

CLEAN HARBORS CANADA INC.
2021 ANNUAL LANDFILL
OPERATIONS REPORT

Submitted By: Stan Yuha

Title: Facility Manager

Table of Contents

Annual Landfill Operations Report – Clean Harbors Ryley	4
1.0 Introduction	4
2.0 Facility Contact Information	5
3.0 Summary of Information Collected as Required in TABLE 4.6-D	6
3.1 Quantity and type of waste received	6
3.2 Quantity and type of material removed.....	6
3.3 General location of waste deposited	6
3.4 Leachate head	6
3.5 Leachate Analysis.....	7
3.6 Volume of Leachate Removed from Leachate Collection System	7
3.7 Leak Detection Liquid Analysis	7
3.8 Volume of Leak Detection Liquid Removed	7
3.9 Final Cover	8
4.0 Summary of Results of Any Audit Performed in Accordance with 4.1.7.....	8
5.0 Summary of the Operations of the Waste Stabilization Area.....	8
6.0 Summary of the Performance of Run-on and Run-off Systems.....	8
7.0 Summary of the Performance of the Leachate Collection System	8
8.0 Summary of the Performance of the Leak Detection System	9
9.0 Response Action Plan Pursuant to 4.4.10.....	9
10.0 Annual Dugout and Water Well Sampling Program	9
11.0 Summary of Revisions to the Landfill Operations Plan.....	9
12.0 Groundwater Remedial Action Taken Pursuant to 4.6.34(p)	9
13.0 Summary of Records of Landfill Inspections Pursuant to 4.6.53	9
14.0 Summary of Operational Issues, Emergencies and Actions Taken	10
15.0 Summary of Public Complaints and Approval Holder’s Responses	10
16.0 Up-to-Date Financial Security Estimate Pursuant to Section 5.1.2.....	12
17.0 Site Development Plan	12
18.0 Annual Landfill Closure Report.....	12
19.0 Summary of Landfill Contraventions Reported	12
20.0 Any Other Information as Required in Writing by the Director.....	12

Appendices

- Appendix A Quantity and Type of Waste Received
- Appendix B General Location of Waste Received
- Appendix C Leachate Head Levels
- Appendix D Leachate Analysis Results
- Appendix E Volume of Leachate Removed from the Leachate Collection System
- Appendix F Leak Detection Liquid Analysis
- Appendix G Volume of Leak Detection Liquid Removed
- Appendix H Third-party Compliance Audit Report
- Appendix I Stabilization Facility
- Appendix J Response Action Plans
- Appendix K Annual Dugout and Water Well Sampling Program Report
- Appendix L Summary of Revisions to Landfill Operations Plan
- Appendix M Examples of Landfill Inspection Forms
- Appendix N Financial Security Calculations
- Appendix O Site Development Plan
- Appendix P Annual Landfill Cell Closure Report
- Appendix Q Contravention Reports

Annual Landfill Operations Report – Clean Harbors Ryley

1.0 Introduction

Clean Harbors Canada Inc. (Clean Harbors) owns and operates the industrial waste management facility located at SE/4 9-50-17 W4M, Ryley, Alberta under Alberta Environment and Parks (AEP) Approval No.: 10348-03-00. The facility consists of a Class I Industrial Landfill and a Hazardous Waste/Recyclable Storage and Processing Facility. This document has been prepared to fulfill the annual reporting requirements specified in Section 4.6.58 of the approval.

The reporting requirements outlined in Section 4.6.58 have been summarized in the concordance table below (Table A). Table A references the relevant approval requirements and the corresponding sections, figures, table and/or appendices that address each requirement.

TABLE A Reporting Requirements – Annual Landfill Operations Report

Approval Section Number	Requirement	Location Herein
4.6.58(a)	Name and contact information of person responsible for the facility	Section 2
4.6.58(b)	Summary of all information collected as required in TABLE 4.6-D	Section 3
4.6.58(b)(i)	Quantity and type of waste received	Section 3.1, Appendix A
4.6.58(b)(ii)	Quantity and type of material removed	Section 3.2
4.6.58(b)(iii)	General location of waste deposited	Section 3.3, Appendix B
4.6.58(b)(iv)	Leachate head	Section 3.4, Appendix C
4.6.58(b)(v)	Leachate analysis, as per TABLE 4.4-A	Section 3.5, Appendix D
4.6.58(b)(vi)	Volume of leachate removed from the leachate collection system	Section 3.6, Appendix E
4.6.58(b)(vii)	Leak detection liquid analysis, as per TABLE 4.4-A	Section 3.7, Appendix F
4.6.58(b)(viii)	Volume of leak detection liquid removed from the leak detection system	Section 3.8, Appendix G
4.6.58(b)(ix)	Final cover	Section 3.9
4.6.58(c)	Summary of the results of any audit conducted in accordance with 4.1.7	Section 4, Appendix H
4.6.58(d)	Summary of the operations of the waste stabilization area	Section 5, Appendix I
4.6.58(e)	Summary of the performance of the run-on and run-off control systems, including a comparison to the limits in TABLES 4.3-B and 4.3-C	Section 6

Approval Section Number	Requirement	Location Herein
4.6.58(f)	Summary of the performance of the leachate collection system, including a comparison to the maximum acceptable leachate head	Section 7
4.6.58(g)	Summary of the performance of the leak detection system, including a comparison to the action leakage rate limit	Section 8
4.6.58(h)	The Response Action Plan for the leak detection system pursuant to 4.4.10	Section 9, Appendix J
4.6.58(i)	Annual Dugout and Water Well Sampling Program Report pursuant to 4.5.4	Section 10, Appendix K
4.6.58(j)	Summary of all revisions to the Landfill Operations Plan pursuant to 4.6.33(b)	Section 11, Appendix L
4.6.58(k)	Any groundwater remedial action taken pursuant to 4.6.34(p)	Section 12
4.6.58(l)	Summary of records of landfill inspections pursuant to 4.6.53	Section 13, Appendix M
4.6.58(m)(i), (ii) & (iii)	Summary of operational issues, emergencies and actions taken	Section 14
4.6.58(n)(i) & (ii)	Summary of records of public complaints and approval holder's responses	Section 15, Appendix Q
4.6.58(o)	Up-to-date financial security estimate pursuant to 5.1.2	Section 16, Appendix N
4.6.58(p)(i), (ii), (iii) & (iv)	Updated site development plan showing the status of the landfill progression at the end of the operating year, including contour mapping, location of active & inactive disposal areas, areas where final cover has been placed & location of new landfill cells constructed	Section 17, Appendix O
4.6.58(q)	Annual Landfill Cell Closure Report pursuant to 7.1.7	Section 18, Appendix P
4.6.58(r)	Summary of contraventions reported pursuant to 2.1.1 related to landfill operations	Section 19, Appendix Q
4.6.58(s)	Any other information as required in writing by the Director	Section 20

2.0 Facility Contact Information

The primary contact for the Facility is:
 Stan Yuha, Facility Manager
 PO Box 390
 Ryley, AB T0B 4A0

Phone: (780) 662-2509
 Mobile: (780) 717-9606

3.0 Summary of Information Collected as Required in TABLE 4.6-D

3.1 Quantity and type of waste received

In 2021, the facility landfilled a total of 151,936.774 tonnes of waste. 80,337.65 tonnes were hazardous waste. Non-hazardous waste landfilled totaled 71,599.124 tonnes.

The full description of the waste landfilled at the Facility by IWIC code and Transportation of Dangerous Goods numbers can be found in Appendix A.

There were no operational or other issues associated with the disposal of the waste.

3.2 Quantity and type of material removed

No waste was removed from the landfill in 2021.

3.3 General location of waste deposited

In 2021, 118,676 cubic metres of landfill capacity was consumed. Cell 3C had an increase of 5,932 cubic metres. Cell 3D had an increase of 2,622 cubic metres of waste. Cell 4 had an increase of 110,122 cubic metres placed. All other cells are either inactive or capped.

The December 2020 and December 2021 survey reports and the December 2021 Site Survey Elevations diagram are attached as Appendix B.

3.4 Leachate head

Approval 1.0348-03 sets out the following limits regarding leachate head in the landfill cells.

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.

4.4.6 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.

The “maximum acceptable leachate head” is defined by Section 1.1.2(fff) as:

“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;”

Section 1.1.2(aa) defines existing cells as:

“existing landfill cells” means Cell 1, Cell 2, Cell 3A, Cell 3B and Cell 3C as described in application No. 005-10348;”

Cell 1 was capped prior to the creation of the *Standards for Landfills in Alberta* and does not have the capability to measure leachate head. The leachate volume from Cell 1 has been steadily decreasing since capping was completed. The Cell 1 primary sump is pumped periodically throughout the year to remove any leachate accumulation. In 2021, 150 litres of leachate were removed from Cell 1.

The leachate head monitoring data for Cells 2, 3A, 3B, 3C, 3D, 3E and 4 is provided in Appendix C.

3.5 Leachate Analysis

TABLE 4.6-D of the approval requires that the landfill leachate from each primary leachate collection sump be analyzed at least once every quarter year for the parameters outlined in TABLE 4.4-A, unless insufficient sample volume is available. No Primary leachate was obtained in Quarters 1 and 2.

Appendix D contains a table showing the Field pH and Electrical Conductivity and the laboratory analytical reports for the parameters in TABLE 4.4-A.

3.6 Volume of Leachate Removed from Leachate Collection System

The approval requires that leachate be removed from the leachate collection systems to maintain the leachate head level as described in Section 3.4 above.

Appendix E contains a table showing the volume of leachate removed from each of the landfill cells in 2021.

3.7 Leak Detection Liquid Analysis

TABLE 4.6-D of the approval requires that the leak detection liquid from each landfill cell be analyzed at least once every quarter year for the parameters outlined in TABLE 4.4-A, unless insufficient sample volume is available. No water was obtained from Cell 1 Leak Detection System in Quarters 1, 2 and 3.

3.8 Volume of Leak Detection Liquid Removed

TABLE 4.6-D requires that the volume of leak detection liquid removed be monitored and recorded at least each working day as removed. Cell 1 has been capped for approximately 20 years and generated only 15 litres in Quarter 4 of 2021.

Appendix G contains a table showing the volume of leak detection liquid removed from the leak detection systems of each landfill cell in 2021.

3.9 Final Cover

No final cover was applied to the cells in 2021.

