissolved
Chromium, total	Molybdenum, dissolved	Zinc, dissolved

(iii) "monitoring system" means all equipment used for sampling, conditioning, analyzing or recording data in respect of any parameter listed or referred to in this approval, including equipment used for continuous monitoring;

(jjj) "month" means calendar month;

(kkk) "municipal solid waste" means solid waste resulting from or incidental to municipal, community, commercial, institutional and recreation activities, and includes garbage, rubbish, ashes, street cleanings, abandoned automobiles and all other solid wastes except hazardous waste, industrial solid waste, oilfield waste and biomedical wastes;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(lll) "new landfill cells" means Cell 3D as described in application No. 005-10348, Cell 3E as described in application No. 012-10348, and Cell 4 as described in the application;

(mmm) "new surface water detention pond" means the surface water detention pond as described in application No. 012-10348;

(nnn) "NORM" means Naturally Occurring Radioactive Materials;

(ooo) "NORM waste" means any waste material with concentrations of NORM above the limits specified in Tables 5.1, 5.2, or 5.3 of the *Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM)*, Health Canada, 2011, as amended;

(ppp) "nutrients" means the following:

Ammonia nitrogen	Nitrite nitrogen
Total Kjeldahl nitrogen	Total phosphorus
Nitrate nitrogen	Dissolved phosphorus

(qqq) "old surface water detention pond" means the surface water detention pond as described in application No. 005-10348;

(rrr) "Petroleum Hydrocarbons Fractions F1 and F2" means the specific hydrocarbon fraction measured by the analytical methods described in the *Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method,* published by the Canadian Council of Ministers of the Environment, 2001, as amended;

(sss) "points of compliance" means the location or locations of the groundwater monitoring wells where measurements of groundwater quality are taken to assess landfill and waste treatment performance;

(ttt) "post-closure" means the period of time after completion of the final landfill closure;

(uuu) "ppm" means concentration in parts per million;

(vvv) "primary liner" means the uppermost geomembrane liner;

(www) "QA/QC" means quality assurance and quality control;

(xxx) "quarter year" means a time period of three consecutive months designated as January, February and March; or April, May and June; or July, August and September; or October, November and December;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(yyy) "regulations" means the regulations enacted pursuant to the Act, as amended;

(zzz) "representative grab" means a sample consisting of equal volume portions of water collected from at least four sites between 0.20 to 0.30 metres below the water surface within a pond;

(aaaa) "runoff" means any rainwater or melt water that drains as surface flow from the facility developed areas, excluding leachate;

(bbbb) "runoff control system" means the parts of the facility that collect, store or treat runoff from the facility, and includes but is not limited to runoff collection ditches, surface water detention pond(s) and tank farm bermed area;

(cccc) "run-on" means any rainwater or melt water that drains as surface flow toward the active landfill area;

(dddd) "run-on control system" means the parts of the facility that divert run-on away from the active landfill area;

(eeee) "scrubber exhaust stack" means the exhaust stack through which the air effluent streams that are:

(i) collected from the exhaust vents of the Drum Processing Building or Staging Building or both, and

(ii) treated with the caustic scrubber and activated carbon filter

are released to the atmosphere as described in the application;

(ffff) "secondary liner" means the lowermost geomembrane liner;

(gggg) "soil" means mineral or organic earthen materials that can, have, or are being altered by weathering, biological processes, or human activity;

(hhhh) "SOP" means Standard Operating Procedures;

(iiii) "storm event" means a 1 in 25 year, 24 hour duration rainfall event at Ryley, Alberta;

(jjjj) "tank" means a stationary device, designed to contain an accumulation of a substance, which is constructed primarily of non-earthen materials that provide structural support including wood, concrete, steel, and plastic;

(kkkk) "TDGR" means the *Transportation of Dangerous Goods Regulations* (SOR/2001-286) made under the *Transportation of Dangerous Goods Act*, 1992 (Canada), as amended;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(llll) "TDS" means Total Dissolved Solids;

(mmmm) "topsoil" means the uppermost layer of soil and consists of:

(i) the A-horizons and all organic horizons as defined in *The Canadian System of Soil Classification* (Third Edition), Agriculture and Agri-Food Canada, Publication 1646, 1998, as amended, and

(ii) the soil ordinarily moved during tillage;

(nnnn) "TSS" means Total Suspended Solids;

(oooo) "upper subsoil" means the layer of soil directly below the topsoil layer that consists of the B-horizons as defined in *The Canadian System of Soil Classification,* (Third Edition), Agriculture and Agri-Food Canada, Publication 1646, 1998, as amended;

(pppp) "volume estimate" means a technical evaluation based on the sources contributing to the release including but not limited to pump capabilities, water meters, and batch release volumes;

(qqqq) "waste stabilization area" means the portion of the landfill that is used for waste stabilization or solidification or both, as described in application no. 008-10348;

(rrrr) "waste storage area" means the areas designated for storage of containers for waste or hazardous recyclable or both, or for storage of tanks for waste or hazardous recyclable or both, or for storage of both, as described in application No. 005-10348;

(ssss) "week" means any consecutive 7-day period;

(tttt) "working face" means that portion of the active landfill area where waste is currently being deposited, spread and compacted; and

(uuuu) "year" means calendar year.

PART 2: GENERAL

SECTION 2.1: REPORTING

2.1.1 The approval holder shall immediately report to the Director by telephone any contravention of the terms and conditions of this approval at 1-780-422-4505.

2.1.2 The approval holder shall submit a written report to the Director within 7 days of the reporting pursuant to 2.1.1.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

2.1.3 The approval holder shall immediately notify the Director in writing if any of the following events occurs:

(a) the approval holder is served with a petition into bankruptcy;

(b) the approval holder files an assignment in bankruptcy or Notice of Intent to make a proposal;

(c) a receiver or receiver-manager is appointed;

(d) an application for protection from creditors is filed for the benefit of the approval holder under any creditor protection legislation; or

(e) any of the assets which are the subject matter of this approval are seized for any reason.

2.1.4 If the approval holder monitors for any substances or parameters which are the subject of operational limits as set out in this approval more frequently than is required and uses procedures authorized in this approval, then the approval holder shall provide the results of such monitoring as an addendum to the reports required by this approval.

2.1.5 The approval holder shall submit all monthly reports required by this approval to be compiled or submitted to the Director on or before the end of the month following the month in which the information was collected, unless otherwise specified in this approval.

2.1.6 The approval holder shall submit all annual reports required by this approval to be compiled or submitted to the Director on or before March 31 of the year following the year in which the information was collected, unless otherwise specified in this approval.

SECTION 2.2: RECORD KEEPING

2.2.1 The approval holder shall:

(a) record; and

(b) retain

all the following information in respect of any sampling conducted or analyses performed in accordance with this approval for a minimum of ten years, unless otherwise authorized in writing by the Director:

(i) the place, date and time of sampling,

(ii) sample type,

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(iii) the dates the analyses were performed,

(iv) the analytical techniques, methods or procedures used in the analyses,

(v) the names of the persons who collected and analysed each sample, and

(vi) the results of the analyses.

2.2.2 The approval holder shall keep and maintain an Operating Record of the landfill as per 4.6.34(a) until the end of the landfill post-closure.

2.2.3 The Operating Record referred to in 2.2.2 shall include, at a minimum, all of the following information:

(a) the information required in section 7.3(c) of the *Standards for Landfills in Alberta*, as amended;

(b) the name and contact information of all persons who discover any contravention;

(c) the names and contact information of all persons who take any remedial actions arising from the contravention of the Act, the regulations, or this approval; and

(d) a description of the remedial measures taken in respect of a contravention of the Act, the regulations, or this approval.

2.2.4 The approval holder shall submit a copy of the most recent Operating Record to the Director upon written request from the Director within the timeline specified in writing by the Director.

SECTION 2.3: ANALYTICAL REQUIREMENTS

2.3.1 With respect to any sample required to be taken pursuant to this approval, the approval holder shall ensure that:

(a) collection;

(b) preservation;

(c) storage;

(d) handling; and

(e) analysis

TERMS AND CONDITIONS ATTACHED TO APPROVAL

shall be conducted in accordance with the following unless otherwise authorized in writing by the Director:

(i) for air:

(A) the *Alberta Stack Sampling Code*, Alberta Environment, 1995, as amended,

(B) the *Methods Manual for Chemical Analysis of Atmospheric Pollutants*, Alberta Environment, 1993, as amended, and

(C) the *Air Monitoring Directive*, Alberta Environment, 1989, as amended;

(ii) for industrial wastewater, industrial runoff, groundwater and domestic wastewater:

(A) the *Standard Methods for the Examination of Water and Wastewater*, published jointly by the American Public Health Association, American Water Works Association, and the Water Environment Federation, 1998, as amended;

(iii) for whole effluent toxicity tests:

(A) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout*, Environment Canada, Environmental Protection Series 1/RM/13, December 2000, as amended,

(B) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia Magna*, Environment Canada, Environmental Protection Series 1/RM/14, December 2000, as amended,

(C) the *Biological Test Method: Growth Inhibition Test Using the Freshwater Alga Selenastrum capricornutum*, Environment Canada, Environmental Protection Series, November 1992, as amended,

(D) the *Biological Test Method: Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia*, Environment Canada, Environmental Protection Series 1/RM/21, February 1992, as amended,

(E) the *Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows*, Environment Canada,

TERMS AND CONDITIONS ATTACHED TO APPROVAL

Environmental Protection Series 1/RM/22, February 1992, as amended, and

(F) the *Biological Test Method: Toxicity Test Using Luminescent Bacteria (Photobacterium phosphoreum)*, Environment Canada, Environmental Protection Series, 1/RM/24, November 1992, as amended;

(iv) for soil:

(A) the *Soil Monitoring Directive,* Alberta Environment, May 2009, as amended, and

(B) the *Soil Quality Criteria Relative to Disturbance and Reclamation*, Alberta Agriculture, March 1987, as amended; and

(v) for waste:

(A) the *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, USEPA, SW-846, September 1986, as amended,

(B) the *Methods Manual for Chemical Analysis of Water and Wastes*, Alberta Environmental Centre, Vegreville, Alberta, 1996, AECV96-M1, as amended,

(C) the *Toxicity Characteristic Leaching Procedure (TCLP)* USEPA Regulation 40 CFR261, Appendix II, Method No. 1311, as amended, or

(D) the *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, American Water Works Association, and the Water Environment Federation, 2010, as amended.

2.3.2 The approval holder shall analyse all samples that are required to be obtained by this approval in a laboratory accredited pursuant to ISO/IEC 17025, as amended, for the specific parameter(s) to be analysed, unless otherwise authorized in writing by the Director.

2.3.3 The term sample used in 2.3.2 does not include samples directed to continuous monitoring equipment, unless specifically required in writing by the Director.

2.3.4 The approval holder shall comply with the terms and conditions of any written authorization issued by the Director under 2.3.2.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

SECTION 2.4: OTHER

2.4.1 The terms and conditions of this approval are severable. If any term or condition of this approval or the application of any term or condition is held invalid, the application of such term or condition to other circumstances and the remainder of this approval shall not be affected thereby.

2.4.2 Any conflict between the *Standards for Landfills in Alberta*, as amended, and the terms and conditions of this approval shall be resolved in favour of this approval.

2.4.3 *Environmental Protection and Enhancement Act* Approval No. 10348-02-00, as amended, is cancelled.

2.4.4 All tanks shall conform to the *Guidelines for Secondary Containment for Above Ground Storage Tanks,* Alberta Environmental Protection, 1997, as amended, unless otherwise authorized in writing by the Director.

2.4.5 All above ground storage tanks containing liquid hydrocarbons or organic compounds shall conform to the *Environmental Guidelines for Controlling Emissions of Volatile Organic Compounds from Aboveground Storage Tanks*, Canadian Council of Ministers of the Environment, PN 1180, 1995, as amended.

PART 3: CONSTRUCTION

SECTION 3.1: LANDFILL

3.1.1 The approval holder shall not commence construction of Cell 4 unless and until updated financial security of the facility has been provided to include Cell 4 lateral expansion.

3.1.2 The approval holder shall construct each new Class I industrial landfill cell in such a way that each new Class I landfill cell shall consist of the following components, at a minimum, unless otherwise authorized in writing by the Director:

(a) a minimum of 0.45 metre thick cover of clean sand or soil placed over top of the uppermost drainage layer;

(b) a composite liner that consists of, at a minimum:

(i) a GCL liner placed in direct contact with an underlying 80 mil HDPE geomembrane liner as a primary liner;

(ii) a GCL liner placed in direct contact with an underlying 80 mil HDPE geomembrane liner as a secondary liner; and

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(iii) a GCL liner placed in direct contact with an underlying clay liner that has:

(A) a minimum thickness of 1.0 metre at all points, measured perpendicular to the slope, and

(B) been compacted to achieve an in-place hydraulic conductivity of 1×10^{-9} m/s or less;

(c) a leachate collection system that:

(i) is placed over the primary liner;

(ii) is capable of maintaining the maximum acceptable leachate head; and

(iii) consists of:

(A) a geo-composite drainage layer with a transmissivity of at least 1×10^{-4} m^2/s placed over top of the primary liner,

(B) a network of perforated leachate collection pipes, and

(C) a leachate collection sump placed over the primary liner;

(d) a leak detection system that:

(i) is installed over the secondary liner;

(ii) is capable of detecting the leakage through the primary liner; and

(iii) consists of:

(A) a geo-composite drainage layer with a transmissivity of at least 1×10^{-4} m^2/s placed over top of the secondary liner,

(B) a network of perforated leak detection liquid collection pipes, and

(C) a leak detection liquid collection sump placed over the secondary liner;

(e) a final cover:

(i) that meets the requirements in section 6.1(c) of the *Standards for Landfills in Alberta*, as amended; or

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(ii) as specified in the Landfill Cell Closure Plan submitted by the approval holder and authorized in writing by the Director pursuant to 7.1.1 and 7.1.4;

(f) a run-on control system capable of preventing flow onto the active landfill area from at least the peak discharge from a 1 in 25 year, 24 hour duration storm event at the facility; and

(g) a runoff control system capable of collecting and controlling at least the runoff volume resulting from a 1 in 25 year, 24 hour duration storm event at the facility.

3.1.3 The composite liner for the landfill shall be constructed on a foundation or base such that there shall be no failure of the liners due to settlement, compression, or uplift.

3.1.4 The approval holder shall submit to the Director the following plans and specifications for the proposed construction of each of the items listed in 3.1.2, signed and stamped by a professional registered with APEGA at least three (3) months prior to construction:

(a) a Detailed Construction Plan and Specifications prepared as per 3.1.2;

(b) a Construction Quality Assurance Plan; and

(c) a Construction Quality Control Plan.

3.1.5 If the Detailed Construction Plan and Specifications in 3.1.4 is found deficient by the Director, the approval holder shall correct all deficiencies as outlined in writing by the Director within the timeline specified in writing by the Director.

3.1.6 The approval holder shall implement the Detailed Construction Plan and Specifications in 3.1.4 as authorized in writing by the Director.

3.1.7 During construction of any of the items listed in 3.1.2, the approval holder shall not deviate from the Detailed Construction Plan and Specifications as authorized in writing by the Director in 3.1.6, unless the following conditions are met:

(a) the deviation results in a minor adjustment to the Detailed Construction Plan and Specifications in order to suit field conditions encountered; and

(b) the deviation will result in an equivalent or better design performance of the landfill.

3.1.8 The approval holder shall submit to the Director a summary report of the Construction Quality Assurance and Construction Quality Control results signed and stamped by a professional registered with APEGA.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

3.1.9 The summary report in 3.1.8 shall contain the following information, at a minimum:

(a) confirmation that the landfill has been constructed according to:

(i) the Construction Quality Assurance Plan,

(ii) the Construction Quality Control Plan, and

(iii) the Detailed Construction Plan and Specifications as authorized in writing by the Director in 3.1.6, subject to the deviations as per 3.1.7;

(b) description of any minor deviations as per 3.1.7;

(c) confirmation by the professional registered with APEGA, that deviations as per 3.1.7 will result in an equivalent or better design performance of the landfill;

(d) "as-built" plans;

(e) photo-documentation of important stages of construction including any repair work or remediation activities to establish or maintain liner integrity; and

(f) any other information as required in writing by the Director.

3.1.10 The approval holder shall notify the Director in writing at least fourteen (14) days prior to commencing operations of any new landfill cell.

3.1.11 The approval holder shall construct the off-loading area (tipping area) as described in the application, unless otherwise authorized in writing by the Director.

3.1.12 The approval holder shall manage landfill progression in such a manner as to minimize off-site visual impacts of the landfill, as described in the Landfill Cell Closure Plan submitted by the approval holder and authorized in writing by the Director pursuant to 7.1.1 and 7.1.4.

SECTION 3.2: WASTE STABILIZATION AREA

3.2.1 The approval holder shall construct the waste stabilization area in accordance with the following:

(a) application No. 008-10348; and

(b) within a Class I landfill cell;

unless otherwise authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

SECTION 3.3: SOIL CONSERVATION

3.3.1 The approval holder shall:

(a) salvage; and

(b) conserve

all topsoil for land reclamation of the landfill.

3.3.2 The approval holder shall:

(a) salvage; and

(b) conserve

all upper subsoil for land reclamation of the landfill.

3.3.3 The approval holder shall:

(a) conserve; and

(b) stockpile

all topsoil separately from the upper subsoil.

3.3.4 The approval holder shall place all:

(a) topsoil stockpiles; and

(b) upper subsoil stockpiles

at the landfill.

3.3.5 The approval holder shall stockpile all topsoil as follows:

(a) on stable foundations; and

(b) on undisturbed topsoil.

3.3.6 The approval holder shall stockpile all upper subsoil as follows:

(a) on stable foundations; and

(b) on areas where the topsoil has been removed.

3.3.7 The approval holder shall take all steps necessary to prevent any erosion (e.g., wind or water), including but not limited to, all of the following:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(a) revegetating the stockpiles; and

(b) any other steps authorized in writing by the Director.

3.3.8 The approval holder shall immediately suspend conservation of:

(a) topsoil; and

(b) upper subsoil

when:

(i) wet or frozen conditions will result in mixing, loss, degradation or compaction of topsoil or upper subsoil, or

(ii) high wind velocities, any other field conditions or facility operations will result in mixing, loss, or degradation of topsoil or upper subsoil.

3.3.9 The approval holder shall recommence conservation of:

(a) topsoil; and

(b) upper subsoil

only when conditions in 3.3.8 no longer exist.

PART 4: OPERATIONS, LIMITS, MONITORING AND REPORTING

SECTION 4.1: GENERAL

4.1.1 The approval holder shall maintain the geographical boundaries of the landfill to that located within SE 1/4 of Section 9, Township 50, Range 17, West of the 4th Meridian, as described in the application.

4.1.2 The approval holder shall limit the waste elevation of the landfill to no more than the maximum designated waste elevation.

4.1.3 The approval holder shall restrict access to the facility to only personnel authorized by the approval holder.

4.1.4 The approval holder shall maintain a publicly available 24 hour "HOTLINE" number for a prompt response during an emergency.

4.1.5 The approval holder shall:

(a) operate; and

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(b) maintain the integrity of

the following waste management facilities at the facility:

(i) the HWRSP Facility;

(ii) the Class I and Class II industrial landfill, including:

(A) Class I landfill cells,

(B) Class II landfill cell(s), and

(C) waste stabilization area within a Class I landfill cell; and

(iii) waste storage area(s);

as described in the application.

4.1.6 In addition to 4.1.5, the approval holder shall:

(a) operate; and

(b) maintain the integrity of

the following infrastructure components at the facility:

(i) the composite liner;

(ii) the leachate collection system,

(iii) the leak detection system,

(iv) the run-on control system,

(v) the runoff control system,

(vi) the groundwater monitoring wells,

(vii) the weigh scale, and

(viii) the site access control;

as described in the application.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

FACILITY AUDIT

4.1.7 The approval holder shall cause the facility to be audited by an independent third-party environmental consultant or organization to assess compliance with the terms and conditions of this approval:

(a) at least once every three years; and

(b) commencing on or before October 1, 2018 for the first audit.

4.1.8 The approval holder shall submit the audit report required in 4.1.7 in the Annual Landfill Operations Report as required in 4.6.58(c).

4.1.9 The requirements in 4.1.7 and 4.1.8 shall not relieve the approval holder of any duty under the Act, or its associated regulations, or this approval.

SECTION 4.2: AIR

OPERATIONS

4.2.1 The approval holder shall not release any air effluent streams to the atmosphere except as authorized by this approval.

4.2.2 The approval holder shall only release air effluent streams to the atmosphere from the following sources:

(a) the scrubber exhaust stack;

(b) the Drum Processing Building natural gas fired air make up unit exhaust vent;

(c) the Staging Building natural gas fired air make up unit exhaust vent;

(d) the Administration Building natural gas fired furnaces exhaust vents;

(e) the Laboratory fume hood and natural gas fired air make up unit exhaust vents;

(f) the Maintenance Shop equipment and natural gas fired Radiant Heater exhaust vents;

(g) the Leachate Collection Tanks natural gas fired heaters exhaust vents;

(h) the leachate transfer lines passive gas vents; and

(i) any other source authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.2.3 The approval holder shall not operate any process equipment unless and until the pollution abatement equipment associated with the corresponding process equipment is:

(a) operational; and

(b) operating.

4.2.4 The approval holder shall treat all air effluent streams from the exhaust vents of the Drum Processing or Staging or both Buildings with a caustic scrubber and an activated carbon filter before directing the air effluent streams to the scrubber exhaust stack for release to the atmosphere while:

(a) hazardous waste or hazardous recyclables or both are being processed;

(b) hazardous waste or hazardous recyclables or both are being transferred; or

(c) containers of hazardous waste or hazardous recyclables or both are open

in the Drum Processing or Staging or both Buildings.

4.2.5 The approval holder shall control fugitive emissions and any source not specified in 4.2.2 in accordance with 4.2.6 of this approval unless otherwise authorized in writing by the Director.

4.2.6 With respect to fugitive emissions and any source not specified in 4.2.2, the approval holder shall not release a substance or cause to be released a substance that causes or may cause any of the following:

(a) impairment, degradation or alteration of the quality of natural resources;

(b) material discomfort, harm or adverse effect to the well being or health of a person; or

(c) harm to property or to vegetative or animal life.

4.2.7 The approval holder shall not burn any debris by means of an open fire unless authorized in writing by the Director.

4.2.8 If the approval holder receives complaints of offensive odours, or fugitive dust, or both, beyond the facility boundaries, the approval holder shall:

(a) conduct the following to reduce the release of those odours, or fugitive dust, or both by:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(i) placing restrictions on types, or volumes, or both, of the wastes being handled or processed or deposited that are causing those odours, or fugitive dust, or both,

(ii) increasing the frequency of cover placement, or modifying waste handling activities, or performing both, at the landfill,

(iii) modifying waste handling activities at the HWRSP Facility, or

(iv) performing any combination of the above; and

(b) activate the Odour and Fugitive Dust Response Program as specified in the Landfill Operations Plan 4.6.34(j).

LIMITS

4.2.9 The approval holder shall maintain the pH of the scrubbing liquid of the caustic scrubber referred to in 4.2.4 at 8.0 or higher.

4.2.10 The approval holder shall replace activated carbon in the activated carbon filter referred to in 4.2.4 immediately when the concentration of total petroleum hydrocarbons in the air effluent streams released from the scrubber exhaust stack to the atmosphere exceeds 25 ppm.

MONITORING AND REPORTING

4.2.11 The approval holder shall monitor, daily at a minimum, the pH of the scrubbing liquid of the caustic scrubber referred to in 4.2.4.

4.2.12 The approval holder shall monitor, weekly at a minimum, the air effluent streams released from the scrubber exhaust stack, using a portable total petroleum hydrocarbon analyzer while:

(a) hazardous waste or hazardous recyclables or both are being processed;

(b) hazardous waste or hazardous recyclables or both are being transferred; or

(c) containers of hazardous waste or hazardous recyclables or both are open

in the Drum Processing or Staging or both Buildings.

4.2.13 The portable total petroleum hydrocarbon analyzer referred to in 4.2.12 shall:

(a) have a detection limit of 1 ppm or lower for total petroleum hydrocarbons;

(b) be located in a straight section of the scrubber exhaust stack, a minimum of one (1) metre downstream from the last flow disturbance; and

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(c) be calibrated regularly in accordance with the analyzer manufacturer's specifications.

4.2.14 The approval holder shall continue to implement the Ambient Air Monitoring Program as authorized in writing by the Director on June 24, 2009, unless and until otherwise authorized in writing by the Director pursuant to 4.2.18.

4.2.15 The approval holder shall submit to the Director the results of the Ambient Air Monitoring Program in 4.2.14 with the following reports:

(a) a Monthly Ambient Air Monitoring Report; and

(b) an Annual Ambient Air Monitoring Report

in accordance with the written authorization by the Director on June 24, 2009, unless and until otherwise authorized in writing by the Director pursuant to 4.2.18.

4.2.16 The approval holder shall submit:

(a) a revised Ambient Air Monitoring Program;

(b) revised reporting requirements, or

(c) both of the above

to the Director upon written request from the Director within the timeline specified in writing by the Director.

4.2.17 If the revised:

(a) Ambient Air Monitoring Program;

(b) reporting requirements; or

(c) both of the above

submitted pursuant to 4.2.16 is found deficient by the Director, the approval holder shall correct all deficiencies as outlined in writing by the Director within the timeline specified in writing by the Director.

4.2.18 The approval holder shall implement the revised:

(a) Ambient Air Monitoring Program;

(b) reporting requirements; or

(c) both of the above

TERMS AND CONDITIONS ATTACHED TO APPROVAL

submitted pursuant to 4.2.16 as authorized in writing by the Director within the timeline specified in writing by the Director.

SECTION 4.3: RUNOFF AND INDUSTRIAL WASTEWATER

OPERATIONS

4.3.1 The approval holder shall not release any substances from the facility to the surrounding watershed except as authorized by this approval.

4.3.2 The approval holder shall operate and maintain the integrity of:

(a) the run-on control system to prevent flow onto the active landfill area from at least the peak discharge from a 1 in 25 year, 24 hour duration storm event at the facility; and

(b) the runoff control system for the facility to collect and control at least the runoff volume resulting from a 1 in 25 year, 24 hour duration storm event at the facility.

4.3.3 All runoff from the facility developed area shall be directed to the runoff control system as described in:

(a) application No. 012-10348, prior to decommissioning and reclamation of the old surface water detention pond; and

(b) the application, after decommissioning and reclamation of the old surface water detention pond;

unless otherwise authorized in writing by the Director.

4.3.4 Prior to decommissioning and reclamation of the old surface water detention pond and subject to 4.3.7, the approval holder shall only make or permit a release from the old surface water detention pond:

(a) at the release point as designated in application No. 012-10348, which is:

(i) located in the south east corner of the old surface water detention pond, and

(ii) referred to as sampling location A1 in 4.3.11;

(b) through a pump and a release hose over the south berm into the drainage control ditch, east of the landfill access road, to the new surface water detention pond, under normal operating conditions; and

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(c) through a pump and a release hose over the south berm directly to the culvert under Highway 854, during periods of high runoff exceeding the holding capacity of the old surface water detention pond;

unless otherwise authorized in writing by the Director.

4.3.5 Subject to 4.3.7, the approval holder shall only make or permit a release from the new surface water detention pond:

(a) at the release point as designated in application No. 012-10348, which is:

(i) located in the north east corner of the new surface water detention pond, and

(ii) referred to as sampling location B1 in 4.3.11; and

(b) through a pump and a release hose over the east berm into the culvert under Highway 854;

unless otherwise authorized in writing by the Director.

4.3.6 The approval holder shall only dispose of industrial wastewaters, or specified runoff in TABLE 4.3-A, or both, by one or more of the following methods:

(a) to facilities holding a current Act authorization to accept such waste;

(b) to facilities approved by a local environmental authority outside of Alberta to accept such waste;

(c) to a disposal well approved by AER;

(d) as per 4.6.51; or

(e) as otherwise authorized in writing by the Director.

TABLE 4.3-A: SPECIFIED RUNOFF

SOURCES
Runoff that exceeds any of the limits for the parameters listed in TABLE 4.3-B.
Runoff for which the results of the parameters listed in TABLE 4.3-B are unavailable at the time that the runoff must be disposed of.
Runoff from within the tank farm bermed area.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

LIMITS

4.3.7 Releases of runoff from:

(a) the old surface water detention pond;

(b) the new surface water detention pond; or

(c) both ponds

to the surrounding watershed shall comply with the limits specified in TABLE 4.3-B.

4.3.8 Releases of runoff from within the tank farm bermed area to the old or new or both surface water detention ponds shall comply with the limits specified in TABLE 4.3-C.

TABLE 4.3-B: RUNOFF LIMITS FOR SURFACE WATER DETENTION POND

PARAMETER	LIMITS Maximum unless otherwise indicated
pH	6.0 – 9.5 pH units
COD	50 mg/L
TDS	2500 mg/L
TSS	25 mg/L
Ammonia (expressed as Nitrogen)	5 mg/L
Chloride	250 mg/L
Sodium	200 mg/L
Sulphate	500 mg/L
Oil or other substances	Not present in amounts sufficient to create a visible film or sheen
96-Hour Multiple Concentration Acute Lethality Test Using Rainbow Trout (*Oncorhynchus mykiss*)	50% or greater survival

TABLE 4.3-C: RUNOFF LIMITS FOR TANK FARM BERMED AREA

PARAMETER	LIMITS Maximum unless otherwise indicated
pH	6.0 – 9.5 pH units
COD	50 mg/L
TSS	25 mg/L
Ammonia (expressed as Nitrogen)	5 mg/L
Oil or other substances	Not present in amounts sufficient to create a visible film or sheen

TERMS AND CONDITIONS ATTACHED TO APPROVAL

MONITORING AND REPORTING

4.3.9 The approval holder shall monitor the runoff control system as required in TABLE 4.3-D, subject to 4.3.12.

4.3.10 The approval holder shall report to the Director the results of the runoff control system monitoring as required in TABLE 4.3-D, subject to 4.3.12.

4.3.11 For the purpose of TABLE 4.3-D:

(a) sampling location A1 is defined as the old surface water detention pond release point;

(b) sampling location A2 is defined as the old surface water detention pond;

(c) sampling location B1 is defined as the new surface water detention pond release point;

(d) sampling location B2 is defined as the new surface water detention pond; and

(e) sampling location C is defined as the tank farm bermed area.

4.3.12 The monitoring and reporting requirements in 4.3.9 and 4.3.10 for the old surface water detention pond (sampling locations A1 and A2) shall not apply after decommissioning and reclamation of the old surface water detention pond.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4.3-D: RUNOFF CONTROL SYSTEM MONITORING AND REPORTING

MONITORING				REPORTING	
Parameter	**Frequency**	**Sample Type**	**Sampling Location**	**Monthly**	**Annually**
Surface Water Detention Pond(s)				Monthly Runoff and Industrial Wastewater Report, for each month when release occurs	Annual Runoff and Industrial Wastewater Report
Flow (m^3/day)	Daily during release	Estimate	A1, B1		
pH	Once per batch release, prior to release	Representative Grab	A2, B2		
COD					
TDS					
TSS					
Ammonia (expressed as nitrogen)					
Chloride					
Sodium					
Sulphate					
Oil or other substances	Daily during release	Visual			
96-hour multiple concentration acute lethality test using rainbow trout (*oncorhynchus mykiss*)	Each month when release occurs, prior to release, for the first batch release of the month	Representative Grab			
48-hour static acute lethality test using *daphnia magna*					
Tank Farm Bermed Area					
Volume (m^3)	Total batch volume released	Estimate	C		
pH	Once per batch release, prior to release to the surface water detention pond(s)	Representative Grab			
COD					
TSS					
Ammonia (expressed as nitrogen)					
Oil or other substances		Visual			

4.3.13 The monitoring and reporting required in TABLE 4.3-D for the acute lethality tests shall comply with:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(a) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout*, Environment Canada, Environmental Protection Series 1/RM/13, December2000, as amended; and

(b) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia Magna*, Environment Canada, Environmental Protection Series 1/RM/14, December 2000, as amended.

4.3.14 The approval holder shall:

(a) treat any acute lethality test that deviates from the corresponding test method referred to in 4.3.13 as invalid; and

(b) repeat the test as soon as logistically possible.

4.3.15 In the event that less than 50% of the rainbow trout survived in the 100% concentration sample, the approval holder shall:

(a) implement a program immediately to identify the source of the toxicity; and

(b) submit to the Director within 90 days after the test result is available, a proposed program to reduce the toxicity of the runoff.

4.3.16 The approval holder shall submit the Monthly Runoff and Industrial Wastewater Report in TABLE 4.3-D to the Director.

4.3.17 The Monthly Runoff and Industrial Wastewater Report shall include, at a minimum, all of the following information:

(a) a monthly assessment of the monitoring results relative to the limits in TABLE 4.3-B;

(b) a monthly assessment of the monitoring results relative to the limits in TABLE 4.3-C;

(c) a monthly assessment of the performance of the:

(i) runoff control system,

(ii) pollution abatement equipment, and

(iii) monitoring equipment;

(d) a monthly summary of management and disposal of the:

(i) industrial wastewaters, and

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(ii) specified runoff

as per 4.3.6;

(e) a monthly summary of management and disposal of runoff in general;

(f) a monthly summary of runoff contraventions reported pursuant to 2.1.1; and

(g) any other information as required in writing by the Director.

4.3.18 The approval holder shall submit the Annual Runoff and Industrial Wastewater Report in TABLE 4.3-D to the Director.

4.3.19 The Annual Runoff and Industrial Wastewater Report shall include, at a minimum, all of the following information:

(a) an annual summary assessment of the monitoring results relative to the limits in TABLE 4.3-B;

(b) an annual summary assessment of the monitoring results relative to the limits in TABLE 4.3-C;

(c) an annual summary assessment of the performance of the:

(i) runoff control system,

(ii) pollution abatement equipment, and

(iii) monitoring equipment;

(d) an annual summary of management and disposal of the:

(i) industrial wastewaters, and

(ii) specified runoff

as per 4.3.6;

(e) an annual summary and evaluation of management and disposal of runoff in general;

(f) an annual summary of the results pursuant to 4.3.21;

(g) an annual summary of runoff contraventions reported pursuant to 2.1.1; and

(h) any other information as required in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.3.20 The approval holder shall:

(a) collect a representative grab sample from the old surface water detention pond at least once per year, prior to decommissioning and reclamation of the pond;

(b) collect a representative grab sample from the new surface water detention pond at least once per year; and

(c) analyze the sample(s) for all of the parameters specified in TABLE 4.3-E.

4.3.21 The approval holder shall submit the results of the analyses in 4.3.20 to the Director in the Annual Runoff and Industrial Wastewater Report.

TABLE 4.3-E: ANNUAL MONITORING OF SURFACE WATER DETENTION POND

PARAMETERS			
pH	TDS; TSS	Fluoride, dissolved	Phenols
Electrical conductivity	Metals	Cyanide (weak acid dissociable)	Total chlorinated phenols
COD	Major ions	BTEX	Polychlorinated biphenyls, total
DOC	Nutrients	Petroleum Hydrocarbons Fractions F1 and F2	Total organic halogens

SECTION 4.4: LEACHATE COLLECTION AND LEAK DETECTION

OPERATIONS

4.4.1 The approval holder shall only dispose of leachate removed from the leachate collection system by one or more of the following methods:

(a) to facilities holding a current Act authorization to accept such waste;

(b) to facilities approved by a local environmental authority outside of Alberta to accept such waste;

(c) to a disposal well approved by AER; or

(d) as per 4.6.51.

4.4.2 The approval holder shall only dispose of liquid removed from the leak detection system by one or more of the following methods:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(a) to facilities holding a current Act authorization to accept such waste;

(b) to facilities approved by a local environmental authority outside of Alberta to accept such waste;

(c) to a disposal well approved by AER; or

(d) as per 4.6.51.

LIMITS

4.4.3 Subject to 4.4.4, the approval holder shall not exceed the maximum acceptable leachate head in any landfill cell.

4.4.4 Subsequent to a storm event, the leachate head in any landfill cell shall not exceed the maximum acceptable leachate head for more than fourteen (14) days, unless otherwise authorized in writing by the Director.

4.4.5 The volume of liquid in the leak detection system, as monitored in TABLE 4.6-D, shall not exceed the action leakage rate in any landfill cell.

MONITORING AND REPORTING

4.4.6 The approval holder shall monitor the leachate collection and leak detection systems as required in TABLE 4.6-D and for all parameters specified in TABLE 4.4-A, subject to 4.4.8 and 4.4.9.

4.4.7 The approval holder shall report to the Director the results of the leachate collection and leak detection systems monitoring as required in TABLE 4.6-D, including the results of the analyses for all parameters specified in TABLE 4.4-A, subject to 4.4.8 and 4.4.9.

TABLE 4.4-A: LEACHATE AND LEAK DETECTION LIQUID MONITORING

PARAMETERS		
pH (field and laboratory)	TDS	Nutrients
Electrical conductivity (field and laboratory)	TSS	BTEX
COD	Metals	Phenols
DOC	Major Ions	Petroleum Hydrocarbons Fractions F1 and F2

4.4.8 The requirements in 4.4.6 and 4.4.7 for monitoring and reporting the parameters in TABLE 4.4-A for leachate shall not apply if insufficient leachate is available for conducting the analyses.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.4.9 The requirements in 4.4.6 and 4.4.7 for monitoring and reporting the parameters in TABLE 4.4-A for leak detection liquid shall not apply if insufficient leak detection liquid is available for conducting the analyses.

4.4.10 If the volume of liquid removed from the leak detection system exceeds the action leakage rate, in addition to reporting pursuant to 2.1.1, the approval holder shall submit a Response Action Plan to the Director within 30 days of the exceedance.

SECTION 4.5: DUGOUTS AND WATER WELLS IN SURROUNDING AREA

MONITORING AND REPORTING

4.5.1 The approval holder shall:

(a) collect a representative sample from:

(i) each of the dugouts, and

(ii) each of the water wells

within an approximate 1.6 kilometre radius around the facility; and

(b) analyze the sample for the parameters listed in TABLE 4.5-A;

unless the approval holder is not granted access by the landowner.

4.5.2 The monitoring required in 4.5.1 shall be conducted once each year in October unless otherwise authorized in writing by the Director.

4.5.3 The approval holder shall record the analytical results of the sampling information required in 4.5.1 in an Annual Dugout and Water Well Sampling Program Report.

4.5.4 The approval holder shall submit the Annual Dugout and Water Well Sampling Program Report to the Director pursuant to 4.6.58(i).

TABLE 4.5-A: DUGOUT AND WATER WELL MONITORING

PARAMETERS		
pH (field and laboratory)	TDS	Nutrients
Electrical conductivity (field and laboratory)	TSS	BTEX
COD	Metals	Phenols
DOC	Major Ions	Petroleum Hydrocarbons Fractions F1 and F2

TERMS AND CONDITIONS ATTACHED TO APPROVAL

SECTION 4.6: HWRSP FACILITY AND LANDFILL

GENERAL

4.6.1 The approval holder shall not:

(a) receive;

(b) process;

(c) dispose of; or

(d) perform any combination of the above for

any of the following wastes, individually or in any combination, at the places specified below respectively:

(i) explosives (Class 1 TDGR wastes), at the facility;

(ii) radioactive wastes (Class 7 TDGR wastes), at the facility;

(iii) radioactive wastes regulated under the *Nuclear Safety and Control Act* (Canada), at the facility;

(iv) biomedical waste, at the facility;

(v) waste containing free liquids, at the landfill, excluding the waste stabilization area;

(vi) material containing ozone depleting substances, at the landfill;

(vii) municipal solid waste, at the facility; and

(viii) NORM waste, at the facility.

4.6.2 Incompatible wastes and incompatible hazardous recyclables shall be prevented from mixing.

4.6.3 The approval holder shall dispose of wastes generated at the facility only:

(a) to facilities holding a current Act authorization;

(b) to facilities approved by a local environmental authority outside of Alberta; or

(c) as otherwise authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

HWRSP FACILITY

OPERATIONS PLAN

4.6.4 The approval holder shall:

(a) develop;

(b) keep up-to-date; and

(c) implement

an HWRSP Facility Operations Plan.

4.6.5 The approval holder shall:

(a) review the HWRSP Facility Operations Plan annually, at a minimum; and

(b) update the HWRSP Facility Operations Plan if any of the following circumstances apply:

(i) there are facility expansions or changes in site operations or equipment,

(ii) there is an applicable change to an applicable regulation, or

(iii) an update is required in writing by the Director.

4.6.6 The approval holder shall retain a copy of the most recent HWRSP Facility Operations Plan at the facility.

4.6.7 The approval holder shall submit a copy of the most recent HWRSP Facility Operations Plan to the Director upon written request from the Director within the timeline specified in writing by the Director.

4.6.8 If the HWRSP Facility Operations Plan submitted pursuant to 4.6.7 is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

4.6.9 The approval hold shall implement the latest HWRSP Facility Operations Plan, unless otherwise authorized in writing by the Director.

OPERATIONS

4.6.10 The approval holder shall only transfer wastes and hazardous recyclables at designated transfer areas designed to contain spills and leaks.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.6.11 The approval holder shall use the following when transferring substances to, from, and between containers, tanks, and trucks:

(a) couplings equipped with seals that are compatible with the substance transferred;

(b) the necessary precautions to prevent spills when the couplings are disconnected;

(c) emergency shut-off valves;

(d) established transfer areas and associated curbing, paving and catchment areas;

(e) drip trays to capture potential losses under coupling devices and other connections; and

(f) manual inspections of the transfer area for leaks and spills during and after waste transfer.

4.6.12 All wastes and all hazardous recyclables that are unloaded shall be immediately transferred to the waste storage area.

4.6.13 All containers and unrinsed empty containers shall be stored in the waste storage area.

4.6.14 The approval holder shall:

(a) provide and maintain an adequate aisle space between containers in the waste storage area to allow:

(i) inspection, and

(ii) unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment to any area of the waste storage area; and

(b) arrange inspection aisles in the waste storage area such that the identification label on each container is readable.

4.6.15 All tanks within the tank farm area shall be equipped, at a minimum, with all of the following:

(a) sensors for detecting the level in each tank;

(b) high level alarms that activate when a tank overfill is imminent;

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(c) automatic shut-off devices or sufficient free board space above the high level sensor to allow operators time to prevent overfill from occurring; and

(d) earthen dikes or equivalent secondary containment structures capable of containing 110% of the volume of the largest tank within the bermed area plus 10% of the aggregate capacity of all other tanks in the bermed area.

4.6.16 All tanks containing hazardous waste and all tanks containing hazardous recyclables in each building shall be equipped, at a minimum, with all of the following:

(a) sensors or gauges for detecting the level in each tank;

(b) a written operating procedure to prevent tank overfill; and

(c) secondary containment structures capable of containing 110% of the volume of the largest tank within the building plus 10% of the aggregate capacity of all other tanks containing hazardous waste and hazardous recyclables in the same building.

4.6.17 Hazardous waste and hazardous recyclables stored in containers and tanks shall be stored in accordance with the *Hazardous Waste Storage Guidelines*, June 1988, Alberta Environment, as amended.