4.0 Summary of Results of Any Audit Performed in Accordance with 4.1.7

The third-party compliance audit was conducted in 2021. A copy of that Audit Report is in Appendix H. The next compliance audit will take place in 2024.

5.0 Summary of the Operations of the Waste Stabilization Area

In 2021, 15,300.069 tonnes of waste were processed through the Stabilization Facility. This volume was broken down as follows:

1. Hazardous Waste Solidified	8352.247 tonnes
2. Non-hazardous Waste Solidified	4779.867 tonnes
3. Encapsulation (with cement)	1321.765 tonnes
4. pH adjustment	3.005 tonnes
5. Sulfur treatment	318.39 tonnes

There were no operational issues were encountered during 2020.

The thickness tests conducted on the two stabilization vessels are included in Appendix I.

6.0 Summary of the Performance of Run-on and Run-off Systems

The run-on and run-off control systems performed in accordance with the design plan. No water was discharged from Pond B in 2021, therefore no batch sampling was performed. The Industrial Wastewater Report has been submitted which includes the required Annual Sampling as per TABLE 4.3-E.

No water was discharged from the tank farm area.

7.0 Summary of the Performance of the Leachate Collection System

The leachate collection systems performed as designed. There were the normal maintenance issues of pump replacement, meter servicing and in the winter months some heat trace lines failed, and transfer lines froze. The issues were dealt with to restore normal operation as quickly as possible.

The relevant approval clauses and definitions regarding leachate head are included in Section 3.4 of this report. The tabular report of leachate head values is in Appendix C. Section 4.4.4, states that “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. At no time in 2021 was the fourteen-day time frame exceeded between precipitation events.

The flow rates of precipitation into the collection trench and sump are dependent upon the composition and permeability of the waste in the landfill cell. This impacts the length of time required to achieve the desired leachate head level after precipitation events.

No leachate was used for dust control in 2021.

8.0 Summary of the Performance of the Leak Detection System

The Leak Detection Systems functioned as designed during 2021. There were no problems with the systems other than those mentioned in the previous section – pump replacement, meter service and heat trace failures.

Cell 1 is not designed to monitor leak detection liquid in the same manner as Cells 2 to 4. The leak detection liquid drains continuously via gravity feed to a leachate manhole. A submersible pump is used to remove any Leak Detection Liquid that accumulates on an as needed basis. At no time during the year did the Cell 1 Leak Detection System daily inflow exceed 790 litres/hectare/day. Cell 1 has an area of 0.688 hectares and during 2021 only 15 litres of leak detection liquid was removed.

9.0 Response Action Plan Pursuant to 4.4.10

No Response Action Plans were required in 2021. Response Action Plans if required would be in Appendix J.

10.0 Annual Dugout and Water Well Sampling Program

The Annual Dugout and Water Well Sampling Program pursuant to Section 4.5 of the approval was conducted in October 2021. Water samples were collected from each water well and dugout within an approximate 1.6 kilometre radius of the facility and analyzed for the parameters listed in TABLE 4.5-A. The Annual Dugout and Water Well Sampling Program Report is attached as Appendix K.

11.0 Summary of Revisions to the Landfill Operations Plan

Minor revisions and edits were made to the Landfill Operations Plan in 2021. A copy of the current Landfill Operations Plan is included as Appendix L.

12.0 Groundwater Remedial Action Taken Pursuant to 4.6.34(p)

No groundwater issues requiring remedial action have been detected. No remedial action has been taken at the facility.

13.0 Summary of Records of Landfill Inspections Pursuant to 4.6.53

Section 4.6.52 requires:

“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.”

Section 4.6.53 requires:

“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.”

Clean Harbors inspects the landfill each operating day. These inspections are entered into the electronic report form and saved on the corporate server. Inspection reports can be retrieved as necessary from the system. The Inspection Report forms can be found in Appendix M.

Issues arising from inspections have been identified previously in Sections 7 and 8. No liner deterioration issues were observed during the year. The surface run-on and runoff control systems functioned as per design.

14.0 Summary of Operational Issues, Emergencies and Actions Taken

There were no major operational issues or emergencies in 2021. All operational issues were of a maintenance nature, such as heat trace failures freezing leachate transfer lines, pump replacement and maintenance of flow meters and pump lines.

A small fire occurred in the landfill when a pail of chemicals self-ignited. An equipment operator extinguished the fire with a small fire extinguisher. The pail had been included in a bulk load of waste and was not visible during the visual inspection of the load. Clients whose loads may have included the pail were notified that waste must conform to profile and regulatory requirements and that loads would be scrutinized. There were no environmental impacts from this incident.

15.0 Summary of Public Complaints and Approval Holder’s Responses

The facility received complaints on four occasions from the public in 2021.

1. February 22, 2021 – A complaint was received at the Clean Harbors Emergency Operations Center based at the corporate office in Norwell, Massachusetts. The complaint was about a sour gas emanating from the landfill and “plastic bags (garbage)” coming onto their property. This call was received after hours, and the information was not received by the Facility Manager until the next morning. It was determined that the wind had been blowing in the direction of the property on the previous afternoon. The odour may have originated from a load received on the previous day that had been processed and handled as per the Dust & Odour Best Practice Guideline. The load had been received and covered immediately. The Facility Manager assigned personnel to pick up any garbage in the ditches along the roadway southeast of the facility. He requested permission to have personnel access the property to pick up any garbage that may have blown onto the property, however access was denied. AEP Reference Number 376351.
2. July 5, 2021 – An odour complaint was received from a resident of Ryley to the Facility Manager’s cellphone. He was on holidays at the time and did not retrieve the message until the next day. The Compliance Manager was notified and in conjunction with the Operations Manager investigated the potential source of the odour. All loads received on July 5th were reviewed with the landfill personnel and there had been no strong odours detected. Wind had been from the north blowing towards Ryley. Origin of the odour was not determined. The Compliance Manager returned the complainant’s call but was only able to leave a message. AEP Reference #380842.
3. July 15, 2021 – An odour complaint was received from a resident of Ryley at 2:28 pm. He said that he had noticed an odour that would come and go but did not describe the odour. The wind was from the north, but the landfill had not received any odourous loads that day. The Facility Manager drove the south perimeter of the landfill but could not detect any odours. He then drove into Ryley to the resident’s location, he checked with two residents sitting in their yard and asked if they had noticed any odours that afternoon. They had not. The source of the odour was undetermined. AEP Reference Number 381259.
4. July 30, 2021 – An odour complaint was received from a resident of Ryley at 8:50 am. He said that he had noticed an odour that would come and go but did not describe the odour. The wind was essentially calm. Neither of the two loads received that morning had any odour according to the landfill operators. The Facility Manager drove by the complainant’s address, but no odour was detected. A discussion with a landfill operator later in the day, indicated that they typically pump secondary leachate in the mornings and that it does have an odour. This is a short duration event. The primary leachate is pumped using a timer at various times in the day. This could explain the last few odour complaints regarding odours that come and go

during the day. As proposed in the 7-day Letter, a scrubber has been installed on the leachate vent line. AEP Reference Number 381915.

The Contravention Reports for these complaints are provided in Appendix Q.0

16.0 Up-to-Date Financial Security Estimate Pursuant to Section 5.1.2

Section 5 of the Approval requires that the financial security estimate for the facility be reviewed annually and submitted as part of the Annual Landfill Operations Report.

The current Security Estimate calculation and a copy of the Security bond are provided in Appendix N.

17.0 Site Development Plan

The site development plan is in Appendix O. This plan shows the progression of the landfill operation. The active area includes portions of Cells 3C, 3D and all of Cell 4. Other areas are inactive or have final cover placed on them.

18.0 Annual Landfill Closure Report

No landfill cells were closed in 2021.

19.0 Summary of Landfill Contraventions Reported

The 2021 landfill contraventions can be grouped into three categories as shown in the following table.

Summary of Landfill Contraventions

Category	Date	Reference Number
Small fire in landfill	January 19, 2021	375305
Odour Complaint	February 22, 2021	376351
	July 5, 2021	380842
	July 15, 2021	381259
	July 30, 2021	381915
Air Monitoring Equipment Problems	September 27, 2021	383965
	January 10, 2022	386952

Copies of the 7-Day Letters to the Director are provided in Appendix Q.

20.0 Any Other Information as Required in Writing by the Director

No additional information was required by the Director.

Appendix A

Quantity and Type of Waste Received

Hazardous Recycle or Waste Name	Uniform Waste Code				Quantity (Kg or L)		Stored	Recycled		Disposed (Kg or L)	
	Waste Code	PIN	Class	Management Code	Hazardous	Non-hazardous		On-site	Off-site	On-site	Off-site
Acid solutions, sludges and residues containing heavy metals	H112	NONE	N/A	D5	205					205	
Acid soln, sludge & residue with metals & non-metals	H113	UN1789	8	D5	67320					67320	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN1760	8	D5	22					22	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN3262	8	D5	105					105	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN2922	8	D5	410					410	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN3244	8	D5	595					595	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN1823	8	D5	4000					4000	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN3266	8	D5	14146					14146	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN3175	4.1	D5	39870					39870	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN1824	8	D5	41812					41812	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	NONE	N/A	D5	170460					170460	
Neutralized soln, sludges, residues with heavy metals	H131	NONE	N/A	D5	199660					199660	
Wastes containing other reactive anions	H135	NONE	N/A	D5	615					615	
Contaminated debris & soil form spills, accidents & leaks	H138	UN1759	8	D5	23420					23420	
Contaminated debris & soil form spills, accidents & leaks	H138	UN3175	4.1	D5	265895					265895	
Contaminated debris & soil form spills, accidents & leaks	H138	NONE	N/A	D5	1044090					1044090	
Residues from steel making	H143	NONE	N/A	D5	4958831					4958831	
Residues from steel making	H143	UN3262	8	D5	6488130					6488130	
Waste from the use of paints, pigments & coatings	H145	UN1325	4.1	D5	300					300	
Waste from the use of paints, pigments & coatings	H145	UN1210	3	D5	1000					1000	
Waste from the use of paints, pigments & coatings	H145	UN1263	3	D5	2701					2701	
Waste from the use of paints, pigments & coatings	H145	NONE	N/A	D5	5345					5345	
Waste from the use of paints, pigments & coatings	H145	UN3175	4.1	D5	376290					376290	
Other specified inorganic sludges, slurries or solids	H146	UN1350	4.1	D5	1010					1010	
Other specified inorganic sludges, slurries or solids	H146	UN2590	9	D5	11490					11490	
Other specified inorganic sludges, slurries or solids	H146	NONE	N/A	D5	12518470					12518470	
Miscellaneous waste inorganic chemicals	H148	UN2902	6.1	D5	205					205	
Miscellaneous waste inorganic chemicals	H148	UN1759	8	D5	224					224	
Miscellaneous waste inorganic chemicals	H148	UN1823	8	D5	410					410	
Miscellaneous waste inorganic chemicals	H148	UN1760	8	D5	630					630	
Miscellaneous waste inorganic chemicals	H148	UN3264	8	D5	4560					4560	
Miscellaneous waste inorganic chemicals	H148	UN3190	4.2	D5	11370					11370	
Miscellaneous waste inorganic chemicals	H148	NONE	N/A	D5	101768					101768	
Miscellaneous waste inorganic chemicals	H148	UN1350	4.1	D5	186935					186935	
Inert inorganic waste	H150	UN2212	9	D5	215					215	
Inert inorganic waste	H150	UN2862	6.1	D5	1000					1000	
Inert inorganic waste	H150	UN1350	4.1	D5	2000					2000	
Inert inorganic waste	H150	UN2590	9	D5	5256					5256	
Inert inorganic waste	H150	NONE	N/A	D5	230630					230630	
Batteries	H151	NONE	N/A	D5	2905					2905	
Empty packages, bags, containers	H152	UN1294	3	D5	80					80	

Hazardous Recycle or Waste Name	Uniform Waste Code				Quantity (Kg or L)		Stored	Recycled		Disposed (Kg or L)	
	Waste Code	PIN	Class	Management Code	Hazardous	Non-hazardous		On-site	Off-site	On-site	Off-site
Empty packages, bags, containers	H152	UN3175	4.1	D5	580					580	
Empty packages, bags, containers	H152	UN1993	3	D5	668					668	
Empty packages, bags, containers	H152	UN2922	8	D5	2402					2402	
Empty packages, bags, containers	H152	UN1182	6.1	D5	5457					5457	
Spent catalysts	H153	UN3175	4.1	D5	17060					17060	
Spent catalysts	H153	UN3190	4.2	D5	1065009					1065009	
Spent catalysts	H153	NONE	N/A	D5	4216439					4216439	
Desiccants - silica gel, activated alumina, molecular sieve	H154	UN3175	4.1	D5	61610					61610	
Desiccants - silica gel, activated alumina, molecular sieve	H154	NONE	N/A	D5	550160					550160	
Aromatic solvents and residues	H211	UN1294	3	D5	20					20	
Aromatic solvents and residues	H211	UN1263	3	D5	225					225	
Aromatic solvents and residues	H211	NONE	N/A	D5	27250					27250	
Aromatic solvents and residues	H211	UN3175	4.1	D5	34920					34920	
Aliphatic solvents and residues	H212	UN1325	4.1	D5	44					44	
Aliphatic solvents and residues	H212	UN1268	3	D5	225					225	
Aliphatic solvents and residues	H212	NONE	N/A	D5	20165					20165	
Petroleum distillates	H213	NONE	N/A	D5	224					224	
Petroleum distillates	H213	UN1268	3	D5	410					410	
Light fuels	H221	NONE	N/A	D5	410					410	
Polymeric resins	H232	NONE	N/A	D5	410					410	
Polymeric resins	H232	UN1263	3	D5	710					710	
Halogenated solvents and residues	H241	UN1593	6.1	D5	205					205	
Halogenated solvents and residues	H241	NONE	N/A	D5	301100					301100	
Halogenated pesticides and herbicides	H242	NONE	N/A	D5	10740					10740	
Waste oils/sludges (petroleum based)	H251	UN3175	4.1	D5	3231314					3231314	
Waste oils/sludges (petroleum based)	H251	NONE	N/A	D5	3982940					3982940	
Waste crankcase oils and lubricants	H252	NONE	N/A	D5	760					760	
Emulsified oils	H253	NONE	N/A	D5	5945					5945	
Filters	H256	NONE	N/A	D5	6280					6280	
Filters	H256	UN3088	4.2	D5	15640					15640	
Filters	H256	UN3190	4.2	D5	71300					71300	
Miscellaneous waste organic chemicals	H263	UN1866	3	D5	19					19	
Miscellaneous waste organic chemicals	H263	UN2811	6.1	D5	25					25	
Miscellaneous waste organic chemicals	H263	UN3082	9	D5	114					114	
Miscellaneous waste organic chemicals	H263	UN1350	4.1	D5	900					900	
Miscellaneous waste organic chemicals	H263	UN1654	6.1	D5	921					921	
Miscellaneous waste organic chemicals	H263	UN1760	8	D5	1176					1176	
Miscellaneous waste organic chemicals	H263	UN1993	3	D5	1720					1720	
Miscellaneous waste organic chemicals	H263	UN3175	4.1	D5	4400					4400	
Miscellaneous waste organic chemicals	H263	NONE	N/A	D5	40189					40189	
Graphic arts wastes	H265	NONE	N/A	D5	19					19	

Hazardous Recycle or Waste Name	Uniform Waste Code				Quantity (Kg or L)		Stored	Recycled		Disposed (Kg or L)	
	Waste Code	PIN	Class	Management Code	Hazardous	Non-hazardous		On-site	Off-site	On-site	Off-site
Graphic arts wastes	H265	UN1133	3	D5	19					19	
Organic acids	H267	UN3265	8	D5	42					42	
Amines	H268	UN2810	6.1	D5	19					19	
Amines	H268	UN1760	8	D5	38					38	
Amines	H268	UN1692	6.1	D5	150					150	
Amines	H268	UN3267	8	D5	681					681	
Amines	H268	UN3259	8	D5	5780					5780	
Amines	H268	UN3082	9	D5	6500					6500	
Amines	H268	UN2735	8	D5	30580					30580	
Amines	H268	NONE	N/A	D5	58610					58610	
Other specified organic sludges, slurries or solids	H270	UN3088	4.2	D5	29730					29730	
Other specified organic sludges, slurries or solids	H270	UN3175	4.1	D5	5806380					5806380	
Other specified organic sludges, slurries or solids	H270	NONE	N/A	D5	10216721					10216721	
Activated carbon	H271	UN3175	4.1	D5	19690					19690	
Activated carbon	H271	UN1325	4.1	D5	21185					21185	
Activated carbon	H271	NONE	N/A	D5	29210					29210	
Activated carbon	H271	UN3088	4.2	D5	36177					36177	
Activated carbon	H271	UN1362	4.2	D5	104505					104505	
Glycol	H273	NONE	N/A	D5	205					205	
Sorbent materials	H274	UN3175	4.1	D5	162870					162870	
Sorbent materials	H274	NONE	N/A	D5	258210					258210	
Used filters	H275	UN3262	8	D5	1600					1600	
Used filters	H275	UN3175	4.1	D5	464330					464330	
Used filters	H275	NONE	N/A	D5	22262337					22262337	
Cooling tower basin sludge	H276	NONE	N/A	D5	353830					353830	
Spontaneously combustible substances	H277	NONE	N/A	D5	3500					3500	
Waste compressed gases, including cylinders	H331	UN1044	2.2	D5	266					266	
Total Hazardous Waste Landfilled										80337650	

Hazardous Recycle or Waste Name	Uniform Waste Code				Quantity (Kg or L)		Stored	Recycled		Disposed	
	Waste Code	PIN	Class	Management Code	Hazardous	Non-hazardous	On-site	On-site	Off-site	On-site	Off-site
Alk. Soln sludge/residue - metals, non-metals, no cyanide	N122	N/R	N/A	D5		71180				71180	
Neutralized soln sludges & residues containing other metals	N132	N/R	N/A	D5		35480				35480	
Brines, chlor-alkali sludges and residues	N133	N/R	N/A	D5		224				224	
Produced water and similar brines	N136	N/R	N/A	D5		11000				11000	
Contaminated debris & soil from spills, accidents & leaks	N138	N/R	N/A	D5		5423506				5423506	
Residues from steel making	N143	N/R	N/A	D5		500				500	
Waste from the use of paints, pigments & coatings	N145	N/R	N/A	D5		204060				204060	
Other specified inorganic sludges, slurries or solids	N146	UN2212	9	D5		1621				1621	
Other specified inorganic sludges, slurries or solids	N146	UN2590	9	D5		4767				4767	
Other specified inorganic sludges, slurries or solids	N146	N/R	N/A	D5		12121665				12121665	
Miscellaneous waste inorganic chemicals	N148	N/R	N/A	D5		1975710				1975710	
Inert inorganic waste	N150	UN2590	9	D5		153342				153342	
Inert inorganic waste	N150	UN2212	9	D5		231380				231380	
Inert inorganic waste	N150	N/R	N/A	D5		4283245				4283245	
Batteries	N151	N/R	N/A	D5		1500				1500	
Empty packages, bags & containers	N152	N/R	N/A	D5		276180				276180	
Spent catalysts	N153	N/R	N/A	D5		1174720				1174720	
Desiccants - silica gel, activated alumina, molecular sieve	N154	N/R	N/A	D5		104309				104309	
Aromatic solvents and residues	N211	N/R	N/A	D5		235				235	
Aliphatic solvents & residues	N212	N/R	N/A	D5		1675				1675	
Petroleum distillates	N213	N/R	N/A	D5		3318				3318	
Solidified, de-watered latex wastes	N231	N/R	N/A	D5		29319				29319	
Polymeric resins	N232	N/R	N/A	D5		41847				41847	
Other polymeric wastes	N233	N/R	N/A	D5		29998				29998	
Halogenated pesticides & herbicides	N242	N/R	N/A	D5		831144				831144	
Waste oils/sludges (petroleum based)	N251	N/R	N/A	D5		588710				588710	
Waste crankcase oils and lubricants	N252	N/R	N/A	D5		664859				664859	
Oily water/waste oil from waste transfer/processing sites	N254	N/R	N/A	D5		37350				37350	
Water filters	N257	N/R	N/A	D5		48750				48750	
Detergents and soaps	N262	N/R	N/A	D5		1099				1099	
Miscellaneous waste organic chemicals	N263	N/R	N/A	D5		2669532				2669532	
Graphic arts waste	N265	N/R	N/A	D5		8136				8136	
Phenolic waste streams	N266	N/R	N/A	D5		85940				85940	
Organic acids	N267	N/R	N/A	D5		14855				14855	
Amines	N268	N/R	N/A	D5		3133				3133	
Other specified organic sludges, slurries and solids	N270	N/R	N/A	D5		1393372				1393372	
Activated carbon	N271	N/R	N/A	D5		4590718				4590718	
Glycol solutions	N273	N/R	N/A	D5		22095				22095	
Sorbent materials	N274	N/R	N/A	D5		965486				965486	
Contaminated debris & soil from spills, accidents & leaks	N275	N/R	N/A	D5		33182289				33182289	
Cooling tower basin sludge	N276	N/R	N/A	D5		310875				310875	
Total Non-hazardous Waste Landfilled - 2021										71599124	

Appendix B
2021 Year-end Survey
Report



CHALLENGER GEOMATICS LTD.