4.6.18 The approval holder shall only carry out the following activities, individually or in any combination, at the HWRSP Facility in relation to hazardous waste or hazardous recyclables or both:

(a) commingling of hazardous waste or hazardous recyclables to make maximum use of available container or tank capacity, only if the resultant mixture has the same TDGR hazard classification as any one of the individual components;

(b) phase separation by gravity settling, only without the addition of any chemicals designed to accelerate settling;

(c) dispersion of solids into liquids by natural or mechanical means, only if the resultant mixture has the same TDGR hazard classification as the original waste;

(d) physical segregation of hazardous from non-hazardous articles or components from the same container, only if no process equipment is used;

(e) washing of drums or other objects, only for the purpose of removing hazardous residue;

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(f) crushing or shredding of used filters, rags, absorbent materials, or empty containers, only for the purpose of volume reduction or liquid recovery, unless otherwise authorized in writing by the Director; or

(g) treatment of hazardous waste, only as authorized in writing by the Director.

4.6.19 Notwithstanding 4.6.18(g), the approval holder shall not incinerate waste at the facility.

LIMITS

4.6.20 The approval holder shall not store a total of more than 752,500 litres of hazardous waste or hazardous recyclables or both at the HWRSP Facility at any time.

4.6.21 In addition to the storage limits in 4.6.20, the approval holder shall not exceed the waste storage limits as specified in TABLE 4.6-A.

TABLE 4.6-A: STORAGE LIMITS FOR HAZARDOUS WASTE OR HAZARDOUS RECYCLABLES OR BOTH AT HWRSP FACILITY

Waste/Recyclable Type	Material	Maximum Quantity
Containers: Hazardous waste or hazardous recyclables or both	TDGR Classification 2, 3, 4, 5, 6, 8 or 9 waste type only	512,500 litres (consisting of 2,500 drum equivalents, each 205 litre capacity)
Bulk Tanks: Hazardous waste or hazardous recyclables or both	Waste flammable liquids, used oil, or wastewaters; or TDGR Classification 3, 5, 6, 8 or 9 waste type only	240,000 litres (consisting of a total of 135 m^3 in the tank farm area, and a total of 105 m^3 inside the buildings)

4.6.22 Containers other than 205 litre drums shall be prorated to 205 litre drum equivalents based on their nominal volumes, e.g., 10 X 20 litre pails = 1 X 205 litre drum.

4.6.23 The limits referred to in 4.6.20 and 4.6.21 shall be calculated based on the:

(a) total nominal volumes of all containers, treating all partially filled containers as if they were full; and

(b) total filled capacities of all tanks.

MONITORING AND REPORTING

4.6.24 The approval holder shall:

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(a) identify;

(b) characterize; and

(c) classify

all waste streams and all hazardous recyclables, generated or received at the HWRSP Facility, not including runoff, industrial wastewater streams and air effluent streams in accordance with the:

(i) *Industrial Waste Identification and Management Options*, Alberta Environment, May 1996, as amended, and

(ii) *Alberta User Guide for Waste Managers*, Alberta Environment, August 1996, as amended.

4.6.25 The approval holder shall measure or, when not feasible to measure, estimate, the quantity of each waste and hazardous recyclable identified in 4.6.24 each year.

4.6.26 The approval holder shall keep a daily:

(a) total; and

(b) inventory

of all materials being stored at the HWRSP Facility.

4.6.27 The daily total and inventory records in 4.6.26 shall be available at the facility at all times for inspection by the Director or an inspector.

4.6.28 The approval holder shall submit a Monthly Waste Management Report to the Director.

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TABLE 4.6-B: MONTHLY WASTE INVENTORY REPORT (BY WASTE CLASS)

COMPANY NAME: _____ APPROVAL NO.: _____

REPORT PERIOD: MONTH _____ YEAR _____

CLASS	UNIT (Kg or L)	OPENING BALANCE	+ RECEIVED IN PROVINCE	+ RECEIVED OUT OF PROVINCE	- SHIPPED *		- ON-SITE DISPOSAL	+ or - ADJUSTMENT **	CLOSING BALANCE	APPROVAL LIMIT
					RECYCLING / PRODUCT	OFF-SITE DISPOSAL				
2										
3										
4										
5										
6.1										
8										
9.1										
9.2										
9.3										
PCB										
NR										
TOTAL										XXXXX
							No. of Containers On site			XXXXX
							Total Litres in Bulk Tanks			XXXXX

Name of Company Official: _____ Title: _____ Signature: _____

Report Date: _____

* Provide a list of the recycling and disposal locations.

** Identity the amount and reason for each adjustment.
Adjustments include consolidation/reclassification, losses to processing, spills, volume miscalculations, or any other circumstances, which would affect the mass balance of the monthly inventory report.

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4.6.29 The approval holder shall compile all of the information indicated in TABLE 4.6-B in the Monthly Waste Management Report which shall contain, at minimum, all of the following information:

(a) an opening waste and hazardous recyclables inventory balance in kilograms or litres by waste class or material type;

(b) the amount and type of waste and hazardous recyclables received:

(i) within the province, and

(ii) from outside the province;

(c) the amount and type of waste and hazardous recyclables:

(i) shipped for recycling or product,

(ii) shipped off-site for disposal, and

(iii) disposed on-site;

(d) any adjustments, including but not limited to, consolidation, reclassification, losses to processing, spills, volume miscalculations, or any other circumstances, which would affect the mass balance of the monthly inventory report;

(e) closing balance in kilograms or litres;

(f) a summary of contraventions reported pursuant to 2.1.1 related to waste and hazardous recyclables; and

(g) any other information as required in writing by the Director.

4.6.30 The approval holder shall compile all the information required by 4.6.24 and 4.6.25 in an Annual Waste Management Summary Report:

(a) as specified in TABLE 4.6-C; and

(b) in accordance with the:

(i) *Industrial Waste Identification and Management Options*, Alberta Environment, May 1996, as amended, and

(ii) *Alberta User Guide for Waste Managers*, Alberta Environment, August 1996, as amended.

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TABLE 4.6-C: ANNUAL WASTE MANAGEMENT SUMMARY

Waste or Hazardous Recyclable Name	Uniform Waste Code				Quantity (kg or L)		Stored	Recycled		Disposed	
	WC	PIN	Class	Mgmt	Hazardous	Non-hazardous	On-site	On-site	Off-site	On-site	Off-site
TOTAL											

4.6.31 The approval holder shall submit the Annual Waste Management Summary Report to the Director.

LANDFILL

OPERATIONS PLAN

4.6.32 The approval holder shall:

(a) develop;

(b) keep up-to-date; and

(c) implement

a Landfill Operations Plan that does not contravene with the requirements of this approval.

4.6.33 The approval holder shall:

(a) review the Landfill Operations Plan annually, at a minimum; and

(b) update the Landfill Operations Plan if any of the following circumstances apply:

(i) there are facility expansions or changes in site operations or equipment,

(ii) there is an applicable change to the *Standards for Landfills in Alberta,* as amended,

(iii) an update is required in writing by the Director, or

(iv) there is an update to an applicable regulation.

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4.6.34 The Landfill Operations Plan shall include, at a minimum, all of the following:

(a) SOP for keeping and maintaining an Operating Record;

(b) SOP for waste control, run-on and runoff controls, and nuisance controls;

(c) SOP for the waste stabilization area operations;

(d) SOP for the acceptance, handling and disposal of wastes, including;

(i) waste characterization and classification at source,

(ii) waste manifesting and tracking,

(iii) QA/QC waste acceptance procedures, and

(iv) waste sampling;

(e) SOP for detecting, preventing and disposal of unauthorized wastes;

(f) SOP for placing waste in a landfill cell including;

(i) working face width,

(ii) lift depth,

(iii) compaction, and

(iv) waste placement location using a grid system;

(g) SOP for managing contaminated sulphur and sulphur containing wastes;

(h) SOP for managing asbestos wastes;

(i) SOP for placing leachate, leak detection liquid, or other authorized wastes and liquids over the surface of the active landfill area for the purpose of evaporation or dust suppression;

(j) an Odour and Fugitive Dust Response Program;

(k) a Fugitive Dust and Odour Best Management Plan;

(l) a runoff and industrial wastewater monitoring and management program;

(m) a leachate monitoring and management program;

(n) a leak detection liquid monitoring and management program;

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(o) a groundwater monitoring program;

(p) a Remediation Plan to deal with groundwater quality deterioration;

(q) a soil monitoring program;

(r) a soil management program;

(s) a landfill cell cover system;

(t) a monitoring and maintenance program for the scale house and heavy operational equipment;

(u) a health and safety program;

(v) an emergency response program, including SOP for handling fires, substance releases to the environment, and health concerns; and

(w) an up-to-date plan of the landfill layout with survey records showing the location of all infrastructure components of the landfill including final cover elevations and contours.

4.6.35 The approval holder shall retain a copy of the most recent Landfill Operations Plan at the facility.

4.6.36 The approval holder shall submit to the Director the most recent Landfill Operations Plan when requested in writing by the Director within the timeline specified in writing by the Director.

4.6.37 The approval holder shall correct all deficiencies in the Landfill Operations Plan submitted pursuant to 4.6.36, as outlined in writing by the Director, within the timeline specified in writing by the Director.

4.6.38 The approval holder shall implement the latest Landfill Operations Plan, unless otherwise authorized in writing by the Director.

OPERATIONS

4.6.39 The approval holder shall classify all materials entering the landfill in accordance with the:

(a) *Waste Control Regulation (AR 192/96)*;

(b) *Industrial Waste Identification and Management Options*, Alberta Environment, May 1996, as amended; and

(c) *Alberta User Guide for Waste Managers*, May 1995, as amended.

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4.6.40 The approval holder shall obtain a detailed representative physical and chemical analysis of a waste prior to disposal of the waste into the landfill at the following times, at a minimum:

(a) the first time a waste is received from a new generator;

(b) the first time a delivery is received from a different process associated with a known waste generator;

(c) the first time a waste is received from a different location associated with a known waste generator; and

(d) when the nature or composition of the waste that was previously characterized by the generator changes.

4.6.41 The approval holder shall not dispose of hazardous waste in any Class II landfill cell.

4.6.42 The approval holder shall:

(a) only carry out waste stabilization or solidification or both within the waste stabilization area; and

(b) not transfer waste from the waste stabilization area to the Class I landfill cell before the waste stabilization or solidification or both have completed.

4.6.43 The approval holder shall only dispose of any liquid collected within the waste stabilization area by one or more of the following methods:

(a) to facilities holding a current Act authorization to accept such waste;

(b) to facilities approved by a local environmental authority outside of Alberta to accept such waste;

(c) to a disposal well approved by AER; or

(d) as otherwise authorized in writing by the Director.

4.6.44 The approval holder shall conduct:

(a) annually, in-house visual inspections for corrosion; and

(b) biennially, ultrasonic testing to monitor thickness

of the steel plate liner of the stabilization pits in the waste stabilization area, unless otherwise authorized in writing by the Director.

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4.6.45 The approval holder shall dispose of asbestos wastes in accordance with *"Guidelines for the Disposal of Asbestos Waste"*, Environmental Protection Services, Alberta Environment, 1989, as amended.

4.6.46 The approval holder shall dispose of sulphur waste in accordance with *"Guidelines for Landfill Disposal of Sulphur Wastes and Remediation of Sulphur Containing Soils"*, Alberta Environment, 2011, as amended.

4.6.47 The approval holder shall only dispose of wastes that the landfill is not authorized to dispose of:

(a) to facilities holding a current Act authorization;

(b) to facilities approved by a local environmental authority outside of Alberta; or

(c) as otherwise authorized in writing by the Director.

4.6.48 If an unauthorized waste is received at the landfill, the approval holder shall remove the waste from the landfill within seven (7) days of the receipt, unless otherwise authorized in writing by the Director.

4.6.49 The approval holder shall restrict the working face of each landfill cell to the smallest practical area.

4.6.50 For any waste disposed of at the landfill that is subject to wind dispersal, the approval holder shall:

(a) wet the waste to prevent dispersal of particulate matter; or

(b) immediately apply cover on top of the waste to minimize entrainment of particulate matter.

4.6.51 Notwithstanding 4.6.1(v), the approval holder may place any of the following wastes over the surface of the active landfill area for the purpose of dust suppression:

(a) specified runoff;

(b) leachate;

(c) leak detection liquid;

(d) sump waste of car wash bays or similar operations;

(e) waste from hydrovac excavation operations; or

(f) any other waste authorized by t*he Alberta User Guide for Waste Managers*, May 1995, as amended;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

provided that placement of such wastes will not cause offensive odours.

4.6.52 The approval holder shall inspect the landfill, at a minimum:

(a) weekly; and

(b) immediately after each storm event to:

(i) detect evidence of deterioration of any infrastructure components, including the composite liner,

(ii) detect any malfunction or improper operation of the run-on and runoff control systems, leachate collection system, or leak detection system, and

(iii) take corrective measures to repair any damage to infrastructure components, including the composite liner.

4.6.53 The approval holder shall:

(a) keep a record of inspections conducted pursuant to 4.6.52;

(b) have the record of inspections available for review upon written request from the Director; and

(c) immediately report any deficiencies detected by the inspection in 4.6.52 to the Director in writing along with any corrective measures taken or proposed.

4.6.54 The approval holder shall not stockpile waste exceeding the maximum designated waste elevation of the landfill for a period of more than two (2) weeks, unless otherwise authorized in writing by the Director.

4.6.55 The approval holder shall take all practical measures to prevent off-site tracking of waste from vehicles and equipment leaving the facility.

MONITORING AND REPORTING

4.6.56 The approval holder shall monitor the landfill operations as required in TABLE 4.6-D.

4.6.57 The approval holder shall report to the Director the results of the landfill operations monitoring as required in TABLE 4.6-D.

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TABLE 4.6-D: LANDFILL OPERATIONS MONITORING AND REPORTING REQUIREMENTS

MONITORING AND REPORTING				
Parameter	**Frequency**	**Sample Type**	**Sampling Location**	**Reporting**
Quantity and type of waste received	Continuously, When operating	Measured or estimated	At entrance to landfill	Annual Landfill Operations Report
Quantity and type of material removed	Continuously, when operating	Measured or estimated	At entrance to landfill	
General location of waste deposited	Continuously, when operating	As per survey, or using grid system	At active landfill area, or survey coordinates	
Leachate head	at least: - once every three working days; - after storm event; and - immediately prior to leachate removal	Calculated	At primary leachate collection system sumps for existing landfill Cell 1	
		Measured	At primary leachate collection system sumps for all other landfill cells	
Leachate analysis, as per TABLE 4.4-A	At least once every quarter year, unless insufficient sample volume is available	Grab sample	At each primary leachate collection system sump	
Volume of leachate removed from the leachate collection system	As removed	Measured or calculated	At leachate collection system sumps	
Leak detection liquid analysis, as per TABLE 4.4-A	At least once every quarter year, unless insufficient sample volume is available	Grab sample	At each leak detection system sump	
Volume of leak detection liquid removed from the leak detection system	At least once every working day, as removed	Measured or calculated	At leak detection system sumps	
Final cover	When final cover is applied	Final cover by survey cores or test pits or both	On each completed landfill cell	

4.6.58 The Annual Landfill Operations Report required in TABLE 4.6-D shall include, at a minimum, all of the following:

(a) the name and contact information of the person responsible for the facility;

(b) a summary of all information collected as required in TABLE 4.6-D;

(c) a summary of the results of any audit conducted in accordance with 4.1.7;

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(d) a summary of the operations of the waste stabilization area;

(e) a summary of the performance of the run-on and runoff control systems, including a comparison to the limits in TABLES 4.3-B and 4.3-C;

(f) a summary of the performance of the leachate collection system, including a comparison to the maximum acceptable leachate head;

(g) a summary of the performance of the leak detection system, including a comparison to the action leakage rate limit;

(h) the Response Action Plan for the leak detection system pursuant to 4.4.10;

(i) the Annual Dugout and Water Well Sampling Program Report pursuant to 4.5.4;

(j) a summary of all revisions to the Landfill Operations Plan pursuant to 4.6.33(b);

(k) any groundwater remedial action taken pursuant to 4.6.34(p);

(l) a summary of records of landfill inspections pursuant to 4.6.53;

(m) a summary of:

  (i) operational issues encountered,

  (ii) emergencies occurred, and

  (iii) measures or actions taken;

(n) a summary of records of:

  (i) public complaints, and

  (ii) the approval holder's responses;

(o) an up-to-date financial security estimate pursuant to 5.1.2;

(p) an updated site development plan showing the status of the landfill progression at the end of the operating year, including but not limited to:

  (i) contour mapping,

  (ii) the location of active and inactive disposal areas,

  (iii) areas where a final cover has been placed, and

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(iv) the location of new landfill cell(s) constructed;

(q) the Annual Landfill Cell Closure Report pursuant to 7.1.7;

(r) a summary of contraventions reported pursuant to 2.1.1 related to landfill operations; and

(s) any other information as required in writing by the Director.

4.6.59 The approval holder shall submit the Annual Landfill Operations Report to the Director.

SECTION 4.7: DOMESTIC WASTEWATER

OPERATIONS

4.7.1 The approval holder shall not release any substances from the domestic wastewater system to the surrounding watershed except as authorized by this approval.

4.7.2 The approval holder shall direct all domestic wastewater to the domestic wastewater system.

4.7.3 The approval holder shall only dispose of substances from the domestic wastewater system:

(a) to facilities holding a current Act authorization;

(b) to facilities approved by a local environmental authority outside of Alberta; or

(c) as otherwise authorized in writing by the Director.

SECTION 4.8: WATERWORKS

Not used at this time.

SECTION 4.9: GROUNDWATER

MONITORING

4.9.1 The approval holder shall continue to implement the existing Groundwater Monitoring Program as authorized in writing by the Director, unless and until otherwise authorized in writing by the Director pursuant to 4.9.4.

4.9.2 The approval holder shall submit a revised Groundwater Monitoring Program to the Director on or before September 30, 2017, unless otherwise authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.9.3 If the revised Groundwater Monitoring Program submitted pursuant to 4.9.2 is found deficient by the Director, the approval holder shall correct all deficiencies as outlined in writing by the Director within the timeline specified in writing by the Director.

4.9.4 The approval holder shall implement the revised Groundwater Monitoring Program submitted pursuant to 4.9.2 as authorized in writing by the Director within the timeline specified in writing by the Director.

4.9.5 The approval holder shall:

(a) collect a representative groundwater sample from each of the groundwater monitor wells specified in the Groundwater Monitoring Program, including the groundwater monitoring wells designated as points of compliance; and

(b) analyze each sample for the parameters listed in TABLE 4.9-A.

TABLE 4.9-A: GROUNDWATER MONITORING PROGRAM

PARAMETERS	
pH	Metals
Electrical conductivity	Major ions
COD	Nutrients
DOC	BTEX
TDS	Petroleum Hydrocarbons Fractions F1 and F2

4.9.6 The monitoring required in 4.9.5 shall be conducted at the following frequencies, unless otherwise authorized in writing by the Director:

(a) a minimum of once per year during each of the active landfill life, landfill cell closure, final landfill closure, and post-closure periods; and

(b) a minimum of four times per year following detection of leachate constituents in groundwater at levels above those specified in 4.9.7, and until the levels specified in 4.9.7 have been met.

4.9.7 The groundwater quality in the monitoring wells, designated as points of compliance in the Groundwater Monitoring Program, shall not exceed the higher of:

(a) the objectives established in the water quality objectives in the *Canadian Environmental Quality Guidelines (CEQG)* for drinking water published by the Canadian Council of Ministers of the Environment (CCME), as amended; or

(b) background groundwater chemistry as determined through a statistical analysis, as a derived alternate groundwater performance standard.

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4.9.8 The approval holder shall implement the Remediation Plan as specified in the Landfill Operations Plan, when groundwater quality exceeds the groundwater performance criteria in 4.9.7.

4.9.9 The samples extracted from the groundwater monitor wells shall be collected using scientifically acceptable purging, sampling and preservation procedures so that a representative groundwater sample is obtained.

4.9.10 The approval holder shall:

(a) protect from damage; and

(b) keep locked except when being sampled

all groundwater monitoring wells unless otherwise authorized in writing by the Director.

4.9.11 If a representative groundwater sample cannot be collected because the groundwater monitoring well is damaged or is no longer capable of producing a representative groundwater sample, the approval holder shall:

(a) clean, repair or replace the groundwater monitoring well; and

(b) collect and analyse a representative groundwater sample prior to the next scheduled sampling event;

unless otherwise authorized in writing by the Director.

4.9.12 In addition to the sampling information recorded in 2.2.1, the approval holder shall record the following sampling information for all groundwater samples collected:

(a) a description of purging and sampling procedures;

(b) the static elevations above sea level, and depth below ground surface of fluid phases in the groundwater monitoring well prior to purging;

(c) the temperature of each sample at the time of sampling;

(d) the pH of each sample at the time of sampling; and

(e) the specific conductance of each sample at the time of sampling.

4.9.13 The approval holder shall carry out remediation of the groundwater in accordance with the following:

(a) *Alberta Tier 1 Soil and Groundwater Remediation Guidelines*, Alberta Environment, February 2009, as amended; and

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(b) *Alberta Tier 2 Soil and Groundwater Remediation Guidelines*, Alberta Environment, February 2009, as amended.

REPORTING

4.9.14 The approval holder shall compile an Annual Groundwater Monitoring Program Report which shall include, at a minimum, all of the following information:

(a) a completed *Record of Site Condition Form*, Alberta Environment, 2009, as amended;

(b) a legal land description of the facility and a map illustrating the facility boundaries;

(c) a topographic map of the facility;

(d) a description of the industrial activity and processes;

(e) a map showing the location of all surface and groundwater users, and a listing describing surface water and water well use details, within at least a 1.6 kilometre radius of the facility;

(f) a general hydrogeological characterization of the region within a five kilometre radius of the facility;

(g) a detailed hydrogeological characterization of the facility, including an interpretation of groundwater flow patterns;

(h) cross-sections showing depth to water table, patterns of groundwater movement and hydraulic gradients at the facility;

(i) borehole logs and completion details for groundwater monitoring wells;

(j) a map showing locations of all known buried channels within at least five kilometre of the facility;

(k) a map of surface drainage within the facility and surrounding area to include nearby water bodies;

(l) a map of groundwater monitoring well locations and a table summarizing the existing groundwater monitoring program for the facility;

(m) a summary of any changes to the groundwater monitoring program made since the last groundwater monitoring report;

(n) analytical data recorded as required in 4.9.5 and 4.9.11(b);

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(o) a summary of fluid elevations recorded as required in 4.9.12(b) and an interpretation of changes in fluid elevations;

(p) an interpretation of QA/QC program results;

(q) an interpretation of all the data in this report, including the following:

  (i) diagrams indicating the location and extent of any contamination,

  (ii) a description of probable sources of contamination, and

  (iii) a site map showing the location and type of current and historical potential sources of groundwater contamination;

(r) a summary and interpretation of the data collected since the groundwater monitoring program began including:

  (i) control charts which indicate trends in concentrations of parameters, and

  (ii) the migration of contaminants;

(s) a description of the following:

  (i) contaminated groundwater remediation techniques employed,

  (ii) source elimination measures employed,

  (iii) risk assessment studies undertaken, and

  (iv) risk management studies undertaken;

(t) a proposed sampling schedule for the following year(s);

(u) a description of any contaminant remediation, risk assessment or risk management action conducted at the facility; and

(v) recommendations for:

  (i) changes to the groundwater monitoring program to make it more effective, and

  (ii) remediation, risk assessment or risk management of contamination identified.

4.9.15 The approval holder shall submit the Annual Groundwater Monitoring Program Report to the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.9.16 If the Annual Groundwater Monitoring Program Report is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director, within the timeline specified in writing by the Director.

SECTION 4.10: SOIL

4.10.1 In addition to any other requirements specified in this approval, the approval holder shall conduct all of the following activities related to soil monitoring and soil management required by this approval in accordance with the *Soil Monitoring Directive,* Alberta Environment, 2009, as amended:

(a) designing and developing proposals for the Soil Monitoring Program;

(b) designing and developing proposals for the Soil Management Program;

(c) all other actions, including sampling, analysing, and reporting, associated with the Soil Monitoring Program; and

(d) all other actions, including sampling, analysing and reporting, associated with the Soil Management Program.

MONITORING AND REPORTING

4.10.2 The approval holder shall submit the Soil Monitoring Program proposal to the Director according to the following schedule:

(a) for the first soil monitoring event on or before January 31, 2019; and

(b) for the second soil monitoring event on or before January 31, 2024;

unless otherwise authorized in writing by the Director.

4.10.3 If any Soil Monitoring Program proposal is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

4.10.4 Subject to 4.10.3, the approval holder shall implement the Soil Monitoring Program as authorized in writing by the Director.

4.10.5 If an authorization or a deficiency letter is not issued within 120 days of the applicable date required by 4.10.2, the approval holder shall implement the Soil Monitoring Program:

(a) in accordance with the program as set out in the proposal submitted by the approval holder; and

(b) within 270 days after the applicable date required by 4.10.2.

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4.10.6 The approval holder shall submit to the Director each Soil Monitoring Program Report obtained from the soil monitoring referred to in 4.10.4 and 4.10.5 according to the following schedule:

(a) for the first Soil Monitoring Program Report on or before January 31, 2020; and

(b) for the second Soil Monitoring Program Report on or before January 31, 2025;

unless otherwise authorized in writing by the Director.

4.10.7 If any Soil Monitoring Program Report is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

SOIL MANAGEMENT PROGRAM

4.10.8 If the Soil Monitoring Program, or any other soil monitoring, reveals that there are substances present in the soil at concentrations greater than any of the applicable concentrations set out in the standards in the *Soil Monitoring Directive*, Alberta Environment, 2009, as amended, the approval holder shall develop a Soil Management Program Proposal.

4.10.9 If a Soil Management Program Proposal is required pursuant to 4.10.8, the approval holder shall submit a Soil Management Program Proposal to the Director according to the following schedule:

(a) for Soil Management Program Proposal that is triggered by the findings from the first soil monitoring event on or before the date in 4.10.6(a);

(b) for Soil Management Program Proposal that is triggered by the findings from a second soil monitoring event on or before the date in 4.10.6(b); or

(c) for any other soil monitoring event not specified in this approval within six months of completion of the soil monitoring event.

4.10.10 If any Soil Management Program Proposal is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

4.10.11 The approval holder shall implement the Soil Management Program as authorized in writing by the Director.

4.10.12 If the approval holder is required to implement a Soil Management Program pursuant to 4.10.11, the approval holder shall submit a written Soil Management Program

TERMS AND CONDITIONS ATTACHED TO APPROVAL

Report to the Director on or before March 31 of each year following the year in which the information was collected.

4.10.13 If any Soil Management Program Report is found deficient by the Director, the approval holder shall correct all deficiencies identified by the Director by the date specified in writing by the Director.

PART 5: FINANCIAL SECURITY REQUIREMENTS

5.1.1 The approval holder shall annually review and revise the cost estimate for reclamation of the facility including decommissioning and land reclamation.

5.1.2 The annual revised cost estimate for the facility shall be submitted to the Director by March 31 of each year.

5.1.3 The approval holder shall review and revise the cost estimate for reclamation of the facility when one or more of the following occurs:

(a) the cost estimate of future conservation and reclamation of the facility changes;

(b) the extent of the operation of the facility is increased or reduced;

(c) the facility or any portion of it is conserved and reclaimed;

(d) the conservation and reclamation plan required by this approval is changed; or

(e) the activities conducted at the facility for which security is required is increased or decreased.

5.1.4 The approval holder shall submit the revised cost estimate arising from 5.1.3 to the Director within 30 days after the occurrence of any of the circumstances described in 5.1.3.

5.1.5 The approval holder shall provide additional financial security as required in writing by the Director.

5.1.6 The approval holder shall renew the financial security for the facility at least 30 days prior to the date it expires.

5.1.7 The approval holder shall maintain the financial security for the facility until returned in accordance with the Act or the regulations.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PART 6: DECOMMISSIONING AND LAND RECLAMATION OF HWRSP FACILITY

SECTION 6.1: GENERAL

6.1.1 The approval holder shall apply for an amendment to this approval to reclaim the HWRSP Facility by submitting to the Director:

(a) a Decommissioning Plan; and

(b) a Land Reclamation Plan.

6.1.2 The approval holder shall submit the:

(a) Decommissioning Plan; and

(b) Land Reclamation Plan

referred to in 6.1.1 within six (6) months of the HWRSP Facility ceasing operation, except for repairs and maintenance, unless otherwise authorized in writing by the Director.

SECTION 6.2: DECOMMISSIONING

6.2.1 The Decommissioning Plan referred to in 6.1.1 shall include, at a minimum, all of the following:

(a) a plan for dismantling the HWRSP Facility;

(b) a comprehensive study to determine the nature, degree and extent of contamination at the HWRSP Facility and affected lands;

(c) a plan to manage all wastes at the HWRSP Facility;

(d) evaluation of remediation technologies proposed to be used at the HWRSP Facility and affected lands;

(e) a plan for decontamination of the HWRSP Facility and affected lands in accordance with the following:

(i) for soil or groundwater, *Alberta Tier 1 Soil and Groundwater Remediation Guidelines*, Alberta Environment, February 2009, as amended,

(ii) for soil or groundwater, *Alberta Tier 2 Soil and Groundwater Remediation Guidelines*, Alberta Environment, February 2009, as amended,

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(iii) for drinking water, *Canadian Environmental Quality Guidelines*, Canadian Council of Ministers of the Environment, PN 1299, 1999, as amended, and

(iv) for surface water, *Surface Water Quality Guidelines for Use in Alberta*, Alberta Environment, November 1999, as amended;

(f) confirmatory testing to indicate compliance with the remediation objectives;

(g) a plan for maintaining and operating contaminant monitoring systems;

(h) a schedule for activities (a) through (g) above; and

(i) any other information as required in writing by the Director.

6.2.2 If the Decommissioning Plan is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

SECTION 6.3: LAND RECLAMATION

6.3.1 The Land Reclamation Plan referred to in 6.1.1 shall include, at a minimum, all of the following:

(a) the final use of the reclaimed area and how equivalent land capability will be achieved;

(b) removal of infrastructure;

(c) restoration of drainage;

(d) soil replacement;

(e) erosion control;

(f) revegetation and conditioning of the HWRSP Facility including:

(i) species list, seed source and quality, seeding rates and methods,

(ii) fertilization rates and methods, and

(iii) wildlife habitat plans where applicable;

(g) reclamation schedule; and

(h) any other information as required in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

6.3.2 If the Land Reclamation Plan is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

PART 7: FINAL LANDFILL CLOSURE AND POST-CLOSURE

SECTION 7.1: LANDFILL CELL CLOSURE AND MAINTENANCE

7.1.1 The approval holder shall submit a Landfill Cell Closure Plan for individual landfill cell closure to the Director on or before September 30, 2017, unless otherwise authorized in writing by the Director.

7.1.2 The Landfill Cell Closure Plan submitted pursuant to 7.1.1 shall be signed and stamped by a professional registered with APEGA.

7.1.3 If the Landfill Cell Closure Plan submitted pursuant to 7.1.1 is found deficient by the Director, the approval holder shall correct all deficiencies as outlined in writing by the Director within the timeline specified in writing by the Director.

7.1.4 The approval holder shall implement the Landfill Cell Closure Plan submitted pursuant to 7.1.1 as authorized in writing by the Director.

7.1.5 The approval holder shall maintain the closed landfill cells to:

(a) protect and maintain the integrity of the final cover and surface water drainage systems;

(b) prevent erosion;

(c) prevent surface water ponding;

(d) remediate areas affected by subsidence and differential settlement; and

(e) prevent leachate break out.

7.1.6 If the approval holder completes landfill cell closure in a year, the approval holder shall prepare an Annual Landfill Cell Closure Report, and include, at a minimum, all of the following information in the Report:

(a) as-built plans and details on the location of landfill cells that have been closed;

(b) certified construction QA/QC procedures employed during cover construction and installation; and

(c) survey reports showing the final cover depths.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

7.1.7 The approval holder shall submit the Annual Landfill Cell Closure Report with the Annual Landfill Operations Report required in 4.6.58.

SECTION 7.2: FINAL LANDFILL CLOSURE AND POST-CLOSURE

7.2.1 The approval holder shall apply for an amendment to this approval for final landfill closure by submitting to the Director:

(a) a Detailed Final Landfill Closure Plan ; and

(b) a Landfill Post-Closure Plan.

7.2.2 The approval holder shall submit the:

(a) Detailed Final Landfill Closure Plan; and

(b) Landfill Post-Closure Plan

referred to in 7.2.1 within six (6) months of the landfill ceasing operations, unless otherwise authorized in writing by the Director.

DETAILED FINAL LANDFILL CLOSURE PLAN

7.2.3 The Detailed Final Landfill Closure Plan shall be developed in accordance with sections 6.1(b) and 6.1(c) of the *Standards for Landfills in Alberta*, as amended.

7.2.4 In addition to 7.2.3, the Detailed Final Landfill Closure Plan shall include, at a minimum, all of the following:

(a) a plan for replacement of soil;

(b) a QA/QC Program; and

(c) any deviations from the most recently submitted closure plan.

7.2.5 The Detailed Final Landfill Closure Plan shall be signed and stamped by a professional registered with APEGA.

7.2.6 If the Detailed Final Landfill Closure Plan is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

7.2.7 The approval holder shall implement the Detailed Final Landfill Closure Plan as authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

LANDFILL POST-CLOSURE PLAN

7.2.8 The Landfill Post-Closure Plan shall be developed in accordance with sections 6.2 and 6.3 of the *Standards for Landfills in Alberta*, as amended.

7.2.9 In addition to 7.2.8, the Landfill Post-Closure Plan shall include, at a minimum, all of the following:

(a) the groundwater monitoring program including performance standards and points of compliance;

(b) the subsurface landfill gas monitoring program and performance standards at points of compliance;

(c) a plan for erosion control;

(d) a plan for maintaining vegetative cover; and

(e) any other information requested in writing by the Director.

7.2.10 The Landfill Post-Closure Plan shall be signed and stamped by a professional registered with APEGA.

7.2.11 If the Landfill Post-Closure Plan is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

7.2.12 The approval holder shall implement the Landfill Post-Closure Plan as authorized in writing by the Director.

PART 8: DECOMMISSIONING AND LAND RECLAMATION OF OLD SURFACE WATER DETENTION POND

8.1.1 The approval holder shall:

(a) decommission; and

(b) reclaim

the old surface water detention pond prior to construction of Cell 4.

8.1.2 The approval holder shall submit a Decommissioning and Land Reclamation Plan for the old surface water detention pond to the Director a minimum of six (6) months prior to decommissioning and land reclamation of the pond.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

8.1.3 If the Decommissioning and Land Reclamation Plan is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

DATED March 31, 2017

DESIGNATED DIRECTOR UNDER THE ACT
Mohammad Habib, P. Eng.

APPENDIX B

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOENVIRONMENTAL

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by TETRA TECH during the performance of the work are TETRA TECH's professional work product and shall remain the copyright property of TETRA TECH.

The Professional Document is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by persons other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this report, at or on the development proposed as of the date of the Professional Document requires a supplementary investigation and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.

APPENDIX C

ALS CHEMICAL ANALYSIS REPORT

ALS Canada Ltd.

right solutions.
right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **EO2209060**	Page	: 1 of 7
Client	: **Tetra Tech Canada Inc.**	Laboratory	: Edmonton - Environmental
Contact	: Brent Finnestad	Account Manager	: Kieran Tordoff
Address	: North Building 14940 123 Ave NW Edmonton AB Canada T5V 1B4	Address	: 9450 - 17 Avenue NW Edmonton AB Canada T6N 1M9
Telephone	: 780-718-9317	Telephone	: +1 780 413 5227
Project	: SWM.SWOP04592-01	Date Samples Received	: 18-Oct-2022 15:43
PO	: ----	Date Analysis Commenced	: 19-Oct-2022
C-O-C number	: ----	Issue Date	: 02-Nov-2022 15:18
Sampler	: ----		
Site	: ----		
Quote number	: ----		
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*
Alex Drake	Lab Analyst	Inorganics, Edmonton, Alberta
Brandon Green	Lab Assistant	Metals, Edmonton, Alberta
Christian Murera	Lab Analyst	Organics, Edmonton, Alberta
Dan Nguyen	Team Leader - Inorganics	Metals, Edmonton, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Jessica Maitland	Lab Assistant	Inorganics, Edmonton, Alberta
Jing Liu	Lab Assistant	Inorganics, Edmonton, Alberta
Joan Wu	Lab Analyst	Metals, Edmonton, Alberta
Kari Mulroy	Lab Supervisor - Environmental	Organics, Edmonton, Alberta
Michelle Schroder	Lab Assistant	Inorganics, Edmonton, Alberta
Ping Yeung	Team Leader - Inorganics	Inorganics, Edmonton, Alberta
Ping Yeung	Team Leader - Inorganics	Metals, Edmonton, Alberta
Ryan Huynh	Lab Assistant	Inorganics, Edmonton, Alberta
Sobhithan Pillay		Inorganics, Edmonton, Alberta
Yan Zhang	Lab Analyst	Organics, Edmonton, Alberta

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
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

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

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

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

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Lysons D.1	Lysons D.2	Lysons D.3	Lysons D.4	Magneson D.3
					Client sampling date / time	18-Oct-2022 12:00	18-Oct-2022 12:20	18-Oct-2022 10:40	18-Oct-2022 11:10	18-Oct-2022 09:50
						EO2209060-001	EO2209060-002	EO2209060-003	EO2209060-004	EO2209060-005
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		96.5	91.8	182	174	158
solids, total suspended [TSS]	----	E160	3.0	mg/L		16.6	8.6	56.2	40.4	39.0
conductivity	----	E100	2.0	µS/cm		535	549	1240	1040	992
pH	----	E108	0.10	pH units		8.72	8.06	8.61	8.58	8.39
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		228	270	481	633	261
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		9.7	<1.0	15.6	17.2	3.4
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	2.0	mg/L		203	222	420	548	219
solids, total dissolved [TDS], calculated	----	EC103	1.0	mg/L		331	346	824	715	656
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0210	1.33	0.0994	0.134	0.0335
phosphorus, total	7723-14-0	E372-S	0.0010	mg/L		1.15	1.20	0.251	0.885	0.122
Kjeldahl nitrogen, total [TKN]	----	E318	0.200	mg/L		2.44	3.66	4.04	6.67	2.37
chloride	16887-00-6	E235.Cl	0.50	mg/L		24.2	21.6	26.5	20.2	12.9
fluoride	16984-48-8	E235.F	0.020	mg/L		0.201	0.233	0.876	0.707	0.825
nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L		<0.020	0.045	<0.020	<0.020	<0.020
nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L		<0.010	0.020	<0.010	<0.010	<0.010
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		30.4	22.6	200	3.80	252
nitrate + nitrite (as N)	----	EC235.N+N	0.0500	mg/L		<0.0500	0.0650	<0.0500	<0.0500	<0.0500
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		27.1	33.5	45.7	79.1	23.3
Ion Balance										
anion sum	----	EC101	0.10	meq/L		5.38	5.53	13.4	11.6	10.0
cation sum	----	EC101	0.10	meq/L		5.71	5.68	13.7	12.5	10.6
ion balance (APHA)	----	EC101	0.010	%		2.98	1.34	1.11	3.73	2.91
ion balance (cations/anions)	----	EC101	0.010	%		106	103	102	108	106
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0023	0.0049	0.0064	0.0145	0.0024
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00015	0.00014	0.00052	0.00052	0.00036

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Lysons D.1	Lysons D.2	Lysons D.3	Lysons D.4	Magneson D.3
					Client sampling date / time	18-Oct-2022 12:00	18-Oct-2022 12:20	18-Oct-2022 10:40	18-Oct-2022 11:10	18-Oct-2022 09:50
						EO2209060-001	EO2209060-002	EO2209060-003	EO2209060-004	EO2209060-005
						Result	Result	Result	Result	Result
Dissolved Metals										
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00591	0.00513	0.00575	0.0122	0.00256
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0286	0.0340	0.0423	0.0520	0.0954
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
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		0.056	0.050	0.033	0.045	0.084
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	<0.0000050	0.0000081	0.0000157	0.0000201
calcium, dissolved	7440-70-2	E421	0.050	mg/L		23.6	22.5	34.4	37.8	35.5
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		0.00057	0.00069	0.00136	0.00161	0.00028
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00044	0.00046	0.00280	0.00299	0.00121
iron, dissolved	7439-89-6	E421	0.030	mg/L		0.042	0.145	<0.030	0.121	<0.030
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	0.000076	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0103	0.0101	0.0213	0.0266	0.0498
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		9.12	8.64	23.4	19.4	16.8
manganese, dissolved	7439-96-5	E421	0.00500	mg/L		0.0169	0.162	0.00573	<0.00500	<0.00500
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		0.000992	0.000826	0.0103	0.00296	0.0434
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00338	0.00279	0.0136	0.0105	0.0171
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		0.972	1.16	0.108	0.654	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		17.4	19.7	24.4	32.4	14.6
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00166	0.00203	0.00109	0.00153	0.00167
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000256	0.000192	0.00100	0.000688	0.000414
silicon, dissolved	7440-21-3	E421	0.050	mg/L		<0.050	2.54	0.261	1.57	2.66
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		76.7	74.4	216	188	162
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.169	0.170	0.391	0.257	0.440
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		13.2	10.7	77.4	4.96	90.6
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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Lysons D.1	Lysons D.2	Lysons D.3	Lysons D.4	Magneson D.3
					Client sampling date / time	18-Oct-2022 12:00	18-Oct-2022 12:20	18-Oct-2022 10:40	18-Oct-2022 11:10	18-Oct-2022 09:50
						EO2209060-001	EO2209060-002	EO2209060-003	EO2209060-004	EO2209060-005
						Result	Result	Result	Result	Result
Dissolved Metals										
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	0.00062	0.00081	0.00200	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	0.00016
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000393	0.000342	0.00628	0.00227	0.00322
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00245	0.00210	0.00182	0.00652	0.00240
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0014	<0.0010	<0.0010	<0.0010	0.0012
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L		0.00044	0.00039	0.00123	0.00203	<0.00030
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-		Laboratory	Laboratory	Laboratory	Laboratory	Laboratory
Aggregate Organics										
chemical oxygen demand [COD]	----	E559-L	10	mg/L		95	87	125	236	74
phenols, total (4AAP)	----	E562	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Volatile Organic Compounds										
benzene	71-43-2	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
ethylbenzene	100-41-4	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
styrene	100-42-5	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
toluene	108-88-3	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
xylene, m+p-	179601-23-1	E611A	0.00040	mg/L		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
xylene, o-	95-47-6	E611A	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
xylenes, total	1330-20-7	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Hydrocarbons										
F1 (C6-C10)	----	E581.F1	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
F2 (C10-C16)	----	E601	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
F1-BTEX	----	EC580	0.100	mg/L		<0.100	<0.100	<0.100	<0.100	<0.100
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%		106	102	100	84.9	86.0
dichlorotoluene, 3,4-	97-75-0	E581.F1	1.0	%		99.4	113	112	110	100
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		85.1	87.1	84.1	84.9	82.7