Suite 110, 2899 Broadmoor Blvd., Sherwood Park, Alberta
Phone: (780) 424-5511 FAX: (780) 424-3837
Email: AVasynda@chalgeo.com

To: Clean Harbors Canada

Attention: Stan Yuha
FAX No: 780-663-3539

From: Andriy Vasynda
Date: **January 4, 2020**
Page 1 of 1
File No: **10265-DEC-20**

Re: Volume Calculation for DEC 31, 2020 (i.e. What happened on site from: **JUNE 30/ 2020 to DEC 31/2020**).

Dear Sir:

Following are the volume calculations for the areas that we surveyed on **Dec. 31/2020**.

Location	Volume	Total Volume in Cell
Cell 3A/3B	Not Observed	Capped Cells
Cell 3C(5)	1,071 cu/m (added)	314,008 cu/m
Cell 3D(6)	1,445 cu/m (cut)	282,777 cu/m
Cell 3E(7)	262 cu/m (added)	364,181 cu/m
Cell 4	34,531 cu/m (added)	112,320 cu/m

Volume reported on JULY 2, 2020

Cell 3A/Cell 3B – These cells are capped.

Cell 3C total volume on June 30/20 was:

312,937cu/m

Cell 3D total volume on June 30/20 was:

284,222cu/m

Cell 3E total volume on June 30/20 was:

363,919 cu/m

Cell 4 total volume on June 30/20 was:

77,789 cu/m

Maximum Elevation of Cell 3C= 712.01m

Maximum Elevation of Cell 3D= 711.16m

Maximum Elevation of Cell 3E= 712.37m

Maximum Elevation of Cell 4= 698.26m

Yours truly,

Challenger Geomatics Ltd.

Andriy Vasynda, ALS, CLS

Project Manager



CHALLENGER GEOMATICS LTD.

Suite 110, 2899 Broadmoor Blvd., Sherwood Park, Alberta
Phone: (780) 424-5511 FAX: (780) 424-3837
Email: AVasynda@chalgeo.com

To: Clean Harbors Canada

Attention: Stan Yuha

FAX No: 780-663-3539

From: Andriy Vasynda

Date: **January 4, 2022**

Page 1 of 1

File No: **10265-DEC-21**

Re: Volume Calculation for December 31, 2021 (i.e. What happened on site from: **June 30/ 2021 to December 31/2021**).

Dear Sir:

Following are the volume calculations for the areas that we surveyed on **Dec 31/2021**.

Location	Volume	Total Volume in Cell
Cell 3C(5)	11,824 cu/m (added)	329,940 cu/m
Cell 3D(6)	1,322 cu/m (added)	285,399 cu/m
Cell 4	39,019 cu/m (added)	222,442 cu/m

Volume reported on July 2, 2021

Cell 3C total volume on Jun 30/21 was: 318,116 cu/m

Cell 3D total volume on Jun 30/21 was: 284,077 cu/m

Cell 4 total volume on Jun 30/21 was: 183,423 cu/m

Maximum Elevation of Cell 3C= 713.68m

Maximum Elevation of Cell 3D= 713.48m

Maximum Elevation of Cell 4= 703.60m

Yours truly,

Challenger Geomatics Ltd.

Andriy Vasynda, ALS, CLS

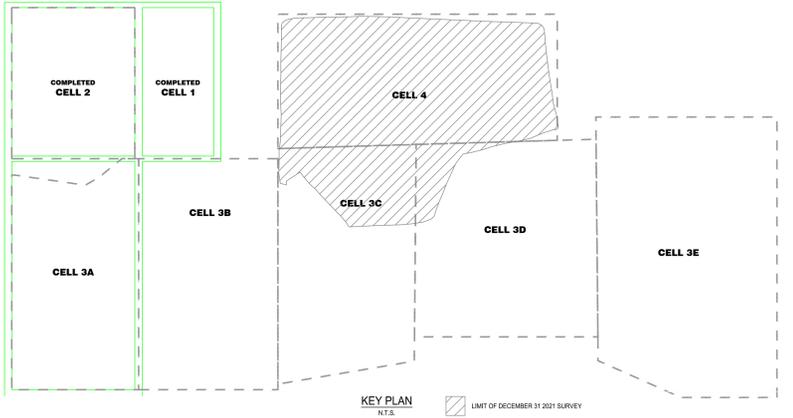
Project Manager

SITE SURVEY ELEVATIONS
FOR
CELL 3C, 3D & 4

RYLEY, ALBERTA

DRAWN BY: HWA/2019/06/04	DATE: JANUARY 4, 2022	SCALE: (Metric)
CHECKED BY: AH		1:500
	JOB No.: 10265	REV. 0

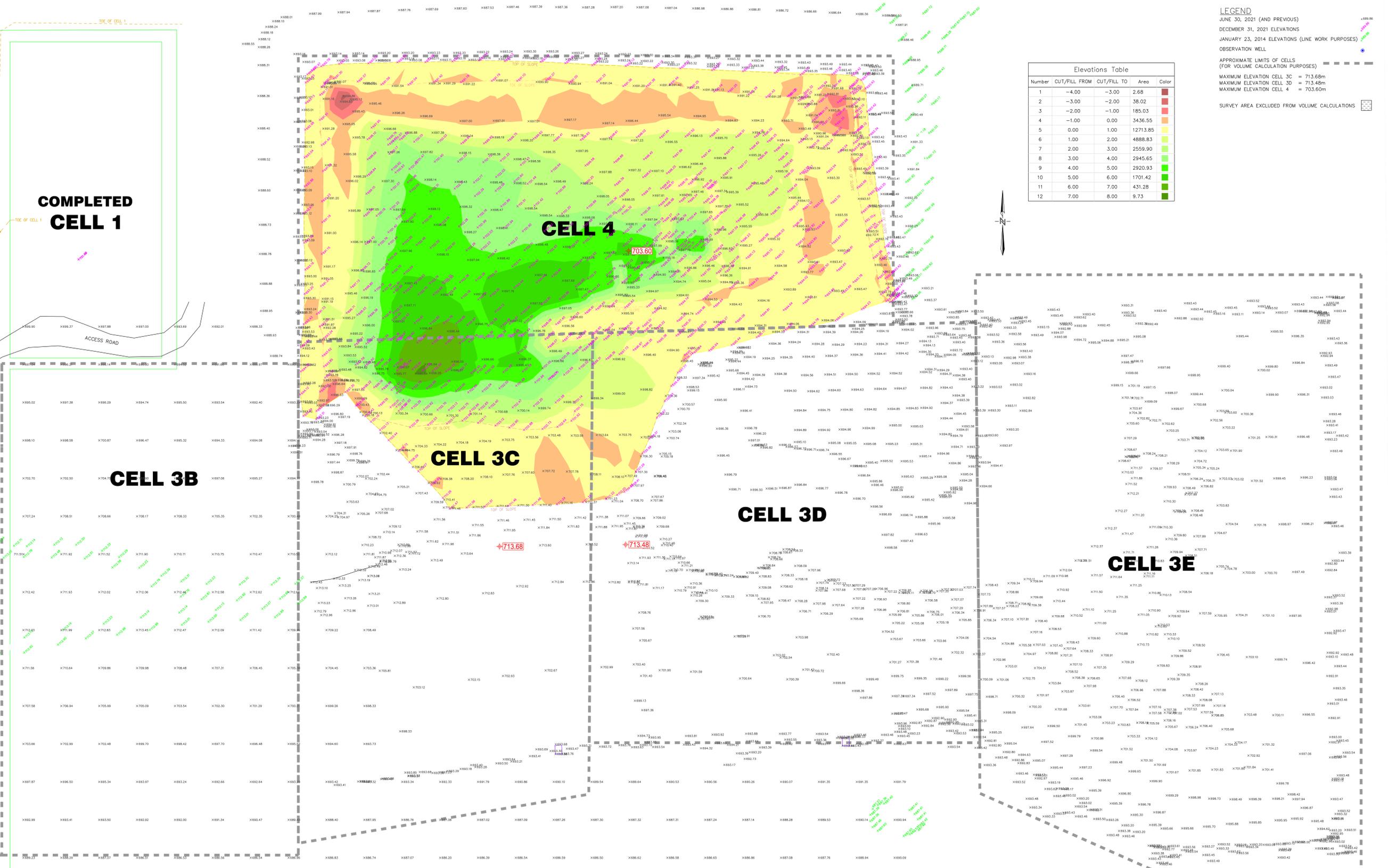
WELL OBSERVATION COORDINATES				
WELL	NORTHING	EASTING	ELEVATION (TOP OF PIPE)	ELEVATION (GROUND)
19MW38B	995.96	1459.70	687.96	687.02
19MW38A	995.91	1456.10	687.97	687.09
19MW37B	1003.00	1261.59	686.59	685.59
19MW37A	1003.78	1260.72	686.94	686.00



Parcel Volume Table - Unadjusted			
Parcel	Cut Cu.M.	Fill Cu.M.	Net Cu.M.
CELL 3C	113	11937	11824(F)
CELL 3D	13	1335	1322(F)
CELL 4	906	39925	39019(F)

LEGEND
 JUNE 30, 2021 (AND PREVIOUS)
 DECEMBER 31, 2021 ELEVATIONS
 JANUARY 23, 2021 ELEVATIONS (LINE WORK PURPOSES)
 OBSERVATION WELL
 APPROXIMATE LIMITS OF CELLS (FOR VOLUME CALCULATION PURPOSES)
 MAXIMUM ELEVATION CELL 3C = 713.68m
 MAXIMUM ELEVATION CELL 3D = 713.48m
 MAXIMUM ELEVATION CELL 4 = 703.60m
 SURVEY AREA EXCLUDED FROM VOLUME CALCULATIONS

Elevations Table				
Number	CUT/FILL FROM	CUT/FILL TO	Area	Color
1	-4.00	-3.00	2.68	Red
2	-3.00	-2.00	38.02	Orange
3	-2.00	-1.00	185.03	Yellow-Orange
4	-1.00	0.00	3436.55	Yellow
5	0.00	1.00	12713.85	Light Green
6	1.00	2.00	4888.83	Green
7	2.00	3.00	2559.90	Dark Green
8	3.00	4.00	2945.65	Very Dark Green
9	4.00	5.00	2920.93	Black
10	5.00	6.00	1701.42	Black
11	6.00	7.00	431.28	Black
12	7.00	8.00	9.73	Black



COMPLETED CELL 1

CELL 4

CELL 3C

CELL 3D

CELL 3E

703.60

+713.68

+713.48



Appendix C

Leachate Head Table

Date	Cell 2 Head Level (m)	Cell 3A Head Level (m)	Cell 3B Head Level (m)	Cell 3C Head Level (m)	Cell 3D Head Level (m)	Cell 3E Head Level (m)	Cell 4 Head Level (m)	Precipitation (mm)
Maximum Acceptable Leachate Head	1.0	1.0	1.0	1.0	0.30	0.3	0.30	
1-Jan-21			Last precip Dec. 28th					
2-Jan-21								
3-Jan-21								
4-Jan-21	0.19	0.20	0.18	1.83	0.19	2.79	0.85	
5-Jan-21	0.25	0.22	0.19	1.88	0.20	2.91	0.17	
6-Jan-21	0.23	0.23	0.19	0.32	0.20	3.05	0.02	
7-Jan-21	0.23	0.21	0.19	0.27	0.20	3.04	0.00	
8-Jan-21	0.30	0.20	0.18	0.24	0.20	3.15	0.00	1
9-Jan-21								
10-Jan-21								
11-Jan-21	0.23	0.20	0.18	0.67	0.20	3.68	0.02	
12-Jan-21	0.24	0.19	0.17	1.07	0.19	3.81	0.00	
13-Jan-21	0.24	0.21	0.18	0.40	0.19	4.03	0.10	
14-Jan-21	0.27	0.22	0.20	0.28	0.21	3.85	0.01	1
15-Jan-21	0.27	0.21	0.19	0.22	0.20	3.98	0.00	
16-Jan-21								
17-Jan-21								
18-Jan-21	0.34	0.20	0.18	0.19	0.19	2.51	0.00	1
19-Jan-21	0.24	0.17	0.17	0.19	0.19	1.62	0.00	
20-Jan-21	0.27	0.21	0.19	0.19	0.20	1.22	0.00	
21-Jan-21	0.28	0.20	0.18	0.19	0.20	0.91	0.00	
22-Jan-21	0.28	0.20	0.18	0.19	0.20	0.78	0.00	3
23-Jan-21								
24-Jan-21								
25-Jan-21	0.29	0.21	0.18	0.19	0.19	0.60	0.10	2
26-Jan-21	0.28	0.21	0.18	0.19	0.20	0.39	0.14	10
27-Jan-21	0.26	0.20	0.18	0.18	0.19	0.36	0.00	40
28-Jan-21	0.28	0.20	0.18	0.18	0.19	0.34	0.05	20
29-Jan-21	0.28	0.20	0.15	0.19	0.20	0.34	0.00	
30-Jan-21								
31-Jan-21								
1-Feb-21	0.29	0.21	0.19	0.19	0.20	0.29	0.00	

Date	Cell 2 Head Level (m)	Cell 3A Head Level (m)	Cell 3B Head Level (m)	Cell 3C Head Level (m)	Cell 3D Head Level (m)	Cell 3E Head Level (m)	Cell 4 Head Level (m)	Precipitation (mm)
Maximum Acceptable Leachate Head	1.0	1.0	1.0	1.0	0.30	0.3	0.30	
2-Feb-21	0.28	0.20	0.18	0.19	0.19	0.27	0.00	
3-Feb-21	0.30	0.21	0.19	0.20	0.20	0.26	0.00	10
4-Feb-21	0.30	0.20	0.18	0.19	0.20	0.25	0.00	1
5-Feb-21	0.29	0.20	0.19	0.19	0.19	0.23	0.00	1
6-Feb-21								
7-Feb-21								
8-Feb-21	0.30	0.21	0.19	0.20	0.22	0.20	0.00	
9-Feb-21	0.29	0.20	0.19	0.19	0.19	0.17	0.00	
10-Feb-21	0.30	0.20	0.18	0.19	0.19	0.16	0.00	
11-Feb-21	0.30	0.21	0.19	0.19	0.21	0.16	0.00	
12-Feb-21	0.32	0.21	0.19	0.19	0.23	0.14	0.00	
13-Feb-21								
14-Feb-21								
15-Feb-21								
16-Feb-21	0.31	0.21	0.18	0.19	1.28	0.11	0.00	
17-Feb-21	0.33	0.21	0.19	0.19	1.52	0.10	0.00	
18-Feb-21	0.33	0.19	0.18	0.18	1.78	0.09	0.00	
19-Feb-21	0.35	0.21	0.19	0.20	2.17	0.09	0.00	
20-Feb-21	0.34	0.22	0.19	0.20	2.68	0.12	0.00	
21-Feb-21								
22-Feb-21								
23-Feb-21	0.34	0.21	0.19	0.19	1.96	0.12	0.00	
24-Feb-21	0.34	0.21	0.18	0.19	0.18	0.12	0.00	2
25-Feb-21	0.32	0.19	0.18	0.21	0.18	0.11	0.00	
26-Feb-21	0.36	0.22	0.19	0.20	0.19	0.11	0.00	10
27-Feb-21								
28-Feb-21								
1-Mar-21	0.32	0.20	0.18	0.19	0.19	0.07	0.00	3
2-Mar-21	0.32	0.20	0.16	0.19	0.18	0.11	0.00	
3-Mar-21	0.31	0.21	0.18	0.22	0.18	0.17	0.00	
4-Mar-21	0.32	0.20	0.18	0.20	0.17	0.23	0.00	
5-Mar-21	0.30	0.20	0.18	0.19	0.17	0.28	0.00	

Date	Cell 2 Head Level (m)	Cell 3A Head Level (m)	Cell 3B Head Level (m)	Cell 3C Head Level (m)	Cell 3D Head Level (m)	Cell 3E Head Level (m)	Cell 4 Head Level (m)	Precipitation (mm)
Maximum Acceptable Leachate Head	1.0	1.0	1.0	1.0	0.30	0.3	0.30	
6-Mar-21								
7-Mar-21								
8-Mar-21	0.30	0.21	0.19	0.37	0.20	0.43	0.00	
9-Mar-21	0.36	0.19	0.18	0.75	0.19	0.47	0.00	
10-Mar-21	0.61	0.22	0.19	0.91	0.19	0.52	0.00	1
11-Mar-21	0.94	0.20	0.18	0.29	0.19	0.57	0.00	
12-Mar-21	1.28	0.21	0.19	0.24	0.20	0.63	0.03	
13-Mar-21								
14-Mar-21								
15-Mar-21	1.72	0.22	0.19	0.12	0.19	0.98	0.14	
16-Mar-21	1.77	0.21	0.19	0.20	0.20	0.99	0.16	
17-Mar-21	1.81	0.20	0.18	0.19	0.20	0.97	0.01	
18-Mar-21	1.86	0.21	0.18	0.19	0.20	0.99	0.02	
19-Mar-21	1.91	0.21	0.18	0.19	0.20	1.01	0.07	
20-Mar-21								
21-Mar-21								
22-Mar-21	0.31	0.20	0.18	0.19	0.19	0.93	0.16	
23-Mar-21	0.29	0.20	0.18	0.19	0.19	0.83	0.07	
24-Mar-21	0.29	0.19	0.17	0.18	0.19	0.90	0.01	1
25-Mar-21	0.31	0.20	0.18	0.19	0.19	0.83	0.04	1
26-Mar-21	0.31	0.21	0.18	0.19	0.20	0.72	0.00	1
27-Mar-21								
28-Mar-21								
29-Mar-21	0.34	0.23	0.21	0.21	0.21	1.01	0.01	30
30-Mar-21	0.31	0.21	0.19	0.19	0.20	1.02	0.00	
31-Mar-21	0.30	0.20	0.18	0.19	0.19	0.27	0.00	
1-Apr-21	0.30	0.19	0.18	0.19	0.20	0.14	0.00	
2-Apr-21								
3-Apr-21								
4-Apr-21								
5-Apr-21	0.31	0.20	0.18	0.19	0.20	0.27	0.07	2
6-Apr-21	0.31	0.20	0.18	0.19	0.19	0.24	0.00	

Date	Cell 2 Head Level (m)	Cell 3A Head Level (m)	Cell 3B Head Level (m)	Cell 3C Head Level (m)	Cell 3D Head Level (m)	Cell 3E Head Level (m)	Cell 4 Head Level (m)	Precipitation (mm)
Maximum Acceptable Leachate Head	1.0	1.0	1.0	1.0	0.30	0.3	0.30	
9-May-21								
10-May-21	0.33	0.20	0.18	0.19	0.16	0.31	0.00	7
11-May-21	0.33	0.20	0.18	0.19	0.17	0.26	0.00	
12-May-21	0.34	0.20	0.18	0.19	0.17	0.25	0.00	
13-May-21	0.38	0.22	0.11	0.19	0.19	0.00	0.00	
14-May-21	0.36	0.21	0.10	0.20	0.20	0.12	0.00	
15-May-21								
16-May-21								
17-May-21	0.30	0.20	0.10	0.20	0.20	0.30	0.00	
18-May-21	0.32	0.19	0.09	0.19	0.20	0.00	0.00	10
19-May-21	0.32	0.22	0.11	0.21	0.25	0.00	0.02	12
20-May-21	0.31	0.21	0.10	0.20	0.20	0.09	0.00	
21-May-21	0.30	0.20	0.09	0.19	0.19	0.14	0.00	
22-May-21								
23-May-21								
24-May-21								
25-May-21	0.34	0.22	0.10	0.20	0.20	0.28	0.02	10
26-May-21	0.30	0.21	0.10	0.19	0.20	0.22	0.00	
27-May-21	0.33	0.20	0.09	0.19	0.19	0.26	0.00	
28-May-21	0.32	0.21	0.11	0.20	0.20	0.26	0.00	
29-May-21								
30-May-21								
31-May-21	0.30	0.21	0.10	0.20	0.20	0.00	0.00	
1-Jun-21	0.28	0.20	0.09	0.19	0.19	0.00	0.00	
2-Jun-21	0.30	0.21	0.10	0.20	0.20	0.00	0.00	
3-Jun-21	0.32	0.20	0.09	0.19	0.20	0.00	0.00	
4-Jun-21	0.32	0.19	0.09	0.19	0.21	0.00	0.00	
5-Jun-21								
6-Jun-21								
7-Jun-21	0.31	0.21	0.10	0.19	0.20	0.00	0.00	
8-Jun-21	0.31	0.21	0.10	0.20	0.20	0.00	0.00	2
9-Jun-21	0.32	0.20	0.09	0.19	0.20	0.00	0.00	1