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	Lysons D.1	Lysons D.2	Lysons D.3	Lysons D.4	Magneson D.3
					Client sampling date / time	18-Oct-2022 12:00	18-Oct-2022 12:20	18-Oct-2022 10:40	18-Oct-2022 11:10	18-Oct-2022 09:50
Analyte	CAS Number	Method	LOR	Unit		EO2209060-001	EO2209060-002	EO2209060-003	EO2209060-004	EO2209060-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds Surrogates										
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		102	103	82.4	106	104

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **EO2209060**	Page	: 1 of 20
Client	: **Tetra Tech Canada Inc.**	Laboratory	: Edmonton - Environmental
Contact	: Brent Finnestad	Account Manager	: Kieran Tordoff
Address	: North Building 14940 123 Ave NW Edmonton AB Canada T5V 1B4	Address	: 9450 - 17 Avenue NW Edmonton, Alberta Canada T6N 1M9
Telephone	: 780-718-9317	Telephone	: +1 780 413 5227
Project	: SWM.SWOP04592-01	Date Samples Received	: 18-Oct-2022 15:43
PO	: ----	Issue Date	: 02-Nov-2022 15:18
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: ----		
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				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Lysons D.1	E559-L	18-Oct-2022	----	----	----		24-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Lysons D.2	E559-L	18-Oct-2022	----	----	----		24-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Lysons D.3	E559-L	18-Oct-2022	----	----	----		24-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Lysons D.4	E559-L	18-Oct-2022	----	----	----		24-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Magneson D.3	E559-L	18-Oct-2022	----	----	----		24-Oct-2022	28 days	6 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid) Lysons D.1	E562	18-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	4 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid) Lysons D.2	E562	18-Oct-2022	22-Oct-2022	----	----		22-Oct-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
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
Lysons D.3	E562	18-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	4 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
Lysons D.4	E562	18-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	4 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
Magneson D.3	E562	18-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	4 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Lysons D.1	E298	18-Oct-2022	24-Oct-2022	----	----		25-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Lysons D.2	E298	18-Oct-2022	24-Oct-2022	----	----		25-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Lysons D.3	E298	18-Oct-2022	24-Oct-2022	----	----		25-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Lysons D.4	E298	18-Oct-2022	24-Oct-2022	----	----		25-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Magneson D.3	E298	18-Oct-2022	24-Oct-2022	----	----		25-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Lysons D.1	E235.Cl	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE Lysons D.2	E235.Cl	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Lysons D.3	E235.Cl	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Lysons D.4	E235.Cl	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Magneson D.3	E235.Cl	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Lysons D.1	E235.F	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Lysons D.2	E235.F	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Lysons D.3	E235.F	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Lysons D.4	E235.F	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Magneson D.3	E235.F	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC										
HDPE Lysons D.1	E235.NO3	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE Lysons D.2	E235.NO3	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE Lysons D.3	E235.NO3	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE Lysons D.4	E235.NO3	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE Magneson D.3	E235.NO3	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE Lysons D.1	E235.NO2	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE Lysons D.2	E235.NO2	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE Lysons D.3	E235.NO2	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE Lysons D.4	E235.NO2	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	3 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC										
HDPE										
Magneson D.3	E235.NO2	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Lysons D.1	E235.SO4	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Lysons D.2	E235.SO4	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Lysons D.3	E235.SO4	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Lysons D.4	E235.SO4	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Magneson D.3	E235.SO4	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Lysons D.1	E318	18-Oct-2022	31-Oct-2022	----	----		01-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Lysons D.2	E318	18-Oct-2022	31-Oct-2022	----	----		01-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Lysons D.3	E318	18-Oct-2022	31-Oct-2022	----	----		01-Nov-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				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Lysons D.4	E318	18-Oct-2022	31-Oct-2022	----	----		01-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Magneson D.3	E318	18-Oct-2022	31-Oct-2022	----	----		01-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.001 mg/L)										
Amber glass total (sulfuric acid) Lysons D.1	E372-S	18-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	11 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.001 mg/L)										
Amber glass total (sulfuric acid) Lysons D.2	E372-S	18-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	11 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.001 mg/L)										
Amber glass total (sulfuric acid) Lysons D.3	E372-S	18-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	11 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.001 mg/L)										
Amber glass total (sulfuric acid) Lysons D.4	E372-S	18-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	11 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.001 mg/L)										
Amber glass total (sulfuric acid) Magneson D.3	E372-S	18-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	11 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Lysons D.1	E509	18-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Lysons D.2	E509	18-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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) Lysons D.3	E509	18-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Lysons D.4	E509	18-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Magneson D.3	E509	18-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) Lysons D.1	E421	18-Oct-2022	23-Oct-2022	----	----		24-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) Lysons D.2	E421	18-Oct-2022	23-Oct-2022	----	----		24-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) Lysons D.3	E421	18-Oct-2022	23-Oct-2022	----	----		24-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) Lysons D.4	E421	18-Oct-2022	23-Oct-2022	----	----		24-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) Magneson D.3	E421	18-Oct-2022	23-Oct-2022	----	----		24-Oct-2022	180 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Lysons D.1	E581.F1	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	14 days	2 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 PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Lysons D.2	E581.F1	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	14 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Lysons D.3	E581.F1	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	14 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Lysons D.4	E581.F1	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	14 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Magneson D.3	E581.F1	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	14 days	2 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) Lysons D.1	E601	18-Oct-2022	20-Oct-2022	14 days	2 days	✓	21-Oct-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) Lysons D.2	E601	18-Oct-2022	20-Oct-2022	14 days	2 days	✓	21-Oct-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) Lysons D.3	E601	18-Oct-2022	20-Oct-2022	14 days	2 days	✓	21-Oct-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) Lysons D.4	E601	18-Oct-2022	21-Oct-2022	14 days	3 days	✓	22-Oct-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) Magneson D.3	E601	18-Oct-2022	21-Oct-2022	14 days	3 days	✓	22-Oct-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				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 (lab preserved) Lysons D.1	E358-L	18-Oct-2022	29-Oct-2022	3 days	11 days	× EHT	29-Oct-2022	28 days	0 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (lab preserved) Lysons D.2	E358-L	18-Oct-2022	29-Oct-2022	3 days	11 days	× EHT	29-Oct-2022	28 days	0 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (lab preserved) Lysons D.3	E358-L	18-Oct-2022	29-Oct-2022	3 days	11 days	× EHT	29-Oct-2022	28 days	0 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (lab preserved) Lysons D.4	E358-L	18-Oct-2022	29-Oct-2022	3 days	11 days	× EHT	29-Oct-2022	28 days	0 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (lab preserved) Magneson D.3	E358-L	18-Oct-2022	29-Oct-2022	3 days	11 days	× EHT	29-Oct-2022	28 days	0 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Lysons D.1	E290	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Lysons D.2	E290	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Lysons D.3	E290	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Lysons D.4	E290	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	14 days	2 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 : Alkalinity Species by Titration										
HDPE Magneson D.3	E290	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE Lysons D.1	E100	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Physical Tests : Conductivity in Water										
HDPE Lysons D.2	E100	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Physical Tests : Conductivity in Water										
HDPE Lysons D.3	E100	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	28 days	1 days	✓
Physical Tests : Conductivity in Water										
HDPE Lysons D.4	E100	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE Magneson D.3	E100	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	28 days	2 days	✓
Physical Tests : pH by Meter										
HDPE Lysons D.1	E108	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	0.25 hrs	1.28 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Lysons D.2	E108	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	0.25 hrs	1.28 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Lysons D.3	E108	18-Oct-2022	19-Oct-2022	----	----		19-Oct-2022	0.25 hrs	1.28 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE Lysons D.4	E108	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	0.25 hrs	3.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Magneson D.3	E108	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	0.25 hrs	3.25 hrs	× EHTR-FM
Physical Tests : TSS by Gravimetry										
HDPE Lysons D.1	E160	18-Oct-2022	----	----	----		24-Oct-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Lysons D.2	E160	18-Oct-2022	----	----	----		24-Oct-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Lysons D.3	E160	18-Oct-2022	----	----	----		24-Oct-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Lysons D.4	E160	18-Oct-2022	----	----	----		24-Oct-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Magneson D.3	E160	18-Oct-2022	----	----	----		24-Oct-2022	7 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Lysons D.1	E611A	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	14 days	2 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Lysons D.2	E611A	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	14 days	2 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 : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Lysons D.3	E611A	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	14 days	2 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Lysons D.4	E611A	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	14 days	2 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Magneson D.3	E611A	18-Oct-2022	20-Oct-2022	----	----		20-Oct-2022	14 days	2 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	703997	2	21	9.5	5.0	✓
Ammonia by Fluorescence	E298	711934	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	705101	1	5	20.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	705102	1	5	20.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	710970	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	704066	1	20	5.0	5.0	✓
Conductivity in Water	E100	703998	2	33	6.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	707419	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	710312	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	721525	2	24	8.3	5.0	✓
Fluoride in Water by IC	E235.F	704065	1	10	10.0	5.0	✓
Nitrate in Water by IC	E235.NO3	704062	1	10	10.0	5.0	✓
Nitrite in Water by IC	E235.NO2	704063	1	10	10.0	5.0	✓
pH by Meter	E108	703999	2	29	6.9	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	710007	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	704064	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	723015	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.001 mg/L)	E372-S	720352	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	711895	2	38	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	703997	2	21	9.5	5.0	✓
Ammonia by Fluorescence	E298	711934	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	705101	1	5	20.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	705102	1	5	20.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	706638	2	40	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	710970	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	704066	1	20	5.0	5.0	✓
Conductivity in Water	E100	703998	2	33	6.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	707419	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	710312	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	721525	2	24	8.3	5.0	✓
Fluoride in Water by IC	E235.F	704065	1	10	10.0	5.0	✓
Nitrate in Water by IC	E235.NO3	704062	1	10	10.0	5.0	✓
Nitrite in Water by IC	E235.NO2	704063	1	10	10.0	5.0	✓
pH by Meter	E108	703999	2	29	6.9	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	710007	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*
Laboratory Control Samples (LCS) - Continued							
Sulfate in Water by IC	E235.SO4	704064	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	723015	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.001 mg/L)	E372-S	720352	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	711895	2	38	5.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	703997	2	21	9.5	5.0	✓
Ammonia by Fluorescence	E298	711934	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	705101	1	5	20.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	705102	1	5	20.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	706638	2	40	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	710970	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	704066	1	20	5.0	5.0	✓
Conductivity in Water	E100	703998	2	33	6.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	707419	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	710312	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	721525	2	24	8.3	5.0	✓
Fluoride in Water by IC	E235.F	704065	1	10	10.0	5.0	✓
Nitrate in Water by IC	E235.NO3	704062	1	10	10.0	5.0	✓
Nitrite in Water by IC	E235.NO2	704063	1	10	10.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	710007	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	704064	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	723015	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.001 mg/L)	E372-S	720352	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	711895	2	38	5.2	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	711934	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	705101	1	5	20.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	710970	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	704066	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	707419	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	710312	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	721525	2	24	8.3	5.0	✓
Fluoride in Water by IC	E235.F	704065	1	10	10.0	5.0	✓
Nitrate in Water by IC	E235.NO3	704062	1	10	10.0	5.0	✓
Nitrite in Water by IC	E235.NO2	704063	1	10	10.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	710007	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	704064	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	723015	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.001 mg/L)	E372-S	720352	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 Edmonton - 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 Edmonton - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 Edmonton - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Edmonton - 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 Edmonton - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC	E235.NO2 Edmonton - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 Edmonton - 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 Edmonton - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Edmonton - 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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 Edmonton - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Edmonton - Environmental	Water	Method Fialab 100, 2018	TKN 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 Calgary - 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 Phosphorus by Colourimetry (0.001 mg/L)	E372-S Edmonton - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically after heated persulfate digestion of the sample.
Dissolved Metals in Water by CRC ICPMS	E421 Edmonton - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Mercury in Water by CVAAS	E509 Edmonton - 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.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Edmonton - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Phenols (4AAP) in Water by Colorimetry	E562 Edmonton - Environmental	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide (K3Fe(CN)6) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
CCME PHC - F1 by Headspace GC-FID	E581.F1 Edmonton - Environmental	Water	CCME PHC in Soil - Tier 1	CCME Fraction 1 (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 Edmonton - Environmental	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
BTEX by Headspace GC-MS	E611A Edmonton - 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 Edmonton - 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.
Ion Balance using Dissolved Metals	EC101 Edmonton - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 Edmonton - Environmental	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Edmonton - 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 Edmonton - 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).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Edmonton - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Edmonton - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Edmonton - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Edmonton - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Edmonton - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
VOCs Preparation for Headspace Analysis	EP581 Edmonton - 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 Edmonton - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

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QUALITY CONTROL REPORT

Work Order	: **EO2209060**	Page	: 1 of 15
Client	: Tetra Tech Canada Inc.	Laboratory	: Edmonton - Environmental
Contact	: Brent Finnestad	Account Manager	: Kieran Tordoff
Address	: North Building 14940 123 Ave NW Edmonton AB Canada T5V 1B4	Address	: 9450 - 17 Avenue NW Edmonton, Alberta Canada T6N 1M9
Telephone	:	Telephone	: +1 780 413 5227
Project	: SWM.SWOP04592-01	Date Samples Received	: 18-Oct-2022 15:43
PO	: ----	Date Analysis Commenced	: 19-Oct-2022
C-O-C number	: ----	Issue Date	: 02-Nov-2022 15:18
Sampler	: ---- 780-718-9317		
Site	: ----		
Quote number	: ----		
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*
Alex Drake	Lab Analyst	Edmonton Inorganics, Edmonton, Alberta
Brandon Green	Lab Assistant	Edmonton Metals, Edmonton, Alberta
Christian Murera	Lab Analyst	Edmonton Organics, Edmonton, Alberta
Dan Nguyen	Team Leader - Inorganics	Edmonton Metals, Edmonton, Alberta
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Ping Yeung	Team Leader - Inorganics	Edmonton Metals, Edmonton, Alberta
Ryan Huynh	Lab Assistant	Edmonton Inorganics, Edmonton, Alberta
Sobhithan Pillay		Edmonton Inorganics, Edmonton, Alberta
Yan Zhang	Lab Analyst	Edmonton Organics, Edmonton, Alberta

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: 703997)											
EO2209072-001	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	129	133	2.67%	20%	----
Physical Tests (QC Lot: 703998)											
EO2209072-001	Anonymous	conductivity	----	E100	1.0	µS/cm	506	504	0.396%	10%	----
Physical Tests (QC Lot: 703999)											
EO2209072-001	Anonymous	pH	----	E108	0.10	pH units	7.97	7.97	0.00%	3%	----
Physical Tests (QC Lot: 705376)											
EO2209060-004	Lysons D.4	pH	----	E108	0.10	pH units	8.58	8.59	0.116%	3%	----
Physical Tests (QC Lot: 705377)											
EO2209060-004	Lysons D.4	conductivity	----	E100	2.0	µS/cm	1040	1020	0.971%	10%	----
Physical Tests (QC Lot: 705378)											
EO2209060-004	Lysons D.4	alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	548	547	0.0548%	20%	----
Physical Tests (QC Lot: 711895)											
EO2209019-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	26.4	22.4	4.0	Diff <2x LOR	----
Physical Tests (QC Lot: 713784)											
EO2208840-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	15.6	14.6	1.0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 704062)											
EO2208850-004	Anonymous	nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 704063)											
EO2208850-004	Anonymous	nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 704064)											
EO2208850-004	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: 704065)											
EO2208850-004	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 704066)											
EO2208850-004	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 711934)											
EO2209060-005	Magneson D.3	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0335	0.0350	0.0015	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 720352)											
EO2208924-028	Anonymous	phosphorus, total	7723-14-0	E372-S	0.0010	mg/L	0.0164	0.0175	6.49%	20%	----
Anions and Nutrients (QC Lot: 723015)											

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*
Anions and Nutrients (QC Lot: 723015) - continued											
EO2209040-006	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.108	0.121	0.014	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 721525)											
EO2208726-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	17.7	18.8	6.02%	20%	----
Organic / Inorganic Carbon (QC Lot: 721526)											
EO2209060-002	Lysons D.2	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	33.5	33.8	0.824%	20%	----
Dissolved Metals (QC Lot: 707419)											
EO2209060-001	Lysons D.1	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 710312)											
EO2209006-006	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0020	mg/L	2.20	2.16	1.90%	20%	----
		antimony, dissolved	7440-36-0	E421	0.00020	mg/L	0.00101	0.00121	0.00020	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00020	mg/L	0.0122	0.0118	2.66%	20%	----
		barium, dissolved	7440-39-3	E421	0.00020	mg/L	0.0296	0.0285	3.84%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000040	mg/L	0.000323	0.000376	0.000053	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	2.93	2.96	0.858%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000100	mg/L	0.000129	0.000123	4.56%	20%	----
		calcium, dissolved	7440-70-2	E421	0.100	mg/L	105	127	19.2%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000020	mg/L	0.000234	0.000286	19.7%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00100	mg/L	0.00199	0.00197	0.00002	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00020	mg/L	0.00341	0.00342	0.271%	20%	----
		copper, dissolved	7440-50-8	E421	0.00040	mg/L	0.0120	0.0118	2.04%	20%	----
		iron, dissolved	7439-89-6	E421	0.060	mg/L	3.06	3.08	0.815%	20%	----
		lead, dissolved	7439-92-1	E421	0.000100	mg/L	0.00153	0.00181	16.4%	20%	----
		lithium, dissolved	7439-93-2	E421	0.0020	mg/L	0.181	0.219	19.2%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0100	mg/L	20.4	19.5	4.46%	20%	----
		manganese, dissolved	7439-96-5	E421	0.0100	mg/L	0.427	0.418	2.14%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000100	mg/L	0.00119	0.00138	14.8%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00100	mg/L	0.00713	0.00694	0.00019	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.100	mg/L	0.941	0.920	0.020	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.100	mg/L	3.90	3.78	3.18%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00040	mg/L	0.00829	0.00821	1.06%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000100	mg/L	0.000491	0.000490	0.0000002	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.100	mg/L	44.0	43.9	0.122%	20%	----
		silver, dissolved	7440-22-4	E421	0.000020	mg/L	0.000073	0.000078	0.000004	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: 710312) - continued											
EO2209006-006	Anonymous	sodium, dissolved	7440-23-5	E421	0.100	mg/L	344	342	0.518%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00040	mg/L	0.994	1.19	17.8%	20%	----
		sulfur, dissolved	7704-34-9	E421	1.00	mg/L	273	262	4.09%	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	0.000074	0.000101	0.000027	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00020	mg/L	0.00051	0.00060	0.00008	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	0.0782	0.0779	0.380%	20%	----
		tungsten, dissolved	7440-33-7	E421	0.00020	mg/L	0.00075	0.00090	0.00016	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000020	mg/L	0.00107	0.00129	18.8%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00100	mg/L	0.0139	0.0139	0.435%	20%	----
		zinc, dissolved	7440-66-6	E421	0.0020	mg/L	0.0073	0.0077	0.0004	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00040	mg/L	0.0318	0.0382	18.4%	20%	----
Aggregate Organics (QC Lot: 710007)											
EO2209031-008	Anonymous	phenols, total (4AAP)	----	E562	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 710970)											
EO2208726-001	Anonymous	chemical oxygen demand [COD]	----	E559-L	200	mg/L	18000	19900	10.3%	20%	----
Volatile Organic Compounds (QC Lot: 705101)											
EO2209060-001	Lysons D.1	benzene	71-43-2	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		styrene	100-42-5	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		toluene	108-88-3	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.00040 mg/L	<0.40	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.30	µg/L	<0.00030 mg/L	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 705102)											
EO2209060-001	Lysons D.1	F1 (C6-C10)	----	E581.F1	100	µg/L	<0.10 mg/L	<100	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: 703997)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 703998)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 705377)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 705378)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 711895)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 713784)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 704062)						
nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 704063)						
nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 704064)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 704065)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 704066)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 711934)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 720352)						
phosphorus, total	7723-14-0	E372-S	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 723015)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 721525)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 721526)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 707419)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 707419) - continued						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 710312)						
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	----
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	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 710312) - continued						
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: 710007)						
phenols, total (4AAP)	----	E562	0.001	mg/L	<0.0010	----
Aggregate Organics (QCLot: 710970)						
chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Volatile Organic Compounds (QCLot: 705101)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	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: 705102)						
F1 (C6-C10)	----	E581.F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 706638)						
F2 (C10-C16)	----	E601	100	µg/L	<100	----
Hydrocarbons (QCLot: 707775)						
F2 (C10-C16)	----	E601	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: 703997)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	110	85.0	115	----
Physical Tests (QCLot: 703998)									
conductivity	----	E100	1	µS/cm	1412 µS/cm	97.7	90.0	110	----
Physical Tests (QCLot: 703999)									
pH	----	E108	----	pH units	6 pH units	100	97.0	103	----
Physical Tests (QCLot: 705376)									
pH	----	E108	----	pH units	6 pH units	100	97.0	103	----
Physical Tests (QCLot: 705377)									
conductivity	----	E100	1	µS/cm	1412 µS/cm	97.7	90.0	110	----
Physical Tests (QCLot: 705378)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	106	85.0	115	----
Physical Tests (QCLot: 711895)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	95.9	85.0	115	----
Physical Tests (QCLot: 713784)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	95.6	85.0	115	----
Anions and Nutrients (QCLot: 704062)									
nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	97.9	90.0	110	----
Anions and Nutrients (QCLot: 704063)									
nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	93.4	90.0	110	----
Anions and Nutrients (QCLot: 704064)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	96.7	90.0	110	----
Anions and Nutrients (QCLot: 704065)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 704066)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	97.5	90.0	110	----
Anions and Nutrients (QCLot: 711934)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	112	85.0	115	----
Anions and Nutrients (QCLot: 720352)									
phosphorus, total	7723-14-0	E372-S	0.001	mg/L	0.05 mg/L	111	80.0	120	----
Anions and Nutrients (QCLot: 723015)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	97.4	75.0	125	----

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: 721525)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 721526)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	106	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	96.5	80.0	120	----
Dissolved Metals (QCLot: 710312)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	99.2	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	95.1	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	98.2	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	103	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	91.0	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	96.2	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.6	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	95.8	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	95.8	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	98.2	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.2	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	101	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	99.2	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	97.0	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.7	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	95.0	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.2	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	103	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	94.5	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	98.7	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.7	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	98.8	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	88.4	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	94.0	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	90.9	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: 710312) - continued									
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	92.7	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.2	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	95.0	80.0	120	----
tin, dissolved	7440-31-5	E421	----	mg/L	0.5 mg/L	95.8	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	97.7	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	98.3	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.0	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.9	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	95.2	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	97.4	80.0	120	----
Aggregate Organics (QCLot: 710007)									
phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	96.4	85.0	115	----
Aggregate Organics (QCLot: 710970)									
chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	102	85.0	115	----
Volatile Organic Compounds (QCLot: 705101)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	80.8	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	94.8	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	109	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	80.2	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	98.9	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	104	70.0	130	----
Hydrocarbons (QCLot: 705102)									
F1 (C6-C10)	----	E581.F1	100	µg/L	2750 µg/L	101	70.0	130	----
Hydrocarbons (QCLot: 706638)									
F2 (C10-C16)	----	E601	100	µg/L	3850 µg/L	102	70.0	130	----
Hydrocarbons (QCLot: 707775)									
F2 (C10-C16)	----	E601	100	µg/L	3850 µg/L	97.0	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: 704062)										
EO2208850-004	Anonymous	nitrate (as N)	14797-55-8	E235.NO3	2.40 mg/L	2.5 mg/L	96.1	75.0	125	----
Anions and Nutrients (QCLot: 704063)										
EO2208850-004	Anonymous	nitrite (as N)	14797-65-0	E235.NO2	0.463 mg/L	0.5 mg/L	92.6	75.0	125	----
Anions and Nutrients (QCLot: 704064)										
EO2208850-004	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	95.1 mg/L	100 mg/L	95.1	75.0	125	----
Anions and Nutrients (QCLot: 704065)										
EO2208850-004	Anonymous	fluoride	16984-48-8	E235.F	0.967 mg/L	1 mg/L	96.7	75.0	125	----
Anions and Nutrients (QCLot: 704066)										
EO2208850-004	Anonymous	chloride	16887-00-6	E235.Cl	96.3 mg/L	100 mg/L	96.3	75.0	125	----
Anions and Nutrients (QCLot: 711934)										
EO2209060-005	Magneson D.3	ammonia, total (as N)	7664-41-7	E298	0.116 mg/L	0.1 mg/L	116	75.0	125	----
Anions and Nutrients (QCLot: 720352)										
EO2208924-032	Anonymous	phosphorus, total	7723-14-0	E372-S	ND mg/L	0.067 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 723015)										
EO2209040-007	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.60 mg/L	2.5 mg/L	104	70.0	130	----
Organic / Inorganic Carbon (QCLot: 721525)										
EO2208726-002	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 721526)										
EO2209060-003	Lysons D.3	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Dissolved Metals (QCLot: 707419)										
EO2209060-002	Lysons D.2	mercury, dissolved	7439-97-6	E509	0.000106 mg/L	0.0001 mg/L	106	70.0	130	----
Dissolved Metals (QCLot: 710312)										
EO2209006-007	Anonymous	aluminum, dissolved	7429-90-5	E421	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0204 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	0.0432 mg/L	0.04 mg/L	108	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00821 mg/L	0.01 mg/L	82.1	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: 710312) - continued										
EO2209006-007	Anonymous	boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00398 mg/L	0.004 mg/L	99.5	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	0.00983 mg/L	0.01 mg/L	98.3	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0395 mg/L	0.04 mg/L	98.7	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0189 mg/L	0.02 mg/L	94.4	70.0	130	----
		iron, dissolved	7439-89-6	E421	2.00 mg/L	2 mg/L	99.9	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0186 mg/L	0.02 mg/L	93.2	70.0	130	----
		lithium, dissolved	7439-93-2	E421	ND mg/L	0.1 mg/L	ND	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	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0375 mg/L	0.04 mg/L	93.7	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.8 mg/L	10 mg/L	108	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.79 mg/L	4 mg/L	94.7	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0418 mg/L	0.04 mg/L	104	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	0.00426 mg/L	0.004 mg/L	106	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	22.1 mg/L	20 mg/L	110	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0354 mg/L	0.04 mg/L	88.6	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00368 mg/L	0.004 mg/L	92.0	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0188 mg/L	0.02 mg/L	94.3	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0420 mg/L	0.04 mg/L	105	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00390 mg/L	0.004 mg/L	97.6	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.389 mg/L	0.4 mg/L	97.3	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0422 mg/L	0.04 mg/L	106	70.0	130	----
Aggregate Organics (QCLot: 710007)										
EO2209031-008	Anonymous	phenols, total (4AAP)	----	E562	0.0186 mg/L	0.02 mg/L	93.0	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
Aggregate Organics (QCLot: 710970)										
EO2208726-002	Anonymous	chemical oxygen demand [COD]	----	E559-L	ND mg/L	100 mg/L	ND	75.0	125	----
Volatile Organic Compounds (QCLot: 705101)										
EO2209060-002	Lysons D.2	benzene	71-43-2	E611A	97.9 µg/L	100 µg/L	97.9	50.0	140	----
		ethylbenzene	100-41-4	E611A	77.1 µg/L	100 µg/L	77.1	50.0	140	----
		styrene	100-42-5	E611A	96.7 µg/L	100 µg/L	96.7	50.0	140	----
		toluene	108-88-3	E611A	86.0 µg/L	100 µg/L	86.0	50.0	140	----
		xylene, m+p-	179601-23-1	E611A	197 µg/L	200 µg/L	98.5	50.0	140	----
		xylene, o-	95-47-6	E611A	91.3 µg/L	100 µg/L	91.3	50.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 21 -

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www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Edmonton
Work Order Reference
EO2209060

Telephone: +1 780 413 5227

Report To	Contact and company name below will appear on the final report
Company:	Tetra Tech Canada Inc.
Contact:	Brent Finnestad
Phone:	780.451.2121
	Company address below will appear on the final report
Street:	14940 - 123 Ave NW
City/Province:	Edmonton
Postal Code:	T5V 1B4
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: Brent.Finnestad@TetraTech.com
Email 2: Fahim.Nazari@TetraTech.com
Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: Brent.Finnestad@TetraTech.com
Email 2: Fahim.Nazari@TetraTech.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.
Additional fees may apply to rush requests on weekends, s
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please conta

Project Information

ALS Account # / Quote #: Q79533
Job #: SWM.SWOP04592-01
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (ALS use only): EO2209060

ALS Contact: **Sampler:**

Analysis Request

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTX, F1, F2 - ED	C-DIS-ORG-CL	COD-T-COL-ED	MET_R-DIS-CCME-ED	NH3-COL-ED	P-T-COL-ED	PHENOLS-4AAP-ED	ROU-ED	SOLIDS-TOTSUS-ED	TKN-F-ED	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	~~Booth D.1~~			Water														
	~~Ewert D.1~~			Water														
	~~Ewert D.2~~			Water														
	~~Ewert D.3~~			Water														
	~~Ewert D.4~~		12:00	Water														
	Lysons D.1	OCT 19/22	~~10:40~~	Water	10	X	X	X	X	X	X	X	X	X	X			
	Lysons D.2	OCT 19/22	12:20	Water	10	X	X	X	X	X	X	X	X	X	X			
	Lysons D.3	OCT 19/22	10:40	Water	10	X	X	X	X	X	X	X	X	X	X			
	Lysons D.4	OCT 19/22	11:10	Water	10	X	X	X	X	X	X	X	X	X	X			
	~~Magneson D.1~~			Water														
	~~Magneson D.2~~			Water														
	Magneson D.3	OCT 19/22	9:50	Water	10	X	X	X	X	X	X	X	X	X	X			

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

Are samples taken from a Regulated DW System? ☐ YES ☐ NO
Are samples for human consumption/ use? ☐ YES ☐ NO

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

ESDAT format

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☑ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
7.9							

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
BX 2	OCT 19/22	1740

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	19-Oct-2022	3:49

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALIG 2020 FRONT

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

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

ALS Canada Ltd.

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CERTIFICATE OF ANALYSIS

Work Order	: **EO2209152**	Page	: 1 of 19
Client	: **Tetra Tech Canada Inc.**	Laboratory	: Edmonton - Environmental
Contact	: Brent Finnestad	Account Manager	: Kieran Tordoff
Address	: North Building 14940 123 Ave NW Edmonton AB Canada T5V 1B4	Address	: 9450 - 17 Avenue NW Edmonton AB Canada T6N 1M9
Telephone	: 780-718-9317	Telephone	: +1 780 413 5227
Project	: SWM.SWOP04592-01	Date Samples Received	: 20-Oct-2022 11:30
PO	: ----	Date Analysis Commenced	: 21-Oct-2022
C-O-C number	: ----	Issue Date	: 07-Nov-2022 09:31
Sampler	: ----		
Site	: ----		
Quote number	: ----		
No. of samples received	: 17		
No. of samples analysed	: 17		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Alex Drake	Lab Analyst	Inorganics, Edmonton, Alberta
Alex Drake	Lab Analyst	Metals, Edmonton, Alberta
Angeli Marzan	Lab Analyst	Inorganics, Edmonton, Alberta
Dan Nguyen	Team Leader - Inorganics	Metals, Edmonton, Alberta
Daniel Nguyen	Lab Assistant	Metals, Edmonton, Alberta
Jessica Maitland	Lab Assistant	Inorganics, Edmonton, Alberta
Jing Liu	Lab Assistant	Inorganics, Edmonton, Alberta
Joan Wu	Lab Analyst	Metals, Edmonton, Alberta
Kari Mulroy	Lab Supervisor - Environmental	Organics, Edmonton, Alberta
Muzammil Ali	Lab Analyst	Inorganics, Edmonton, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Ryan Huynh	Lab Assistant	Inorganics, Edmonton, Alberta
Shruti Mudliar	Lab Analyst	Inorganics, Edmonton, Alberta
Sobhithan Pillay		Inorganics, Edmonton, Alberta
Yan Zhang	Lab Analyst	Organics, Edmonton, Alberta

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
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
IB:INT	*Ion Balance Reviewed: Imbalance is due to interference or non-measured component.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOOTH D.1	EWERT D.1	EWERT D.2	EWERT D.3	EWERT D.4
					Client sampling date / time	19-Oct-2022 09:10	19-Oct-2022 10:00	19-Oct-2022 10:30	19-Oct-2022 10:15	19-Oct-2022 09:30
						EO2209152-001	EO2209152-002	EO2209152-003	EO2209152-004	EO2209152-005
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		96.8	114	127	96.6	118
solids, total suspended [TSS]	----	E160	3.0	mg/L		24.2	35.8	53.8	37.8	40.2
conductivity	----	E100	2.0	µS/cm		803	1340	922	696	718
pH	----	E108	0.10	pH units		8.26	9.75	8.92	8.38	8.75
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		389	375	393	291	364
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		<1.0	135	23.8	2.5	14.9
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	2.0	mg/L		319	532	362	243	324
solids, total dissolved [TDS], calculated	----	EC103	1.0	mg/L		496	897	617	457	472
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		1.87	0.0625	0.0393	0.0730	0.0678
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.525 DLHC	0.578 DLHC	1.43 DLHC	1.46 DLHC	0.301 DLHC
Kjeldahl nitrogen, total [TKN]	----	E318	0.200	mg/L		7.30	3.80	4.24	4.87	4.27
chloride	16887-00-6	E235.Cl	0.50	mg/L		43.6	60.1	40.2	68.0	15.2
fluoride	16984-48-8	E235.F	0.020	mg/L		0.295	0.435	0.305	0.249	0.481
nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L		<0.020	<0.020	<0.020	<0.020	0.032
nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	0.013
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		34.0	118	80.2	17.2	42.3
nitrate + nitrite (as N)	----	EC235.N+N	0.0500	mg/L		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		28.6	45.3	37.8	45.9	28.3
Ion Balance										
anion sum	----	EC101	0.10	meq/L		8.33	14.8	10.0	7.14	7.81
cation sum	----	EC101	0.10	meq/L		8.82	15.7	10.9	7.84	8.72
ion balance (APHA)	----	EC101	0.010	%		2.86	2.95	4.31	4.67	5.50
ion balance (cations/anions)	----	EC101	0.010	%		106	106	109	110	112
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0025	0.0179	0.0091	0.0111	0.0645
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00020	0.00051	0.00022	0.00016	0.00031

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOOTH D.1	EWERT D.1	EWERT D.2	EWERT D.3	EWERT D.4
					Client sampling date / time	19-Oct-2022 09:10	19-Oct-2022 10:00	19-Oct-2022 10:30	19-Oct-2022 10:15	19-Oct-2022 09:30
						EO2209152-001	EO2209152-002	EO2209152-003	EO2209152-004	EO2209152-005
						Result	Result	Result	Result	Result
Dissolved Metals										
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00780	0.0164	0.0113	0.00691	0.00625
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0590	0.0401	0.0252	0.0208	0.0589
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
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		0.037	0.041	0.030	0.039	0.042
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		19.8	19.0	28.3	20.7	22.2
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		0.00033	0.00067	0.00088	0.00106	0.00093
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00020	0.00143	0.00088	0.00091	0.00078
iron, dissolved	7439-89-6	E421	0.030	mg/L		0.192	0.063	0.112	0.586	0.113
lead, dissolved	7439-92-1	E421	0.000050	mg/L		0.000077	0.000097	0.000089	0.000136	0.000093
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0351	0.0366	0.0232	0.0116	0.0162
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		11.5	16.1	13.6	10.9	15.2
manganese, dissolved	7439-96-5	E421	0.00500	mg/L		0.0514	0.0287	0.0343	0.146	0.0131
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		0.00105	0.00196	0.000878	0.000938	0.00205
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00273	0.00434	0.00503	0.00468	0.00442
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		0.540	0.545	1.60	1.24	0.105
potassium, dissolved	7440-09-7	E421	0.050	mg/L		15.4	23.5	19.3	18.9	16.7
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00143	0.00101	0.00156	0.00172	0.00170
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000135	0.000435	0.000380	0.000277	0.000305
silicon, dissolved	7440-21-3	E421	0.050	mg/L		0.906	0.060	<0.050	1.54	0.356
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		146	295	180	124	136
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.220	0.223	0.273	0.165	0.231
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		15.0	46.0	31.9	8.59	17.0
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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOOTH D.1	EWERT D.1	EWERT D.2	EWERT D.3	EWERT D.4
					Client sampling date / time	19-Oct-2022 09:10	19-Oct-2022 10:00	19-Oct-2022 10:30	19-Oct-2022 10:15	19-Oct-2022 09:30
						EO2209152-001	EO2209152-002	EO2209152-003	EO2209152-004	EO2209152-005
						Result	Result	Result	Result	Result
Dissolved Metals										
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		0.00075	0.00229	0.00114	0.00124	0.00314
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		0.000532	0.00253	0.000777	0.000332	0.00130
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00088	0.00499	0.00363	0.00290	0.00153
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0012	<0.0010	<0.0010	0.0012	<0.0010
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L		0.00059	0.00143	0.00136	0.00115	0.00056
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field
Aggregate Organics										
chemical oxygen demand [COD]	----	E559-L	10	mg/L		109	153	124	164	114
phenols, total (4AAP)	----	E562	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Volatile Organic Compounds										
benzene	71-43-2	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
ethylbenzene	100-41-4	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
styrene	100-42-5	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
toluene	108-88-3	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
xylene, m+p-	179601-23-1	E611A	0.00040	mg/L		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
xylene, o-	95-47-6	E611A	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
xylenes, total	1330-20-7	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Hydrocarbons										
F1 (C6-C10)	----	E581.F1	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
F2 (C10-C16)	----	E601	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
F1-BTEX	----	EC580	0.100	mg/L		<0.100	<0.100	<0.100	<0.100	<0.100
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%		95.0	96.7	99.0	96.7	97.0
dichlorotoluene, 3,4-	97-75-0	E581.F1	1.0	%		91.9	91.1	96.3	88.5	90.0
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		92.0	96.6	93.6	96.9	94.3

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	BOOTH D.1	EWERT D.1	EWERT D.2	EWERT D.3	EWERT D.4
					Client sampling date / time	19-Oct-2022 09:10	19-Oct-2022 10:00	19-Oct-2022 10:30	19-Oct-2022 10:15	19-Oct-2022 09:30
Analyte	CAS Number	Method	LOR	Unit		EO2209152-001	EO2209152-002	EO2209152-003	EO2209152-004	EO2209152-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds Surrogates										
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		89.0	90.1	87.4	86.6	88.1

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	Client sample ID	MAGNESON D.1	MAGNESON D.2	MAGNESON D.4	MAGNESON D.5	MAGNESON D.6
					Client sampling date / time	19-Oct-2022 12:50	19-Oct-2022 12:20	19-Oct-2022 13:25	19-Oct-2022 12:35	19-Oct-2022 13:05
						EO2209152-006	EO2209152-007	EO2209152-008	EO2209152-009	EO2209152-010
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		362	143	582	248	443
solids, total suspended [TSS]	----	E160	3.0	mg/L		22.8	56.8	12.6	63.8	32.0
conductivity	----	E100	2.0	µS/cm		2810 RRV	837	5390	2500	3760
pH	----	E108	0.10	pH units		8.78 RRV	8.62	8.74	9.11	8.84
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		650 RRV	464	1560	769	417
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		34.6 RRV	13.2	74.9	80.5	28.1
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0 RRV	<1.0	<1.0	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	2.0	mg/L		591 RRV	403	1400	765	389
solids, total dissolved [TDS], calculated	----	EC103	1.0	mg/L		1980	584	4190	1760	2730
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.422	0.100	1.63	0.158	0.0747
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		6.31 DLHC	0.836 DLHC	26.2 DLHC	2.05 DLHC	0.625 DLHC
Kjeldahl nitrogen, total [TKN]	----	E318	0.200	mg/L		8.71	7.23	42.1	9.63	4.17
chloride	16887-00-6	E235.Cl	0.50	mg/L		287 DLDS, RRV	28.7	831 DLDS	230 DLDS	358 DLDS
fluoride	16984-48-8	E235.F	0.020	mg/L		0.416 DLDS	0.482	0.940 DLDS	0.979 DLDS	0.382 DLDS
nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L		<0.100 DLDS	<0.020	0.150 DLDS	<0.100 DLDS	<0.100 DLDS
nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L		<0.050 DLDS	<0.010	1.73 DLDS	<0.050 DLDS	<0.050 DLDS
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		512 DLDS, RRV	9.38	715 DLDS	319 DLDS	1210 DLDS
nitrate + nitrite (as N)	----	EC235.N+N	0.0500	mg/L		<0.112	<0.0500	1.88	<0.112	<0.112
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		80.6	67.7	277	84.6	39.7
Ion Balance										
anion sum	----	EC101	0.10	meq/L		30.6	9.08	66.5	28.5	43.1
cation sum	----	EC101	0.10	meq/L		31.0	10.1	55.7	27.9	41.3
ion balance (APHA)	----	EC101	0.010	%		0.649	5.32	8.84	1.06	2.13
ion balance (cations/anions)	----	EC101	0.010	%		101	111	83.8 IB:INT	97.9	95.8
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0607	0.0338	0.273	0.0676	0.0041
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00200 DLDS	0.00039	0.00091	0.00104	0.00088
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.0222	0.00544	0.0347	0.0242	0.0209

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MAGNESON D.1	MAGNESON D.2	MAGNESON D.4	MAGNESON D.5	MAGNESON D.6
					Client sampling date / time	19-Oct-2022 12:50	19-Oct-2022 12:20	19-Oct-2022 13:25	19-Oct-2022 12:35	19-Oct-2022 13:05
						EO2209152-006	EO2209152-007	EO2209152-008	EO2209152-009	EO2209152-010
						Result	Result	Result	Result	Result
Dissolved Metals										
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0332	0.0450	0.150	0.0817	0.0212
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000400 DLDS	<0.000020	<0.000100 DLDS	<0.000040 DLDS	<0.000040 DLDS
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.00100 DLDS	<0.000050	<0.000250 DLDS	<0.000100 DLDS	<0.000100 DLDS
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.226	0.030	0.211	0.031	0.239
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.000100 DLDS	0.0000070	0.0000275	0.0000161	<0.0000100 DLDS
calcium, dissolved	7440-70-2	E421	0.050	mg/L		75.5	34.2	101	51.0	67.4
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000200 DLDS	<0.000010	<0.000050 DLDS	<0.000020 DLDS	<0.000020 DLDS
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.0100 DLDS	<0.00050	0.00337	<0.00100 DLDS	<0.00100 DLDS
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00545	0.00222	0.0113	0.00241	0.00069
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.0318	0.00314	0.00685	0.00187	0.00080
iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.600 DLDS	0.222	3.93	0.083	<0.060 DLDS
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.00100 DLDS	0.000162	0.00310	0.000140	<0.000100 DLDS
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0776	0.0183	0.0956	0.0597	0.128
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		42.1	14.0	80.0	29.2	66.7
manganese, dissolved	7439-96-5	E421	0.00500	mg/L		0.359	0.00785	0.771	0.0226	0.0308
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		0.00541	0.00643	0.00656	0.0238	0.00151
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.0244	0.0116	0.0435	0.0205	0.00495
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		7.13	0.342	19.8	1.61	0.472
potassium, dissolved	7440-09-7	E421	0.050	mg/L		146	48.4	696	113	33.1
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.0126	0.00146	0.0995	0.00401	0.00303
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.00102	0.000663	0.00155	0.000740	0.000297
silicon, dissolved	7440-21-3	E421	0.050	mg/L		6.55	0.387	15.9	2.81	<0.100 DLDS
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000200 DLDS	<0.000010	0.000059	<0.000020 DLDS	<0.000020 DLDS
sodium, dissolved	7440-23-5	E421	0.050	mg/L		460	138	596	461	726
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.706	0.183	0.754	0.545	0.937
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		180	6.62	182	108	418
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00400 DLDS	<0.00020	<0.00100 DLDS	<0.00040 DLDS	<0.00040 DLDS
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000200 DLDS	<0.000010	<0.000050 DLDS	<0.000020 DLDS	<0.000020 DLDS
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00200 DLDS	<0.00010	0.00171	<0.00020 DLDS	<0.00020 DLDS

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MAGNESON D.1	MAGNESON D.2	MAGNESON D.4	MAGNESON D.5	MAGNESON D.6
					Client sampling date / time	19-Oct-2022 12:50	19-Oct-2022 12:20	19-Oct-2022 13:25	19-Oct-2022 12:35	19-Oct-2022 13:05
						EO2209152-006	EO2209152-007	EO2209152-008	EO2209152-009	EO2209152-010
						Result	Result	Result	Result	Result
Dissolved Metals										
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00200 DLDS	<0.00010	<0.00050 DLDS	<0.00020 DLDS	<0.00020 DLDS
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		0.00841	0.00166	0.0586	0.00480	<0.00060 DLDS
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00200 DLDS	<0.00010	<0.00050 DLDS	0.00066	<0.00020 DLDS
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00310	0.00497	0.00323	0.00441	0.00437
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.0166	0.00476	0.0240	0.0153	0.00352
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0200 DLDS	<0.0010	0.0165	<0.0020 DLDS	0.0021
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L		<0.00600 DLDS	0.00194	0.0203	0.00366	0.00094
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field
Aggregate Organics										
chemical oxygen demand [COD]	----	E559-L	10	mg/L		245	224	1100 DLM	282	127
phenols, total (4AAP)	----	E562	0.0010	mg/L		<0.0010	<0.0010	0.0018	<0.0010	<0.0010
Volatile Organic Compounds										
benzene	71-43-2	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
ethylbenzene	100-41-4	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
styrene	100-42-5	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
toluene	108-88-3	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
xylene, m+p-	179601-23-1	E611A	0.00040	mg/L		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
xylene, o-	95-47-6	E611A	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
xylenes, total	1330-20-7	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Hydrocarbons										
F1 (C6-C10)	----	E581.F1	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
F2 (C10-C16)	----	E601	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
F1-BTEX	----	EC580	0.100	mg/L		<0.100	<0.100	<0.100	<0.100	<0.100
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%		99.4	95.9	96.7	96.5	97.1
dichlorotoluene, 3,4-	97-75-0	E581.F1	1.0	%		73.8	80.3	97.8	79.1	98.1
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		97.7	97.6	95.9	93.2	95.6
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		88.1	86.2	88.9	87.4	89.0

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	Client sample ID	BEAVER COUNTY D.1	WINSNES D.1	BALASH D.1	BALASH D.2	BALASH D.3
					Client sampling date / time	19-Oct-2022 08:30	19-Oct-2022 10:50	19-Oct-2022 11:15	19-Oct-2022 11:35	19-Oct-2022 11:50
						EO2209152-011	EO2209152-012	EO2209152-013	EO2209152-014	EO2209152-015
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		317	193	180	550	413
solids, total suspended [TSS]	----	E160	3.0	mg/L		161	20.6	41.2	55.8	32.0
conductivity	----	E100	2.0	µS/cm		1830	1070	651	2410	2350
pH	----	E108	0.10	pH units		8.52	8.86	8.24	8.73	9.04
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		550	305	291	494	334
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		13.3	18.4	<1.0	30.1	37.8
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	2.0	mg/L		473	280	238	456	337
solids, total dissolved [TDS], calculated	----	EC103	1.0	mg/L		1180	698	423	1570	1490
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.490	0.0610 RRV	0.117	0.0622	0.109
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		2.21 DLHC	0.249 DLHC	0.463 DLHC	0.928 DLHC	0.840 DLHC
Kjeldahl nitrogen, total [TKN]	----	E318	0.200	mg/L		8.06	3.03	3.52	5.08	5.13
chloride	16887-00-6	E235.Cl	0.50	mg/L		234	89.1	49.2	393	469
fluoride	16984-48-8	E235.F	0.020	mg/L		0.356	0.263	0.162	0.234	0.189
nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L		<0.020	<0.020	<0.020	<0.020	0.024
nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		170	160	42.4	300	244
nitrate + nitrite (as N)	----	EC235.N+N	0.0500	mg/L		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		42.7	24.1	23.5	36.7	48.0
Ion Balance										
anion sum	----	EC101	0.10	meq/L		19.6	11.4	7.04	26.4	25.0
cation sum	----	EC101	0.10	meq/L		20.5	12.1	7.22	26.4	24.9
ion balance (APHA)	----	EC101	0.010	%		2.24	2.98	1.26	<0.010	0.200
ion balance (cations/anions)	----	EC101	0.010	%		104	106	102	100	99.6
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0046	0.0037	0.0041	0.0069	0.0111
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00042	0.00023	<0.00010	0.00039	<0.00020 DLDS
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.0114	0.00529	0.00297	0.00898	0.00847

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BEAVER COUNTY D.1	WINSNES D.1	BALASH D.1	BALASH D.2	BALASH D.3
					Client sampling date / time	19-Oct-2022 08:30	19-Oct-2022 10:50	19-Oct-2022 11:15	19-Oct-2022 11:35	19-Oct-2022 11:50
						EO2209152-011	EO2209152-012	EO2209152-013	EO2209152-014	EO2209152-015
						Result	Result	Result	Result	Result
Dissolved Metals										
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0243	0.0592	0.0992	0.114	0.0503
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000020	<0.000020	<0.000020	<0.000040 DLDS	<0.000040 DLDS
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000100 DLDS	<0.000100 DLDS
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.058	0.034	0.023	0.048	<0.020 DLDS
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000100 DLDS	<0.0000100 DLDS
calcium, dissolved	7440-70-2	E421	0.050	mg/L		73.8	35.9	45.5	105	70.7
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000020 DLDS	<0.000020 DLDS
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00100 DLDS	<0.00100 DLDS
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00111	0.00051	0.00029	0.00147	0.00085
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00077	0.00042	0.00020	0.00158	0.00074
iron, dissolved	7439-89-6	E421	0.030	mg/L		0.032	<0.030	<0.030	<0.060 DLDS	<0.060 DLDS
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000100 DLDS	<0.000100 DLDS
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0343	0.0213	0.0192	0.0490	0.0267
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		32.3	25.2	16.2	69.9	57.4
manganese, dissolved	7439-96-5	E421	0.00500	mg/L		0.409	<0.00500	0.0800	0.286	0.0551
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	0.0000113	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00168	0.000873	0.000419	0.00129	0.000922
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00695	0.00290	0.00277	0.00614	0.00269
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		1.82	0.190	0.271	0.444	0.742
potassium, dissolved	7440-09-7	E421	0.050	mg/L		20.9	15.8	14.2	39.3	39.4
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00171	0.00136	0.00238	0.00272	0.00404
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000302	0.000169	0.000170	0.000267	0.000208
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.48	<0.050	5.28	6.87	<0.100 DLDS
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000020 DLDS	<0.000020 DLDS
sodium, dissolved	7440-23-5	E421	0.050	mg/L		312	180	74.6	331	359
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.563	0.411	0.284	0.830	0.503
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		66.4	60.8	15.8	108	89.5
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00040 DLDS	<0.00040 DLDS
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000020 DLDS	<0.000020 DLDS
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00020 DLDS	<0.00020 DLDS

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BEAVER COUNTY D.1	WINSNES D.1	BALASH D.1	BALASH D.2	BALASH D.3
					Client sampling date / time	19-Oct-2022 08:30	19-Oct-2022 10:50	19-Oct-2022 11:15	19-Oct-2022 11:35	19-Oct-2022 11:50
						EO2209152-011	EO2209152-012	EO2209152-013	EO2209152-014	EO2209152-015
						Result	Result	Result	Result	Result
Dissolved Metals										
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00020 DLDS	<0.00020 DLDS
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		0.00052	<0.00030	<0.00030	<0.00060 DLDS	<0.00060 DLDS
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		0.00015	<0.00010	<0.00010	<0.00020 DLDS	<0.00020 DLDS
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00210	0.00143	0.000245	0.00362	0.00175
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00761	0.00166	0.00092	0.00420	0.00320
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0011	0.0011	<0.0010	<0.0020 DLDS	<0.0020 DLDS
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L		0.00083	<0.00030	<0.00030	<0.00060 DLDS	0.00074
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field
Aggregate Organics										
chemical oxygen demand [COD]	----	E559-L	10	mg/L		185	80	96	148	156
phenols, total (4AAP)	----	E562	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Volatile Organic Compounds										
benzene	71-43-2	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
ethylbenzene	100-41-4	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
styrene	100-42-5	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
toluene	108-88-3	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
xylene, m+p-	179601-23-1	E611A	0.00040	mg/L		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
xylene, o-	95-47-6	E611A	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
xylenes, total	1330-20-7	E611A	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Hydrocarbons										
F1 (C6-C10)	----	E581.F1	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
F2 (C10-C16)	----	E601	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
F1-BTEX	----	EC580	0.100	mg/L		<0.100	<0.100	<0.100	<0.100	<0.100
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%		98.0	102	105	101	100
dichlorotoluene, 3,4-	97-75-0	E581.F1	1.0	%		90.1	92.8	99.7	90.3	76.5
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		91.6	89.6	95.7	93.6	84.8
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		88.1	88.6	89.4	88.2	84.7

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

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	DUPILCATE 1	DUPILCATE 2	----	----	----
					Client sampling date / time	19-Oct-2022	19-Oct-2022	----	----	----
Analyte	CAS Number	Method	LOR	Unit		EO2209152-016	EO2209152-017	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		97.4	553	----	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		35.2	52.6	----	----	----
conductivity	----	E100	2.0	µS/cm		692	2450 RRV	----	----	----
pH	----	E108	0.10	pH units		8.41	8.73 RRV	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		292	524 RRV	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		2.9	31.7 RRV	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0 RRV	----	----	----
alkalinity, total (as CaCO3)	----	E290	2.0	mg/L		244	482 RRV	----	----	----
solids, total dissolved [TDS], calculated	----	EC103	1.0	mg/L		462	1590	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0969	0.0570	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		1.44 DLHC	0.916 DLHC	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.200	mg/L		4.79	5.39	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		69.1	396 DLDS	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.270	0.464 DLDS	----	----	----
nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L		<0.020	<0.100 DLDS	----	----	----
nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L		<0.010	<0.050 DLDS	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		17.8	299 DLDS	----	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0500	mg/L		<0.0500	<0.112	----	----	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		47.8	38.4	----	----	----
Ion Balance										
anion sum	----	EC101	0.10	meq/L		7.21	27.0	----	----	----
cation sum	----	EC101	0.10	meq/L		7.88	26.6	----	----	----
ion balance (APHA)	----	EC101	0.010	%		4.44	0.746	----	----	----
ion balance (cations/anions)	----	EC101	0.010	%		109	98.5	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0103	0.0099	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00015	0.00037	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00701	0.00888	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	DUPILCATE 1	DUPILCATE 2	----	----	----
					Client sampling date / time	19-Oct-2022	19-Oct-2022	----	----	----
						EO2209152-016	EO2209152-017	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0215	0.112	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000020	<0.000040 DLDS	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000100 DLDS	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.034	0.049	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	<0.0000100 DLDS	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		21.7	106	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	<0.000020 DLDS	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00100 DLDS	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00106	0.00144	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00087	0.00123	----	----	----
iron, dissolved	7439-89-6	E421	0.030	mg/L		0.637	<0.060 DLDS	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		0.000149	<0.000100 DLDS	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0115	0.0505	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		10.5	70.1	----	----	----
manganese, dissolved	7439-96-5	E421	0.00500	mg/L		0.154	0.304	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000895	0.00123	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00467	0.00544	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		1.34	0.526	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		19.6	39.1	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00168	0.00292	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000304	0.000328	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.58	7.01	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000020 DLDS	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		124	333	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.173	0.843	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		8.98	111	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00020	<0.00040 DLDS	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000020 DLDS	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00010	<0.00020 DLDS	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	DUPILCATE 1	DUPILCATE 2	----	----	----
					Client sampling date / time	19-Oct-2022	19-Oct-2022	----	----	----
Analyte	CAS Number	Method	LOR	Unit		EO2209152-016	EO2209152-017	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00020 DLDS	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		0.00124	<0.00060 DLDS	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	<0.00020 DLDS	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000324	0.00369	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00295	0.00431	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0021	<0.0020 DLDS	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L		0.00122	<0.00060 DLDS	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----
Aggregate Organics										
chemical oxygen demand [COD]	----	E559-L	10	mg/L		159	152	----	----	----
phenols, total (4AAP)	----	E562	0.0010	mg/L		<0.0010	<0.0010	----	----	----
Volatile Organic Compounds										
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	----	----	----
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	----	----	----
xylene, m+p-	179601-23-1	E611A	0.00040	mg/L		<0.00040	<0.00040	----	----	----
xylene, o-	95-47-6	E611A	0.00030	mg/L		<0.00030	<0.00030	----	----	----
xylenes, total	1330-20-7	E611A	0.00050	mg/L		<0.00050	<0.00050	----	----	----
Hydrocarbons										
F1 (C6-C10)	----	E581.F1	0.10	mg/L		<0.10	<0.10	----	----	----
F2 (C10-C16)	----	E601	0.10	mg/L		<0.10	<0.10	----	----	----
F1-BTEX	----	EC580	0.100	mg/L		<0.100	<0.100	----	----	----
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%		101	102	----	----	----
dichlorotoluene, 3,4-	97-75-0	E581.F1	1.0	%		88.9	87.8	----	----	----
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		92.2	94.1	----	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		87.8	88.2	----	----	----

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **EO2209152**	Page	: 1 of 47
Client	: **Tetra Tech Canada Inc.**	Laboratory	: Edmonton - Environmental
Contact	: Brent Finnestad	Account Manager	: Kieran Tordoff
Address	: North Building 14940 123 Ave NW Edmonton AB Canada T5V 1B4	Address	: 9450 - 17 Avenue NW Edmonton, Alberta Canada T6N 1M9
Telephone	: 780-718-9317	Telephone	: +1 780 413 5227
Project	: SWM.SWOP04592-01	Date Samples Received	: 20-Oct-2022 11:30
PO	: ----	Issue Date	: 07-Nov-2022 09:31
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: ----		
No. of samples received	: 17		
No. of samples analysed	: 17		

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

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) BALASH D.1	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) BALASH D.2	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) BALASH D.3	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) BEAVER COUNTY D.1	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) BOOTH D.1	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) EWERT D.1	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) EWERT D.2	E559-L	19-Oct-2022	----	----	----		25-Oct-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
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) EWERT D.3	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) EWERT D.4	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MAGNESON D.1	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MAGNESON D.2	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MAGNESON D.4	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MAGNESON D.5	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MAGNESON D.6	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) WINSNES D.1	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) DUPILCATE 1	E559-L	19-Oct-2022	----	----	----		25-Oct-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
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
DUPILCATE 2	E559-L	19-Oct-2022	----	----	----		25-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
BALASH D.1	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
BALASH D.2	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
BALASH D.3	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
BEAVER COUNTY D.1	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
BOOTH D.1	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
EWERT D.1	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
EWERT D.2	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
EWERT D.3	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-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
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
EWERT D.4	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
MAGNESON D.1	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
MAGNESON D.2	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
MAGNESON D.4	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
MAGNESON D.5	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
MAGNESON D.6	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
WINSNES D.1	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
DUPILCATE 1	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-2022	28 days	8 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
DUPILCATE 2	E562	19-Oct-2022	26-Oct-2022	----	----		26-Oct-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
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BALASH D.1	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BALASH D.2	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BALASH D.3	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BEAVER COUNTY D.1	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BOOTH D.1	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
EWERT D.1	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
EWERT D.2	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
EWERT D.3	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
EWERT D.4	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-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
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MAGNESON D.1	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MAGNESON D.2	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MAGNESON D.4	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MAGNESON D.5	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MAGNESON D.6	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) WINSNES D.1	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) DUPILCATE 1	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) DUPILCATE 2	E298	19-Oct-2022	27-Oct-2022	----	----		27-Oct-2022	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BALASH D.1	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 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 : Chloride in Water by IC										
HDPE BALASH D.2	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BALASH D.3	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BEAVER COUNTY D.1	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BOOTH D.1	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE DUPILCATE 1	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE DUPILCATE 2	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EWERT D.1	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EWERT D.2	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EWERT D.3	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 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 : Chloride in Water by IC										
HDPE EWERT D.4	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MAGNESON D.1	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MAGNESON D.2	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MAGNESON D.4	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MAGNESON D.5	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MAGNESON D.6	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE WINSNES D.1	E235.Cl	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BALASH D.1	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BALASH D.2	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 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 BALASH D.3	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BEAVER COUNTY D.1	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BOOTH D.1	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE DUPILCATE 1	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE DUPILCATE 2	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EWERT D.1	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EWERT D.2	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EWERT D.3	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EWERT D.4	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 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 MAGNESON D.1	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MAGNESON D.2	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MAGNESON D.4	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MAGNESON D.5	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MAGNESON D.6	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE WINSNES D.1	E235.F	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE BALASH D.1	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE BALASH D.2	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE BALASH D.3	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 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										
HDPE BEAVER COUNTY D.1	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE BOOTH D.1	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE DUPILCATE 1	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE DUPILCATE 2	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE EWERT D.1	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE EWERT D.2	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE EWERT D.3	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE EWERT D.4	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE MAGNESON D.1	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 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										
HDPE MAGNESON D.2	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE MAGNESON D.4	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE MAGNESON D.5	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE MAGNESON D.6	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE WINSNES D.1	E235.NO3	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE BALASH D.1	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE BALASH D.2	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE BALASH D.3	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE BEAVER COUNTY D.1	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 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 : Nitrite in Water by IC										
HDPE BOOTH D.1	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE DUPILCATE 1	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE DUPILCATE 2	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE EWERT D.1	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE EWERT D.2	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE EWERT D.3	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE EWERT D.4	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE MAGNESON D.1	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE MAGNESON D.2	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 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 : Nitrite in Water by IC										
HDPE MAGNESON D.4	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE MAGNESON D.5	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE MAGNESON D.6	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE WINSNES D.1	E235.NO2	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE BALASH D.1	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE BALASH D.2	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE BALASH D.3	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE BEAVER COUNTY D.1	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE BOOTH D.1	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓

Matrix: **Water**

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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 DUPILCATE 1	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE DUPILCATE 2	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EWERT D.1	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EWERT D.2	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EWERT D.3	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EWERT D.4	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MAGNESON D.1	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MAGNESON D.2	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MAGNESON D.4	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 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										
MAGNESON D.5	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MAGNESON D.6	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
WINSNES D.1	E235.SO4	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
BALASH D.1	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
BALASH D.2	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
BALASH D.3	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
BEAVER COUNTY D.1	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
BOOTH D.1	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
EWERT D.1	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-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				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) EWERT D.2	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) EWERT D.3	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) EWERT D.4	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) MAGNESON D.1	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) MAGNESON D.2	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) MAGNESON D.4	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) MAGNESON D.5	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) MAGNESON D.6	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) WINSNES D.1	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-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				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) DUPILCATE 1	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	15 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) DUPILCATE 2	E318	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	15 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) BALASH D.1	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) BALASH D.2	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) BALASH D.3	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) BEAVER COUNTY D.1	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) BOOTH D.1	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) EWERT D.1	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) EWERT D.2	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-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 : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) EWERT D.3	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) EWERT D.4	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MAGNESON D.1	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MAGNESON D.2	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MAGNESON D.4	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MAGNESON D.5	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MAGNESON D.6	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) WINSNES D.1	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) DUPILCATE 1	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-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
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
DUPILCATE 2	E372-U	19-Oct-2022	25-Oct-2022	----	----		26-Oct-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
BALASH D.1	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
BALASH D.2	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
BALASH D.3	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
BEAVER COUNTY D.1	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
BOOTH D.1	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
DUPILCATE 1	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
DUPILCATE 2	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
EWERT D.1	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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) EWERT D.2	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EWERT D.3	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EWERT D.4	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MAGNESON D.1	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MAGNESON D.2	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MAGNESON D.4	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MAGNESON D.5	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MAGNESON D.6	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) WINSNES D.1	E509	19-Oct-2022	22-Oct-2022	----	----		22-Oct-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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 (lab preserved) BALASH D.1	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BALASH D.2	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BALASH D.3	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BEAVER COUNTY D.1	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BOOTH D.1	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EWERT D.1	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EWERT D.2	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EWERT D.3	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EWERT D.4	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-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				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 (lab preserved) MAGNESON D.1	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MAGNESON D.2	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MAGNESON D.4	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MAGNESON D.5	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MAGNESON D.6	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) WINSNES D.1	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) DUPILCATE 1	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) DUPILCATE 2	E421	19-Oct-2022	25-Oct-2022	----	----		25-Oct-2022	180 days	7 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) BALASH D.1	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓

Matrix: **Water**

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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 PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) BALASH D.2	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) BALASH D.3	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) BEAVER COUNTY D.1	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) BOOTH D.1	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) EWERT D.1	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) EWERT D.2	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) EWERT D.3	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) EWERT D.4	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MAGNESON D.1	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓

Matrix: **Water**

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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 PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MAGNESON D.2	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MAGNESON D.4	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MAGNESON D.5	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MAGNESON D.6	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) WINSNES D.1	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUPILCATE 1	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	7 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUPILCATE 2	E581.F1	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	7 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BEAVER COUNTY D.1	E601	19-Oct-2022	21-Oct-2022	14 days	2 days	✓	24-Oct-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BOOTH D.1	E601	19-Oct-2022	21-Oct-2022	14 days	2 days	✓	24-Oct-2022	40 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
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) EWERT D.1	E601	19-Oct-2022	21-Oct-2022	14 days	2 days	✓	24-Oct-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) EWERT D.2	E601	19-Oct-2022	21-Oct-2022	14 days	2 days	✓	24-Oct-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) EWERT D.3	E601	19-Oct-2022	21-Oct-2022	14 days	2 days	✓	24-Oct-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) EWERT D.4	E601	19-Oct-2022	21-Oct-2022	14 days	2 days	✓	24-Oct-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MAGNESON D.1	E601	19-Oct-2022	21-Oct-2022	14 days	2 days	✓	24-Oct-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MAGNESON D.2	E601	19-Oct-2022	21-Oct-2022	14 days	2 days	✓	24-Oct-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MAGNESON D.4	E601	19-Oct-2022	21-Oct-2022	14 days	2 days	✓	24-Oct-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MAGNESON D.5	E601	19-Oct-2022	21-Oct-2022	14 days	2 days	✓	24-Oct-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MAGNESON D.6	E601	19-Oct-2022	21-Oct-2022	14 days	2 days	✓	24-Oct-2022	40 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
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BALASH D.1	E601	19-Oct-2022	24-Oct-2022	14 days	5 days	✓	24-Oct-2022	40 days	0 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BALASH D.2	E601	19-Oct-2022	24-Oct-2022	14 days	5 days	✓	24-Oct-2022	40 days	0 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BALASH D.3	E601	19-Oct-2022	24-Oct-2022	14 days	5 days	✓	24-Oct-2022	40 days	0 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) WINSNES D.1	E601	19-Oct-2022	24-Oct-2022	14 days	5 days	✓	24-Oct-2022	40 days	0 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUPILCATE 1	E601	19-Oct-2022	24-Oct-2022	14 days	6 days	✓	24-Oct-2022	40 days	0 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUPILCATE 2	E601	19-Oct-2022	24-Oct-2022	14 days	6 days	✓	24-Oct-2022	40 days	0 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) DUPILCATE 1	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	10 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) DUPILCATE 2	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	10 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BALASH D.1	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-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
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BALASH D.2	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BALASH D.3	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BEAVER COUNTY D.1	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BOOTH D.1	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EWERT D.1	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EWERT D.2	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EWERT D.3	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EWERT D.4	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) MAGNESON D.1	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-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
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) MAGNESON D.2	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) MAGNESON D.4	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) MAGNESON D.5	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) MAGNESON D.6	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) WINSNES D.1	E358-L	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	28 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE BALASH D.1	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE BALASH D.2	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE BALASH D.3	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE BEAVER COUNTY D.1	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 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 : Alkalinity Species by Titration										
HDPE BOOTH D.1	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE DUPILCATE 1	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE DUPILCATE 2	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EWERT D.1	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EWERT D.2	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EWERT D.3	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EWERT D.4	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MAGNESON D.1	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MAGNESON D.2	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 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 : Alkalinity Species by Titration										
HDPE MAGNESON D.4	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MAGNESON D.5	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MAGNESON D.6	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE WINSNES D.1	E290	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE BALASH D.1	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE BALASH D.2	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE BALASH D.3	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE BEAVER COUNTY D.1	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE BOOTH D.1	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 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 DUPILCATE 1	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE DUPILCATE 2	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE EWERT D.1	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE EWERT D.2	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE EWERT D.3	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE EWERT D.4	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE MAGNESON D.1	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE MAGNESON D.2	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE MAGNESON D.4	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 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 MAGNESON D.5	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE MAGNESON D.6	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE WINSNES D.1	E100	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	28 days	2 days	✓
Physical Tests : pH by Meter										
HDPE BALASH D.1	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE BALASH D.2	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE BALASH D.3	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE BEAVER COUNTY D.1	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE BOOTH D.1	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE DUPILCATE 1	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE DUPILCATE 2	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EWERT D.1	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EWERT D.2	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EWERT D.3	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EWERT D.4	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MAGNESON D.1	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MAGNESON D.2	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MAGNESON D.4	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MAGNESON D.5	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE MAGNESON D.6	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE WINSNES D.1	E108	19-Oct-2022	21-Oct-2022	----	----		21-Oct-2022	0.25 hrs	5.25 hrs	× EHTR-FM
Physical Tests : TSS by Gravimetry										
HDPE BOOTH D.1	E160	19-Oct-2022	----	----	----		25-Oct-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE EWERT D.1	E160	19-Oct-2022	----	----	----		25-Oct-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE EWERT D.2	E160	19-Oct-2022	----	----	----		25-Oct-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE EWERT D.3	E160	19-Oct-2022	----	----	----		25-Oct-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE EWERT D.4	E160	19-Oct-2022	----	----	----		25-Oct-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MAGNESON D.1	E160	19-Oct-2022	----	----	----		25-Oct-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE BALASH D.1	E160	19-Oct-2022	----	----	----		26-Oct-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				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 BALASH D.2	E160	19-Oct-2022	----	----	----		26-Oct-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE BALASH D.3	E160	19-Oct-2022	----	----	----		26-Oct-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE BEAVER COUNTY D.1	E160	19-Oct-2022	----	----	----		26-Oct-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE DUPILCATE 1	E160	19-Oct-2022	----	----	----		26-Oct-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE DUPILCATE 2	E160	19-Oct-2022	----	----	----		26-Oct-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MAGNESON D.2	E160	19-Oct-2022	----	----	----		26-Oct-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MAGNESON D.4	E160	19-Oct-2022	----	----	----		26-Oct-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MAGNESON D.5	E160	19-Oct-2022	----	----	----		26-Oct-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MAGNESON D.6	E160	19-Oct-2022	----	----	----		26-Oct-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				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										
WINSNES D.1	E160	19-Oct-2022	----	----	----		26-Oct-2022	7 days	7 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BALASH D.1	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BALASH D.2	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BALASH D.3	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BEAVER COUNTY D.1	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BOOTH D.1	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
EWERT D.1	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
EWERT D.2	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
EWERT D.3	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓

Matrix: **Water**

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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 : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) EWERT D.4	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MAGNESON D.1	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MAGNESON D.2	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MAGNESON D.4	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MAGNESON D.5	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MAGNESON D.6	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) WINSNES D.1	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUPILCATE 1	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	7 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUPILCATE 2	E611A	19-Oct-2022	21-Oct-2022	----	----		25-Oct-2022	14 days	7 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	707394	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	718420	2	40	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	707340	1	17	5.8	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	707341	1	17	5.8	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	713719	2	39	5.1	5.0	✓
Chloride in Water by IC	E235.Cl	707668	1	20	5.0	5.0	✓
Conductivity in Water	E100	707393	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	709326	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	713693	2	39	5.1	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	720570	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	707667	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	707664	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	707665	1	20	5.0	5.0	✓
pH by Meter	E108	707392	1	20	5.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	716367	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	707666	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	724620	3	42	7.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	714235	2	39	5.1	5.0	✓
TSS by Gravimetry	E160	714307	2	40	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	707394	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	718420	2	40	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	707340	1	17	5.8	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	707341	1	17	5.8	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	707973	2	40	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	713719	2	39	5.1	5.0	✓
Chloride in Water by IC	E235.Cl	707668	1	20	5.0	5.0	✓
Conductivity in Water	E100	707393	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	709326	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	713693	2	39	5.1	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	720570	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	707667	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	707664	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	707665	1	20	5.0	5.0	✓
pH by Meter	E108	707392	1	20	5.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	716367	2	40	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*
Laboratory Control Samples (LCS) - Continued							
Sulfate in Water by IC	E235.SO4	707666	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	724620	3	42	7.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	714235	2	39	5.1	5.0	✓
TSS by Gravimetry	E160	714307	2	40	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	707394	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	718420	2	40	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	707340	1	17	5.8	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	707341	1	17	5.8	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	707973	2	40	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	713719	2	39	5.1	5.0	✓
Chloride in Water by IC	E235.Cl	707668	1	20	5.0	5.0	✓
Conductivity in Water	E100	707393	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	709326	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	713693	2	39	5.1	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	720570	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	707667	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	707664	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	707665	1	20	5.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	716367	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	707666	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	724620	3	42	7.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	714235	2	39	5.1	5.0	✓
TSS by Gravimetry	E160	714307	2	40	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	718420	2	40	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	707340	1	17	5.8	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	713719	2	39	5.1	5.0	✓
Chloride in Water by IC	E235.Cl	707668	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	709326	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	713693	2	39	5.1	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	720570	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	707667	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	707664	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	707665	1	20	5.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	716367	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	707666	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	724620	2	42	4.7	5.0	✗
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	714235	2	39	5.1	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 Edmonton - 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 Edmonton - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 Edmonton - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Edmonton - 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 Edmonton - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC	E235.NO2 Edmonton - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 Edmonton - 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 Edmonton - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Edmonton - 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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 Edmonton - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Edmonton - Environmental	Water	Method Fialab 100, 2018	TKN 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 Edmonton - 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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Metals in Water by CRC ICPMS	E421 Edmonton - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Mercury in Water by CVAAS	E509 Edmonton - 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.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Edmonton - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Phenols (4AAP) in Water by Colorimetry	E562 Edmonton - Environmental	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide (K3Fe(CN)6) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
CCME PHC - F1 by Headspace GC-FID	E581.F1 Edmonton - Environmental	Water	CCME PHC in Soil - Tier 1	CCME Fraction 1 (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 Edmonton - Environmental	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
BTEX by Headspace GC-MS	E611A Edmonton - 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 Edmonton - 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.
Ion Balance using Dissolved Metals	EC101 Edmonton - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 Edmonton - Environmental	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Edmonton - 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 Edmonton - 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).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Edmonton - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Edmonton - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Edmonton - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Edmonton - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Edmonton - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
VOCs Preparation for Headspace Analysis	EP581 Edmonton - 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 Edmonton - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

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QUALITY CONTROL REPORT

Work Order	: **EO2209152**	Page	: 1 of 22
Client	: Tetra Tech Canada Inc.	Laboratory	: Edmonton - Environmental
Contact	: Brent Finnestad	Account Manager	: Kieran Tordoff
Address	: North Building 14940 123 Ave NW Edmonton AB Canada T5V 1B4	Address	: 9450 - 17 Avenue NW Edmonton, Alberta Canada T6N 1M9
Telephone	:	Telephone	: +1 780 413 5227
Project	: SWM.SWOP04592-01	Date Samples Received	: 20-Oct-2022 11:30
PO	: ----	Date Analysis Commenced	: 21-Oct-2022
C-O-C number	: ----	Issue Date	: 07-Nov-2022 09:31
Sampler	: ---- 780-718-9317		
Site	: ----		
Quote number	: ----		
No. of samples received	: 17		
No. of samples analysed	: 17		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Alex Drake	Lab Analyst	Edmonton Inorganics, Edmonton, Alberta
Alex Drake	Lab Analyst	Edmonton Metals, Edmonton, Alberta
Angeli Marzan	Lab Analyst	Edmonton Inorganics, Edmonton, Alberta
Dan Nguyen	Team Leader - Inorganics	Edmonton Metals, Edmonton, Alberta
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Shruti Mudliar	Lab Analyst	Edmonton Inorganics, Edmonton, Alberta
Sobhithan Pillay		Edmonton Inorganics, Edmonton, Alberta
Yan Zhang	Lab Analyst	Edmonton Organics, Edmonton, Alberta

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: 707392)											
EO2209146-019	Anonymous	pH	----	E108	0.10	pH units	7.85	7.86	0.127%	3%	----
Physical Tests (QC Lot: 707393)											
EO2209146-019	Anonymous	conductivity	----	E100	2.0	µS/cm	2600	2630	1.15%	10%	----
Physical Tests (QC Lot: 707394)											
EO2209146-019	Anonymous	alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	1150	1140	1.13%	20%	----
Physical Tests (QC Lot: 714307)											
EO2209148-011	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	5.0	5.6	0.6	Diff <2x LOR	----
Physical Tests (QC Lot: 715337)											
EO2209152-007	MAGNESON D.2	solids, total suspended [TSS]	----	E160	3.0	mg/L	56.8	54.4	4.32%	20%	----
Anions and Nutrients (QC Lot: 707664)											
EO2209152-016	DUPILCATE 1	nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 707665)											
EO2209152-016	DUPILCATE 1	nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 707666)											
EO2209152-016	DUPILCATE 1	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	17.8	17.3	2.68%	20%	----
Anions and Nutrients (QC Lot: 707667)											
EO2209152-016	DUPILCATE 1	fluoride	16984-48-8	E235.F	0.020	mg/L	0.270	0.274	1.47%	20%	----
Anions and Nutrients (QC Lot: 707668)											
EO2209152-016	DUPILCATE 1	chloride	16887-00-6	E235.Cl	0.50	mg/L	69.1	68.6	0.736%	20%	----
Anions and Nutrients (QC Lot: 714235)											
EO2209146-015	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: 714236)											
EO2209152-014	BALASH D.2	phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.928	0.932	0.354%	20%	----
Anions and Nutrients (QC Lot: 718420)											
EO2209123-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0250	mg/L	1.65	1.71	3.52%	20%	----
Anions and Nutrients (QC Lot: 718428)											
EO2209153-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.399	0.416	4.05%	20%	----
Anions and Nutrients (QC Lot: 724620)											
EO2209114-003	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.200	mg/L	0.240	0.252	0.012	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 724655)											

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*
Anions and Nutrients (QC Lot: 724655) - continued											
EO2209040-010	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.318	0.363	0.045	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 724656)											
EO2209152-017	DUPILCATE 2	Kjeldahl nitrogen, total [TKN]	----	E318	0.200	mg/L	5.39	5.05	6.41%	20%	----
Organic / Inorganic Carbon (QC Lot: 720570)											
FC2202553-002	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 709326)											
EO2209062-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	0.000461	0.000456	1.09%	20%	----
Dissolved Metals (QC Lot: 709327)											
EO2209152-017	DUPILCATE 2	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 713693)											
EO2209142-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0016	0.0019	0.0003	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00010	<0.00010	0.000005	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00018	0.00017	0.000003	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0732	0.0729	0.400%	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	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000288	0.0000288	0.00000006	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	28.1	29.4	4.61%	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	<0.00020	<0.00020	0	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	0.0015	0.0015	0.00001	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	4.43	4.34	2.26%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0266	0.0254	4.57%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000198	0.000210	0.000012	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00065	0.00064	0.000006	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.608	0.600	1.42%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00052	0.00045	0.00007	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 713693) - continued											
EO2209142-001	Anonymous	silicon, dissolved	7440-21-3	E421	0.050	mg/L	9.24	9.16	0.895%	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	3.03	2.91	3.87%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0460	0.0482	4.63%	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	0.00016	0.00016	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	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000101	0.000097	0.000004	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 713694)											
EO2209152-011	BEAVER COUNTY D.1	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0046	0.0055	0.0010	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00042	0.00044	0.00001	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0114	0.0111	3.20%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0243	0.0248	2.18%	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	0.058	0.059	0.001	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	73.8	76.1	2.96%	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	0.00111	0.00112	0.909%	20%	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00077	0.00078	0.000005	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.030	mg/L	0.032	0.033	0.001	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	0.0343	0.0322	6.50%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	32.3	32.2	0.368%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00500	mg/L	0.409	0.415	1.39%	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*
Dissolved Metals (QC Lot: 713694) - continued											
EO2209152-011	BEAVER COUNTY D.1	molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00168	0.00172	2.32%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00695	0.00708	1.90%	20%	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	1.82	1.73	5.14%	20%	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	20.9	20.6	1.17%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00171	0.00168	0.00003	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000302	0.000278	0.000024	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.48	2.52	1.61%	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	312	324	3.57%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.563	0.552	2.01%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	66.4	67.8	2.07%	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	0.00052	0.00052	0.000003	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.00015	0.00014	0.000007	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00210	0.00207	1.48%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00761	0.00778	2.21%	20%	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0011	0.0013	0.0003	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	0.00083	0.00084	0.00001	Diff <2x LOR	----
Aggregate Organics (QC Lot: 713719)											
EO2209110-001	Anonymous	chemical oxygen demand [COD]	----	E559-L	10	mg/L	76	76	0.06	Diff <2x LOR	----
Aggregate Organics (QC Lot: 713720)											
EO2209152-010	MAGNESON D.6	chemical oxygen demand [COD]	----	E559-L	10	mg/L	127	131	3.30%	20%	----
Aggregate Organics (QC Lot: 716367)											
EO2209145-002	Anonymous	phenols, total (4AAP)	----	E562	0.0010	mg/L	0.0030	0.0031	0.0002	Diff <2x LOR	----
Aggregate Organics (QC Lot: 716369)											
FC2202583-002	Anonymous	phenols, total (4AAP)	----	E562	0.0010	mg/L	0.0050	0.0059	0.0010	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 707340)											
EO2209152-001	BOOTH D.1	benzene	71-43-2	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		styrene	100-42-5	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	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*
Volatile Organic Compounds (QC Lot: 707340) - continued											
EO2209152-001	BOOTH D.1	toluene	108-88-3	E611A	0.50	µg/L	<0.00050 mg/L	<0.50	0	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.00040 mg/L	<0.40	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.30	µg/L	<0.00030 mg/L	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 707341)											
EO2209152-001	BOOTH D.1	F1 (C6-C10)	----	E581.F1	100	µg/L	<0.10 mg/L	<100	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: 707393)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 707394)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 714307)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 715337)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 707664)						
nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 707665)						
nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 707666)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 707667)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 707668)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 714235)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 714236)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 718420)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 718428)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 724620)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 724655)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 724656)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 720570)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 720570) - continued						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 709326)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 709327)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 713693)						
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	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 713693) - continued						
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	----
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: 713694)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 713694) - continued						
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	----
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: 713719)						
chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Aggregate Organics (QCLot: 713720)						
chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Aggregate Organics (QCLot: 716367)						
phenols, total (4AAP)	----	E562	0.001	mg/L	<0.0010	----
Aggregate Organics (QCLot: 716369)						
phenols, total (4AAP)	----	E562	0.001	mg/L	<0.0010	----
Volatile Organic Compounds (QCLot: 707340)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	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: 707341)						
F1 (C6-C10)	----	E581.F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 707973)						
F2 (C10-C16)	----	E601	100	µg/L	<100	----
Hydrocarbons (QCLot: 711536)						
F2 (C10-C16)	----	E601	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: 707392)									
pH	----	E108	----	pH units	6 pH units	101	97.0	103	----
Physical Tests (QCLot: 707393)									
conductivity	----	E100	1	µS/cm	1412 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 707394)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	110	85.0	115	----
Physical Tests (QCLot: 714307)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	98.4	85.0	115	----
Physical Tests (QCLot: 715337)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 707664)									
nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 707665)									
nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 707666)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	107	90.0	110	----
Anions and Nutrients (QCLot: 707667)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 707668)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	108	90.0	110	----
Anions and Nutrients (QCLot: 714235)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.03 mg/L	96.1	80.0	120	----
Anions and Nutrients (QCLot: 714236)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.03 mg/L	97.6	80.0	120	----
Anions and Nutrients (QCLot: 718420)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 718428)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	108	85.0	115	----
Anions and Nutrients (QCLot: 724620)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 724655)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	102	75.0	125	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 724656)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	110	75.0	125	----
Organic / Inorganic Carbon (QCLot: 720570)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	92.3	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	97.2	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	101	80.0	120	----
Dissolved Metals (QCLot: 713693)									
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	97.9	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	92.9	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.4	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	97.2	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.9	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.6	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	103	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	99.4	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	95.5	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	96.4	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	92.7	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.8	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	94.0	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	97.1	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.2	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	100	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	99.9	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	94.3	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	99.0	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	98.4	80.0	120	----
sodium, dissolved	7440-23-5	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	97.2	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 713693) - 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	106	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.4	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	93.8	80.0	120	----
tin, dissolved	7440-31-5	E421	----	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	95.4	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	103	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.4	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	93.8	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	93.8	80.0	120	----
Dissolved Metals (QCLot: 713694)									
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	105	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	97.5	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	91.3	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	97.0	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	99.3	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	97.8	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	104	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	97.3	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	93.7	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	98.0	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	94.2	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.6	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	94.8	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	95.8	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	110	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	99.8	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.9	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: 713694) - continued									
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	98.6	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	98.5	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	98.4	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	95.6	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
tin, dissolved	7440-31-5	E421	----	mg/L	0.5 mg/L	98.7	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	95.0	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	104	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.8	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.5	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
Aggregate Organics (QCLot: 713719)									
chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	108	85.0	115	----
Aggregate Organics (QCLot: 713720)									
chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	106	85.0	115	----
Aggregate Organics (QCLot: 716367)									
phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	87.2	85.0	115	----
Aggregate Organics (QCLot: 716369)									
phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	92.4	85.0	115	----
Volatile Organic Compounds (QCLot: 707340)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	112	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	83.7	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	96.2	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	109	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	104	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	84.1	70.0	130	----
Hydrocarbons (QCLot: 707341)									
F1 (C6-C10)	----	E581.F1	100	µg/L	2750 µg/L	87.0	70.0	130	----
Hydrocarbons (QCLot: 707973)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Hydrocarbons (QCLot: 707973) - continued									
F2 (C10-C16)	----	E601	100	µg/L	3850 µg/L	103	70.0	130	----
Hydrocarbons (QCLot: 711536)									
F2 (C10-C16)	----	E601	100	µg/L	3850 µg/L	101	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: 707664)										
EO2209152-016	DUPILCATE 1	nitrate (as N)	14797-55-8	E235.NO3	2.68 mg/L	2.5 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 707665)										
EO2209152-016	DUPILCATE 1	nitrite (as N)	14797-65-0	E235.NO2	0.515 mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 707666)										
EO2209152-016	DUPILCATE 1	sulfate (as SO4)	14808-79-8	E235.SO4	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 707667)										
EO2209152-016	DUPILCATE 1	fluoride	16984-48-8	E235.F	1.04 mg/L	1 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 707668)										
EO2209152-016	DUPILCATE 1	chloride	16887-00-6	E235.Cl	98.3 mg/L	100 mg/L	98.3	75.0	125	----
Anions and Nutrients (QCLot: 714235)										
EO2209146-016	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0494 mg/L	0.05 mg/L	98.9	70.0	130	----
Anions and Nutrients (QCLot: 714236)										
EO2209152-015	BALASH D.3	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 718420)										
EO2209123-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 718428)										
EO2209153-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 724620)										
EO2209114-004	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.47 mg/L	2.5 mg/L	99.0	70.0	130	----
Anions and Nutrients (QCLot: 724655)										
EO2209040-011	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.54 mg/L	2.5 mg/L	101	70.0	130	----
Organic / Inorganic Carbon (QCLot: 720570)										
FC2202553-002	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	4.20 mg/L	5 mg/L	84.0	70.0	130	----
Dissolved Metals (QCLot: 709326)										
EO2209152-001	BOOTH D.1	mercury, dissolved	7439-97-6	E509	0.000112 mg/L	0.0001 mg/L	112	70.0	130	----
Dissolved Metals (QCLot: 709327)										
EO2209153-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.000104 mg/L	0.0001 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: 713693)										
EO2209142-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.204 mg/L	0.2 mg/L	102	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0226 mg/L	0.02 mg/L	113	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0205 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	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00899 mg/L	0.01 mg/L	89.9	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.108 mg/L	0.1 mg/L	108	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00411 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	0.0107 mg/L	0.01 mg/L	107	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.94 mg/L	2 mg/L	96.9	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	0.102 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	0.0187 mg/L	0.02 mg/L	93.4	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0216 mg/L	0.02 mg/L	108	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	11.0 mg/L	10 mg/L	110	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.83 mg/L	4 mg/L	95.8	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0200 mg/L	0.02 mg/L	100	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	9.52 mg/L	10 mg/L	95.2	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00430 mg/L	0.004 mg/L	107	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	20.3 mg/L	20 mg/L	102	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0440 mg/L	0.04 mg/L	110	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	0.0219 mg/L	0.02 mg/L	110	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0214 mg/L	0.02 mg/L	107	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0213 mg/L	0.02 mg/L	106	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: 713693) - continued										
EO2209142-002	Anonymous	uranium, dissolved	7440-61-1	E421	0.00427 mg/L	0.004 mg/L	107	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0996 mg/L	0.1 mg/L	99.6	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.398 mg/L	0.4 mg/L	99.5	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0452 mg/L	0.04 mg/L	113	70.0	130	----
Dissolved Metals (QCLot: 713694)										
EO2209152-012	WINSNES D.1	aluminum, dissolved	7429-90-5	E421	0.216 mg/L	0.2 mg/L	108	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0226 mg/L	0.02 mg/L	113	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	0.0425 mg/L	0.04 mg/L	106	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00983 mg/L	0.01 mg/L	98.3	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00409 mg/L	0.004 mg/L	102	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0105 mg/L	0.01 mg/L	105	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0421 mg/L	0.04 mg/L	105	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0203 mg/L	0.02 mg/L	101	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	2.01 mg/L	2 mg/L	100	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	0.106 mg/L	0.1 mg/L	106	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	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0393 mg/L	0.04 mg/L	98.3	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	12.5 mg/L	10 mg/L	125	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	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		silicon, dissolved	7440-21-3	E421	10.6 mg/L	10 mg/L	106	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00404 mg/L	0.004 mg/L	101	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	0.0428 mg/L	0.04 mg/L	107	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: 713694) - continued										
EO2209152-012	WINSNES D.1	thallium, dissolved	7440-28-0	E421	0.00392 mg/L	0.004 mg/L	98.1	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0222 mg/L	0.02 mg/L	111	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0218 mg/L	0.02 mg/L	109	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0452 mg/L	0.04 mg/L	113	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0224 mg/L	0.02 mg/L	112	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00445 mg/L	0.004 mg/L	111	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	0.377 mg/L	0.4 mg/L	94.4	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0449 mg/L	0.04 mg/L	112	70.0	130	----
Aggregate Organics (QCLot: 713719)										
EO2209110-002	Anonymous	chemical oxygen demand [COD]	----	E559-L	92 mg/L	100 mg/L	91.6	75.0	125	----
Aggregate Organics (QCLot: 713720)										
EO2209152-011	BEAVER COUNTY D.1	chemical oxygen demand [COD]	----	E559-L	ND mg/L	100 mg/L	ND	75.0	125	----
Aggregate Organics (QCLot: 716367)										
EO2209145-002	Anonymous	phenols, total (4AAP)	----	E562	0.0176 mg/L	0.02 mg/L	88.2	75.0	125	----
Aggregate Organics (QCLot: 716369)										
FC2202583-002	Anonymous	phenols, total (4AAP)	----	E562	0.0168 mg/L	0.02 mg/L	84.2	75.0	125	----
Volatile Organic Compounds (QCLot: 707340)										
EO2209152-002	EWERT D.1	benzene	71-43-2	E611A	73.9 µg/L	100 µg/L	73.9	50.0	140	----
		ethylbenzene	100-41-4	E611A	80.4 µg/L	100 µg/L	80.4	50.0	140	----
		styrene	100-42-5	E611A	83.6 µg/L	100 µg/L	83.6	50.0	140	----
		toluene	108-88-3	E611A	92.0 µg/L	100 µg/L	92.0	50.0	140	----
		xylene, m+p-	179601-23-1	E611A	178 µg/L	200 µg/L	89.2	50.0	140	----
		xylene, o-	95-47-6	E611A	80.8 µg/L	100 µg/L	80.8	50.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 21 -