Date	Cell 2 Head Level (m)	Cell 3A Head Level (m)	Cell 3B Head Level (m)	Cell 3C Head Level (m)	Cell 3D Head Level (m)	Cell 3E Head Level (m)	Cell 4 Head Level (m)	Precipitation (mm)
Maximum Acceptable Leachate Head	1.0	1.0	1.0	1.0	0.30	0.3	0.30	
12-Jul-21	0.25	0.21	0.10	0.20	0.20	0.00	0.00	
13-Jul-21	0.25	0.20	0.09	0.19	0.20	0.00	0.00	
14-Jul-21	0.26	0.19	0.09	0.19	0.20	0.00	0.00	
15-Jul-21	0.29	0.21	0.09	0.20	0.20	0.00	0.00	
16-Jul-21	0.27	0.22	0.09	0.18	0.20	0.00	0.00	
17-Jul-21								
18-Jul-21								
19-Jul-21	0.18	0.20	0.07	0.19	0.19	0.09	0.00	
20-Jul-21	0.19	0.20	0.09	0.19	0.20	0.00	0.00	1
21-Jul-21	0.19	0.19	0.09	0.19	0.20	0.00	0.00	3
22-Jul-21	0.20	0.21	0.09	0.20	0.20	0.00	0.00	1
23-Jul-21	0.14	0.20	0.09	0.19	0.19	0.00	0.00	25
24-Jul-21								
25-Jul-21								
26-Jul-21	0.12	0.20	0.09	0.19	0.20	0.00	0.00	3
27-Jul-21	0.00	0.21	0.09	0.19	0.20	0.00	0.00	
28-Jul-21	0.00	0.21	0.09	0.19	0.20	0.00	0.00	
29-Jul-21	0.00	0.21	0.09	0.20	0.20	0.00	0.00	
30-Jul-21	0.00	0.20	0.09	0.20	0.20	0.00	0.00	
31-Jul-21								
1-Aug-21								
2-Aug-21								
3-Aug-21	0.00	0.21	0.09	0.20	0.20	0.00	0.00	1
4-Aug-21	0.00	0.20	0.09	0.19	0.20	0	0.00	
5-Aug-21	0.00	0.20	0.08	0.19	0.19	0.00	0.00	
6-Aug-21	0.00	0.20	0.09	0.19	0.20	0.00	0.00	
7-Aug-21								
8-Aug-21								
9-Aug-21	0.00	0.20	0.08	0.19	0.20	0.00	0.00	
10-Aug-21	0.05	0.20	0.09	0.19	0.19	0.00	0.00	1
11-Aug-21	0.00	0.22	0.10	0.20	0.20	0.00	0.00	
12-Aug-21	0.00	0.21	0.09	0.20	0.20	0.00	0.00	

Date	Cell 2 Head Level (m)	Cell 3A Head Level (m)	Cell 3B Head Level (m)	Cell 3C Head Level (m)	Cell 3D Head Level (m)	Cell 3E Head Level (m)	Cell 4 Head Level (m)	Precipitation (mm)
Maximum Acceptable Leachate Head	1.0	1.0	1.0	1.0	0.30	0.3	0.30	
13-Aug-21	0.00	0.21	0.08	0.20	0.20	0.00	0.00	
14-Aug-21								
15-Aug-21								
16-Aug-21	0.00	0.21	0.09	0.20	0.20	0.00	0.00	
17-Aug-21	0.00	0.20	0.08	0.19	0.19	0.00	0.00	2
18-Aug-21	0.00	0.20	0.08	0.19	0.20	0.00	0.00	
19-Aug-21	0.00	0.21	0.08	0.20	0.20	0.00	0.00	
20-Aug-21	0.00	0.20	0.08	0.19	0.20	0.00	0.00	1
21-Aug-21								
22-Aug-21								
23-Aug-21	0.08	0.20	0.08	0.19	0.19	0.00	0.00	51
24-Aug-21	0.28	0.20	0.08	0.19	0.20	0.00	0.00	51
25-Aug-21	0.03	0.20	0.08	0.19	0.19	0.00	0.00	
26-Aug-21	0.22	0.21	0.08	0.20	0.20	0.00	0.00	
27-Aug-21	0.54	0.20	0.10	0.19	0.19	0.00	0.00	
28-Aug-21								
29-Aug-21								
30-Aug-21	1.00	0.20	0.08	0.19	0.20	0.00	0.00	
31-Aug-21	1.08	0.21	0.08	0.19	0.20	0.00	0.00	
1-Sep-21	1.14	0.21	0.08	0.20	0.20	0.00	0.00	
2-Sep-21	1.19	0.21	0.08	0.17	0.20	0.00	0.00	3
3-Sep-21	1.21	0.21	0.08	0.20	0.20	0.00	0.00	
4-Sep-21								
5-Sep-21								
6-Sep-21								
7-Sep-21	1.29	0.21	0.08	0.20	0.20	0.00	0.06	
8-Sep-21	0.30	0.21	0.08	0.19	0.15	0.00	0.10	
9-Sep-21	0.00	0.21	0.08	0.20	0.20	0.00	0.17	
10-Sep-21	0.00	0.21	0.08	0.20	0.20	0.00	0.25	3
11-Sep-21								
12-Sep-21								
13-Sep-21	0.00	0.21	0.08	0.20	0.20	0.00	0.11	1

Date	Cell 2 Head Level (m)	Cell 3A Head Level (m)	Cell 3B Head Level (m)	Cell 3C Head Level (m)	Cell 3D Head Level (m)	Cell 3E Head Level (m)	Cell 4 Head Level (m)	Precipitation (mm)
Maximum Acceptable Leachate Head	1.0	1.0	1.0	1.0	0.30	0.3	0.30	
14-Sep-21	0.00	0.20	0.08	0.19	0.20	0.00	0.00	
15-Sep-21	0.00	0.22	0.09	0.20	0.21	0.00	0.00	1
16-Sep-21	0.00	0.21	0.08	0.19	0.20	0.00	0.00	
17-Sep-21	0.00	0.19	0.07	0.18	0.20	0.01	0.00	
18-Sep-21								
19-Sep-21								
20-Sep-21	0.00	0.21	0.08	0.19	0.20	0.00	0.00	
21-Sep-21	0.00	0.20	0.07	0.19	0.19	0.00	0.00	
22-Sep-21	0.00	0.21	0.08	0.19	0.20	0.00	0.00	
23-Sep-21	0.00	0.21	0.08	0.20	0.20	0.00	0.00	6
24-Sep-21	0.00	0.14	0.01	0.14	0.15	0.00	0.00	
25-Sep-21								
26-Sep-21								
27-Sep-21	0.00	0.21	0.08	0.20	0.20	0.00	0.00	
28-Sep-21	0.00	0.20	0.08	0.20	0.20	0.00	0.00	
29-Sep-21	0.00	0.21	0.08	0.20	0.20	0.00	0.00	
30-Sep-21								
1-Oct-21	0.00	0.21	0.08	0.19	0.20	0.00	0.00	
2-Oct-21								
3-Oct-21								
4-Oct-21	0.00	0.20	0.07	0.19	0.20	0.00	0.00	
5-Oct-21	0.00	0.20	0.07	0.20	0.20	0.00	0.00	
6-Oct-21	0.00	0.22	0.09	0.20	0.20	0.00	0.00	
7-Oct-21	0.00	0.22	0.08	0.20	0.20	0.00	0.00	
8-Oct-21	0.00	0.21	0.08	0.20	0.20	0.00	0.00	
9-Oct-21								
10-Oct-21								
11-Oct-21								
12-Oct-21	0.00	0.19	0.06	0.19	0.19	0.00	0.00	
13-Oct-21	0.00	0.21	0.08	0.20	0.20	0.00	0.00	
14-Oct-21	0.00	0.21	0.08	0.20	0.20	0.00	0.00	
15-Oct-21	0.00	0.20	0.07	0.19	0.20	0.00	0.00	

Date	Cell 2 Head Level (m)	Cell 3A Head Level (m)	Cell 3B Head Level (m)	Cell 3C Head Level (m)	Cell 3D Head Level (m)	Cell 3E Head Level (m)	Cell 4 Head Level (m)	Precipitation (mm)
Maximum Acceptable Leachate Head	1.0	1.0	1.0	1.0	0.30	0.3	0.30	
16-Oct-21								
17-Oct-21								
18-Oct-21	0.00	0.22	0.08	0.20	0.20	0.00	0.00	
19-Oct-21	0.00	0.21	0.07	0.19	0.20	0.00	0.00	
20-Oct-21	0.00	0.21	0.08	0.20	0.21	0.00	0.00	
21-Oct-21	0.00	0.22	0.08	0.20	0.20	0.00	0.00	
22-Oct-21	0.00	0.20	0.06	0.19	0.20	0.00	0.00	
23-Oct-21								
24-Oct-21								
25-Oct-21	0.00	0.20	0.06	0.19	0.20	0.00	0.00	10
26-Oct-21	0.00	0.20	0.07	0.20	0.20	0.00	0.00	6
27-Oct-21	0.00	0.12	0.08	0.20	0.21	0.00	0.00	
28-Oct-21	0.00	0.22	0.07	0.20	0.12	0.00	0.00	
29-Oct-21	0.00	0.22	0.08	0.20	0.21	0.00	0.00	
30-Oct-21								
31-Oct-21								
1-Nov-21	0.00	0.20	0.07	0.20	0.27	0.00	0.00	
2-Nov-21	0.00	0.20	0.06	0.23	0.19	0.00	0.00	
3-Nov-21	0.00	0.20	0.06	0.27	0.20	0.00	0.00	
4-Nov-21	0.00	0.20	0.06	0.26	0.20	0.00	0.00	
5-Nov-21	0.00	0.21	0.07	0.25	0.21	0.00	0.00	
6-Nov-21								
7-Nov-21								
8-Nov-21	0.00	0.21	0.07	0.21	0.20	0.00	0.00	
9-Nov-21	0.00	0.18	0.06	0.20	0.20	0.00	0.00	
10-Nov-21	0.00	0.21	0.07	0.19	0.20	0.00	0.00	
11-Nov-21	0.00	0.21	0.07	0.18	0.20	0.00	0.00	1
12-Nov-21	0.00	0.11	0.04	0.19	0.20	0.00	0.00	
13-Nov-21								
14-Nov-21								
15-Nov-21	0.00	0.20	0.05	0.18	0.20	0.00	0.00	1
16-Nov-21	0.00	0.26	0.11	0.22	0.22	0.00	0.00	100