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Canada Toll Free: 1 800 668 9878

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Report To	Contact and company name below will appear on the final report
Company:	Tetra Tech Canada Inc.
Contact:	Brent Finnestad
Phone:	780.451.2121
	Company address below will appear on the final report
Street:	14940 - 123 Ave NW
City/Province:	Edmonton
Postal Code:	T5V 1B4
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

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

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

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

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Brent.Finnestad@TetraTech.com

Email 2: Fahim.Nazari@TetraTech.com

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Brent.Finnestad@TetraTech.com

Email 2: Fahim.Nazari@TetraTech.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	Q79533	AFE/Cost Center:	PO#
Job #:	SWM.SWOP04592-01	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	EO2209152	ALS Contact:	Sampler:

Analysis Request

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTX_F1_F2-ED	C-DIS/ORG-CL	COD-T-COL-ED	MET_R-DIS-COME-ED	NH3-COL-ED	P-T-COL-ED	PHENOLS-4AAP-ED	RIO-ED	SOLIDS-TOTSUS-ED	TKN-F-ED	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
						P	F/P		F	F	P	P			P			
1	Booth D.1	19-OCT-22	9:10	Surface Water	10	X	X	X	X	X	X	X	X	X	X			
2	Ewert D.1	19-OCT-22	10:00	"	10	X	X	X	X	X	X	X	X	X	X			
3	Ewert D.2	19-OCT-22	10:30	"	10	X	X	X	X	X	X	X	X	X	X			
4	Ewert D.3	19-OCT-22	10:15	"	10	X	X	X	X	X	X	X	X	X	X			
5	Ewert D.4	19-OCT-22	9:30	"	10	X	X	X	X	X	X	X	X	X	X			
	~~Lysons D.1~~																	
	~~Lysons D.2~~																	
	~~Lysons D.3~~																	
	~~Lysons D.4~~																	
6	Magneson D.1	19-OCT-22	12:50	"	10	X	X	X	X	X	X	X	X	X	X			
7	Magneson D.2	19-OCT-22	12:20	"	10	X	X	X	X	X	X	X	X	X	X			
	~~Magneson D.3~~																	

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

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

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

SAMPLE RECEIPT DETAILS

Cooling Method: ☐ NONE ☒ ICE ☐ ICE PACKS ☐

Submission Comments identified on Sample Receipt Notif

Cooler Custody Seals Intact: ☐ YES ☐ N/A Samp

INITIAL COOLER TEMPERATURES °C: 6.8°C | 4.5°C | 5.4°C

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECE	
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:
				20-Oct 2022	11:30		

Environmental Division
Edmonton
Work Order Reference
EO2209152

Telephone : +1 780 413 5227

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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

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

Chain of Custody (COC) / Analytical Request Form

COC Number: 21 -

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Tetra Tech Canada Inc.
Contact:	Brent Finnestad
Phone:	780.451.2121
	Company address below will appear on the final report
Street:	14940 - 123 Ave NW
City/Province:	Edmonton
Postal Code:	T5V 1B4
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

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

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

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

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Brent.Finnestad@TetraTech.com

Email 2: Fahim.Nazari@TetraTech.com

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Brent.Finnestad@TetraTech.com

Email 2: Fahim.Nazari@TetraTech.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	Q79533
Job #:	SWM.SWOP04592-01
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact:

Sampler:

Analysis Request

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTX, F1, F2 - ED (P)	C-DIS-ORG-CL (F/P)	COD-T-COL-ED	MET_R-DIS-CCME-ED (F)	NH3-COL-ED	P-T-COL-ED (P)	PHENOLS-4AAP-ED (P)	ROU-ED	SOLIDS-TOTSUS-ED	TKN-F-ED (P)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
8	Magneson D.4	19 OCT 22	13:25	Water	10	X	X	X	X	X	X	X	X	X	X			
9	Magneson D.5	19 OCT 22	12:35	Water	10	X	X	X	X	X	X	X	X	X	X			
10	Magneson D.6	19 OCT 22	13:05	Water	10	X	X	X	X	X	X	X	X	X	X			
11	Beaver County D.1	19 OCT 22	8:30	Water	10	X	X	X	X	X	X	X	X	X	X			
12	Winsnes D.1	19 OCT 22	10:50	Water	10	X	X	X	X	X	X	X	X	X	X			
13	Balash D.1	19 OCT 22	11:15	Water	10	X	X	X	X	X	X	X	X	X	X			
14	Balash D.2	19 OCT 22	11:35	Water	10	X	X	X	X	X	X	X	X	X	X			
15	Balash D.3	19 OCT 22	11:50	Water	10	X	X	X	X	X	X	X	X	X	X			
16	Duplicate 1	19 OCT 22		Water	10	X	X	X	X	X	X	X	X	X	X			
17	Duplicate 2	19 OCT 22		Water	10	X	X	X	X	X	X	X	X	X	X			

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

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

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

ESDAT format

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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

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

APPENDIX D

HISTORICAL DUGOUT CHEMICAL ANALYTICAL RESULTS

Table D.1: Chemical Analytical Results

Sample ID:		Booth D.1																						
Site Number:		1																						
Date Sampled:	Units	15-Oct-1996	3-Oct-1997	8-Oct-1998	20-Oct-1999	11-Oct-2000	24-Oct-2001	8-Oct-2002	15-Oct-2003	14-Oct-2004	20-Oct-2005	13-Oct-2006	3-Oct-2007	16-Oct-2008	28-Oct-2009	18-Oct-2010	12-Oct-2011	15-Oct-2012	8-Oct-2013	15-Oct-2014	14-Oct-2015	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019
Chem. O_2 Demand	mg/L	70	40	50	70	50	40	60	50	40	55	61	50	69	65.5	59.4	75	92	78	71	219	68	77	98	84
Ammonia-N	mg/L	<0.05	<0.05	<0.05	0.06	0.58	0.16	<0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	0.79	0.108	1.21	<0.050	0.565	<0.050
Total Kjeldahl Nitrogen	mg/L	<0.2	0.6	1.6	1.8	1.5	2.4	1.8	1.7	1.8	1.8	1.8	1.7	2.5	1.84	2.1	2.89	2.55	2.76	2.76	7.02	3.09	2.58	4.70	2.51
Total Organic Carbon	mg/L	16	15	19	17	17	16	22	17	21	21	21	19	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												18	22.5	22.2	29.4	26.8	29.0	22.7	59.9	21.4	77	29.9	22.9
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0019	0.0075
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	0.01	<0.010	<0.010	<0.010	0.013	<0.01	0.0035	0.0016	0.0031	0.0056	0.0021
Antimony	mg/L	0.0007	0.0005	0.0009	0.0005	0.0007	0.0006	0.0009	0.0012	0.0024	0.0007	0.0009	0.0019	0.0005	<0.00040	<0.00040	<0.00040	<0.00080	0.00043	<0.0004	0.00077	0.0002	0.00024	0.00029	0.00020
Arsenic	mg/L	Not required under previous permit														-	-	-	-	-	-	-	-	0.00703	0.00484
Barium	mg/L	0.033	0.025	0.03	0.032	0.051	0.049	0.025	0.039	0.018	0.033	0.079	0.075	0.073	0.0655	0.0731	0.0674	0.0518	0.0600	0.0673	0.0421	0.0883	0.0594	0.0714	0.0614
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	0.054	<0.050	<0.050	<0.050	<0.05	<0.020	0.064	0.045	0.049	0.047
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00092	0.00023	0.00034	0.00045	0.00035
Copper	mg/L	0.022	0.007	0.011	0.012	0.014	0.025	0.016	0.016	0.005	<0.001	0.001	<0.001	<0.001	<0.0010	0.0046	<0.0010	<0.0010	<0.0010	<0.001	<0.00040	0.00045	0.00054	0.00049	0.00053
Iron	mg/L	0.120	0.328	0.445	0.572	0.403	0.126	0.181	0.577	0.081	0.077	0.212	0.175	0.022	0.02	0.018	0.029	<0.010	0.025	0.07	0.021	0.021	0.033	0.028	0.121
Lead	mg/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	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	0.00011	<0.00010	<0.000050	0.000077	<0.000050	0.000072
Lithium	mg/L	Not required under previous permit														-	-	-	-	-	-	-	-	0.0446	0.0327
Manganese	mg/L													0.003	0.005	<0.0020	<0.0020	<0.0020	0.0025	0.0024	0.154	0.00071	0.00744	0.00864	0.00250
Mercury	mg/L	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000095	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00244	0.00125	0.00111	0.000989	0.000853
Nickel	mg/L	<0.002	<0.002	0.003	0.005	0.005	0.003	0.004	0.006	<0.002	<0.002	0.004	0.003	0.003	0.0035	0.0038	0.0047	0.0036	0.0035	0.0041	0.0060	0.0043	0.0034	0.00279	0.00353
Selenium	mg/L	Not required under previous permit												<0.0004	<0.00080	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00045	0.000114	0.000115	0.000143	0.000115
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													0.0002	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000010	<0.000010	0.000016	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	<0.001	<0.00060	<0.00030	0.00032	0.00049	0.00059
Uranium	mg/L															-	-	-	-	-	-	-	-	0.000784	0.000578
Vanadium	mg/L													0.001	<0.0010	<0.0010	<0.0010	0.0017	0.0026	0.0015	0.0053	0.00087	0.00112	0.00135	0.00076
Zinc	mg/L	0.293	0.256	0.106	0.055	0.117	0.099	0.011	0.026	0.054	0.002	0.005	0.011	0.008	<0.0020	<0.0020	<0.0020	0.0035	<0.0020	0.0119	0.0021	<0.0010	0.0021	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	100	108	101	101	102	102	98.5	104	102	104	101	99.2	98.8	95	109	88	91.9	104	110	96.7	107	95.5	107	103
Bicarbonate	mg/L	299	283	324	302	330	345	210	164	215	299	311	342	340	291	334	425	383	333	342	552	357	396	345	328
Chloride	mg/L	15.8	16.1	18.1	20.0	31.0	54.0	62	43	55	52	72	65	73	76	83.2	85.6	96.9	97.1	78.4	80.3	61.7	59.7	54.6	46.3
Carbonate	mg/L	<5	<5	<5	<5	<5	<5	76	37	45	<5	<5	<5	12	29.3	15	11.7	28.7	36.1	11.2	24.6	<5.0	10.7	7.6	<5.0
Conductivity (EC)	uS/cm	1080	986	903	956	1070	1260	1500	998	1150	898	951	944	987	1010	1100	1130	1180	1100	989	1560	885	893	845	714
Calcium	mg/L	25.5	20.5	18.1	15.5	26.2	28.6	13.2	14.2	14.6	23	31.2	30.1	21.7	14.8	33.3	28	13.1	14.7	19.6	33.6	29	14.8	14.7	21.5
Potassium	mg/L	7.6	7.2	7.8	7.8	11	10.5	12.3	9.6	9.3	9.7	12.3	10.6	10.9	12.2	11.7	9.26	11.8	12.9	12.2	17.9	13.9	12.3	15.1	12.5
Magnesium	mg/L	14.0	10.8	11.3	10.4	14.3	17.1	18	11.7	12.7	11.4	12.9	12.3	14	12.2	16.9	13	13.4	15.0	13.6	20.8	13.9	12.5	11.7	10.8
Sodium	mg/L	211	198	194	175	204	250	333	194	219	178	163	153	171	182	202	178	210	217	186	254	154	167	156	128
Sulfate	mg/L	307	231	216	185	223	332	382	233	228	159	136	100	98.3	125	135	101	106	90.2	67.7	157	70.6	59.6	43.0	43.4
Phosphorus	mg/L	Not required under previous permit													0.057	0.087	0.324	0.16	0.166	0.245	1.09	0.155	0.128	0.276	0.211
pH in H_20	pH	8.4	8.4	8.0	8.3	8.0	8.1	9.5	9.4	9.3	8.3	8.1	8.4	8.6	8.84	8.6	8.48	8.93	8.96	8.6	8.63	8.37	8.53	8.49	8.36
TDS (Calculated)	mg/L	729	625	625	563	659	870	966	624	690	580	581	542	568	594	661	636	668	647	557	860	524	531	472	428
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.040	0.312	<0.020	<0.020	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.020	0.026	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	<0.022
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	84.9	98.2
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	295	276
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.146	0.284
Field Data																									
pH in H_20	pH	Not required under previous permit												8.41	8.19	9.03	8.56	9.36	9.5	8.35	9.21	8.7	9.1	11.1	8.4
Conductivity (EC)	uS/cm													1044	650	717	1241	1157	1127	804	1580	893	980	858	80

Table D.2: Chemical Analytical Results

Sample ID:		Ewert D.1																							
Site Number:		2																							
Date Sampled:	**Units**	**16-Oct-1996**	**7-Oct-1997**	**9-Oct-1998**	**20-Oct-1999**	**11-Oct-2000**	**4-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**13-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	40	50	100	90	50	90	90	80	40	85	55	68	70	103	67	81	81	80	79	131	83	122	53	79
Ammonia-N	mg/L	1.65	0.36	0.8	<0.05	<0.05	0.28	<0.05	<0.05	<0.05	<0.05	1.64	<0.05	<0.05	0.207	<0.050	<0.050	0.198	<0.050	0.082	0.304	0.052	1.11	3.79	<0.050
Total Kjeldahl Nitrogen	mg/L	3.3	2.7	3	2.5	1.7	0.9	3.9	4.8	2.7	2.2	3.9	2.3	2.4	5.8	3.52	2.66	3.15	3.13	2.95	6.65	3.06	7.29	5.64	2.70
Total Organic Carbon	mg/L	17	24	23	19	19	31	37	29	23	31	20	24	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												18	29.1	31.7	20	24.8	24.9	23.4	37.2	24.3	122	21.6	22.2
Phenols	mg/L													-		-	-	-	-	-	-	-	-	0.0018	0.0101
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	0.026	0.022	<0.010	<0.010	<0.010	<0.01	0.0167	0.0025	0.0151	0.0303	0.0349
Antimony	mg/L	<0.0004	<0.0002	0.0005	<0.0004	0.0005	0.0009	0.0015	0.0015	0.0016	0.0015	0.0012	0.002	0.0005	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00043	0.00013	0.0003	<0.00010	0.00025
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00165	0.0137
Barium	mg/L	0.051	0.075	0.064	0.111	0.078	0.075	0.131	0.155	0.155	0.041	0.088	0.071	0.057	0.048	0.0581	0.044	0.0789	0.0584	0.0826	0.0506	0.0699	0.0642	0.118	0.0449
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													0.05	0.052	0.057	0.058	0.057	0.052	0.061	0.059	0.073	0.053	0.046	0.040
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000099	0.0000059	0.0000083	<0.0000050	0.0000070
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00013	<0.00010	<0.00010	0.00011	<0.00010
Cobalt	mg/L	<0.002	0.005	0.018	<0.002	<0.002	0.002	0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00060	0.00025	0.00064	0.00065	0.00062
Copper	mg/L	0.132	0.008	0.014	0.016	0.011	0.028	0.021	0.027	0.007	0.004	0.003	0.005	0.001	0.0019	0.0037	<0.0010	<0.0010	<0.0010	<0.001	0.00180	0.00360	0.00193	0.00081	0.00271
Iron	mg/L	0.277	0.754	0.595	1.400	0.770	2.920	4.33	7.07	0.616	0.454	1.67	1.19	0.032	0.087	0.055	<0.030	0.027	0.098	0.031	0.062	0.012	0.052	0.166	0.077
Lead	mg/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	<0.0001	0.00018	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	0.000176	<0.000050	0.000098	0.000113	0.000076
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0263	0.0222
Manganese	mg/L													0.002	0.0075	0.0096	<0.0050	<0.0020	0.0046	<0.002	0.00448	0.00161	0.0116	0.192	0.0138
Mercury	mg/L	<0.0002	<0.0004	0.0005	<0.0002	<0.0002	0.0009	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	0.0000052	0.0000081	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.007	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00252	0.00142	0.000884	0.00136	0.00198
Nickel	mg/L	<0.002	<0.002	0.018	0.01	0.004	0.004	0.01	0.013	<0.002	0.004	0.006	0.006	0.005	0.0047	0.0043	0.0026	0.0046	0.0027	0.0037	0.00581	0.00424	0.00243	0.00389	0.00321
Selenium	mg/L	Not required under previous permit												0.0005	0.00058	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000347	0.000248	0.00025	0.000169	0.000258
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000017	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	0.00011	<0.00010	<0.00010
Titanium	mg/L													<0.001	0.0026	0.0027	<0.0010	<0.0010	<0.0010	<0.001	0.00118	<0.00030	0.00044	0.0029	0.00517
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00123	0.00138
Vanadium	mg/L													<0.001	0.002	0.0012	<0.0010	<0.0010	<0.0010	<0.001	0.00286	<0.00050	0.00228	0.00067	0.00299
Zinc	mg/L	<0.051	0.038	0.078	0.018	0.009	0.085	0.02	0.043	0.037	0.003	0.006	0.007	0.009	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0074	0.0026	<0.0010	0.0057	<0.0010	0.0011
Routine Water																									
Ion Balance	%	93	108	99	99	101	92.3	101	103	99.5	103	103	98.9	103	106	108	95.5	92.4	107	109	102	111	88.7	102	100
Bicarbonate	mg/L	401	368	422	421	349	282	499	280	315	211	554	297	307	277	298	350	392	272	310	285	354	456	319	304
Chloride	mg/L	11.5	12.7	10.7	15.0	13.0	18.0	27	26	13	12	13	13	16	14.8	13	20.8	20.4	32.0	23.7	27.2	31.5	31.3	30.8	32.9
Carbonate	mg/L	<5	13	<5	<5	<5	41	41	111	<5	36	<5	12	20	32.6	18	21.2	10.3	18.6	14.3	15.8	6.6	12.7	8.2	38.3
Conductivity (EC)	uS/cm	718	889	828	1050	1140	1170	1680	1410	656	519	554	653	734	662	662	692	727	597	648	622	759	851	758	675
Calcium	mg/L	15.6	27.6	32.2	32.5	27.5	17.1	23.3	17.5	17.4	16	18.8	16.7	17.1	12.8	15.3	15.3	16.8	11.8	17.3	10.6	24.8	13.3	26.0	21.5
Potassium	mg/L	15	17.4	17.6	17	19.5	13.8	22.5	14.8	13.9	9.6	14.1	12.2	13.4	13.8	13.6	14.6	15.5	17.7	17.8	14.4	19.2	18.5	19.9	16.0
Magnesium	mg/L	8.5	14.4	12.9	14.8	14.5	9.7	18.1	11	8.7	7.0	9.4	8	9.9	7.34	8.72	10.6	9.01	10.8	10.3	5.81	12.9	12	12.8	10.2
Sodium	mg/L	122	175	145	172	203	214	388	310	110	99	88	114	135	138	129	118	124	109	111	115	134	144	109	124
Sulfate	mg/L	39.9	144	111	170	261	278	390	293	59.2	35.1	24.1	57.7	73.9	53.3	50.9	21.4	31.2	13.3	10.8	14.4	39.6	30.2	65.3	24.3
Phosphorus	mg/L	Not required under previous permit													0.451	0.332	0.244	0.219	0.207	0.158	0.559	0.28	0.403	0.065	0.628
pH in H20	pH	8.2	8.6	8.0	8.1	8.5	9.1	8.6	9.7	8.4	9.3	8.2	8.7	8.8	8.95	8.78	8.71	8.56	8.84	8.72	8.81	8.45	8.54	8.49	9.16
TDS (Calculated)	mg/L	410	586	537	629	727	729	1120	921	381	318	316	379	436	409	395	394	420	347	358	344	444	491	429	417
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.043	<0.020	0.024	0.072	0.047
Nitrite	mg/L													-	<0.0050	<0.050	<0.050	<0.050	<0.050	<0.02	0.016	<0.010	0.103	<0.010	0.013
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.072	0.06
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	118	95.7
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	275	313
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.154	0.372
Field Data																									
pH in H_20	pH	Not required under previous permit												8.91	8.19	9.61	9.61	8.69	9.7	8.5	9.45	8.8	9.0	8.7	2.54
Conductivity (EC)	uS/cm													857	500	846	846	748	620	464	642	778	900	776	829

Table D.3: Chemical Analytical Results

Sample ID:		Ewert D.2																							
Site Number:		3																							
Date Sampled:	Units	16-Oct-1996	7-Oct-1997	9-Oct-1998	20-Oct-1999	11-Oct-2000	4-Oct-2001	8-Oct-2002	15-Oct-2003	14-Oct-2004	20-Oct-2005	13-Oct-2006	3-Oct-2007	16-Oct-2008	28-Oct-2009	18-Oct-2010	13-Oct-2011	15-Oct-2012	8-Oct-2013	15-Oct-2014	14-Oct-2015	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019
Chem. O_2 Demand	mg/L	40	50	70	90	50	60	70	30	30	49	53	67	65	54.7	55.2	62	77	53	61	158	61	88	127	92
Ammonia-N	mg/L	0.69	<0.05	0.06	0.05	0.05	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.613	<0.050	<0.050	0.174	<0.050	<0.05	0.127	<0.05	<0.05	0.113	0.254
Total Kjeldahl Nitrogen	mg/L	3.1	2.1	2.7	2.8	1.8	3.6	3.5	1.3	1.9	1.6	1.8	1.7	2.3	2.95	2.12	1.9	2.44	1.60	1.8	2.62	1.94	3.09	5.07	3.01
Total Organic Carbon	mg/L	19	27	31	22	21	21	32	11	21	16	23	19	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												18	19.2	22.4	18	22.9	31.7	18.2	23.4	21	88	44.0	28.2
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0018	0.0068
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												0.01	0.02	<0.010	0.01	0.055	<0.010	<0.01	0.0055	0.0011	0.0045	0.0317	0.0334
Antimony	mg/L	0.0004	<0.0002	0.0008	<0.0004	0.0005	0.0007	0.002	0.0011	0.0013	0.001	0.0010	0.0025	0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00021	0.00015	0.00017	0.00038	0.00020
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00803	0.00619
Barium	mg/L	0.106	0.065	0.056	0.083	0.059	0.093	0.046	0.077	0.018	0.034	0.069	0.052	0.042	0.0452	0.0454	0.0361	0.0532	0.0540	0.0482	0.0511	0.041	0.0501	0.0439	0.0364
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.038	0.05	0.039	0.039	0.034
Cadmium	mg/L	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	0.0000154	<0.0000050
Chromium	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010	0.00011	0.00013
Cobalt	mg/L	0.003	0.005	0.022	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00036	0.00014	0.00053	0.00063	0.00061
Copper	mg/L	0.008	<0.001	0.01	0.004	0.006	0.011	0.012	0.009	0.004	0.001	0.003	0.001	0.001	0.0014	0.0036	<0.0010	0.0016	<0.0010	<0.001	0.00063	0.00797	0.00111	0.00234	0.00127
Iron	mg/L	7.200	1.060	1.510	1.980	1.280	4.770	1.28	3.04	0.216	0.452	1.13	0.734	0.046	0.043	0.085	0.073	0.098	0.046	0.032	0.083	0.045	0.056	0.054	0.256
Lead	mg/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	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	0.000072	<0.000050	<0.000050	0.00010	0.000164
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0323	0.0261
Manganese	mg/L													0.003	<0.0020	<0.0020	<0.0050	0.0021	0.0067	<0.002	0.00205	0.00125	0.107	0.0131	0.00377
Mercury	mg/L	<0.0002	<0.0004	0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000066	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00108	0.000744	0.000491	0.0010	0.000761
Nickel	mg/L	0.009	0.004	0.019	0.009	0.008	0.004	0.008	0.009	<0.002	0.004	0.007	0.006	0.005	0.0047	0.0065	0.0048	0.0053	0.0048	0.0034	0.0042	0.00457	0.00417	0.00423	0.00630
Selenium	mg/L	Not required under previous permit												0.0005	0.00052	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000243	0.000245	0.000184	0.000319	0.000366
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.00001	<0.000010	0.000016	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													0.001	0.0013	<0.0010	<0.0010	0.003	<0.0010	<0.001	0.00034	<0.0003	0.00062	0.00375	0.00694
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00159	0.000775
Vanadium	mg/L													0.001	0.0019	<0.0010	<0.0010	0.0012	<0.0010	<0.001	0.00096	0.00072	0.00136	0.00513	0.00218
Zinc	mg/L	0.028	0.025	0.027	0.019	0.014	0.039	0.011	0.016	0.066	0.002	0.006	0.008	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.006	0.0010	0.0020	0.0085	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	103	109	103	100	103	92.9	101	102	99.9	103	105	99.4	103	104	109	88.3	97.3	105	109	97.5	100	96.1	107	105
Bicarbonate	mg/L	380	369	394	338	327	341	445	261	130	175	242	255	251	260	238	272	341	306	281	312	355	496	433	407
Chloride	mg/L	12.5	14.3	11.8	13.0	10.0	14.0	22	9	15	10	12	13	16	21.4	10.5	10.3	13.7	15.5	13.2	18.0	31.3	36.3	35.7	33.3
Carbonate	mg/L	<5	25	13	17	<5	14	51	17	111	15	<5	<5	19	9.4	7.9	8.7	7.5	8.8	11	8.2	5	15.8	11.9	<5.0
Conductivity (EC)	uS/cm	845	926	869	900	941	1080	1610	852	1170	430	529	639	702	602	546	571	661	580	568	614	723	964	885	844
Calcium	mg/L	15.9	19.2	29.8	16.6	29.8	27.9	16.2	17.4	13.9	17.7	22.5	21.5	17.1	13.8	20.9	15.3	12.9	21.5	19.1	16.0	28.2	28.6	17.1	25.8
Potassium	mg/L	15.1	15.5	15.8	13.4	17	16.5	23.4	13.5	12	9.8	14.1	13.9	13.2	13	12.8	10.4	12.9	15.3	14.5	15.7	15.5	21.4	20.5	19.0
Magnesium	mg/L	8.5	9.7	9.4	9.6	12.4	15.8	18.5	9.7	8.6	6.4	8.2	8.7	8.6	6.97	7.76	6.78	6.99	8.89	8.08	8.00	11.90	14.00	11.2	13.4
Sodium	mg/L	174	201	182	168	157	177	365	167	223	71	81	98	128	104	93.8	85.6	124	101	98.6	98.4	118	168	179	157
Sulfate	mg/L	122	130	125	135	187	261	370	191	248	46.9	52.9	91.2	98.3	36.8	55.1	47	44	26.8	19.9	19.0	48.4	55.8	46.2	77.3
Phosphorus	mg/L	Not required under previous permit													0.195	0.164	0.262	0.223	0.108	0.163	0.224	0.262	0.442	0.542	0.576
pH in H20	pH	8.3	8.9	8.5	8.8	8.2	8.5	9	8.8	10.0	9.0	8.2	8.3	8.8	8.53	8.58	8.61	8.53	8.52	8.65	8.50	8.41	8.56	8.57	8.29
TDS (Calculated)	mg/L	535	596	570	539	575	699	1050	553	696	263	310	372	424	333	326	318	390	348	322	337	434	584	535	531
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	0.12	<0.050	<0.05	<0.020	<0.02	<0.020	<0.020	0.388
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.01	<0.010	<0.010	0.029
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	0.416
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	88.8	120
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	375	339
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.194	0.292
Field Data																									
pH in H_20	pH	Not required under previous permit												9.06	8.79	9.03	9.79	8.8	9.9	8.29	8.94	8.9	8.8	11.3	6.49
Conductivity (EC)	uS/cm													812	450	862	382	660	596	565	624	740	1062	950	104.3

Table D.4: Chemical Analytical Results

Sample ID:		Ewert D.3																						
Site Number:		4																						
Date Sampled:	**Units**	**16-Oct-1996**	**7-Oct-1997**	**9-Oct-1998**	**20-Oct-1999**	**11-Oct-2000**	**4-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**13-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	50	60	50	70	60	80	70	50	40	43	48	82	83	77	62.5	81	72	53	30	117	74	51	78	106
Ammonia-N	mg/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	0.845	<0.050	<0.050	2.15	<0.050	<0.05	0.785	0.641	<0.050	0.655	<0.050
Total Kjeldahl Nitrogen	mg/L	2.7	1.8	2.1	2	1.8	3.9	4.6	3.9	3.1	1.5	1.5	2.3	2.9	3.38	2.08	2.66	4.3	2.04	1.88	5.40	3.84	2.55	3.31	3.22
Total Organic Carbon	mg/L	19	21	21	18	23	26	29	17	24	15	19	25	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												20	26.6	22.9	21	27.8	23.5	19.3	28.4	27.2	51	38.0	28.3
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0018	0.0058
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	0.069	<0.010	<0.010	0.113	<0.010	<0.01	0.0024	0.0473	0.0052	0.0673	0.0107
Antimony	mg/L	<0.0004	<0.0002	0.0007	<0.0004	0.0005	0.0005	0.001	0.0009	0.0014	0.0006	0.0014	0.0018	<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00018	0.0001	0.0001	0.00016	0.00016
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0032	0.0031
Barium	mg/L	0.059	0.057	0.046	0.064	0.05	0.064	0.076	0.046	0.024	0.026	0.045	0.052	0.028	0.0629	0.0431	0.0261	0.0631	0.0330	0.0302	0.0300	0.0433	0.0288	0.0656	0.0418
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.029	0.044	0.018	0.035	0.039
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	<0.005	<0.005	n/a	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.00014	<0.00010	0.00018	0.00017
Cobalt	mg/L	<0.002	0.004	0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00039	0.00024	0.00046	0.00095	0.00036
Copper	mg/L	0.002	<0.001	0.011	0.003	0.002	0.006	0.009	0.004	0.002	<0.001	<0.001	0.002	<0.001	<0.0010	0.0023	<0.0010	0.0012	<0.0010	<0.001	<0.00020	0.00661	0.0013	0.00163	0.00163
Iron	mg/L	0.951	0.987	0.462	1.770	0.671	1.870	3.11	0.793	0.666	0.328	0.561	1.82	0.181	0.455	0.05	0.194	0.236	0.037	0.247	0.089	1.79	0.659	0.848	1.01
Lead	mg/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	<0.0001	0.00019	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	0.000132	0.000168	0.000389	0.000211
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0153	0.0125
Manganese	mg/L													0.008	0.0812	<0.0020	<0.0050	0.082	0.0027	<0.002	0.0025	0.00451	0.0477	0.194	0.00879
Mercury	mg/L	<0.0002	0.0012	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000069	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000746	0.000389	0.00046	0.000956	0.000489
Nickel	mg/L	<0.002	0.003	0.016	0.006	0.004	<0.002	0.006	0.005	<0.002	0.003	0.003	0.004	0.002	0.0039	0.0043	0.0025	0.0047	0.0024	<0.002	0.00122	0.00222	0.00281	0.00396	0.00281
Selenium	mg/L	Not required under previous permit												<0.0004	<0.00080	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000135	0.000153	0.000151	0.000192	0.000188
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000032	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													<0.001	0.0031	<0.0010	<0.0010	0.004	<0.0010	<0.001	<0.00030	0.00264	0.00083	0.00499	0.00168
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.000531	0.000262
Vanadium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	0.0013	<0.0010	<0.001	0.00099	0.00102	0.00102	0.00193	0.00144
Zinc	mg/L	0.011	0.02	0.019	0.007	0.002	0.043	0.017	0.007	0.036	0.002	0.004	0.007	0.015	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0089	<0.0010	0.0024	0.0151	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	106	108	107	98	102	96.1	101	103	99.6	103	104	99	96.9	114	104	93.9	94.1	104	106	98.3	106	95.1	105	103
Bicarbonate	mg/L	250	232	244	232	255	265	381	234	272	153	179	207	232	289	241	259	298	245	200	205	247	326	308	290
Chloride	mg/L	9.7	15.2	9.8	13.0	12.0	13.0	20	7	11	14	21	25	30	33.3	25.4	52.2	63.1	51.5	32.9	65.3	51	55.8	64.6	56.2
Carbonate	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	12	<5.0	7.2	<5.0	<5.0	<5.0	<5	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	462	480	476	488	523	543	860	403	545	277	363	460	488	577	506	608	682	547	448	568	549	679	708	622
Calcium	mg/L	17.3	19.4	19.9	15.8	20.7	17.3	18.5	21.4	16.6	16.9	17.8	19.4	19.6	20.9	20.2	23.2	19.4	22.2	18.8	15.0	25.7	21.5	23.4	22.5
Potassium	mg/L	16.2	13.4	15	12.9	16.3	15	18.6	13.1	12.9	9.8	13.0	12.9	13.1	14.9	14	12.7	15.7	16.4	15.8	17.1	15	14.9	22.0	14.2
Magnesium	mg/L	6.8	8.1	8.6	7.7	8.9	9.5	10.7	7.6	6.9	5.8	7.2	7.8	8.7	9.31	7.68	9.81	9.67	10.3	7.96	8.28	10.5	9.48	10.9	10.7
Sodium	mg/L	70	77	75	69	74	73	186	64	89	37	46	62	71	109	78.6	76.2	96.1	79.4	57.1	75.5	76.3	108	114	103
Sulfate	mg/L	12.2	33.9	34.2	33.2	37.9	45	118	30.1	41	9.4	7.4	28.1	11.2	20.2	13.4	11.8	10.4	6.55	1.09	4.24	3.93	11.9	19.1	14.3
Phosphorus	mg/L	Not required under previous permit												-	0.25	0.12	0.639	0.203	0.224	0.18	0.317	0.596	0.437	0.523	0.605
pH in H_20	pH	8.1	8.4	7.9	8.3	7.9	8.3	8.1	8.2	8.3	8.2	7.9	8.3	8.7	8.18	8.56	8.41	8.37	8.32	8.45	8.21	8.23	8.37	8.05	7.98
TDS (Calculated)	mg/L	255	282	283	266	295	309	536	258	312	168	201	257	280	353	285	316	365	309	236	286	304	391	406	364
Nitrate	mg/L	Not required under previous permit												<0.1	0.692	<0.050	0.06	0.309	<0.050	<0.05	<0.020	0.083	<0.020	0.198	0.027
Nitrite	mg/L													-	<0.050	<0.050	<0.050	0.083	<0.050	<0.02	<0.010	0.039	<0.010	<0.010	0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.198	0.037
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	103	100
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	252	238
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.102	0.169
Field Data																									
pH in H_20	pH	Not required under previous permit												8.28	8.63	9.25	8.34	8.41	8.8	8.1	9.27	8.4	8.6	9.9	14.47
Conductivity (EC)	uS/cm													588	588	726	422	681	564	521	588	522	754	971	803

Table D.5: Chemical Analytical Results

Sample ID:		Ewert D.4																						
Site Number:		**5**																						
Date Sampled:	**Units**	**16-Oct-1996**	**7-Oct-1997**	**9-Oct-1998**	**20-Oct-1999**	**11-Oct-2000**	**4-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**12-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	30	40	50	80	60	60	60	50	40	103	123	82	78	98.5	69.6	66	95	67	79	109	30	102	86	92
Ammonia-N	mg/L	<0.05	<0.05	0.042	<0.05	<0.05	0.06	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	0.124	<0.050	0.055	0.103	0.098	<0.05	0.059	<0.050	<0.050	0.120	<0.050
Total Kjeldahl Nitrogen	mg/L	1.5	1.2	2.7	2.3	1.7	3.1	3.4	2.1	3.1	4	5	6	2.9	4.74	3.2	2.8	3.17	2.82	2.25	3.33	2.88	3.48	2.91	3.61
Total Organic Carbon	mg/L	16	17	21	19	18	23	31	20	23	35	48	26	-	-	-	-	-	-		-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												22	31.2	28	27.2	30.6	26.6	23	31.9	29.4	102	38.0	22.7
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0015	0.0076
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	0.77
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												0.02	0.033	0.053	0.011	<0.010	<0.010	<0.01	0.0238	0.0013	0.0062	0.0194	0.0015
Antimony	mg/L	<0.0004	<0.0002	0.0009	0.0004	0.0005	0.0006	0.0011	0.0011	0.0019	0.0011	0.002	0.003	0.0005	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00031	0.00018	0.00022	0.00025	0.00015
Arsenic	mg/L	Not required under previous permit															-	-	-	-	-	-	-	0.0114	0.00313
Barium	mg/L	0.054	0.058	0.058	0.135	0.083	0.056	0.203	0.069	0.054	0.126	0.1	0.1	0.127	0.0772	0.0843	0.0335	0.0722	0.148	0.0639	0.0651	0.0524	0.0903	0.0588	0.0528
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.035	0.046	0.04	0.050	0.042
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	0.0000196	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt	mg/L	<0.002	0.003	0.021	0.002	<0.002	<0.002	0.003	<0.002	<0.002	0.003	0.003	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.0010	0.00035	0.00051	0.00094	0.00043
Copper	mg/L	0.003	<0.001	0.01	0.005	0.004	0.006	0.011	0.005	0.002	0.004	0.002	0.002	0.001	0.0017	0.0042	<0.0010	0.0017	0.0011	<0.001	0.00139	0.00084	0.00095	0.00102	0.00054
Iron	mg/L	1.310	1.180	1.100	4.150	2.190	0.964	9.66	1.32	0.463	2.31	3.8	1.92	0.058	0.083	0.171	0.044	0.152	0.044	0.043	0.111	0.04	0.12	0.087	0.026
Lead	mg/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	<0.0001	<0.00010	0.00019	<0.00010	<0.0050	<0.00010	<0.0001	0.000119	<0.000050	0.000096	0.00010	<0.000050
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0247	0.016
Manganese	mg/L													0.004	0.0021	0.007	<0.0020	0.0024	<0.0020	<0.002	0.0038	0.00066	0.00532	0.00626	0.00080
Mercury	mg/L	<0.0002	0.0009	0.0009	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000108	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00329	0.00216	0.00196	0.0019	0.00118
Nickel	mg/L	0.003	<0.002	0.014	0.01	0.008	0.004	0.013	0.009	0.003	0.011	0.01	0.008	0.009	0.0066	0.0063	0.0056	0.0066	0.0079	0.0052	0.00487	0.00606	0.00687	0.00569	0.00406
Selenium	mg/L	Not required under previous permit												0.0006	0.00056	0.00046	<0.00040	<0.00080	<0.00040	<0.0004	0.000372	0.000302	0.000271	0.000299	0.000217
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000015	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													0.001	0.002	0.0037	<0.0010	0.0025	<0.0010	<0.001	0.00345	<0.00030	0.00069	0.00219	<0.00030
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.001	0.000602
Vanadium	mg/L													<0.001	0.001	0.0013	<0.0010	0.0014	<0.0010	<0.001	0.00294	<0.00050	<0.00050	0.00251	<0.00050
Zinc	mg/L	0.007	0.018	0.023	0.012	0.007	0.052	0.023	0.004	0.05	0.02	0.005	0.009	0.003	<0.0020	<0.0020	<0.0020	0.002	<0.0020	0.0087	<0.0010	0.001	0.0031	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	109	109	100	99	103	93.5	99.1	97	97	102	102	97.4	99.2	99.1	106	92	93.1	106	108	96.2	114	92.9	115	102
Bicarbonate	mg/L	286	294	338	360	352	342	485	289	274	317	407	348	357	337	313	336	369	357	303	280	324	442	398	356
Chloride	mg/L	4.2	4.3	3.4	6.0	6.0	9.0	14	12	16	18	28	20	23	21.7	19.7	15.2	19.4	21.4	15.2	18.5	17.5	19.4	21.7	18
Carbonate	mg/L	25	17	<5	24	7	42	46	56	65	30	<5	<5	10	21.8	14.9	7	13.9	10.0	12.2	38.0	<5.0	7.2	<5.0	6.6
Conductivity (EC)	uS/cm	645	601	565	682	658	735	974	735	711	598	700	602	637	627	606	613	666	668	587	627	599	742	713	624
Calcium	mg/L	14	12.8	14.3	18.1	16.4	10.7	13.7	14.5	10.5	18.7	21.4	18.7	19.5	11.8	15.4	15.9	12.8	27.7	19.4	10.7	21.9	22	19.1	23.9
Potassium	mg/L	6.7	5.6	7	7.2	7.6	7.2	8.1	6.4	9.7	11.2	17.6	12.8	11.4	10.4	9.43	10.2	10.1	14.3	12.8	13.4	13.3	15.5	14.8	14.5
Magnesium	mg/L	6.8	7.5	7.4	9.0	9.0	10.0	11.9	7.6	8.5	10.4	12.5	10.2	10.8	9.7	8.85	10	7.97	13.1	11.1	9.75	12	13.4	13.3	13.3
Sodium	mg/L	133	130	109	126	117	131	259	149	139	115	118	96	111	122	116	95	122	114	98.6	106	105	125	141	103
Sulfate	mg/L	47.4	47.8	27.7	27.7	35	42	67	62.5	26.8	9.6	5.4	8.5	10.2	8.19	11.7	17.8	15.1	28.1	9.27	6.33	15.1	26.8	15.1	20.2
Phosphorus	mg/L	Not required under previous permit												-	0.253	0.271	0.2	0.265	0.129	0.178	0.239	0.248	0.251	0.493	0.225
pH in H_20	pH	8.9	8.9	8.1	8.8	8.5	9.1	8.9	9.3	9.5	9.0	8.2	8.3	8.5	8.71	8.7	8.46	8.68	8.50	8.64	9.14	8.38	8.4	8.32	8.44
TDS (Calculated)	mg/L	377	369	335	395	377	427	614	450	407	370	403	339	371	372	350	336	383	404	327	341	349	448	424	375
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	0.056	<0.05	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	<0.022
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	102	114
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	331	303
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.396	0.499
Field Data																									
pH in H_20	pH	Not required under previous permit												8.34	8.79	9.06	8.99	9.18	8.9	8.57	9.66	8.5	8.9	10.4	14.36
Conductivity (EC)	uS/cm													770	460	744	1000	664	691	424	650	623	810	780	803

Table D.6: Chemical Analytical Results

Sample ID:		Lyons D.1																						
Site Number:		6																						
Date Sampled:	**Units**	**15-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**20-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**13-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	50	50	80	90	80	80	160	60	60	56	61	84	71	91.1	59.8	63	83	75	71	101	71	70	78	89
Ammonia-N	mg/L	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.0021	<0.05	<0.05	<0.050	0.155	0.202	0.252	<0.050	<0.05	0.053	1.35	<0.050	0.063	0.575
Total Kjeldahl Nitrogen	mg/L	1.2	2	3.7	2.9	2.9	3.5	5.8	1.7	3.2	2	1.7	3.8	2.4	4.73	2.91	2.19	2.81	2.59	1.95	3.63	3.62	2.55	2.89	3.01
Total Organic Carbon	mg/L	19	20	26	24	27	31	40	22	26	21	20	36	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												21	27.4	22.9	28.6	26.8	27.1	19.8	26.8	25	70	28.0	24.7
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0013	0.0087
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	0.012	<0.010	<0.010	<0.010	<0.010	<0.01	0.0040	0.0962	0.0097	0.015	0.0306
Antimony	mg/L	<0.0004	0.0006	0.0006	<0.0004	0.0006	0.0006	0.0008	0.001	0.0012	0.0012	0.0021	0.0012	<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00025	0.00013	0.00014	0.00022	0.00017
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00522	0.00531
Barium	mg/L	0.052	0.058	0.066	0.085	0.078	0.082	0.105	0.015	0.046	0.023	0.044	0.075	0.053	0.0369	0.0554	0.0296	0.033	0.0623	0.0417	0.0472	0.0448	0.032	0.0495	0.0421
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													0.05	0.056	<0.050	<0.050	0.078	0.065	0.055	0.052	0.042	0.04	0.050	0.029
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	0.0000172	<0.0000050
Chromium	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.0002	<0.00010	0.00011	0.0002
Cobalt	mg/L	<0.002	<0.002	0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00050	0.0003	0.0004	0.00063	0.00038
Copper	mg/L	0.002	<0.001	<0.001	0.003	0.002	0.004	0.009	0.023	0.002	0.002	0.001	0.003	<0.001	<0.0010	0.0073	0.0011	0.0013	<0.0010	<0.001	0.00065	0.00066	0.0006	0.00071	0.00063
Iron	mg/L	<0.005	0.377	0.854	1.910	1.640	1.020	2.28	0.642	0.418	0.145	0.141	2.57	0.026	0.071	0.015	0.089	0.03	0.094	0.024	0.040	0.629	0.121	0.136	0.958
Lead	mg/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	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	0.000189	0.000056	0.000112	0.000229
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0136	0.0074
Manganese	mg/L													0.002	0.033	<0.0020	<0.0050	0.0023	0.0127	<0.002	0.0052	0.00338	0.00586	0.0135	0.00866
Mercury	mg/L	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000878	0.000596	0.000817	0.00112	0.00076
Nickel	mg/L	0.002	<0.002	0.01	0.009	0.012	0.007	0.007	0.005	<0.002	0.003	0.005	0.009	0.006	0.004	0.0035	0.0035	0.0035	0.0038	0.0029	0.00278	0.00337	0.00397	0.00414	0.00361
Selenium	mg/L	Not required under previous permit												0.0004	0.00042	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000202	0.000194	0.000194	0.000273	0.000212
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000017	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.001	0.00047	0.00568	0.00088	0.00113	0.00329
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.000909	0.000234
Vanadium	mg/L													0.001	0.0018	<0.0010	0.0016	0.0026	0.0023	0.0011	0.00334	0.00241	0.0021	0.00256	0.00205
Zinc	mg/L	0.007	0.038	0.028	0.01	0.017	0.038	0.008	0.006	0.053	0.001	0.005	0.012	0.002	<0.0020	<0.0020	0.0027	<0.0020	<0.0020	0.0052	<0.0010	0.0012	0.0021	<0.0010	0.0016
Routine Water																									
Ion Balance	%	98	106	108	100	109	106	99.9	106	103	105	103	104	104	91.6	103	96.2	94.4	97.3	106	96.3	104	94.3	110	101
Bicarbonate	mg/L	334	314	361	359	338	427	510	281	452	211	259	207	271	287	257	304	291	311	224	213	277	281	270	217
Chloride	mg/L	7.5	8.3	11.5	12.0	12.0	17.0	24	14	35	21	23	15	19	25.1	21.3	19.9	18.4	29.2	22.1	20.9	19.4	17.7	20.6	12.9
Carbonate	mg/L	<5	<5	<5	5	5	17	25	48	8	<5	<5	<5	<5	5.4	5.7	5.1	5.4	7.9	6.7	22.2	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	844	734	735	900	887	1110	1980	1450	1680	504	612	455	594	612	591	649	605	595	490	526	523	510	519	405
Calcium	mg/L	33.8	29.3	30.1	29	29.8	47.8	33.3	44.6	44.9	28.3	29	18.8	27.1	18.6	22.1	22.5	17.5	23.4	22.4	16.7	21.2	20.1	22.3	18.6
Potassium	mg/L	11.6	12.5	16.1	14.6	17.8	20.9	24.1	19.3	23.6	15.5	17.1	18	17.3	16.3	15.5	16.2	16	17.3	14.6	15.3	19.3	17.5	21.7	17.1
Magnesium	mg/L	13.5	11.3	12.5	13.4	14.0	20.3	30.2	26.3	24.5	9.4	10.9	7.4	10.4	9.16	9.15	8.76	8.54	10.7	7.78	7.64	8.52	7.74	8.55	8.46
Sodium	mg/L	140	123	153	147	151	230	455	292	281	71	83	65	86	89.3	91.7	96.2	92.9	96.2	69.2	75.3	75.3	75.3	84.3	51
Sulfate	mg/L	176	107	126	143	165	204	561	481	429	65.7	64	40.2	56.5	45.3	50.2	47.1	45	32.4	14.9	23.9	11.6	27.2	22.3	15
Phosphorus	mg/L	Not required under previous permit												-	0.43	0.245	0.846	0.394	0.346	0.417	0.344	0.931	0.555	0.520	1.38
pH in H_20	pH	8.2	8.4	7.9	8.5	8.5	8.5	8.4	9.1	8.4	8.2	8.1	7.8	8.4	8.41	8.49	8.44	8.48	8.50	8.53	9.00	8.26	8.31	8.17	7.91
TDS (Calculated)	mg/L	547	449	527	541	574	732	1340	1060	1090	315	355	266	353	350	342	366	347	370	268	287	295	307	313	232
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	0.235	<0.050	<0.050	<0.05	<0.020	0.588	<0.020	<0.020	0.429
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	0.077	<0.010	<0.010	0.045
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	0.474
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	90.9	81.3
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	222	178
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.104	0.155
Field Data																									
pH in H_20	pH	Not required under previous permit												8.15	8.17	8.90	8.11	9.10	9.1	8.42	9.51	8.2	8.7	10.4	2.59
Conductivity (EC)	uS/cm													704	330	886	300	604	609	491	547	517	568	566	496

Table D.7: Chemical Analytical Results

Sample ID:		Lyons D.2																						
Site Number:		**7**																						
Date Sampled:	**Units**	**15-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**20-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**13-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	60	70	80	110	70	90	100	60	60	56	95	80	72	75	55.6	77	71	71	84	103	80	64	70	83
Ammonia-N	mg/L	<0.05	0.48	0.16	0.15	<0.05	<0.05	<0.05	0.51	0.24	<0.05	<0.05	<0.05	<0.05	0.267	<0.050	0.663	<0.050	<0.050	<0.05	0.051	0.685	<0.050	1.17	0.414
Total Kjeldahl Nitrogen	mg/L	2.5	2.8	2.8	3.8	2.7	4.9	5.2	3.5	4.2	2	2.9	3.4	2.7	3.27	2.53	3.15	2.56	3.83	2.62	3.75	3.69	2.45	4.37	2.58
Total Organic Carbon	mg/L	24	23	25	24	23	26	30	25	35	23	29	30	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												20	25.9	20.5	30.4	25	25.2	21.5	27.4	26.9	64	25.0	23.4
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0018	0.0075
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	<0.010	<0.010	0.027	<0.010	0.015	<0.01	0.0070	0.0058	0.0096	0.0643	0.0613
Antimony	mg/L	<0.0004	<0.0004	0.0037	<0.0004	0.0005	0.0005	0.0013	0.0013	0.0014	0.0017	0.0013	0.002	<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00023	0.00013	0.00015	0.00021	0.00012
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00407	0.00497
Barium	mg/L	0.057	0.073	0.049	0.095	0.071	0.08	0.068	0.069	0.047	0.031	0.039	0.045	0.044	0.0588	0.041	0.0504	0.0469	0.0291	0.0503	0.0403	0.0263	0.0364	0.0655	0.0649
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	0.056	<0.050	<0.050	<0.05	0.053	0.026	0.037	0.044	0.022
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	0.0000098	<0.0000050	<0.0000050
Chromium	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.00017	<0.00010	0.00028	0.00018
Cobalt	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00026	0.00029	0.00048	0.00079	0.00049
Copper	mg/L	0.004	0.004	0.003	0.009	0.004	0.008	0.013	0.035	0.004	0.003	0.002	0.001	0.001	0.0018	0.0034	<0.0010	0.0013	0.0012	<0.001	0.00071	0.00073	0.00091	0.00116	0.00083
Iron	mg/L	<0.005	0.837	0.680	2.430	0.680	1.480	1.64	0.601	0.113	0.122	0.215	0.547	0.056	0.044	0.023	0.839	0.016	0.028	0.036	0.013	0.268	0.083	0.275	1.51
Lead	mg/L	<0.005	<0.005	<0.005	0.95	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	0.00032	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050	0.00015	0.000218	0.000281
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0137	0.0071
Manganese	mg/L													0.02	0.0318	<0.0020	0.0075	0.0055	0.0028	0.0026	0.0031	0.00297	0.0198	0.122	0.0361
Mercury	mg/L	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.000007	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000755	0.000696	0.000893	0.00102	0.00063
Nickel	mg/L	0.003	<0.002	0.007	0.007	0.005	0.005	0.006	0.006	<0.002	0.004	0.005	0.004	0.004	0.0042	0.0038	0.0043	0.0034	0.0030	0.0027	0.00223	0.00433	0.00483	0.00453	0.00341
Selenium	mg/L	Not required under previous permit												0.0005	0.00041	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000175	0.000252	0.000205	0.00023	0.000212
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000018	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.0001	0.00018	<0.00010	<0.00010
Titanium	mg/L													0.001	<0.0010	<0.0010	0.0028	<0.0010	<0.0010	<0.001	<0.00030	0.0013	0.00052	0.00545	0.00488
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.000787	0.000266
Vanadium	mg/L													0.002	0.0027	0.0022	0.0022	0.002	0.0022	0.001	0.00394	0.00253	0.00196	0.0023	0.00206
Zinc	mg/L	0.012	0.033	0.03	0.007	0.009	0.068	0.009	0.017	0.046	0.002	0.007	0.006	0.014	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0054	<0.0010	0.0026	0.0122	<0.0010	0.0018
Routine Water																									
Ion Balance	%	107	104	107	99	104	96.7	99.9	106	101	103	103	95.9	102	104	106	96.6	98.5	108	106	96.6	101	94.1	109	97.4
Bicarbonate	mg/L	300	318	351	326	348	372	406	386	346	308	288	250	289	318	257	254	354	300	270	279	222	296	278	232
Chloride	mg/L	9.9	11.7	15.3	15.0	15.0	20.0	23	24	30	27	28	19	24	23.7	25	14.1	24.3	32.8	26.9	28.6	11.8	20	21.4	15.6
Carbonate	mg/L	<5	<5	<5	7	7	35	48	38	58	5	13	<5	13	21.5	33.7	<5.0	12.3	10.9	13.8	14.6	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	600	650	643	721	791	963	1120	1120	1300	772	738	478	657	759	799	505	737	653	590	604	408	525	536	435
Calcium	mg/L	25.6	25.7	25.6	23.8	30.5	43.6	25.4	30.4	28.6	29	25.9	19	28.4	32.7	26.1	20.6	25.6	19.1	22.2	15.5	19.3	22.5	24.9	17.4
Potassium	mg/L	20	18.5	23.1	20.5	23.1	26.3	29.9	28.2	26	22.1	22.3	19.7	20.7	23.4	22.7	14.1	21.5	18.6	17	19.0	15.2	18.9	21.8	18.5
Magnesium	mg/L	8.3	9.1	9.4	9.0	11.0	15.4	16.6	16.2	15.0	11.3	11.1	7.2	10.6	11.3	11.6	7.82	10.7	10.5	8.17	7.80	7.55	7.81	8.34	7.74
Sodium	mg/L	97	105	125	112	132	192	239	228	214	131	118	74	98	124	137	67.8	117	116	94.8	93.0	51.6	76.2	79.7	56.5
Sulfate	mg/L	49.8	60.6	65	68	102	121	185	217	236	114	82	41.2	53.6	79.1	108	29.8	48.8	28.4	15.6	13.3	12.5	23	15.7	14.5
Phosphorus	mg/L	Not required under previous permit													0.427	0.372	0.994	0.346	0.523	0.484	0.392	0.954	0.351	0.580	1.13
pH in H_20	pH	7.8	8.2	7.6	8.6	8.5	8.8	8.9	9	9.2	8.4	8.4	8	8.7	8.65	9.05	8.33	8.64	8.57	8.73	8.75	8.15	8.22	8.24	8.11
TDS (Calculated)	mg/L	358	387	436	419	494	599	742	774	795	491	442	303	391	472	491	282	435	384	332	329	227	315	310	246
Nitrate	mg/L	Not required under previous permit												<0.1	0.082	<0.050	0.373	<0.050	<0.050	<0.05	<0.020	0.02	<0.020	0.316	0.396
Nitrite	mg/L													-	-	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	0.017	<0.010	<0.010	0.042
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.316	0.437
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	96.5	75.3
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	228	190
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.118	0.176
Field Data																									
pH in H_20	pH	Not required under previous permit												8.51	8.21	9.98	8.06	9.17	9.0	8.78	9.53	8.2	8.6	9.3	10.73
Conductivity (EC)	uS/cm													731	560	884	375	721	670	579	617	397	581	589	529

Table D.8: Chemical Analytical Results

Sample ID:		Lyons D.3																						
Site Number:		8																						
Date Sampled:	**Units**	**15-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**20-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**13-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	40	100	70	100	90	110	230	80	60	66	92	78	105	110	64.1	86	108	67	127	150	149	232	171	105
Ammonia-N	mg/L	0.05	0.74	<0.05	<0.05	0.31	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	0.14	<0.05	<0.050	0.133	0.264	0.434	<0.050	0.08	0.256	0.099	0.082	0.186	<0.050
Total Kjeldahl Nitrogen	mg/L	2.7	4.7	2.7	3	3.2	6.5	22.2	2.8	2.7	2.4	2.9	3.5	3.9	5.64	2.98	3.48	4.78	2.39	5.93	5.61	6.45	9.34	8.83	3.66
Total Organic Carbon	mg/L	19	36	27	30	34	42	151	27	29	26	32	33	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												31	41.8	24.5	30.4	34.9	29.5	27.6	47.3	35.8	232	41.4	30.9
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0021	0.0137
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												0.82	0.104	<0.010	0.471	0.095	0.036	0.014	0.0507	0.0166	0.0196	0.0563	0.0192
Antimony	mg/L	0.0006	0.0006	0.0008	<0.0004	0.0006	0.0006	0.0021	0.0011	0.0014	0.001	0.0014	0.0033	0.0007	0.00046	<0.00040	<0.00040	<0.00080	<0.00040	0.00052	0.00076	0.00043	0.00054	0.00096	0.0003
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00277	0.00261
Barium	mg/L	0.117	0.136	<0.003	0.095	0.116	0.159	0.26	0.091	0.077	0.085	0.111	0.146	0.058	0.0635	0.0733	0.0607	0.105	0.0416	0.0408	0.119	0.0567	0.0797	0.108	0.0461
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	0.055	<0.050	<0.050	<0.050	0.061	0.052	0.068	0.079	0.035	0.027
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000062	0.0000078	0.0000064	0.000031	0.0000068
Chromium	mg/L	0.012	0.006	<0.005	<0.005	<0.005	<0.005	0.017	<0.005	<0.005	<0.005	<0.005	0.011	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.00015	<0.00010	0.00058	0.00010
Cobalt	mg/L	0.003	<0.002	<0.002	<0.002	0.003	0.003	0.01	<0.002	<0.002	<0.002	<0.002	0.004	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0023	0.00100	0.00123	0.00182	0.00183	0.00161
Copper	mg/L	0.008	0.004	0.001	0.004	0.004	0.009	0.032	0.016	0.004	0.004	0.004	0.01	0.003	0.0031	0.0062	0.0033	0.0033	0.0028	0.0031	0.00334	0.0046	0.00427	0.00582	0.00484
Iron	mg/L	8.390	8.430	0.006	1.530	3.600	4.340	15.9	1.56	1.46	2.32	1.6	9.23	0.653	0.194	0.057	0.537	0.114	0.032	0.039	0.030	0.025	0.021	0.046	0.064
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	0.0004	0.00015	<0.00010	0.00029	<0.0050	<0.00010	<0.0001	<0.000050	<0.000005	<0.000050	0.000076	0.000051
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.028	0.0166
Manganese	mg/L													0.035	0.0062	0.0089	0.0088	0.0195	0.0021	0.0174	0.00259	0.00127	0.00254	0.00185	0.00279
Mercury	mg/L	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000051	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	0.023	<0.005	<0.005	<0.005	<0.005	0.006	0.006	<0.0050	<0.0050	<0.0050	0.0087	0.0062	0.007	0.0116	0.00669	0.00966	0.0144	0.00452
Nickel	mg/L	0.01	0.012	<0.002	0.01	0.015	0.017	0.04	0.013	0.004	0.008	0.011	0.021	0.012	0.0093	0.0106	0.0093	0.0128	0.0089	0.0128	0.0135	0.0135	0.0133	0.0151	0.0112
Selenium	mg/L	Not required under previous permit												0.0012	0.00117	0.00072	0.00067	0.00085	0.00067	0.00084	0.00141	0.000916	0.00106	0.00113	0.000684
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000001	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000001	<0.000010	0.000021	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													0.032	0.0065	<0.0010	0.0168	0.0057	0.0022	0.0019	0.00143	0.00098	0.00045	0.0040	0.00244
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.01	0.00318
Vanadium	mg/L													0.003	0.0035	<0.0010	0.0034	<0.0010	0.0018	0.0028	0.00110	0.0016	0.00149	0.00126	0.00110
Zinc	mg/L	0.037	0.036	0.005	0.006	0.034	0.098	0.049	0.013	0.061	0.007	0.007	0.032	0.017	<0.0020	<0.0020	0.0024	<0.0020	<0.0020	0.0069	<0.0010	<0.0010	<0.0010	<0.0010	0.0017
Routine Water																									
Ion Balance	%	99	106	110	101	104	109	101	103	98.4	106	103	102	94.6	98.4	108	95	96.9	102	110	95.3	112	95.2	113	103
Bicarbonate	mg/L	335	383	391	405	446	503	872	387	329	339	314	357	393	366	329	380	389	376	339	474	353	516	409	413
Chloride	mg/L	11.7	22.5	14.0	16.0	19.0	32.0	120	29	21	17	23	23	29	25.1	27.4	20.8	37.8	21.5	20.4	34.0	25.7	34.7	48.4	22.3
Carbonate	mg/L	<5	<5	<5	19	<5	27	196	13	17	<5	<5	<5	13	32.3	17.2	7.4	7.8	20.4	25.8	13.5	7.7	24.6	12.7	14.5
Conductivity (EC)	uS/cm	810	689	717	897	998	1440	2980	913	760	628	693	673	781	782	807	733	948	815	937	1210	855	1230	1420	978
Calcium	mg/L	17.7	22.5	20.8	19.6	30.1	30.6	12.8	32.3	18.3	20.8	25.4	26	24.4	17.6	42.4	24.2	17	28.6	33.2	24.4	42.4	33.3	37.6	41.3
Potassium	mg/L	7.3	20.6	11	10.8	16.1	18.9	21.1	19.1	18	15.3	17.9	18.8	16.8	17.5	22.7	15.8	17	21.2	22	20.9	27.6	30.2	29.2	22.2
Magnesium	mg/L	8.9	10.9	10.0	11.2	15.4	22.8	30.2	16.8	13.1	13.8	13.2	14	15.7	14.5	18.3	13.6	12.4	18.2	18.5	14.6	21.2	25.8	23.1	24.6
Sodium	mg/L	146	122	166	169	180	290	752	168	122	110	107	116	123	140	115	108	168	136	154	207	118	198	270	149
Sulfate	mg/L	116	22.6	83.3	85.1	145	264	421	137	69.4	43.6	68.3	62.1	51.4	46.3	87.4	36.6	108	85.6	122	160	89.4	167	280	138
Phosphorus	mg/L	Not required under previous permit												-	0.426	0.208	0.518	0.503	0.101	0.472	0.620	0.721	0.741	0.737	0.290
pH in H_20	pH	8.4	8.2	7.8	8.7	7.8	8.6	9.3	8.6	8.7	8.4	8.2	8.2	8.5	8.82	8.63	8.48	8.49	8.68	8.89	8.54	8.45	8.73	8.57	8.60
TDS (Calculated)	mg/L	476	411	497	529	631	942	1920	606	443	392	409	435	467	473	492	414	559	517	563	709	507	771	906	615
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	0.211	<0.050	<0.050	<0.05	<0.020	<0.020	<0.020	0.689	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.689	<0.022
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	189	204
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	357	362
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.478	0.472
Field Data																									
pH in H_20	pH	Not required under previous permit												8.36	8.22	9.22	8.26	8.45	9.1	9.32	8.68	9.0	9.2	10.1	-0.24
Conductivity (EC)	uS/cm													886	590	627	200	940	825	943	1233	876	1346	1488	1198

Table D.9: Chemical Analytical Results

Sample ID:		Lyons D.4																						
Site Number:		9																						
Date Sampled:	Units	15-Oct-1996	3-Oct-1997	8-Oct-1998	20-Oct-1999	10-Oct-2000	5-Oct-2001	8-Oct-2002	15-Oct-2003	15-Oct-2004	20-Oct-2005	13-Oct-2007	3-Oct-2007	16-Oct-2008	28-Oct-2009	18-Oct-2010	12-Oct-2011	15-Oct-2012	8-Oct-2013	15-Oct-2014	14-Oct-2015	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019
Chem. O_2 Demand	mg/L	60	50	190	730	250	290	EMPTY	90	90	126	112	130	132	131	84.4	165	149	95	132	155	120	202	221	137
Ammonia-N	mg/L	<0.05	<0.05	0.06	1.59	0.89	5.69		0.16	0.73	0.42	0.68	<0.05	<0.05	0.065	<0.050	0.143	0.491	<0.050	0.055	0.137	0.111	3.04	1.82	0.397
Total Kjeldahl Nitrogen	mg/L	3.9	2.5	5	19.6	2.6	20.2		3.8	3.8	5.1	7.3	5.9	5.1	6.39	4.36	6.18	4.78	3.71	4.04	6.38	6.87	11.1	10.3	4.26
Total Organic Carbon	mg/L	33	20	47	184	156	26		33	33	47	48	51	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required by previous permit							Not required by previous permit					35	54	33.6	69.2	56.5	37.8	42	47.7	49.2	202	74.0	42.9
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0019	0.0088
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required by previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required by previous permit						EMPTY	Not required by previous permit					0.23	0.129	0.069	0.03	0.045	0.066	0.032	0.0313	0.0755	0.0785	0.0911	0.0764
Antimony	mg/L	0.0009	0.0009	0.003	<0.0004	0.0021	0.0011		0.0014	0.0021	0.0012	0.0016	0.0012	0.0006	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00069	0.00024	0.00047	0.00058	0.00024
Arsenic	mg/L	Not required by previous permit							Not required by previous permit					-	-	-	-	-	-	-	-	-	-	0.00685	0.00314
Barium	mg/L	0.097	0.106	0.143	0.677	0.388	0.399		0.181	0.245	0.136	0.297	0.133	0.057	0.0671	0.0785	0.0171	0.0556	0.0851	0.0658	0.124	0.0338	0.0643	0.0935	0.0406
Beryllium	mg/L	Not required by previous permit							Not required by previous permit					<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.052	<0.010	0.026	0.040	0.024
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000103	0.0000097	0.0000079	0.0000297	0.0000099
Chromium	mg/L	0.008	<0.005	0.007	0.032	0.028	0.017		0.01	0.016	0.008	0.025	0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00011	0.00042	0.00025	0.00033	0.00031
Cobalt	mg/L	<0.002	<0.002	<0.002	0.011	0.011	0.011		0.005	0.006	0.004	0.010	0.003	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00133	0.00063	0.00197	0.0022	0.00060
Copper	mg/L	0.004	0.004	0.007	0.024	0.027	0.02		0.055	0.015	0.008	0.02	0.006	0.004	0.002	0.004	<0.0010	0.0013	0.0012	0.0015	0.00181	0.00152	0.00243	0.00383	0.00123
Iron	mg/L	1.830	4.620	7.320	27.800	15.300	27.400		8.99	13.9	7.47	20.6	4.71	0.142	0.3	2.12	0.998	0.268	0.067	1.18	0.216	0.995	0.108	0.168	0.922
Lead	mg/L	<0.005	<0.005	<0.005	0.016	0.016	0.01		0.006	0.008	<0.005	0.012	<0.005	0.0001	0.0003	0.00065	<0.00010	<0.0050	<0.00010	0.00054	0.000267	0.00028	0.000059	0.000125	0.000283
Lithium	mg/L	Not required by previous permit							Not required by previous permit					-	-	-	-	-	-	-	-	-	-	0.0339	0.016
Manganese	mg/L													0.001	0.004	0.03	0.0484	0.0031	0.0022	0.0062	0.00197	0.00355	0.147	0.0927	0.00266
Mercury	mg/L	0.0004	<0.0002	<0.0002	<0.0002	0.0005	<0.0005		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	0.007	<0.005	0.008	0.01		0.007	0.008	<0.005	0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00953	0.00113	0.00311	0.00662	0.00164
Nickel	mg/L	0.003	0.003	0.014	0.039	0.056	0.039		0.021	0.023	0.013	0.030	0.013	0.008	0.0079	0.0057	<0.0020	0.0092	0.0072	0.0062	0.0126	0.00526	0.00965	0.0132	0.00455
Selenium	mg/L	Not required by previous permit							Not required by previous permit					0.0007	0.00095	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000626	0.000393	0.000497	0.000795	0.000262
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000019	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													0.01	0.008	0.0092	0.0024	0.0083	0.0026	0.0109	0.00518	0.0061	0.00269	0.0104	0.00661
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00446	0.000924
Vanadium	mg/L													0.006	0.0025	0.003	0.0014	0.0051	0.0018	0.0022	0.00199	0.00334	0.00415	0.00393	0.00222
Zinc	mg/L	0.038	0.025	0.058	0.029	0.605	0.088		0.032	0.143	0.063	0.079	0.021	0.012	<0.0020	<0.0020	<0.0020	0.0035	<0.0020	0.0066	<0.0010	0.0027	0.0017	<0.0010	0.0024
Routine Water																									
Ion Balance	%	98	108	100	99	114	105	EMPTY	104	103	105	102	98.1	98.6	99.9	109	92.8	94.8	110	104	98.9	110	97.7	112	101
Bicarbonate	mg/L	385	331	459	705	650	636		402	411	429	459	428	343	405	318	470	599	425	297	413	356	619	564	442
Chloride	mg/L	18.2	10.2	21.9	181.0	120.0	173.0		40	41	37	45	38	38	31.2	13.6	33.7	48.4	19.1	16.1	32.3	29.8	47.5	48.6	22.9
Carbonate	mg/L	<5	<5	<5	<5	<5	<5		9	<5	<5	<5	<5	42	17.4	6.4	<5.0	17.3	7.5	9.8	10.6	<5	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	742	713	745	1740	1390	1840		887	891	730	879	760	774	758	553	921	1090	730	559	834	675	1050	1050	734
Calcium	mg/L	23.1	20.5	21.9	39.5	45.9	56.6		39.1	29.5	27	28.2	24.4	22.7	20.5	27.7	29.4	31.9	36.6	25.3	28.7	23.5	28.8	28.6	22.2
Potassium	mg/L	12.5	9.2	20.9	93.4	75.8	54.1		28.9	28.9	32.8	34.9	32.8	23.5	25.6	21.5	38.7	39.3	35.4	28.5	36.0	35.6	45.2	43.5	26.8
Magnesium	mg/L	10.1	9.5	11.4	21.1	22.3	29.8		16.9	14.7	13.9	14.9	13.1	12.9	12	12.2	12.3	15.3	16.2	10.9	12.9	12.4	16.1	16.5	12.7
Sodium	mg/L	125	139	149	254	208	373		151	140	123	141	116	130	132	81.4	121	174	106	71.7	117	101	175	197	121
Sulfate	mg/L	51.7	83.2	38.9	36.2	37.4	224		105	73.1	10.7	34.3	12.3	22.8	15.3	6.13	36.5	15.7	6.24	5.18	25.8	6.68	14.9	28.9	5.32
Phosphorus	mg/L	Not required by previous permit							Not required by previous permit					-	0.507	1.39	5.07	1.48	0.361	1.88	0.531	2.2	0.98	1.89	0.614
pH in H_20	pH	8.2	8.4	7.7	8.4	7.7	8.2		8.5	8.4	8.4	8.2	8.1	9	8.59	8.43	8.37	8.56	8.41	8.57	8.50	8.4	8.06	8.29	8.23
TDS (Calculated)	mg/L	430	437	493	975	874	1180		591	540	460	524	447	461	453	325	507	637	436	314	467	389	640	644	431
Nitrate	mg/L	Not required by previous permit							Not required by previous permit					<0.1	<0.050	<0.050	0.092	<0.050	<0.050	<0.05	<0.020	<0.020	0.243	0.157	0.336
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010	0.086	<0.010	0.030
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.157	0.365
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	139	108
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	466	363
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.39	0.369
Field Data																									
pH in H_20	pH	Not required by previous permit						EMP	Not required by previous permit					9.08	8.19	9.24	7.94	8.33	8.6	8.16	8.86	8.5	8.6	10.2	6.14
Conductivity (EC)	uS/cm													919	580	867	300	1093	750	408	846	703	1170	1133	897

Table D.10: Chemical Analytical Results

Sample ID:		Magneson D.1																						
Site Number:		**10**																						
Date Sampled:	**Units**	**17-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**19-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**21-Oct-2003**	**15-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	50	70	110	90	130	80	140	120	120	88	126	244	186	96.3	134	280	211	149	257	197	320	323	268	339
Ammonia-N	mg/L	<0.05	0.27	0.85	1.6	1.42	0.36	0.53	0.21	0.79	0.13	0.13	0.13	<0.05	<0.050	0.167	0.134	0.138	0.086	0.157	0.215	0.571	0.200	0.123	0.104
Total Kjeldahl Nitrogen	mg/L	2.5	2.8	4.7	5.2	5.5	8.6	6.2	4.2	4.8	3.7	4.5	7.6	6.7	5.59	10.2	9.14	7.93	3.88	8.78	8.94	12.3	11.7	10.4	11.0
Total Organic Carbon	mg/L	20	24	38	32	44	53	55	43	43	37	45	54	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												55	34.7	72.3	85.5	64	77.4	58.1	93.9	106	323	91.0	102
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0017	0.0084
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.2	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.20	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												2.43	0.075	0.866	0.59	1.63	1.84	<0.01	0.326	0.168	0.0146	0.302	0.039
Antimony	mg/L	0.0005	0.001	0.0012	<0.0004	0.0008	0.0008	0.0012	0.0013	0.0013	0.001	0.0010	0.002	0.0009	<0.00040	0.00067	<0.00040	<0.00080	0.00049	<0.0004	0.00044	0.00045	0.00057	0.00059	0.0005
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0181	0.0175
Barium	mg/L	0.03	0.036	0.042	0.052	0.06	0.055	0.041	0.038	0.045	0.058	0.06	0.104	0.062	0.0618	0.0474	0.031	0.0645	0.0712	0.0308	0.0376	0.0623	0.0562	0.0720	0.0701
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Boron	mg/L													0.11	<0.050	0.115	0.072	0.086	0.085	0.087	0.087	0.107	0.091	0.091	0.091
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0003	<0.000050	0.000055	0.000055	<0.0010	0.000074	<0.00005	0.000043	0.00005	0.000038	0.000056	0.00005
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00104	0.00114	0.00096	0.00115	0.00092
Cobalt	mg/L	<0.002	<0.002	0.021	0.002	0.003	0.002	<0.002	<0.002	<0.002	0.002	0.002	0.005	<0.002	<0.0020	0.0026	0.0033	0.0044	0.0042	<0.002	0.00336	0.00442	0.00637	0.00608	0.0051
Copper	mg/L	0.004	0.002	0.011	0.006	0.014	0.009	0.012	0.005	0.005	0.096	0.226	0.162	0.139	0.0014	0.0922	0.169	0.198	0.107	0.484	0.309	0.094	0.0532	0.0521	0.0255
Iron	mg/L	<0.005	0.549	1.100	1.680	1.560	1.500	0.37	0.455	0.53	3.65	3.4	6.6	1.93	0.309	0.861	0.864	1.37	2.09	0.42	0.784	1.41	0.822	1.41	1.08
Lead	mg/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	0.0014	0.00032	0.00083	0.0006	<0.0050	0.00284	0.00039	0.00053	0.00134	0.00076	0.00118	0.00105
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0639	0.0537
Manganese	mg/L													0.029	0.0223	0.079	0.0699	0.232	0.440	0.0279	0.280	0.179	0.451	0.333	0.587
Mercury	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	0.0000205	<0.0000050	<0.0000050	<0.0000050	0.0000086
Molybdenum	mg/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	<0.0050	0.0054	<0.0050	0.005	<0.0050	<0.005	0.00595	0.00523	0.00447	0.00457	0.00327
Nickel	mg/L	0.007	0.01	0.016	0.012	0.014	0.011	0.013	0.013	0.01	0.015	0.02	0.022	0.022	0.0058	0.0239	0.0214	0.0316	0.0283	0.0226	0.0261	0.0287	0.0288	0.0293	0.0243
Selenium	mg/L	Not required under previous permit												0.0021	<0.00040	<0.0020	0.00069	0.00084	0.00067	0.00051	0.00076	0.00077	0.00096	0.00099	0.00080
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	0.000034	<0.000020	<0.000020	<0.000020
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000020	<0.000020	0.000023	<0.000020
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Titanium	mg/L													0.119	0.006	0.0546	0.0342	0.0754	0.0836	0.0031	0.0226	0.0135	0.00819	0.0552	0.00886
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00196	0.00185
Vanadium	mg/L													0.016	0.0034	0.0121	0.0106	0.0246	0.0201	0.0108	0.0139	0.0152	0.0155	0.0154	0.0131
Zinc	mg/L	0.023	0.017	0.014	0.01	0.021	0.062	0.008	0.008	0.049	0.08	0.021	0.051	0.015	<0.0020	0.0065	0.0103	0.0143	0.0174	0.0304	0.0055	0.0123	0.0091	0.0071	0.0076
Routine Water																									
Ion Balance	%	102	102	94	103	108	105	103	106	102	105	96.5	100	101	105	94.5	91.6	97.4	106	109	102	108	91.7	103	102
Bicarbonate	mg/L	346	328	465	360	646	590	675	746	717	434	483	471	516	251	481	440	482	453	434	474	540	688	617	609
Chloride	mg/L	73.1	70.5	96.1	97.0	110.0	159.0	161	149	158	94	101	123	157	12.2	149	126	142	136	151	147	174	200	197	202
Carbonate	mg/L	19	16	<5	48	<5	64	86	60	90	16	30	10	19	53.6	28.4	7.9	15.5	14.0	19.7	12.5	15	<5.0	17.9	16.1
Conductivity (EC)	uS/cm	1490	1150	1200	1420	1900	2160	2370	2500	2430	1410	1580	1430	1850	569	1930	1590	1750	1680	1830	1870	2030	2190	2150	2150
Calcium	mg/L	28.4	27	28.6	28.3	40.7	40.3	40.6	44.4	48.9	32.3	35.0	38.2	45.5	19.8	44.3	32.8	40.3	45.7	42.9	43.1	48.8	46.1	51.1	51.7
Potassium	mg/L	22.9	33.4	46.2	45.7	49.1	55.8	68	61.8	62.7	48.5	62.6	76.7	79.4	15.7	80.2	82.7	99.4	96.0	113	111	131	132	127	135
Magnesium	mg/L	13.0	11.5	11.2	12.3	20.5	22.0	26.1	24.7	25.5	16.0	17.5	18.9	23.2	7.6	20.2	14.3	19.7	19.9	19.3	18.9	25.1	24	26.9	31
Sodium	mg/L	280	211	222	250	357	404	495	520	528	280	270	245	302	110	288	208	251	263	284	250	304	305	327	326
Sulfate	mg/L	314	199	176	186	322	349	361	402	447	249	256	209	263	9.83	312	202	245	241	260	228	250	250	252	284
Phosphorus	mg/L	Not required under previous permit												-	0.8	5.38	5.26	4.69	4.29	6.43	5.71	7.1	7.43	8.88	8.91
pH in H_20	pH	8.8	8.7	7.8	9.1	8.2	8.9	9	8.9	9.0	8.6	8.6	8.4	8.5	9.24	8.72	8.47	8.6	8.53	8.7	8.50	8.54	8.3	8.54	8.52
TDS (Calculated)	mg/L	920	730	809	843	1250	1430	1550	1630	1710	952	1010	961	1150	352	1160	892	1050	1040	1110	1050	1220	1330	1310	1350
Nitrate	mg/L	Not required under previous permit												2	<0.050	0.138	0.419	0.517	0.882	0.473	0.662	0.43	1.4	0.958	1.12
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.020	0.034	<0.050	<0.020	<0.020
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.958	1.12
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	238	257
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	536	526
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.129	0.297
Field Data																									
pH in H_20	pH	Not required under previous permit												8.62	8.73	9.92	8.65	8.73	8.8	8.21	8.34	8.8	8.1	10.2	9.73
Conductivity (EC)	uS/cm													1738	500	2080	450	1772	1720	1872	1951	2030	2360	2290	2.66