Appendix D

Primary Leachate Analyses

Clean Harbors Canada, Inc. - Approval 10348-02							
2021 Annual Report							
Section 1.5 Primary Leachate							
Field pH & Electrical Conductivity Measurements							
	Qtr 1				Qtr 2		
	Date	pH	Conductivity (uS/cm)		Date	pH	Conductivity (uS/cm)
Cell 1	Not Sampled			Cell 1	Not Sampled		
Cell 2	2021-03-01	8.2	38260	Cell 2	2021-06-28	8.4	40040
Cell 3A	2021-03-01	7.1	14580	Cell 3A	2021-06-28	7.5	28360
Cell 3B	2021-03-01	9.4	41870	Cell 3B	2021-06-28	9.4	44590
Cell 3C	2021-03-01	8.7	14850	Cell 3C	2021-06-28	8.7	15340
Cell 3D	2021-03-01	8.0	20580	Cell 3D	2021-06-28	8.0	20780
Cell 3E	2021-03-16	8.6	19480	Cell 3E	2021-06-28	7.9	14560
Cell 4	2021-03-01	7.2	17800	Cell 4	2021-06-28	7.3	11120
	Qtr 3				Qtr 4		
	Date	pH	Conductivity (uS/cm)		Date	pH	Conductivity (uS/cm)
Cell 1	2021-09-27	7.5	18620	Cell 1	2021-11-30	7.5	19850
Cell 2	2021-09-27	8.4	41260	Cell 2	2021-11-30	8.3	30820
Cell 3A	2021-09-27	7.5	31150	Cell 3A	2021-11-30	7.4	30440
Cell 3B	2021-09-27	9.4	45030	Cell 3B	2021-11-30	9.3	46090
Cell 3C	2021-09-27	8.6	16510	Cell 3C	2021-11-15	8.4	18100
Cell 3D	2021-09-27	8.0	20720	Cell 3D	2021-11-15	7.8	21730
Cell 3E	2021-09-27	8.0	14720	Cell 3E	2021-11-15	7.8	15480

Appendix D
Primary Leachate Analyses
Quarter 1



Clean Harbors Canada Inc.
ATTN: Todd Webb
PO BOX 390
RYLEY AB TOB 4A0

Date Received: 02-MAR-21
Report Date: 09-MAR-21 16:52 (MT)
Version: FINAL

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2562631
Project P.O. #: 215319RY
Job Reference: PRIMARY LEACHATE QTR 1
C of C Numbers:
Legal Site Desc:


Kieran Tordoff
Account Manager

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ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562631-1 PRIMARY LEACHATE CELL 2 (PC2)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0604		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Toluene	0.0102		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
EthylBenzene	0.00076		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
m+p-Xylene	0.00277		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
o-Xylene	0.00268		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Styrene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
F1(C6-C10)	0.58		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
F1-BTEX	0.51		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
Xylenes	0.00545		0.00071	mg/L	04-MAR-21	08-MAR-21	R5362917
Surrogate: 1,4-Difluorobenzene (SS)	104.8		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 4-Bromofluorobenzene (SS)	98.0		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 3,4-Dichlorotoluene (SS)	97.7		70-130	%	04-MAR-21	08-MAR-21	R5362917
F2 (>C10-C16)							
F2 (C10-C16)	0.92		0.10	mg/L	03-MAR-21	03-MAR-21	R5396738
Surrogate: 2-Bromobenzotrifluoride	99.6		60-140	%	03-MAR-21	03-MAR-21	R5396738
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.296		0.010	mg/L		03-MAR-21	R5396047
Miscellaneous Parameters							
Ammonia, Total (as N)	894	DLHC	50	mg/L		07-MAR-21	R5397710
Chemical Oxygen Demand	7360	DLHC	50	mg/L		06-MAR-21	R5397663
Hexavalent Chromium-Dissolved	<0.0025	DLM	0.0025	mg/L		03-MAR-21	R5396539
Dissolved Organic Carbon	1230	DLHC	20	mg/L		07-MAR-21	R5398156
Phenols (4AAP)	4.02	DLHC	0.20	mg/L		03-MAR-21	R5397134
Total Kjeldahl Nitrogen	875	DLHC	20	mg/L	03-MAR-21	05-MAR-21	R5396803
Phosphorus (P)-Total Dissolved	4.28	DLHC	0.50	mg/L		08-MAR-21	R5398171
Total Dissolved Solids	27800	DLHC	80	mg/L		07-MAR-21	R5398192
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		03-MAR-21	R5396156
Phosphorus (P)-Total	3.88	DLHC	0.10	mg/L	04-MAR-21	05-MAR-21	R5397364
Total Suspended Solids	56.8		3.0	mg/L		05-MAR-21	R5397093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	8190	DLDS	50	mg/L		02-MAR-21	R5397105
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-MAR-21	R5395625
Aluminum (Al)-Dissolved	0.11		0.10	mg/L		04-MAR-21	R5396704
Antimony (Sb)-Dissolved	0.025		0.010	mg/L		04-MAR-21	R5396704
Arsenic (As)-Dissolved	0.046		0.010	mg/L		04-MAR-21	R5396704
Barium (Ba)-Dissolved	1.48		0.010	mg/L		04-MAR-21	R5396704
Beryllium (Be)-Dissolved	<0.010	DLDS	0.010	mg/L		04-MAR-21	R5396704
Bismuth (Bi)-Dissolved	<0.0050	DLDS	0.0050	mg/L		04-MAR-21	R5396704
Boron (B)-Dissolved	50.7		1.0	mg/L		04-MAR-21	R5396704
Cadmium (Cd)-Dissolved	0.00133		0.00050	mg/L		04-MAR-21	R5396704
Calcium (Ca)-Dissolved	60.6		5.0	mg/L		04-MAR-21	R5396704
Cesium (Cs)-Dissolved	0.0017		0.0010	mg/L		04-MAR-21	R5396704
Chromium (Cr)-Dissolved	0.242		0.010	mg/L		04-MAR-21	R5396704
Cobalt (Co)-Dissolved	<0.010	DLDS	0.010	mg/L		04-MAR-21	R5396704
Copper (Cu)-Dissolved	<0.020	DLDS	0.020	mg/L		04-MAR-21	R5396704
Iron (Fe)-Dissolved	<1.0	DLDS	1.0	mg/L		04-MAR-21	R5396704
Lead (Pb)-Dissolved	<0.0050	DLDS	0.0050	mg/L		04-MAR-21	R5396704