Table D.11: Chemical Analytical Results

Sample ID:		Magneson D.2																						
Site Number:		11																						
Date Sampled:	**Units**	**17-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**19-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**15-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**12-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	250	220	370	590	260	550	EMPTY	340	160	395	165	349	231	EMPTY	124	185	EMPTY	298	215	267	126	188	160	114
Ammonia-N	mg/L	4.6	2.09	4.98	4.83	5	2.31		6.22	10.5	6.03	2.71	0.19	6.04		0.605	0.82		0.187	0.094	0.241	0.076	0.749	0.137	0.063
Total Kjeldahl Nitrogen	mg/L	20.5	18.8	23.3	19.4	3.6	30.1		31.8	17.2	22	12.0	16.7	23.7		16.7	11.5		4.11	8.76	13.6	4.64	8.26	6.13	3.46
Total Organic Carbon	mg/L	96	88	183	154	100	144		170	66	114	61	125	-		-	-		-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit							Not required under previous permit					117		51.2	77		51.9	39.3	35.6	41.3	188	60.0	33.5
Phenols	mg/L													-		-	-		-	-	-	-	-	0.0028	0.0142
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit						EMPTY	Not required under previous permit					<0.0005	EMPTY	<0.00050	<0.00050	EMPTY	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005		<0.00050	<0.00050		<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005		<0.00050	<0.00050		<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-		-	-		-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-		-	-		-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005		<0.00071	<0.00071		<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-		-	-		-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1		<0.10	<0.10		<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1		<0.10	<0.10		<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.2		<0.25	<0.25		0.44	<0.25	<0.20	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit						EMPTY	Not required under previous permit					0.33	EMPTY	0.021	0.095	EMPTY	0.016	0.018	0.0069	0.132	0.0858	0.217	0.168
Antimony	mg/L	0.0005	0.0007	0.0014	0.0004	0.0008	0.0007		0.0026	0.0021	0.0013	0.0020	0.0015	0.0011		0.00044	0.00047		<0.00040	<0.0004	0.00040	0.00021	0.00034	0.00024	0.00018
Arsenic	mg/L	Not required under previous permit							Not required under previous permit							-	-		-	-	-	-	-	0.0137	0.00332
Barium	mg/L	0.726	1.28	0.967	1.3	1.03	1.04		1.9	0.343	0.967	0.394	1.08	0.147		0.0544	0.0685		0.124	0.0733	0.0963	0.0276	0.0547	0.0136	0.0524
Beryllium	mg/L	Not required under previous permit							Not required under previous permit					<0.001		<0.0010	<0.0010		<0.0010	<0.001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
Boron	mg/L													0.07		0.058	<0.050		0.058	<0.05	0.038	0.038	0.028	0.036	0.024
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001		<0.000050	<0.000050		<0.000050	<0.00005	0.0000095	0.0000108	0.0000207	0.0000249	0.0000153
Chromium	mg/L	0.019	0.052	0.047	0.085	0.07	0.096		0.147	0.022	0.059	0.033	0.075	<0.005		<0.0050	<0.0050		<0.0050	<0.005	0.00013	0.00034	0.00027	0.00053	0.00034
Cobalt	mg/L	0.008	<0.002	0.044	0.018	0.016	0.031		0.042	0.008	0.019	0.011	0.021	0.003		0.002	<0.0020		0.0024	0.0028	0.00197	0.00079	0.00164	0.00070	0.00057
Copper	mg/L	0.015	0.04	0.037	0.031	0.033	0.052		0.102	0.016	0.035	0.026	0.045	0.01		0.0091	0.0044		<0.0010	<0.001	0.00078	0.00204	0.00454	0.00276	0.00211
Iron	mg/L	22.7	67.4	56.8	76.8	56.6	120		130	18.2	65.4	30.3	71.7	0.24		0.11	0.159		0.725	0.987	0.592	0.7	0.134	0.197	1.43
Lead	mg/L	0.017	0.009	<0.005	0.031	0.032	0.054		0.07	0.011	0.043	0.019	0.045	0.0002		<0.00010	0.00014		0.00014	0.00034	0.000141	0.000212	0.000154	0.000151	0.000582
Lithium	mg/L	Not required under previous permit							Not required under previous permit					-		-	-		-	-	-	-	-	0.0124	0.0104
Manganese	mg/L													0.197		0.0342	0.0063		0.424	0.344	0.384	0.00264	0.0402	0.0111	0.00213
Mercury	mg/L	0.0002	0.0002	<0.0002	<0.0002	0.0002	<0.0002		<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0001		<0.00010	<0.00010		<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005
Molybdenum	mg/L	<0.005	<0.005	0.005	<0.005	<0.005	0.007		0.01	0.018	0.007	0.009	<0.005	0.021		<0.0050	<0.0050		0.0129	<0.005	0.0162	0.00198	0.00451	0.00352	0.00111
Nickel	mg/L	0.022	0.086	0.07	0.052	0.077	0.079		0.111	0.028	0.049	0.033	0.055	0.019		0.0149	0.014		0.0118	0.0104	0.0129	0.00687	0.0105	0.00544	0.00512
Selenium	mg/L	Not required under previous permit							Not required under previous permit					0.002		<0.0020	0.00074		0.00051	<0.0004	0.000899	0.000297	0.000603	0.000474	0.000263
Silver	mg/L													<0.0001		<0.00010	<0.00010		<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001		<0.00010	<0.00010		<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000018	<0.000010
Tin	mg/L													<0.05		<0.050	<0.050		<0.050	<0.05	<0.00010	<0.00010	0.00025	<0.00010	<0.00010
Titanium	mg/L													0.025		0.0027	0.0065		0.0019	0.0018	0.00171	0.0056	0.00306	0.0158	0.0141
Uranium	mg/L															-	-		-	-	-	-	-	0.00188	0.000954
Vanadium	mg/L													0.008		0.0074	0.0069		0.0075	0.0019	0.00533	0.00443	0.0038	0.0122	0.00364
Zinc	mg/L	0.068	0.232	0.188	0.109	0.381	0.274		0.384	0.126	0.198	0.125	0.192	0.01		<0.0020	0.0024		<0.0020	0.0065	0.0013	0.0019	0.0037	<0.0010	0.0015
Routine Water																									
Ion Balance	%	101	97	105	107	112	107	EMPTY	101	104	102	100	98.7	96	EMPTY	110	91.3	EMPTY	102	107	97	114	92.1	107	102
Bicarbonate	mg/L	597	520	514	562	541	521		847	495	598	318	592	745		335	501		457	297	409	241	527	332	296
Chloride	mg/L	94.2	64.0	71.3	97.0	71.0	145.0		187	109	102	80	72	168		56.9	42.7		41.8	25.6	63.5	22.4	54.4	48.5	19.2
Carbonate	mg/L	<5	<5	<5	<5	<5	<5		<5	<5	6	<5	7	<5		9.9	11.5		14.5	11.8	6.0	<5	<5.0	12.7	<5.0
Conductivity (EC)	uS/cm	1310	998	922	1190	1070	1350		1600	1350	1160	904	1120	1780		832	946		853	590	904	499	967	760	516
Calcium	mg/L	42.4	27.1	31.9	34.2	47.8	88.6		84.5	55.7	47.1	24.4	37.5	54.6		38.1	30.7		44.8	34.4	40.5	22.8	26.1	19.9	20.8
Potassium	mg/L	75	68.8	58.1	66.3	73.6	94.8		101	69.4	74.6	48.9	71.2	79.8		47.8	45.3		57.6	38.3	51.5	34	45.8	39.1	32.9
Magnesium	mg/L	19.0	12.7	13.5	15.5	23.4	38.7		33.1	19.8	19.9	10.3	17.8	24.6		15.8	12.2		16.9	12.6	13.7	9.57	12.2	8.43	9.31
Sodium	mg/L	187	148	172	199	166	231		251	185	173	128	169	262		110	121		98.3	61.5	99.8	58.6	143	128	69.1
Sulfate	mg/L	53	26	35.5	27.5	23	74		62.7	157	32.4	73.3	28.1	116		45.2	3.76		3.38	0.8	16.6	2.91	14.1	21.6	5.44
Phosphorus	mg/L	Not required under previous permit							Not required under previous permit					-		4.56	2.48		1.69	2.42	1.35	1.93	0.622	2.28	1.21
pH in H_20	pH	8.2	8.0	7.5	8.2	7.7	8.0		8.3	8.3	8.4	7.9	8.3	8.2		8.49	8.5		8.53	8.64	8.40	8.28	8.26	8.68	8.19
TDS (Calculated)	mg/L	765	602	636	716	650	603		1140	841	752	525	702	1070		491	514		502	331	494	270	559	442	303
Nitrate	mg/L	Not required under previous permit							Not required under previous permit					0.2		0.574	0.06		<0.050	<0.05	<0.020	0.248	0.176	<0.020	0.253
Nitrite	mg/L													-		<0.050	<0.050		<0.050	<0.02	<0.010	<0.010	0.017	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-		-	-		-	-	-	-	-	<0.022	0.253
Hardness as $CaCO_3$	mg/L													-		-	-		-	-	-	-	-	84.4	90.3
Alkalinity (total as $CaCO_3$)	mg/L													-		-	-		-	-	-	-	-	293	242
Hydroxide	mg/L													-		-	-		-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-		-	-		-	-	-	-	-	0.284	0.228
Field Data																									
pH in H_20	pH	Not required under previous permit												na	EMPTY	9.95	8.45	EMPTY	8.6	8.45	9.09	8.8	8.8	11.4	10.3
Conductivity (EC)	uS/cm													na		997	300		864	433	931	508	1052	786	650

Table D.12: Chemical Analytical Results

Sample ID:		Magneson D.3																						
Site Number:		12																						
Date Sampled:	**Units**	**17-Oct-1996**	**Oct. 3, 97**	**8-Oct-1998**	**19-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**15-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**19-Oct-2010**	**12-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	10	30	30	50	40	40	30	30	30	40	39	49	53	57.2	45.1	42	49	37	59	49	37	57		119
Ammonia-N	mg/L	0.06	<0.05	0.05	<0.05	<0.05	<0.05	0.12	<0.05	0.38	<0.05	<0.05	0.1	<0.05	<0.050	<0.050	<0.050	0.116	<0.050	<0.05	0.252	<0.050	<0.050		<0.050
Total Kjeldahl Nitrogen	mg/L	1.3	<0.2	1.1	1	0.9	2.9	1.1	1.3	1.5	1	0.9	1.2	1.5	1.86	1.65	1.22	1.77	1.44	1.48	1.97	1.29	1.79	Not analyzed	3.49
Total Organic Carbon	mg/L	9	12	13	13	12	13	14	12	16	14	14	17	-	-	-	-	-	-	-	-	-	-		-
Dissolved Organic Carbon	mg/L	Not required under previous permit												18	20.1	15.1	17.8	19.1	19.5	15.5	17.6	17.3	57		17.9
Phenols	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		0.0136
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050		<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050		<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050		<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-		<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-		<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	Not analyzed	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-		<0.00050
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10		<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10		<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.20	<0.13	<0.10		<0.10
Dissolved Metals																									
Antimony	mg/L	0.0004	0.0008	0.0012	<0.0004	0.0006	0.0005	0.0011	0.0011	0.0012	0.0014	0.0011	0.0018	0.0005	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00054	0.00031	0.00027		0.00029
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		0.00194
Barium	mg/L	0.039	0.041	0.039	0.069	0.053	0.058	0.082	0.058	0.079	0.047	0.047	0.071	0.066	0.0646	0.0455	0.0687	0.0798	0.0262	0.0425	0.0968	0.0264	0.0913		0.0773
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000084	0.0000249	0.0000585		0.0000188
Chromium	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010		0.00016
Cobalt	mg/L	0.002	0.002	0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00024	0.00018	0.00039		0.00052
Copper	mg/L	0.006	0.002	0.009	0.002	0.004	0.004	0.007	0.005	0.007	0.003	0.003	0.002	0.002	0.0022	0.0087	0.0011	0.0015	0.0016	0.0014	0.00136	0.0013	0.00283		0.00242
Iron	mg/L	<0.005	0.982	0.603	0.977	0.266	0.810	2.36	1.48	3.32	0.437	1.07	0.872	0.032	0.071	0.014	0.102	0.047	0.036	<0.01	0.018	<0.010	0.019		0.015
Lead	mg/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	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050	0.000087		<0.000050
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		0.0409
Molybdenum	mg/L	0.008	<0.005	0.007	0.006	<0.005	0.006	0.007	0.008	0.007	0.006	0.006	<0.005	0.007	0.0072	0.0217	0.0146	0.0169	0.0225	0.0212	0.0302	0.0302	0.0206		0.0254
Nickel	mg/L	0.013	0.009	0.015	0.008	0.01	0.008	0.011	0.009	0.012	0.007	0.007	0.007	0.007	0.0081	0.0105	0.0113	0.0116	0.0127	0.013	0.0191	0.0172	0.0121		0.0203
Zinc	mg/L	0.016	0.015	0.031	0.009	<0.001	0.032	0.01	0.009	0.066	0.004	0.009	0.009	0.009	<0.0020	<0.0020	0.0021	<0.0020	<0.0020	0.0079	0.0021	0.0015	0.0057	Not analyzed	0.0028
Mercury	mg/L	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050		<0.0000050
Aluminium	mg/L	Not required under previous permit												0.02	0.082	0.011	0.012	0.031	0.039	<0.01	0.0233	0.0023	0.0149		0.0033
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010		<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	0.058	0.055	0.055	0.053	0.065	0.061	0.071		0.060
Manganese	mg/L													0.002	0.0026	<0.0020	<0.0020	<0.0020	0.0020	<0.002	0.0009	0.00027	0.0211		0.00123
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010		<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	0.00033		<0.00010
Selenium	mg/L													0.0007	0.00054	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000412	0.000322	0.000233		0.000304
Titanium	mg/L													0.001	0.0037	<0.0010	<0.0010	0.0023	0.0025	<0.001	0.00114	<0.00030	0.00144		<0.00030
Thallium	mg/L													0.0002	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010		<0.000010
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-		0.00247
Vanadium	mg/L													0.001	<0.0010	0.0015	0.0034	0.005	0.0127	0.0096	0.00866	0.0164	0.00285		0.00262
Routine Water																									
Ion Balance	%	103	106	109	103	105	108	97.6	104	102	109	104	103	99.5	92.3	95.7	93.6	94.2	104	104	94.5	99.8	94.8		102
Bicarbonate	mg/L	237	198	227	222	222	246	247	200	261	225	224	256	268	228	189	267	290	253	230	251	256	334		268
Chloride	mg/L	4.4	3.9	4.4	5.0	4.0	6.0	7	6	8	6	7	6	12	10.6	24	19.2	24.5	24.4	21.3	20.9	18.2	18.3		14.7
Carbonate	mg/L	<5	<5	<5	5	<5	<5	13	9	<5	<5	<5	<5	14	7.1	<5.0	7.1	6	6.7	8.4	<5.0	<5.0	6.4		<5.0
Conductivity (EC)	uS/cm	876	603	632	745	789	918	1050	909	1110	779	790	683	831	918	989	928	1060	993	957	987	943	1020		960
Calcium	mg/L	21.8	24.9	21.1	23	24.3	28.7	22.8	21.6	35.6	37.5	26.3	27.5	25.7	19	25.5	34.4	27.4	26.4	24.4	31.3	27.9	29.1		49.1
Potassium	mg/L	6.9	6.6	7.3	7.3	7.8	8.4	9.5	7.1	7.7	7.1	8.4	8.5	8.6	8.39	8.8	8.06	10.9	11.6	10.7	11.5	10.4	11.1		13.6
Magnesium	mg/L	8.0	6.4	7.9	8.8	10.2	12.0	13	10	11.0	10.6	10.4	9.9	12.4	12.4	13.1	13.5	14.2	16.0	14.7	11.8	15.5	15.3		17.4
Sodium	mg/L	168	100	130	129	139	181	213	174	201	145	140	107	140	154	153	132	171	172	162	142	153	162		139
Sulfate	mg/L	238	124	149	168	198	246	331	267	333	220	205	119	166	257	282	203	252	239	229	231	234	209	Not analyzed	252
Phosphorus	mg/L	Not required under previous permit													0.055	0.161	0.118	0.091	0.051	0.132	0.134	0.038	0.051		0.185
pH in H_20	pH	8.4	8.4	7.9	8.6	8.4	8.3	8.3	8.7	8.3	8.4	8.3	8.5	8.7	8.51	8.44	8.51	8.49	8.46	8.62	8.36	8.23	8.44		8.38
TDS (Calculated)	mg/L	565	365	431	456	493	595	722	593	725	540	508	409	511	581	603	549	649	620	583	576	585	616		623
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.020	<0.020	<0.020		0.029
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010	<0.010		<0.010
Nitrate and Nitrite (as N)	mg/L	Not analyzed																							0.029
Hardness as CaCO3	mg/L																								194
Alkalinity (total as CaCO3)	mg/L																								227
Hydroxide	mg/L																								<5.0
Fluoride	mg/L																								0.465
Field Data																									
pH in H_20	pH	Not required under previous permit												8.72	8.24	8.85	8.57	8.86	9.2	8.68	8.57	8.8	8.8	Not analyzed	11.68
Conductivity (EC)	uS/cm													867	750	1055	689	1053	1007	693	996	930	1116		1203

Table D.13: Chemical Analytical Results

Sample ID:		Magneson D.4																				
Site Number:		13																				
Date Sampled:	Units	7-Oct-1997	8-Oct-1998	19-Oct-1999	10-Oct-2000	5-Oct-2001	8-Oct-2002	15-Oct-2003	14-Oct-2004	20-Oct-2005	13-Oct-2006	3-Oct-2007	17-Oct-2008	28-Oct-2009	18-Oct-2010	12-Oct-2011	16-Oct-2012	8-Oct-2013	15-Oct-2014	14-Oct-2015	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019
Chem. O_2 Demand	mg/L	350	1430	680	1450	5260	EMPTY	1270	EMPTY	259	1120	1070	1440	EMPTY	4810	1220	1550	1560	1580	1190	1300	1930	960	1370
Ammonia-N	mg/L	9.72	2.35	2.41	14.6	1.73		0.77		0.26	1.48	1.37	0.67		5.11	4.39	2.04	2.24	0.828	1.37	3.13	1.37	0.409	2.85
Total Kjeldahl Nitrogen	mg/L	27.8	86.2	30.7	<3	91.2		58.2		11.9	45.1	44.4	71		128	44.6	63.8	49.7	54.7	52.8	56.1	62	39.4	43.7
Total Organic Carbon	mg/L	168	714	187	813	1690		356		105	271	251	-		-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit						ired under previou		Not required under previous permit			527		1430	554	392	756	609	531	507	1930	329	415
Phenols	mg/L												-		-	-	-	-	-	-	-	-	<0.01	0.0116
BTEX, F1 (C6-C10) and F2 (>C10-C16)																								
Benzene	mg/L	Not required under previous permit					EMPTY	ired under previou	EMPTY	Not required under previous permit			<0.0005	EMPTY	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L												<0.0005		0.00318	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L												<0.0005		0.00107	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L												-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L												-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L												<0.0005		0.00825	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L												-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L												<0.1		<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L												<0.1		<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L												<0.2		<0.625	<0.25	<0.25	<0.25	<0.25	<0.20	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																								
Aluminium	mg/L	Not required under previous permit					EMPTY	ired under previou	EMPTY	Not required under previous permit			<0.2	EMPTY	0.23	0.617	1.09	0.45	0.075	5.79	0.273	0.149	0.145	0.080
Antimony	mg/L	<0.0002	0.003	<0.0004	0.0034	0.0021		0.0007		0.0019	<0.0004	0.0012	<0.008		<0.0080	<0.00080	0.00121	<0.01	<0.001	0.0013	0.00082	0.00088	0.00082	0.00064
Arsenic	mg/L	Not required under previous permit						ired under previou		Not required under previous permit			-		-	-	-	-	-	-	-	-	0.0327	0.0275
Barium	mg/L	0.383	1.09	0.208	1.29	0.998		0.137		0.083	0.03	0.736	<0.06		0.317	0.0722	0.305	0.113	0.137	0.330	0.188	0.236	0.383	0.166
Beryllium	mg/L	Not required under previous permit						ired under previou		Not required under previous permit			<0.02		<0.010	<0.0020	<0.0010	<0.050	<0.001	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050
Boron	mg/L												<1		0.48	<0.10	0.318	<1.0	0.28	0.270	0.289	0.302	0.267	0.204
Cadmium	mg/L	<0.001	<0.001	<0.001	0.002	<0.001		<0.001		<0.001	<0.001	<0.001	<0.002		<0.0010	<0.00010	<0.0010	<0.0010	0.00017	0.000114	0.000094	0.000061	0.000064	0.000079
Chromium	mg/L	0.039	0.079	0.026	0.114	0.055		0.018		0.005	<0.005	0.07	<0..1		<0.0080	<0.010	0.0057	<0.010	<0.005	0.0119	0.00483	0.00492	0.00482	0.00285
Cobalt	mg/L	0.024	0.063	0.011	0.069	0.061		0.008		0.006	0.003	0.036	<0.04		0.0218	<0.0040	0.013	0.014	0.0144	0.0154	0.0128	0.0108	0.00594	0.00794
Copper	mg/L	0.017	0.084	0.017	0.136	0.188		0.018		0.0011	0.008	0.078	0.02		0.016	0.0031	0.0283	0.024	0.0335	0.0263	0.0138	0.0093	0.0069	0.0093
Iron	mg/L	29.100	80.000	14.900	93.800	98.300	EMPTY	113	EMPTY	5.19	5.76	62.7	0.43	EMPTY	4.93	5.83	6.3	2.3	3.64	9.88	3.92	2.86	3.26	1.99
Lead	mg/L	0.011	0.009	0.005	0.048	0.043		0.007		<0.005	<0.005	0.033	<0.002		0.003	0.00103	<0.0050	<0.0050	0.0044	0.00689	0.00385	0.00305	0.00422	0.00304
Lithium	mg/L	Not required under previous permit						ired under previou		Not required under previous permit			-		-	-	-	-	-	-	-	-	0.128	0.0902
Manganese	mg/L												0.3		1.83	1.18	1.18	0.649	0.615	1.15	0.945	1.06	1.39	0.748
Mercury	mg/L	0.0009	<0.0002	<0.0002	0.0008	<0.0002		<0.0002		<0.0002	<0.0002	<0.0002	<0.0001		<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	0.0000184	<0.000050	<0.0000050	<0.000050	<0.000050
Molybdenum	mg/L	0.006	0.019	0.006	0.036	0.017		0.005		0.021	<0.005	0.005	0.03		<0.0050	<0.010	0.0189	0.0409	0.0078	0.0179	0.00911	0.00492	0.00333	0.00193
Nickel	mg/L	0.059	0.18	0.047	0.212	0.201		0.029		0.024	0.011	0.099	0.07		0.0998	0.0122	0.0658	0.085	0.0507	0.0553	0.0497	0.045	0.0350	0.0350
Selenium	mg/L	Not required under previous permit						ired under previou		Not required under previous permit			0.014		<0.040	<0.00080	0.00225	<0.010	0.0016	0.00339	0.00192	0.00218	0.00159	0.00142
Silver	mg/L												<0.002		<0.0020	<0.00020	<0.0050	<0.0010	<0.0001	0.00014	0.000092	0.000075	0.00009	<0.000050
Thallium	mg/L												<0.002		<0.0010	<0.00020	<0.050	<0.0050	<0.0001	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050
Tin	mg/L												<1		<0.050	<0.10	<0.050	<0.050	<0.05	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050
Titanium	mg/L												<0.02		0.128	0.0338	0.0989	0.083	0.0437	0.334	0.0677	0.0592	0.0716	0.0444
Uranium	mg/L												-		-	-	-	-	-	-	-	-	0.00295	0.00214
Vanadium	mg/L												0.06		0.0793	0.0072	0.0345	0.055	0.033	0.0481	0.0336	0.0351	0.0277	0.0286
Zinc	mg/L	0.149	0.424	0.027	0.505	1.92		0.067		0.073	0.015	0.261	<0.04		0.094	0.0106	0.0284	<0.10	0.053	0.047	0.0421	0.0297	0.0247	0.032
Routine Water																								
Ion Balance	%	104	102	105	107	107	EMPTY	103	EMPTY	102	111	98.1	95	EMPTY	115	91.8	96.1	96.8	101	97.9	114	98.6	101	110
Bicarbonate	mg/L	1240	1650	1450	2200	2500		1890		883	1570	1470	2830		2220	1320	2350	3210	1490	1540	1080	1830	1580	1310
Chloride	mg/L	505	868	674	1420	2530		1640		424	921	605	2040		1190	480	1030	1930	807	744	615	932	894	603
Carbonate	mg/L	29	70	95	<5	189		81		53	57	75	359		73	49.9	140	341	138	88.6	65.1	94.1	87.5	47.6
Conductivity (EC)	uS/cm	3620	4920	4510	7690	11700		8430		3000	6190	3980	11500		7840	4020	7490	11,800	5830	5640	4620	6910	6470	4570
Calcium	mg/L	86.3	113	74.1	205	212		244		113	144	108	61.9		177	86.6	165	119	93.5	113	89.2	105	118	84.2
Potassium	mg/L	322	492	359	1090	1310		1120		329	678	545	1260		1290	481	976	1550	788	728	610	870	717	634
Magnesium	mg/L	61.4	95.8	84.0	142.0	198.0		246		67.0	112	56	177		112	44.9	90.6	148	60.8	59.2	60.3	90	84.4	71.6
Sodium	mg/L	517	870	709	1220	2450		1540		432	838	515	1760		915	365	898	1700	680	591	560	881	844	596
Sulfate	mg/L	140	418	126	555	713		2150		448	751	174	826		341	141	521	856	343	331	308	659	637	361
Phosphorus	mg/L	Not required under previous permit						ired under previou		Not required under previous permit			-		44	30	44.5	48.1	41.6	34.4	34.8	44.7	31.3	26.9
pH in H_20	pH	8.5	8.4	8.7	8.2	8.7		8.5		8.6	8.5	8.7	8.8		8.54	8.56	8.72	8.88	8.96	8.73	8.74	8.74	8.73	8.64
TDS (Calculated)	mg/L	2270	3740	2830	5410	8260		7950		2300	4060	2800	7880		5290	2290	4980	8220	3640	3420	2840	4580	4160	3040
Nitrate	mg/L	Not required under previous permit						ired under previou		Not required under previous permit			0.2		<5.0	<1.0	<0.50	<1.0	0.36	0.86	<0.10	1.35	0.33	0.570
Nitrite	mg/L												-		<0.50	<1.0	<0.50	<1.0	0.11	<0.050	<0.050	<0.050	<0.050	0.083
Nitrate and Nitrite (as N)	mg/L												-		-	-	-	-	-	-	-	-	0.33	0.65
Hardness as $CaCO_3$	mg/L												-		-	-	-	-	-	-	-	-	642	505
Alkalinity (total as $CaCO_3$)	mg/L												-		-	-	-	-	-	-	-	-	1440	1150
Hydroxide	mg/L												-		-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L												-		-	-	-	-	-	-	-	-	<0.1	<0.10
Field Data																								
pH in H_20	pH	Not required under previous permit											na	EMPTY	9.00	8.34	8.84	9.1	8.79	8.76	9.2	8.7	10.4	9.81
Conductivity (EC)	uS/cm												na		7290	300	7640	1201	5190	5720	4480	7210	2230	6.83

Table D.14: Chemical Analytical Results

Sample ID:		Magneson D.5																						
Site Number:		**14**																						
Date Sampled:	**Units**	**7-Oct-1997**	**8-Oct-1998**	**19-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**15-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	90	120	130	120	280	440	240	130	156	117	153	191	181	98.2	156	178	146	100	146	184	268	243	370
Ammonia-N	mg/L	0.05	0.32	0.1	0.08	<0.05	0.13	0.05	1.15	<0.05	1.04	0.52	0.95	0.432	0.087	0.135	0.084	<0.050	0.704	1.38	0.138	2.42	0.455	0.600
Total Kjeldahl Nitrogen	mg/L	3.7	5.1	5.2	4.6	14.2	21.5	8.2	7	5.9	7.5	6.6	8.6	9.67	8.29	5.73	7.03	4.24	4.16	6.24	6.84	11.6	10.0	13.9
Total Organic Carbon	mg/L	34	45	49	47	76	201	49	52	63	46	56	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit											60	68.7	61.6	57.5	60.5	49.1	36.8	55.1	62.4	268	88.0	100
Phenols	mg/L												-	-	-	-	-	-	-	-	-	-	0.0025	0.0071
BTEX, F1 (C6-C10) and F2 (>C10-C16)																								
Benzene	mg/L	Not required under previous permit											<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L												-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L												-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L												<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L												-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L												<0.2	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																								
Aluminium	mg/L	Not required under previous permit											1.16	0.057	0.031	0.035	0.106	0.203	<0.01	0.0288	0.0636	0.297	0.0245	0.0182
Antimony	mg/L	<0.0002	0.001	0.0009	0.0009	0.001	0.0022	0.0023	0.0021	0.0012	0.0022	0.0015	0.003	0.00138	0.00082	0.00072	0.00099	0.00104	0.00047	0.00055	0.00049	0.00045	0.00101	0.00073
Arsenic	mg/L	Not required under previous permit											-	-	-	-	-	-	-	-	-	-	0.019	0.0155
Barium	mg/L	0.068	0.081	0.092	0.063	0.121	0.188	0.191	0.197	0.057	0.327	0.083	0.09	0.0835	0.0459	0.0428	0.0737	0.0697	0.0402	0.0616	0.0324	0.0255	0.0764	0.0337
Beryllium	mg/L	Not required under previous permit											<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Boron	mg/L												<0.05	<0.050	0.056	<0.050	<0.050	<0.050	<0.05	0.032	0.038	<0.020	<0.020	0.048
Cadmium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	0.00005	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000010	<0.000010	<0.000010	0.000019	0.000012
Chromium	mg/L	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	0.024	0.019	<0.005	0.047	0.008	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00020	0.00043	0.00068	0.00025	0.00055
Cobalt	mg/L	0.005	0.022	0.004	0.003	0.003	0.008	0.014	0.01	0.004	0.015	0.005	0.004	0.0034	0.0035	0.0034	<0.0020	<0.0020	0.003	0.00218	0.00169	0.00234	0.00364	0.00428
Copper	mg/L	<0.001	0.014	0.009	0.007	0.008	0.032	0.028	0.016	0.005	0.031	0.008	0.008	0.0055	0.0118	0.0063	0.0035	0.0031	0.0023	0.00201	0.00214	0.00112	0.0052	0.00527
Iron	mg/L	2.770	3.470	3.220	1.510	4.460	6.480	15.2	13.1	0.725	32.2	3.34	0.726	0.059	0.064	0.05	0.098	0.143	<0.01	<0.020	0.322	0.223	0.070	0.277
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.01	0.009	<0.005	0.025	<0.005	0.0086	<0.00010	<0.00010	<0.00010	<0.0050	0.00020	<0.0001	<0.00010	0.00024	0.00021	0.00011	0.00037
Lithium	mg/L	Not required under previous permit											-	-	-	-	-	-	-	-	-	-	0.0576	0.0533
Manganese	mg/L												0.066	<0.0020	0.0384	0.0024	0.0033	0.0047	0.0375	0.00208	0.0381	0.633	0.00515	0.220
Mercury	mg/L	<0.0004	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000118	<0.0000050	<0.0000050	0.0000063
Molybdenum	mg/L	<0.005	0.005	0.007	0.007	0.012	0.065	0.014	0.019	0.016	0.015	0.008	0.04	0.0326	0.0122	0.0191	0.0458	0.0444	0.0131	0.0218	0.00595	0.00653	0.0110	0.00592
Nickel	mg/L	0.011	0.024	0.02	0.019	0.019	0.071	0.056	0.042	0.025	0.055	0.025	0.033	0.0319	0.0283	0.0314	0.0408	0.0253	0.0204	0.0236	0.0165	0.0168	0.0232	0.0225
Selenium	mg/L	Not required under previous permit											0.0018	0.002	<0.0020	0.00121	0.00091	0.00072	0.00063	0.00087	0.00067	0.00062	0.00078	0.00088
Silver	mg/L												<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Thallium	mg/L												<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000020	<0.000020	<0.00002	<0.000020
Tin	mg/L												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Titanium	mg/L												0.05	0.0037	0.0041	0.0015	0.0037	0.0164	<0.001	0.00148	0.00805	0.0116	0.00511	0.00459
Uranium	mg/L												-	-	-	-	-	-	-	-	-	-	0.00351	0.0023
Vanadium	mg/L												0.009	0.0044	0.0074	0.0294	0.0365	0.0286	0.0162	0.0138	0.0178	0.018	0.0188	0.0269
Zinc	mg/L	0.032	0.052	0.013	0.064	0.246	0.031	0.098	0.168	0.01	0.210	0.036	0.006	0.0108	0.003	0.0021	<0.0020	<0.0020	0.0071	<0.0020	0.0028	0.0033	<0.0020	0.004
Routine Water																								
Ion Balance	%	109	100	108	105	107	102	98.2	107	104	102	98.7	100	104	105	91.5	95.3	103	111	94.5	107	94.4	99.5	104
Bicarbonate	mg/L	360	529	455	408	571	1370	482	622	565	658	533	687	664	491	537	709	549	521	713	589	1100	932	850
Chloride	mg/L	40.9	51.6	57.0	60.0	109.0	323.0	104	103	106	99	95	140	126	76.7	82.1	114	89.3	54.9	81.4	71.4	143	145	175
Carbonate	mg/L	26	<5	60	45	69	89	20	19	19	<5	22	29	67.1	19.8	73	46.7	68.9	42.9	40.3	22.4	18.7	37.6	21.7
Conductivity (EC)	uS/cm	1020	976	1200	1030	1460	3320	1410	1700	1530	1500	1420	1830	1810	1280	1610	1950	1480	1370	1640	1520	2080	2030	2120
Calcium	mg/L	30.4	31.1	32	23.7	33.1	36.3	43	48.5	46.2	23.7	30.9	33.8	30	31.8	39.7	32.9	29.2	33.7	34.3	38.5	43.4	35.6	50.3
Potassium	mg/L	40.4	43.2	42.2	32.6	35.1	43.1	57.1	52.5	48.1	35.7	52.6	42.9	40.6	57	52.1	45	40.3	42	44.9	54.5	83.8	67.2	119
Magnesium	mg/L	11.8	12.2	13.5	10.5	12.3	23.2	15.1	18.7	17.2	9.7	15.3	14.2	15.3	13.2	16.9	14.6	11.3	15.6	13.5	20.4	26.1	18.2	35.9
Sodium	mg/L	194	184	238	205	367	802	253	307	323	299	235	359	388	227	252	363	296	261	274	263	375	391	353
Sulfate	mg/L	146	75.2	101	70.2	55	152	221	250	179	97.6	117	162	157	114	172	210	99.7	117	74.4	144	45.4	71.6	162
Phosphorus	mg/L	Not required under previous permit											-	0.77	3.05	2.74	1.27	0.994	1.52	1.40	5.4	5.82	2.99	10.1
pH in H_20	pH	8.9	8.3	9.1	9.0	9.0	8.7	8.6	8.5	9.0	8.3	8.6	8.6	8.89	8.57	8.99	8.85	9.06	8.86	8.71	8.64	8.45	8.66	8.53
TDS (Calculated)	mg/L	666	661	767	647	904	2110	953	1140	1070	889	831	1120	1150	788	952	1170	905	823	915	904	1300	1230	1340
Nitrate	mg/L	Not required under previous permit											<0.1	<0.050	1.68	<0.050	<0.050	<0.050	0.075	<0.040	<0.040	0.19	<0.040	0.557
Nitrite	mg/L												-	<0.050	<0.050	<0.050	<0.050	<0.050	0.029	<0.020	<0.020	0.053	<0.020	<0.020
Nitrate and Nitrite (as N)	mg/L												-	-	-	-	-	-	-	-	-	-	<0.045	0.557
Hardness as $CaCO_3$	mg/L												-	-	-	-	-	-	-	-	-	-	164	273
Alkalinity (total as $CaCO_3$)	mg/L												-	-	-	-	-	-	-	-	-	-	827	733
Hydroxide	mg/L												-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L												-	-	-	-	-	-	-	-	-	-	0.512	0.180
Field Data																								
pH in H_20	pH	Not required under previous permit											8.54	8.26	9.2	9.63	9.10	9.2	8.62	8.87	8.9	8.8	10.6	11.75
Conductivity (EC)	uS/cm												1775	1180	13.84	200	1953	1502	1389	1675	1509	2310	2140	2.78

Table D.15: Chemical Analytical Results

Sample ID:		**Magneson D.6**				
Site Number:		**15**				
Date Sampled:	**Units**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	121	106	127	125	125
Ammonia-N	mg/L	0.088	0.056	0.27	<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	4.06	4.16	4.05	4.58	4.16
Total Organic Carbon	mg/L	-	-	-	-	-
Dissolved Organic Carbon	mg/L	43.1	33	127	43.0	33.1
Phenols	mg/L	-	-	-	0.0021	0.013
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L	-	-	-	<0.0005	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0224	0.0167	<0.0050	0.0151	0.0051
Antimony	mg/L	0.00080	0.0007	0.00103	0.00113	0.00086
Arsenic	mg/L	-	-	-	0.019	0.0134
Barium	mg/L	0.0342	0.0266	0.0375	0.0302	0.0512
Beryllium	mg/L	<0.0005	<0.00050	<0.00050	<0.00020	<0.00020
Boron	mg/L	0.306	0.279	0.337	0.301	0.237
Cadmium	mg/L	<0.000025	<0.000025	<0.000025	0.000018	0.000012
Chromium	mg/L	<0.00050	<0.0005	<0.00050	<0.00020	<0.00020
Cobalt	mg/L	0.00061	0.00086	0.00133	0.00089	0.00075
Copper	mg/L	<0.0010	0.0016	<0.0010	0.00103	0.00174
Iron	mg/L	<0.050	<0.050	0.063	0.037	0.023
Lead	mg/L	<0.00025	<0.00025	<0.00025	<0.00010	<0.00010
Lithium	mg/L	-	-	-	0.13	0.0978
Manganese	mg/L	0.00404	0.00561	0.532	0.00962	0.00599
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00327	0.00254	0.0016	0.00211	0.00179
Nickel	mg/L	0.0072	0.0069	0.0086	0.0067	0.0082
Selenium	mg/L	0.00033	0.00037	<0.00025	0.00032	0.00029
Silver	mg/L	<0.000050	<0.000050	<0.000050	<0.000020	<0.000020
Thallium	mg/L	<0.000050	<0.000050	<0.000050	<0.00002	<0.000020
Tin	mg/L	<0.00050	<0.00050	<0.00050	<0.00020	<0.00020
Titanium	mg/L	0.0016	<0.0015	<0.0015	0.00146	0.00134
Uranium	mg/L	-	-	-	0.00442	0.00507
Vanadium	mg/L	0.00450	0.0052	0.0044	0.0042	0.0063
Zinc	mg/L	<0.0050	<0.0050	<0.0050	0.0020	<0.0020
Routine Water						
Ion Balance	%	104	106	94.3	98.7	101
Bicarbonate	mg/L	593	343	694	538	520
Chloride	mg/L	334	235	340	359	286
Carbonate	mg/L	30.9	13.1	20	14.5	16.6
Conductivity (EC)	uS/cm	4080	2790	4020	4070	3120
Calcium	mg/L	54.3	40.2	70.2	41.7	97.9
Potassium	mg/L	31.3	27.1	29.6	29.8	34.1
Magnesium	mg/L	55.5	42.5	56.4	58.5	56.6
Sodium	mg/L	785	528	729	794	558
Sulfate	mg/L	990	711	1030	1120	818
Phosphorus	mg/L	0.707	0.385	0.963	0.486	0.745
pH in H_20	pH	8.61	8.56	8.52	8.47	8.52
TDS (Calculated)	mg/L	2570	1770	2620	2680	2120
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
Nitrate and Nitrite (as N)	mg/L	-	-	-	<0.11	<0.101
Hardness as $CaCO_3$	mg/L	-	-	-	345	478
Alkalinity (total as $CaCO_3$)	mg/L	-	-	-	465	454
Hydroxide	mg/L	-	-	-	<5	<5.0
Fluoride	mg/L	-	-	-	0.22	0.35
Field Data						
pH in H_20	pH	8.68	9.5	8.5	10.9	9.48
Conductivity (EC)	uS/cm	4120	2730	4300	4140	3.82

Table D.16: Chemical Analytical Results

Sample ID:		Beaver D.1																						
Site Number:		**16**																						
Date Sampled:	**Units**	**18-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**20-Oct-1999**	**11-Oct-2000**	**4-Oct-2001**	**9-Oct-2002**	**16-Oct-2003**	**14-Oct-2004**	**21-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**19-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	60	70	90	90	80	100	80	50	70	59	65	78	85	140	66.4	89	302	73	105	60	74	56	66	93
Ammonia-N	mg/L	0.1	<0.05	0.07	<0.05	<0.05	1.24	<0.05	<0.05	0.05	0.22	<0.05	2.11	0.46	5.66	<0.050	<0.050	<0.050	2.57	<0.05	0.168	<0.05	1.00	1.10	0.071
Total Kjeldahl Nitrogen	mg/L	4.9	2.2	2.9	2.5	2	5.9	2.3	<0.2	2	1.8	2.1	8.5	2.8	9	2.21	2.62	3.98	4.30	3.69	1.61	2.67	2.78	4.27	2.46
Total Organic Carbon	mg/L	25	28	30	25	26	30	32	26	24	22	22	27	-	-	-	-	-	-	-	-	-		-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												27	63.2	24.9	29	29.9	29.5	25.6	22.7	22.5	56.0	25.6	28.1
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0023	0.0099
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	0.074	0.022	<0.010	<0.010	0.059	<0.01	0.0119	0.0011	0.008	0.0064	0.0036
Antimony	mg/L	<0.0004	0.0006	0.0011	<0.0004	0.0005	0.0007	<0.0004	0.0009	0.0018	0.001	0.0014	0.0009	0.0008	<0.0016	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00025	0.00024	0.00023	0.00024	0.00022
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00455	0.00586
Barium	mg/L	0.15	0.049	0.029	0.084	0.074	0.123	0.15	0.051	0..040	0.047	0.061	0.092	0.039	0.115	0.037	0.0521	0.0799	0.0952	0.0558	0.0756	0.0581	0.0707	0.0833	0.0489
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													0.07	<0.050	0.071	<0.050	<0.050	<0.050	<0.05	0.037	0.058	0.037	0.051	0.039
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.00020	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	0.000005	<0.0000050	0.0000056
Chromium	mg/L	0.015	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.010	0.01	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010	<0.00010	0.00013
Cobalt	mg/L	0.005	<0.002	0.019	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00035	0.0003	0.00078	0.00094	0.00038
Copper	mg/L	0.01	<0.001	0.006	<0.001	0.001	0.007	0.022	0.005	0.001	<0.001	0.002	0.001	0.001	<0.0024	0.0019	<0.0010	<0.0010	<0.0010	<0.001	0.00043	0.00034	0.00101	0.00057	0.00071
Iron	mg/L	6.880	0.376	0.201	0.581	0.127	1.220	0.339	1.17	0.09	0.316	0.311	0.74	0.008	0.089	0.013	0.016	0.04	0.212	0.078	0.038	0.011	0.033	0.026	0.049
Lead	mg/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	0.0002	<0.00040	<0.00010	<0.00010	<0.0050	0.00013	<0.0001	<0.000050	<0.000050	0.000075	<0.000050	<0.000050
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0329	0.0308
Manganese	mg/L													0.025	0.137	<0.0020	0.0025	<0.0020	0.248	0.0073	0.00078	0.00062	0.182	0.387	0.00491
Mercury	mg/L	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00199	0.000986	0.00105	0.00153	0.00067
Nickel	mg/L	0.011	<0.002	0.015	0.005	0.003	<0.002	0.005	0.005	<0.005	<0.002	0.005	0.006	0.007	0.004	0.0049	0.0036	0.0049	0.0047	0.0043	0.00725	0.00521	0.00592	0.00697	0.00493
Selenium	mg/L													0.0015	0.0038	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000217	0.000194	0.000206	0.000284	0.000205
Silver	mg/L													<0.0001	<0.00040	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00020	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000015	<0.000010
Tin	mg/L	Not required under previous permit												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	0.00016	<0.00010	<0.00010
Titanium	mg/L													0.002	<0.0012	<0.0010	<0.0010	<0.0010	0.0037	<0.001	0.00081	<0.00030	0.00044	0.00086	0.00069
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00225	0.00115
Vanadium	mg/L													0.01	0.0052	0.0024	0.0031	0.0072	0.0038	0.0036	0.00484	0.00328	0.00439	0.00363	0.00324
Zinc	mg/L	0.046	0.017	0.031	0.005	0.009	0.036	0.011	0.006	0.022	0.002	0.006	0.006	0.009	<0.0040	<0.0020	<0.0020	<0.0020	0.0051	0.0088	<0.0010	<0.0010	0.0098	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	97	103	103	94	103	91.7	102	102	96.7	103	103	97.4	95.5	92.5	93.9	93.5	95.8	101	109	98.6	100	104	103	109
Bicarbonate	mg/L	338	315	271	315	310	423	520	193	361	335	270	386	408	348	327	357	345	429	306	307	396	566	451	464
Chloride	mg/L	138.0	125.0	146.0	203.0	175.0	267.0	436	192	245	182	166	153	233	384	160	117	205	218	145	149	137	203	237	182
Carbonate	mg/L	<5	7	27	15	16	<5	<5	15	<5	<5	<5	<5	9	6.1	11.1	12.8	9.3	11.6	25.2	<5.0	8.4	<5.0	7.9	6.7
Conductivity (EC)	uS/cm	1200	1210	1020	1530	1380	1640	2860	1210	1520	1130	1120	1410	1620	1980	1280	1150	1420	1500	1130	1330	1230	1660	1780	1490
Calcium	mg/L	43.9	43.1	36.1	48.7	47.2	55.8	70.9	63.6	53.2	48.9	46.8	55.9	62.9	72.9	42.1	46.3	43.7	55.7	50.2	53.0	49.4	58.5	67.2	53.7
Potassium	mg/L	12.5	14.5	15.5	14.7	14.6	16.3	31.5	14.4	14.3	10	11.7	13.9	16.4	19.2	13.8	13.4	20.2	21.8	14.9	16.3	16.8	20.6	19.6	19.1
Magnesium	mg/L	19.3	18.4	18.3	21.9	19.0	22.3	55.5	21.7	19.7	17.7	16.0	19.9	24	23.2	18.3	17.2	22.2	24.7	17.9	18.5	20.4	26.6	28.5	28.2
Sodium	mg/L	186	200	204	223	219	228	498	185	234	194	171	206	238	283	185	156	207	234	179	166	185	279	275	266
Sulfate	mg/L	149	165	134	182	135	113	436	195	131	75.3	92.7	174	149	170	122	97.7	114	98.6	55.4	127	93.7	98	163	131
Phosphorus	mg/L	Not required under previous permit												-	0.258	0.568	0.876	0.615	1.45	1.42	0.160	0.612	0.82	0.464	1.41
pH in H_20	pH	8.4	8.6	8.7	8.7	8.7	8.1	7.1	8.8	8.3	8.4	8.3	8.2	8.4	8.38	8.51	8.54	8.52	8.46	8.85	8.23	8.44	8.08	8.39	8.37
TDS (Calculated)	mg/L	717	728	714	864	777	918	1780	782	878	698	637	812	933	1130	713	636	791	875	638	687	705	967	1020	915
Nitrate	mg/L													<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	1.38	<0.020	<0.10	0.299	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	0.039	<0.010	<0.050	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.299	<0.022
Hardness as $CaCO_3$	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	285	250
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	383	392
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.129	0.208
Field Data																									
pH in H_20	pH	Not required under previous permit												8.68	7.93	9.33	8.50	8.78	8.9	8.84	8.68	8.5	8.1	9.6	10.32
Conductivity (EC)	uS/cm													1634	1310	1258	1468	1423	1564	1146	1323	1225	1863	1875	1940

Table D.18: Chemical Analytical Results

Sample ID:		Norgaard D.1																						
Site Number:		18																						
Date Sampled:	**Units**	**17-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**20-Oct-1999**	**11-Oct-2000**	**5-Oct-2001**	**9-Oct-2002**	**16-Oct-2003**	**14-Oct-2004**	**21-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**19-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	60	90	100	120	90	110	180	200	110	120	99	<5	109	131	82.8	119	109	106	155	81	80	78	35	158
Ammonia-N	mg/L	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	0.06	<0.05	3.85	<0.050	<0.050	<0.050	<0.050	0.062	1.31	0.553	<0.050	<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	4	1.8	3.8	3.6	2.4	4.7	4.9	3.2	3	3.4	2.7	3.1	3.5	7.86	2.52	4.03	3.42	2.57	2.98	3.14	2.67	2.74	1.71	4.19
Total Organic Carbon	mg/L	24	32	35	45	32	37	62	45	66	47	35	54	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												38	54.4	31.3	34.5	37	34.5	29.5	29.9	27.7	78	21.6	39.2
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0019	0.0081
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.04	0.14	<0.010	<0.010	<0.010	0.022	<0.01	0.0056	0.0086	0.0025	0.0034	0.0035
Antimony	mg/L	<0.0004	0.0006	0.0006	<0.0004	0.0005	0.0004	0.0007	0.0011	0.0015	0.001	0.0010	0.0021	<0.002	<0.0080	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	<0.00020	0.00012	0.00011	0.00027	0.00021
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00107	0.00247
Barium	mg/L	0.111	0.087	0.084	0.101	0.1	0.133	0.217	0.038	0.048	0.056	0.105	0.145	0.1	0.168	0.0779	0.086	0.0961	<0.0030	0.0947	0.096	0.0642	0.0801	0.0924	0.0716
Beryllium	mg/L	Not required under previous permit												<0.004	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00010	<0.00010	<0.00020	<0.00020
Boron	mg/L													<0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.027	0.077	0.032	0.024	0.053
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0004	<0.0010	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000010	<0.0000050	<0.0000050	0.000018	<0.000010
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.011	<0.005	<0.005	<0.005	0.013	0.012	<0.02	<0.0080	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00020	0.00015	0.00013	<0.0002	<0.00020
Cobalt	mg/L	<0.002	<0.002	0.019	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.008	0.0049	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00045	0.00033	0.00048	0.0101	0.00040
Copper	mg/L	0.003	0.04	0.005	<0.001	0.001	0.004	0.017	0.005	0.002	<0.001	0.001	0.002	<0.004	<0.012	0.0037	<0.0010	<0.0010	<0.0010	<0.001	<0.00040	0.00022	0.00031	0.00127	0.00049
Iron	mg/L	<0.005	0.265	0.243	0.469	0.063	0.377	4.04	0.372	0.098	0.067	0.136	0.646	0.011	<0.010	0.025	0.034	0.024	0.022	0.073	0.033	0.129	0.081	0.064	0.111
Lead	mg/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	0.0005	<0.0020	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.00010	<0.000050	<0.000050	<0.00010	<0.00010
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0698	0.0423
Manganese	mg/L													0.165	0.378	0.0021	0.01	<0.0020	0.411	0.0039	0.0758	0.00168	0.229	5.26	0.00533
Mercury	mg/L	0.0002	<0.0002	<0.0002	0.0002	0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/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	<0.02	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00088	0.000341	0.000524	0.00304	0.00095
Nickel	mg/L	0.003	<0.002	<0.002	0.004	0.003	<0.002	0.011	0.003	<0.002	<0.002	0.005	0.006	<0.008	0.06	0.0034	0.0025	0.0039	0.0043	0.0035	0.0057	0.00333	0.00448	0.0113	0.0042
Selenium	mg/L	Not required under previous permit												0.003	0.0093	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	<0.00010	0.000118	0.000092	0.00013	0.00018
silver	mg/L													<0.0004	<0.0020	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	<0.000010	<0.000010	<0.000020	<0.000020
Thallium	mg/L													<0.0004	<0.0010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000010	<0.000010	0.000022	<0.000020
Tin	mg/L													<0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00010	<0.00010	<0.00020	<0.00020
Titanium	mg/L													<0.004	<0.0060	<0.0010	<0.0010	<0.0010	0.0019	<0.001	<0.00060	0.00072	0.00033	<0.00060	<0.0006
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.0197	0.000974
Vanadium	mg/L													0.009	<0.0020	0.0014	0.0012	0.0038	0.0032	0.0011	0.0032	0.0016	0.00151	<0.0010	0.0013
Zinc	mg/L	0.021	0.051	0.025	0.002	0.001	0.041	0.026	0.006	0.037	0.002	0.01	0.034	<0.008	<0.020	<0.0020	<0.0020	<0.0020	<0.0020	0.0085	<0.0020	0.0013	0.0012	0.0064	<0.0020
Routine Water																									
Ion Balance	%	101	103	99	95	102	103	100	104	98.7	98.2	99.9	95.3	99.5	95.2	94.5	95.6	98	99.0	108	99.2	104	97.9	109	107
Bicarbonate	mg/L	537	639	420	598	551	607	567	228	480	747	602	778	820	718	603	537	532	522	414	455	417	573	558	784
Chloride	mg/L	268.0	375.0	339.0	465.0	343.0	544.0	881	579	586	520	443	514	595	756	296	181	283	242	155	228	156	265	688	285
Carbonate	mg/L	<5	<5	<5	18	<5	<5	44	21	<5	10	<5	6	32	<5.0	<5.0	26.3	12.5	32.7	21.1	6.4	11.2	10.3	<5.0	<5.0
Conductivity (EC)	uS/cm	2250	2510	2140	2770	2410	2890	4120	2890	3080	2790	2350	3030	3230	3820	1800	1560	1790	1600	1250	1740	1180	1800	3810	2120
Calcium	mg/L	93.2	91.1	60.6	64.6	96.8	109	57.7	113	83.7	91.6	90.8	98.7	87.3	102	77.3	64.9	63.9	63.1	69.4	74.9	59.9	79.6	298	109
Potassium	mg/L	21.3	26.1	23.9	23.9	24.9	31.5	36.9	38.1	30.3	31.5	25.7	32	32.6	40	21.5	22.1	28.8	22.5	19.4	22.9	19.2	20	26.1	26.1
Magnesium	mg/L	49.7	57.5	39.5	48.2	49.0	62.4	66.5	91.7	57.9	58.9	48.4	59.5	63.4	67.3	35.5	25.9	29.1	29.4	20.9	26.7	21.8	31	87.2	43.8
Sodium	mg/L	348	380	348	443	344	556	816	556	498	452	360	449	540	613	258	213	266	255	181	216	171	267	498	330
Sulfate	mg/L	378	220	282	245	273	315	342	771	407	153	120	202	133	357	67.6	53.6	54.8	45.1	32.1	96.2	28.8	76.1	592	78.4
Phosphorus	mg/L	Not required under previous permit												-	<0.020	1.03	1.43	0.704	1.04	1.76	0.674	1.02	0.527	0.243	1.02
pH in H_20	pH	8.0	8.3	8.1	8.5	8.2	8.2	8.4	8.8	8.3	8.3	8.3	8.3	8.5	8.31	8.18	8.57	8.49	8.69	8.65	8.37	8.47	8.41	8.18	8.10
TDS (Calculated)	mg/L	1420	1470	1300	1600	1410	1850	2480	2280	1910	1680	1390	1740	1890	2290	1050	851	1000	947	703	896	673	1040	2460	1260
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.219	<0.020	<0.10	<0.10	<0.040
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	0.029	<0.010	<0.050	<0.050	0.022
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.11	<0.045
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	1100	453
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	457	643
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.15	0.273
Field Data																									
pH in H_20	pH	Not required under previous permit												8.42	7.85	8.67	8.46	8.45	9.0	7.72	8.15	8.8	8.3	8.3	9.89
Conductivity (EC)	uS/cm													2240	1890	1292	1167	1801	1621	1256	1774	1220	2040	3960	2.62

Table D.19: Chemical Analytical Results

Sample ID:		Winsnes D.1																						
Site Number:		19																						
Date Sampled:	Units	16-Oct-1996	7-Oct-1997	9-Oct-1998	19-Oct-1999	10-Oct-2000	4-Oct-2001	9-Oct-2002	16-Oct-2003	14-Oct-2004	21-Oct-2005	13-Oct-2006	3-Oct-2007	17-Oct-2008	28-Oct-2009	19-Oct-2010	12-Oct-2011	16-Oct-2012	8-Oct-2013	15-Oct-2014	14-Oct-2015	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019
Chem. O_2 Demand	mg/L	60	70	70	90	100	110	100	80	80	54	65	68	65	101	85.8	68	420	79	94	92	69	83	92	75
Ammonia-N	mg/L	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.105	0.09	<0.050	<0.050	0.084	0.059	0.069	<0.05	1.08	0.058	<0.050
Total Kjeldahl Nitrogen	mg/L	3.1	2.5	2.6	2.5	3.4	6.2	4.1	3.6	2.1	1.7	2.4	2.7	3.8	4.48	4.36	2.79	3.66	3.62	3.48	3.76	3.52	4.11	4.01	2.52
Total Organic Carbon	mg/L	25	28	28	27	31	36	40	37	30	23	24	24	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												23	31.9	29.7	25	33.6	28.2	26.4	28.2	27	83	27.3	24.2
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0026	0.0077
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.12	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	<0.010	0.025	<0.010	<0.010	<0.010	<0.01	0.0013	<0.0010	0.0038	0.0085	0.0017
Antimony	mg/L	<0.0004	0.0002	0.0009	<0.0004	0.0006	0.0008	0.0006	0.0014	0.0014	0.0015	0.0021	0.0011	0.0007	0.00045	0.0004	<0.00040	<0.00080	<0.00040	<0.0004	0.00029	0.00021	0.00023	0.00030	0.0002
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00574	0.00471
Barium	mg/L	0.036	0.055	0.049	0.051	0.053	0.042	0.105	0.04	0.011	0.022	0.043	0.081	0.04	0.0418	0.0425	0.0238	0.0149	0.0257	0.0589	0.0508	0.0633	0.0359	0.0623	0.0412
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	0.051	0.051	<0.050	<0.050	<0.050	<0.05	0.037	0.046	0.034	0.037	0.039
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	0.0000168	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.008	0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010	0.00011	<0.00010
Cobalt	mg/L	<0.002	0.002	0.021	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00033	0.00022	0.00065	0.00055	0.00035
Copper	mg/L	0.002	<0.001	0.009	0.002	0.003	0.006	0.009	0.006	0.003	0.001	0.002	0.002	<0.001	<0.0010	0.0059	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	0.00021	0.00033	0.00043	0.00027
Iron	mg/L	<0.005	0.291	0.200	0.460	0.342	0.081	0.991	0.369	0.203	0.101	0.211	0.76	0.005	0.022	<0.010	0.032	0.011	0.014	0.024	0.014	0.019	0.054	0.038	0.011
Lead	mg/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	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050	0.000055	0.000061	<0.000050
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0279	0.0235
Manganese	mg/L													0.006	0.0341	0.0022	0.0025	0.0037	0.0029	0.0053	0.00179	0.00088	0.276	0.0371	0.00135
Mercury	mg/L	0.0003	0.0008	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.000006	0.0000058	<0.0000050	<0.0000050
Molybdenum	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000688	0.00036	0.000554	0.000512	0.000602
Nickel	mg/L	<0.002	<0.002	0.012	0.003	0.004	<0.002	0.006	0.004	<0.002	0.002	0.005	0.006	<0.002	0.0026	<0.0020	0.002	<0.0020	<0.0020	0.0025	0.00178	0.00214	0.0035	0.00316	0.00287
Selenium	mg/L	Not required under previous permit												0.0007	0.00049	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000194	0.000232	0.00021	0.000206	0.000204
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000015	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00030	<0.00030	0.00078	0.00093	<0.0003
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00159	0.00116
Vanadium	mg/L													0.004	0.0041	0.0018	<0.0010	0.001	<0.0010	0.0015	0.00172	0.00107	0.00167	0.00163	0.00094
Zinc	mg/L	0.006	0.025	0.057	0.003	0.017	0.048	0.008	0.008	0.074	0.002	0.008	0.008	0.03	<0.0020	<0.0020	<0.0020	0.0024	<0.0020	0.0058	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	98	110	108	103	109	90.3	101	106	105	107	106	97.7	98	100	106	97.1	92.7	103	104	93.2	100	96.3	107	104
Bicarbonate	mg/L	483	445	475	485	464	457	635	361	276	285	315	366	319	366	362	370	348	450	420	408	446	563	469	416
Chloride	mg/L	20.7	20.0	17.0	21.0	21.0	25.0	32	29	29	17	18	15	19	17.9	19.4	15	17.7	19.8	23.5	27.2	38.3	59.3	58.7	71.6
Carbonate	mg/L	<5	<5	<5	17	25	60	44	49	75	13	7	12	46	52.4	32	11	46	11.3	30.9	18.2	9.3	<5.0	<5.0	10.8
Conductivity (EC)	uS/cm	1270	1230	1100	1270	1320	1520	1850	1950	2400	1530	1280	1030	1080	1150	1180	914	1000	1020	1040	971	997	1190	1070	1060
Calcium	mg/L	31.5	32.4	32.3	27.8	26.3	20.8	23.4	32.9	31.9	40.2	39.3	42.2	19.1	19.5	20.4	24.5	15.7	24.4	27.5	19.6	32.4	43.8	26.8	39.2
Potassium	mg/L	8.8	10.6	10.3	11.1	10.8	11	13.4	13.5	11.9	10.9	12.5	11.6	11	13.2	13.9	12.8	12.7	14.2	13.6	12.7	13.7	16.4	15.8	15.7
Magnesium	mg/L	16.6	17.5	17.8	17.7	18.9	19.5	21.6	34.9	31.7	26.3	22	18.7	17.8	19.6	20.8	14.7	15.6	18.2	17.2	14.2	18.7	22.9	21.3	23.7
Sodium	mg/L	219	248	250	259	277	279	415	444	482	289	221	159	191	225	256	149	175	191	191	158	168	190	197	174
Sulfate	mg/L	250	239	235	233	265	278	331	693	809	498	340	206	189	214	282	128	147	133	116	93.9	99.6	111	92.4	106
Phosphorus	mg/L	Not required under previous permit												-	0.523	0.459	0.4	0.391	0.467	0.43	0.336	0.515	0.419	0.339	0.263
pH in H_20	pH	8.2	8.4	8.0	8.6	8.6	9.0	8.7	9.1	9.4	8.6	8.5	8.6	9	9.01	8.69	8.54	9.16	8.49	8.85	8.67	8.48	8.22	8.36	8.51
TDS (Calculated)	mg/L	762	790	796	825	886	902	1160	1470	1610	1040	815	645	649	742	823	537	601	633	626	545	600	725	648	646
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.020	<0.020	<0.020	<0.020	0.025
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010	<0.010	<0.010	0.014
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	0.039
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	155	195
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	393	359
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.16	0.292
Field Data																									
pH in H_20	pH	Not required under previous permit												9.11	8.5	9.04	8.44	9.49	8.5	8.0	8.84	8.6	8.6	10.7	10.44
Conductivity (EC)	uS/cm													1062	800	1013	1000	1007	1039	1042	1005	1004	1295	1123	1306

Table D.20: Chemical Analytical Results

Sample ID:		Winsnes D.2																						
Site Number:		20																						
Date Sampled:	Units	16-Oct-1996	7-Oct-1997	9-Oct-1998	26-Nov-1999	10-Oct-2000	4-Oct-2001	9-Oct-2002	16-Oct-2003	14-Oct-2004	21-Oct-2005	13-Oct-2006	3-Oct-2007	17-Oct-2008	28-Oct-2009	19-Oct-2010	12-Oct-2011	16-Oct-2012	8-Oct-2013	15-Oct-2014	14-Oct-2015	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019
Chem. O_2 Demand	mg/L	40	50	50	60	70	70	70	50	60	45	56	65	62	80.7	49.6	56	61	65	49	54	81	77	61	79
Ammonia-N	mg/L	<0.05	0.06	<0.05	0.14	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.050	0.06	<0.050	<0.050	0.056	<0.05	0.139	0.618	0.67	<0.050	0.824
Total Kjeldahl Nitrogen	mg/L	0.9	0.9	1.5	1.6	1.9	2.8	1.5	1.6	1.3	1.6	1.7	1.8	2	2.99	1.5	1.32	1.74	2.29	1.54	1.51	3.93	2.06	1.73	3.35
Total Organic Carbon	mg/L	17	18	21	17	22	24	26	28	18	19	22	25	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												20	27.8	18.7	22	21.5	20.2	17.9	20.0	20.9	77	21.5	25.3
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0018	0.0052
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.0010	0.0018	0.004	0.0046	0.0052
Antimony	mg/L	<0.0004	<0.0002	0.0005	<0.0004	<0.0004	0.0005	<0.0004	0.0009	0.0011	0.0006	0.0012	0.0015	<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00013	<0.00010	0.00013	0.00016	0.00013
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00218	0.00283
Barium	mg/L	0.086	0.179	0.112	0.17	0.118	0.087	0.06	0.128	0.096	0.095	0.132	0.136	0.116	0.189	0.134	0.134	0.107	0.115	0.103	0.119	0.104	0.0911	0.104	0.0997
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.039	0.04	0.023	0.033	0.028
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	0.000661	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	0.0000237	0.0000063
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010	0.00013	0.00012
Cobalt	mg/L	<0.002	0.002	0.023	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00025	0.00012	0.0004	0.00053	0.00031
Copper	mg/L	0.002	<0.001	0.007	0.001	0.003	0.002	0.003	0.002	<0.001	0.001	<0.001	<0.001	<0.001	<0.0010	0.0033	<0.0010	<0.0010	<0.0010	<0.001	0.00022	0.00027	0.00037	0.00027	0.00026
Iron	mg/L	<0.005	0.771	1.490	0.065	0.765	0.748	0.308	0.818	0.983	1.29	0.927	1.96	0.057	0.095	0.416	0.152	0.013	0.444	0.047	<0.010	0.878	0.526	0.185	0.815
Lead	mg/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	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050	0.000111	0.000067	0.000071
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0237	0.0178
Manganese	mg/L													<0.001	0.0306	0.003	<0.0020	<0.0020	<0.0020	<0.002	0.00053	0.00173	0.104	0.0629	0.00851
Mercury	mg/L	0.0002	0.0006	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/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	<0.0001	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.0015	0.000584	0.00068	0.00061	0.00039
Nickel	mg/L	<0.002	0.002	0.013	0.007	0.007	<0.002	0.004	0.005	<0.002	0.002	0.005	0.005	0.005	0.0093	0.0045	0.0032	0.0031	0.0030	0.0031	0.00341	0.00267	0.00373	0.00305	0.00293
Selenium	mg/L	Not required under previous permit												<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000186	0.000212	0.00019	0.00018	0.000188
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000024	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00030	<0.00030	0.00074	0.00053	0.00095
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.000372	0.000199
Vanadium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00050	<0.00050	0.00059	0.00071	0.00095
Zinc	mg/L	0.005	0.022	0.135	0.021	0.028	0.038	0.007	0.003	0.044	0.007	0.004	0.01	0.003	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0073	<0.0010	<0.0010	0.0027	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	99	106	104	101	99.5	101	103	103	98.5	105	109	98.7	97.5	96.3	97.6	105	93.9	107	103	102	109	91.1	108	106
Bicarbonate	mg/L	262	273	273	307	272	286	173	293	310	277	299	315	323	340	303	319	295	266	245	255	227	294	269	277
Chloride	mg/L	15.4	15.1	9.3	17.0	15.0	19.0	21	14	13	10	12	13	17	15.8	12.4	12.7	23.4	14.4	13.7	15.6	19.8	38.5	37.6	43.9
Carbonate	mg/L	<5	<5	<5	<5	<5	<5	56	<5	<5	<5	<5	<5	<5	<5.0	<5.0	5.4	6.5	6.3	7.6	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	514	557	511	591	479	523	514	482	518	501	529	542	552	567	538	567	515	484	465	490	431	634	569	574
Calcium	mg/L	27.3	34.5	36.2	34.1	34.2	26.7	11.7	34.6	32.2	37.6	38.3	41.2	38.3	34.9	34	40.3	23.7	29.8	32	31.6	32.7	39.1	35.2	43.6
Potassium	mg/L	11.5	11.5	11.2	13.3	12.2	13	15.2	14.5	14.4	12.9	14.2	13.8	14.4	16.6	15.6	17.1	15.7	15.4	14.3	16.7	13.6	15.8	17.8	14.8
Magnesium	mg/L	11.2	14.4	13.7	14.7	12.1	13.6	14.7	14.1	12.8	13.4	15.2	14.1	14.3	15.5	13.7	15.8	15.2	14.5	11.9	12.3	12.5	15.8	16.3	15.8
Sodium	mg/L	60	70	65	72	56	56	85	56	51	50	57	52	56	62.2	51.3	61.3	61.9	56.8	46.5	44.4	43.4	61.8	66.1	57.3
Sulfate	mg/L	26	46.9	51.7	39.9	19.3	21	16	16.5	8.9	15.4	14	18.1	13	17.7	13.3	17	8.42	9.93	7.76	10.3	12.4	40	23.8	12.1
Phosphorus	mg/L	Not required under previous permit												-	<0.050	0.072	0.112	0.070 *	0.064	0.088	0.050	0.396	0.27	0.106	0.463
pH in H_20	pH	8.1	8.0	7.7	8.0	7.5	8.1	9.5	8.2	8.2	8.2	8.3	8.2	8.3	8.2	8.38	8.38	8.49	8.44	8.55	8.37	8.04	8.15	8.19	8.13
TDS (Calculated)	mg/L	280	327	322	342	278	300	301	294	290	281	300	308	316	330	294	327	300	278	254	260	246	366	329	324
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.020	<0.020	<0.020	<0.020	0.037
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	0.037
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	155	174
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	220	227
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.101	0.199
Field Data																									
pH in H_20	pH	Not required under previous permit												8.39	8.4	8.33	7.63	8.36	8.6	7.99	8.10	8.1	8.3	10.3	9.26
Conductivity (EC)	uS/cm													642	450	960	1172	512	503	474	510	4.53	689	600	714

Table D.21: Chemical Analytical Results

Sample ID:		Winsnes D.3																						
Site Number:		21																						
Date Sampled:	**Units**	**16-Oct-1996**	**7-Oct-1997**	**9-Oct-1998**	**19-Oct-1999**	**10-Oct-2000**	**4-Oct-2001**	**9-Oct-2002**	**16-Oct-2003**	**15-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	60	80	160	110	110	260	E m p t y	90	110	54	85	64	106	251	97	96	128	116	108	108	81	97	112	93
Ammonia-N	mg/L	0.06	<0.05	1.45	0.3	<0.05	2.78		<0.05	<0.05	<0.05	0.15	1.47	0.34	1.02	0.083	<0.050	0.225	<0.050	<0.05	0.639	<0.05	0.059	0.090	<0.050
Total Kjeldahl Nitrogen	mg/L	5.5	3.2	10.5	5.2	4	15.8		2.9	3.4	1.7	3.1	3.8	4.1	13.8	4.71	3.08	4.2	4.03	3.81	5.34	2.92	3.91	4.39	2.75
Total Organic Carbon	mg/L	26	32	44	28	39	71		49	38	20	29	29	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit							Not required under previous permit					33	82.1	36.9	31	39	33.1	32.1	37.9	26.8	97	32.4	29.5
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0018	0.0093
BTEX, F1 (C6-C10) and F2(>C10-C16)																									
Benzene	mg/L	Not required under previous permit						E m p t y	Not required under previous permit					<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit						E m p t y	Not required under previous permit					<0.01	0.034	<0.010	<0.010	<0.010	<0.010	<0.01	0.0405	0.002	0.003	0.0177	0.0071
Antimony	mg/L	0.0008	<0.0002	0.0014	<0.0004	0.001	0.001		0.0017	0.0013	0.0014	0.0013	0.001	0.0008	<0.0016	<0.00040	<0.00040	<0.00080	0.00044	0.00054	0.00093	0.00031	0.00044	0.00061	0.00024
Arsenic	mg/L	Not required under previous permit							Not required under previous permit					-	-	-	-	-	-	-	-	-	-	0.00898	0.00575
Barium	mg/L	0.109	0.011	0.155	0.159	0.105	0.175		0.006	0.008	0.013	0.12	0.094	0.091	0.109	0.103	0.0553	0.111	0.101	0.0732	0.134	0.101	0.107	0.114	0.0766
Beryllium	mg/L	Not required under previous permit							Not required under previous permit					<0.001	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	0.067	0.077	0.073	0.079	0.077	0.094	<0.020	0.021	0.05
Cadmium	mg/L	<0.001	0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.00020	<0.00050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000074	<0.0000050	<0.000010	0.0000199	<0.0000050
Chromium	mg/L	0.008	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00020	0.00014	<0.00010
Cobalt	mg/L	0.003	0.003	0.022	<0.002	0.002	0.003		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00156	0.00053	0.00124	0.00158	0.00056
Copper	mg/L	0.006	<0.001	0.008	0.001	0.006	0.01		0.005	0.002	<0.001	<0.001	<0.001	0.001	<0.0024	0.0031	<0.0010	0.0016	<0.0010	0.0012	0.00236	0.00132	0.00141	0.00202	0.00071
Iron	mg/L	1.320	1.090	2.500	1.110	0.628	3.690		0.146	0.163	0.051	0.083	0.508	0.015	0.062	0.011	0.02	0.025	0.022	0.047	0.022	0.011	0.03	0.037	0.038
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00040	<0.00010	<0.00010	<0.0050	<0.00010	0.0001	<0.000050	<0.000050	<0.00010	0.00006	<0.000050
Lithium	mg/L	Not required under previous permit							Not required under previous permit					-	-	-	-	-	-	-	-	-	-	0.0595	0.0419
Manganese	mg/L													0.003	0.0538	<0.0020	<0.0020	<0.0020	0.0593	0.0142	0.00143	0.00076	0.0129	0.00528	0.00437
Mercury	mg/L	0.0003	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.0074	0.00303	0.00251	0.00298	0.000719
Nickel	mg/L	0.007	<0.002	0.027	0.008	0.014	0.008		0.007	<0.002	<0.002	0.004	0.004	0.006	0.0063	0.0058	0.0043	0.0074	0.0041	0.0053	0.0117	0.00722	0.0057	0.0072	0.00398
Selenium	mg/L	Not required under previous permit							Not required under previous permit					0.0014	0.003	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000359	0.000239	0.00027	0.000366	0.000201
Silver	mg/L													<0.0001	<0.00040	0.00032	<0.00010	<0.0050	<0.00010	<0.0001	0.00001	<0.000010	<0.000020	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00020	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000020	0.000017	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010
Titanium	mg/L													0.003	<0.0012	<0.0010	<0.0010	0.0012	<0.0010	0.002	0.00198	<0.00030	0.00132	0.00333	0.00134
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00437	0.0021
Vanadium	mg/L													0.006	0.007	0.002	0.0025	0.0098	0.0019	0.0052	0.00154	0.0016	0.0048	0.00433	0.0018
Zinc	mg/L	0.016	0.022	0.049	0.004	0.063	0.047		0.009	0.06	0.006	0.003	0.017	0.016	0.006	<0.0020	<0.0020	<0.0020	<0.0020	0.0053	<0.0010	0.0014	<0.0020	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	109	109	109	97	107	92.2	E m p t y	107	103	104	103	101	96.5	106	107	101	97.4	107	106	97.5	105	98.9	105	106
Bicarbonate	mg/L	219	285	336	357	428	623		72	693	381	450	455	352	386	353	446	419	375	292	375	396	504	429	435
Chloride	mg/L	81.9	112.0	156.0	158.0	152.0	248.0		318	294	76	101	133	213	266	270	156	222	209	224	216	238	357	304	244
Carbonate	mg/L	55	15	<5	7	34	<5		114	14	15	28	<5	69	70.5	30	21.1	48.3	38.8	59.6	9.3	<5.0	10.9	<5.0	<5.0
Conductivity (EC)	uS/cm	793	886	992	1210	1310	1640		2950	2620	832	1140	1180	1380	1620	1880	1350	1530	1410	1400	1500	1420	2020	1710	1580
Calcium	mg/L	19.8	32.4	27.9	34	29.1	26.6		57.6	105	46.6	45.4	50.4	39.9	36.7	54.4	54.1	39.3	38.2	29.7	29.8	52.4	52.3	46.7	69.8
Potassium	mg/L	20.6	22.4	22.5	24.5	25.8	26.4		67.3	73	26.1	32.2	25.6	23.3	33.1	38.6	28.8	30.4	28.1	26.1	28.5	27.8	30.3	28.5	22.6
Magnesium	mg/L	18.9	19.3	22.8	28.2	24.6	27.1		158	133.0	34.6	43.9	35.4	32.9	38.7	52.6	37	38	41.6	35.6	30.7	41.4	54.1	45.7	47.4
Sodium	mg/L	136	133	196	175	232	267		506	376	106	142	137	207	288	288	170	224	219	221	193	195	281	254	210
Sulfate	mg/L	26.9	21.6	67	102	51.3	17		1100	638	57.7	67.0	39.5	36.8	61.2	232	60.5	62.9	59.3	37.2	45.9	62.2	73.9	67.1	104
Phosphorus	mg/L	Not required under previous permit							Not required under previous permit					-	1.47	0.613	1.24	1.12	0.685	0.707	0.479	0.287	0.641	0.654	0.755
pH in H_20	pH	9.4	8.8	8.3	8.5	8.8	7.9		10	8.4	8.6	8.5	8.4	9.1	9.06	8.78	8.53	8.97	8.88	9.25	8.47	8.29	8.43	8.30	8.22
TDS (Calculated)	mg/L	466	496	658	705	764	922		2360	1970	550	681	650	795	984	1140	747	871	818	777	738	812	1110	960	912
Nitrate	mg/L	Not required under previous permit							Not required under previous permit					<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.040	<0.020	<0.10	<0.020	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.020	<0.010	<0.050	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	<0.022
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	305	369
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	356	357
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.188	0.184
Field Data																									
pH in H_20	pH	Not required under previous permit												9.08	8.55	9.1	9.23	9.28	9.4	9.65	8.60	8.60	9.10	10.7	9.22
Conductivity (EC)	uS/cm													1356	1050	2160	1780	1541	1439	1393	1530	1476	2100	1198	1960

Table D.22: Chemical Analytical Results

Sample ID:		Winsnes D.4																						
Site Number:		22																						
Date Sampled:	Units	16-Oct-1996	7-Oct-1997	9-Oct-1998	19-Oct-1999	10-Oct-2000	4-Oct-2001	9-Oct-2002	16-Oct-2003	15-Oct-2004	20-Oct-2005	13-Oct-2006	3-Oct-2007	17-Oct-2008	28-Oct-2009	18-Oct-2010	12-Oct-2011	16-Oct-2012	8-Oct-2013	15-Oct-2014	14-Oct-2015	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019
Chem. O_2 Demand	mg/L	70	70	100	90	130	150	180	140	150	83	97	86	95	138	88.6	115	116	78	102	96	70	112	101	535
Ammonia-N	mg/L	0.06	<0.05	1.58	<0.05	<0.05	0.52	<0.05	<0.05	0.75	<0.05	<0.05	0.06	3.11	0.917	0.399	<0.050	0.052	<0.050	<0.05	0.070	<0.050	0.120	0.055	0.075
Total Kjeldahl Nitrogen	mg/L	4.5	3	5.5	3.4	3.7	8.2	5.4	5.9	9.3	2.9	2.9	2.6	6.1	8.08	3.47	3.95	4.36	2.65	3.27	2.48	2.33	3.4	3.57	17.0
Total Organic Carbon	mg/L	29	25	34	28	46	61	68	59	55	32	33	33	-	-	-	-		-		-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												32	47	34.8	32	38.9	32.3	30.4	33.2	25.3	112	34.2	31.2
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0012	0.0067
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												0.02	0.062	<0.010	<0.010	<0.010	<0.010	<0.01	<0.0010	0.0017	0.0114	0.0455	0.0165
Antimony	mg/L	<0.0004	<0.0004	0.0009	<0.0004	0.0006	0.0009	<0.0004	0.0015	0.0015	0.0016	0.0016	0.0022	<0.0004	<0.0016	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00033	0.00017	0.00026	0.00029	0.00019
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00555	0.0057
Barium	mg/L	0.058	0.044	0.063	0.083	0.058	0.052	<0.003	0.089	0.061	0.01	0.022	0.014	0.084	0.0693	0.0728	0.0302	0.0782	0.129	0.0722	0.115	0.0559	0.0462	0.0659	0.0437
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.041	0.041	0.036	0.031	0.033
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.00020	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	0.0000172	<0.0000050
Chromium	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010	0.00012	0.00014
Cobalt	mg/L	<0.002	0.005	0.019	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00056	0.00027	0.00085	0.00099	0.00101
Copper	mg/L	0.002	<0.001	0.007	0.002	0.007	0.009	<0.001	0.006	0.003	<0.001	<0.001	<0.001	<0.001	<0.0024	0.0038	<0.0010	<0.0010	<0.0010	<0.001	0.00043	0.00052	0.0008	0.00118	0.00101
Iron	mg/L	0.612	0.807	1.140	1.810	0.373	0.639	0.065	3.48	0.815	0.3	0.602	0.581	0.041	0.053	0.033	0.018	0.06	<0.010	0.027	0.011	0.021	0.088	0.130	0.898
Lead	mg/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	0.0001	<0.00040	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050	0.000068	0.00012	0.000139
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0158	0.013
Manganese	mg/L													0.404	0.0068	0.0143	0.0326	0.0046	<0.0020	0.003	0.00099	0.00054	0.0158	0.0104	0.410
Mercury	mg/L	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00373	0.00197	0.00135	0.00183	0.000865
Nickel	mg/L	0.002	0.003	0.018	0.006	0.015	<0.002	<0.002	0.011	0.006	0.002	0.005	0.003	0.006	0.0051	0.0051	0.0029	0.004	0.0058	0.0049	0.00578	0.00391	0.00359	0.00364	0.00233
Selenium	mg/L	Not required under previous permit												0.0011	0.0021	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000293	0.000227	0.000222	0.000252	0.000201
Silver	mg/L													<0.0001	<0.00040	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00020	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000017	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													0.001	<0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00030	<0.00030	0.00067	0.00854	0.00139
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00247	0.000959
Vanadium	mg/L													0.003	0.0049	0.0011	<0.0010	0.0026	<0.0010	<0.001	<0.00050	<0.00050	0.00144	0.00229	0.0018
Zinc	mg/L	0.11	0.016	0.05	0.015	0.246	0.045	0.007	0.014	0.243	0.003	0.005	0.012	0.004	<0.0040	<0.0020	<0.0020	<0.0020	<0.0020	0.0086	<0.0010	0.001	0.0015	<0.0010	0.0012
Routine Water																									
Ion Balance	%	109	107	103	105	109	92	102	104	102	101	103	99.6	95.6	105	104	96.5	98.1	110	107	100	107	101	110	107
Bicarbonate	mg/L	253	287	284	223	591	526	536	387	509	347	336	322	384	288	313	341	311	300	261	248	216	350	290	264
Chloride	mg/L	135.0	105.0	183.0	181.0	134.0	189.0	235	200	207	98	101	83	146	156	242	173	241	240	246	204	170	238	222	246
Carbonate	mg/L	17	41	<5	16	<5	64	124	90	47	<5	13	<5	<5	38.2	11.9	<5.0	14.4	8.8	8.3	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	884	934	1000	1050	1490	1660	1990	1520	1550	773	905	787	1050	1070	1350	1130	1310	1280	1270	1190	889	1330	1190	1230
Calcium	mg/L	28.1	34	34	29.9	32.4	22.2	25.7	34.2	26.4	21.9	20.5	25.5	28.9	25.8	31.5	29.8	27.2	34.1	27.9	29.4	27.9	40.2	37.5	45.1
Potassium	mg/L	24.4	19.7	25.6	22.8	26	24.6	27.7	29.9	27.7	18.8	24.1	21.2	23.1	25.7	29.7	25.8	28.1	30.6	28.1	25.9	22.9	32.3	32.8	26
Magnesium	mg/L	16.8	26.9	21.3	18.8	23.3	20.0	<0.1	19.2	19.5	13.0	15.9	16.5	18.1	16.9	24.7	20.7	22	24.6	22.3	18.4	18.5	29	26.7	29.2
Sodium	mg/L	141	138	168	169	299	299	2	320	304	138	145	107	153	184	210	149	197	209	198	150	129	182	177	173
Sulfate	mg/L	13.7	36.3	60.5	54.7	105	96	84.6	111	41.9	6	9.4	11.9	22.2	21.3	31.1	11.3	15.7	16.5	11.5	15.3	9.21	24.2	20.6	37.4
Phosphorus	mg/L	Not required under previous permit												-	0.849	0.269	0.594	0.539	0.083	0.264	0.156	0.111	0.312	0.283	2.55
pH in H_20	pH	8.9	9.2	8.1	8.8	8.2	9.0	9.3	9.4	8.9	8.4	8.4	8.4	8.3	8.96	8.57	8.38	8.74	8.50	8.57	8.28	8.05	8.15	8.25	7.99
TDS (Calculated)	mg/L	501	541	633	602	907	977	1200	995	924	468	494	428	582	610	735	580	698	711	671	566	484	718	660	687
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	0.111	<0.050	<0.050	<0.050	<0.05	<0.040	<0.020	<0.020	<0.020	<0.020
Nitrite	mg/L													-	<0.050	0.052	<0.050	<0.050	<0.050	<0.02	<0.020	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	<0.022
Hardness as $CaCO_3$	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	204	233
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	238	217
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.113	0.028
Field Data																									
pH in H_20	pH	Not required under previous permit												8.63	8.41	9.48	9.5	9.27	8.8	8.56	8.44	8.9	9.1	10.5	9.67
Conductivity (EC)	uS/cm													1086	750	2020	1220	1309	1313	1268	1208	862	1429	1274	1545

APPENDIX E

SITE PHOTOGRAPHS

Photo 1: Dugout 12, a typical dugout in the sampling program. Taken October 18, 2022.

Photo 2: Dugout 21, a typical dugout in the sampling program. Taken October 19, 2022.