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562631-1 PRIMARY LEACHATE CELL 2 (PC2) Sampled By: CLIENT on 01-MAR-21 Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	6.86		0.10	mg/L		04-MAR-21	R5396704
Magnesium (Mg)-Dissolved	407		0.50	mg/L		04-MAR-21	R5396704
Manganese (Mn)-Dissolved	1.12		0.010	mg/L		04-MAR-21	R5396704
Molybdenum (Mo)-Dissolved	5.45		0.0050	mg/L		04-MAR-21	R5396704
Nickel (Ni)-Dissolved	0.275		0.050	mg/L		04-MAR-21	R5396704
Phosphorus (P)-Dissolved	5.6		5.0	mg/L		04-MAR-21	R5396704
Potassium (K)-Dissolved	1080		5.0	mg/L		04-MAR-21	R5396704
Rubidium (Rb)-Dissolved	0.180		0.020	mg/L		04-MAR-21	R5396704
Selenium (Se)-Dissolved	0.0557		0.0050	mg/L		04-MAR-21	R5396704
Silicon (Si)-Dissolved	9.8		5.0	mg/L		04-MAR-21	R5396704
Silver (Ag)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Sodium (Na)-Dissolved	7700		5.0	mg/L		04-MAR-21	R5396704
Strontium (Sr)-Dissolved	4.40		0.020	mg/L		04-MAR-21	R5396704
Sulfur (S)-Dissolved	602		50	mg/L		04-MAR-21	R5396704
Tellurium (Te)-Dissolved	<0.020	DLDS	0.020	mg/L		04-MAR-21	R5396704
Thallium (Tl)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Thorium (Th)-Dissolved	<0.010	DLDS	0.010	mg/L		04-MAR-21	R5396704
Tin (Sn)-Dissolved	<0.010	DLDS	0.010	mg/L		04-MAR-21	R5396704
Titanium (Ti)-Dissolved	0.136		0.030	mg/L		04-MAR-21	R5396704
Tungsten (W)-Dissolved	14.6		0.010	mg/L		04-MAR-21	R5396704
Uranium (U)-Dissolved	0.0017		0.0010	mg/L		04-MAR-21	R5396704
Vanadium (V)-Dissolved	0.502		0.050	mg/L		04-MAR-21	R5396704
Zinc (Zn)-Dissolved	<0.10	DLDS	0.10	mg/L		04-MAR-21	R5396704
Zirconium (Zr)-Dissolved	0.237		0.020	mg/L		04-MAR-21	R5396704
Fluoride in Water by IC							
Fluoride (F)	<2.0	DLDS	2.0	mg/L		02-MAR-21	R5397105
Ion Balance Calculation							
Ion Balance	95.7			%		07-MAR-21	
TDS (Calculated)	25400			mg/L		07-MAR-21	
Hardness (as CaCO3)	1830			mg/L		07-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	<2.0	DLDS	2.0	mg/L		02-MAR-21	R5397105
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<2.2		2.2	mg/L		05-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<1.0	DLDS	1.0	mg/L		02-MAR-21	R5397105
Sulfate in Water by IC							
Sulfate (SO4)	915	DLDS	30	mg/L		02-MAR-21	R5397105
pH, Conductivity and Total Alkalinity							
pH	8.54		0.10	pH		03-MAR-21	R5396436
Conductivity (EC)	34400		2.0	uS/cm		03-MAR-21	R5396436
Bicarbonate (HCO3)	13000	DLHC	50	mg/L		03-MAR-21	R5396436
Carbonate (CO3)	618	DLHC	50	mg/L		03-MAR-21	R5396436
Hydroxide (OH)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Alkalinity, Total (as CaCO3)	11700	DLHC	20	mg/L		03-MAR-21	R5396436
L2562631-2 PRIMARY LEACHATE CELL 3A (PC3A) Sampled By: CLIENT on 01-MAR-21 Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0282		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562631-2 PRIMARY LEACHATE CELL 3A (PC3A)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
Toluene	0.00958		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
EthylBenzene	0.00166		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
m+p-Xylene	0.00353		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
o-Xylene	0.00173		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Styrene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
F1(C6-C10)	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
F1-BTEX	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
Xylenes	0.00526		0.00071	mg/L	04-MAR-21	08-MAR-21	R5362917
Surrogate: 1,4-Difluorobenzene (SS)	94.7		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 4-Bromofluorobenzene (SS)	88.0		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 3,4-Dichlorotoluene (SS)	100.5		70-130	%	04-MAR-21	08-MAR-21	R5362917
F2 (>C10-C16)							
F2 (C10-C16)	0.31		0.10	mg/L	03-MAR-21	03-MAR-21	R5396738
Surrogate: 2-Bromobenzotrifluoride	99.3		60-140	%	03-MAR-21	03-MAR-21	R5396738
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0163		0.0010	mg/L		03-MAR-21	R5396047
Miscellaneous Parameters							
Ammonia, Total (as N)	11.7	DLHC	0.50	mg/L		07-MAR-21	R5397710
Chemical Oxygen Demand	294		10	mg/L		04-MAR-21	R5396619
Hexavalent Chromium-Dissolved	<0.0025	DLM	0.0025	mg/L		03-MAR-21	R5396539
Dissolved Organic Carbon	95.7		1.0	mg/L		07-MAR-21	R5398156
Phenols (4AAP)	0.055	DLM	0.020	mg/L		03-MAR-21	R5397134
Total Kjeldahl Nitrogen	17.0	DLM	2.0	mg/L	03-MAR-21	05-MAR-21	R5396803
Phosphorus (P)-Total Dissolved	0.110	DLHC	0.050	mg/L		08-MAR-21	R5398171
Total Dissolved Solids	12800	DLHC	80	mg/L		07-MAR-21	R5398192
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		03-MAR-21	R5396156
Phosphorus (P)-Total	0.292		0.020	mg/L	04-MAR-21	05-MAR-21	R5397364
Total Suspended Solids	57.8		3.0	mg/L		05-MAR-21	R5397093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	266	DLDS	2.5	mg/L		02-MAR-21	R5397105
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-MAR-21	R5395625
Aluminum (Al)-Dissolved	0.018		0.010	mg/L		04-MAR-21	R5396704
Antimony (Sb)-Dissolved	0.0033		0.0010	mg/L		04-MAR-21	R5396704
Arsenic (As)-Dissolved	0.0080		0.0010	mg/L		04-MAR-21	R5396704
Barium (Ba)-Dissolved	0.157		0.0010	mg/L		04-MAR-21	R5396704
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Boron (B)-Dissolved	0.88		0.10	mg/L		04-MAR-21	R5396704
Cadmium (Cd)-Dissolved	0.000129		0.000050	mg/L		04-MAR-21	R5396704
Calcium (Ca)-Dissolved	407		0.50	mg/L		04-MAR-21	R5396704
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Chromium (Cr)-Dissolved	0.0068		0.0010	mg/L		04-MAR-21	R5396704
Cobalt (Co)-Dissolved	0.0085		0.0010	mg/L		04-MAR-21	R5396704
Copper (Cu)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Iron (Fe)-Dissolved	1.19		0.10	mg/L		04-MAR-21	R5396704
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Lithium (Li)-Dissolved	0.491		0.010	mg/L		04-MAR-21	R5396704
Magnesium (Mg)-Dissolved	302		0.10	mg/L		04-MAR-21	R5396704

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562631-2 PRIMARY LEACHATE CELL 3A (PC3A) Sampled By: CLIENT on 01-MAR-21 Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Manganese (Mn)-Dissolved	5.44		0.0010	mg/L		04-MAR-21	R5396704
Molybdenum (Mo)-Dissolved	0.582		0.00050	mg/L		04-MAR-21	R5396704
Nickel (Ni)-Dissolved	0.112		0.0050	mg/L		04-MAR-21	R5396704
Phosphorus (P)-Dissolved	<0.50	DLDS	0.50	mg/L		04-MAR-21	R5396704
Potassium (K)-Dissolved	36.0		0.50	mg/L		04-MAR-21	R5396704
Rubidium (Rb)-Dissolved	0.0300		0.0020	mg/L		04-MAR-21	R5396704
Selenium (Se)-Dissolved	0.00130		0.00050	mg/L		04-MAR-21	R5396704
Silicon (Si)-Dissolved	7.38		0.50	mg/L		04-MAR-21	R5396704
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Sodium (Na)-Dissolved	3240		1.0	mg/L		04-MAR-21	R5396704
Strontium (Sr)-Dissolved	5.43		0.0020	mg/L		04-MAR-21	R5396704
Sulfur (S)-Dissolved	3110		5.0	mg/L		04-MAR-21	R5396704
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Titanium (Ti)-Dissolved	0.0038		0.0030	mg/L		04-MAR-21	R5396704
Tungsten (W)-Dissolved	0.210		0.0010	mg/L		04-MAR-21	R5396704
Uranium (U)-Dissolved	0.0398		0.00010	mg/L		04-MAR-21	R5396704
Vanadium (V)-Dissolved	0.0074		0.0050	mg/L		04-MAR-21	R5396704
Zinc (Zn)-Dissolved	0.020		0.010	mg/L		04-MAR-21	R5396704
Zirconium (Zr)-Dissolved	0.0103		0.0020	mg/L		04-MAR-21	R5396704
Fluoride in Water by IC							
Fluoride (F)	1.24	DLDS	0.10	mg/L		02-MAR-21	R5397105
Ion Balance Calculation							
Ion Balance	89.0	BL:INT		%		07-MAR-21	
TDS (Calculated)	13700			mg/L		07-MAR-21	
Hardness (as CaCO3)	2260			mg/L		07-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		02-MAR-21	R5397105
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.11		0.11	mg/L		06-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		02-MAR-21	R5397105
Sulfate in Water by IC							
Sulfate (SO4)	8920	DLDS	30	mg/L		02-MAR-21	R5397105
pH, Conductivity and Total Alkalinity							
pH	7.72		0.10	pH		03-MAR-21	R5396436
Conductivity (EC)	13000		2.0	uS/cm		03-MAR-21	R5396436
Bicarbonate (HCO3)	1090		5.0	mg/L		03-MAR-21	R5396436
Carbonate (CO3)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Hydroxide (OH)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Alkalinity, Total (as CaCO3)	892		2.0	mg/L		03-MAR-21	R5396436
L2562631-3 PRIMARY LEACHATE CELL 3B (PC3B) Sampled By: CLIENT on 01-MAR-21 Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0161		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Toluene	0.0173		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
EthylBenzene	0.00136		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562631-3 PRIMARY LEACHATE CELL 3B (PC3B)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
m+p-Xylene	0.00422		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
o-Xylene	0.00332		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Styrene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
F1(C6-C10)	1.26		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
F1-BTEX	1.21		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
Xylenes	0.00754		0.00071	mg/L	04-MAR-21	08-MAR-21	R5362917
Surrogate: 1,4-Difluorobenzene (SS)	101.3		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 4-Bromofluorobenzene (SS)	110.3		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 3,4-Dichlorotoluene (SS)	79.5		70-130	%	04-MAR-21	08-MAR-21	R5362917
F2 (>C10-C16)							
F2 (C10-C16)	2.62		0.10	mg/L	03-MAR-21	03-MAR-21	R5396738
Surrogate: 2-Bromobenzotrifluoride	103.0		60-140	%	03-MAR-21	03-MAR-21	R5396738
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.359		0.010	mg/L		03-MAR-21	R5396047
Miscellaneous Parameters							
Ammonia, Total (as N)	1710	DLHC	50	mg/L		07-MAR-21	R5397710
Chemical Oxygen Demand	15500	DLHC	200	mg/L		08-MAR-21	R5397663
Hexavalent Chromium-Dissolved	<0.0025	DLM	0.0025	mg/L		03-MAR-21	R5396539
Dissolved Organic Carbon	4580	DLHC	100	mg/L		07-MAR-21	R5398156
Phenols (4AAP)	25.4	DLHC	0.40	mg/L		03-MAR-21	R5397134
Total Kjeldahl Nitrogen	1730	DLHC	200	mg/L	03-MAR-21	04-MAR-21	R5396803
Phosphorus (P)-Total Dissolved	4.38	DLHC	0.50	mg/L		08-MAR-21	R5398171
Total Dissolved Solids	32400	DLHC	80	mg/L		07-MAR-21	R5398192
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		03-MAR-21	R5396156
Phosphorus (P)-Total	4.90	DLHC	0.10	mg/L	04-MAR-21	05-MAR-21	R5397364
Total Suspended Solids	77.6		3.0	mg/L		05-MAR-21	R5397093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	9070	DLDS	50	mg/L		02-MAR-21	R5397105
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-MAR-21	R5395625
Aluminum (Al)-Dissolved	0.27		0.10	mg/L		04-MAR-21	R5396704
Antimony (Sb)-Dissolved	<0.010	DLDS	0.010	mg/L		04-MAR-21	R5396704
Arsenic (As)-Dissolved	0.046		0.010	mg/L		04-MAR-21	R5396704
Barium (Ba)-Dissolved	0.485		0.010	mg/L		04-MAR-21	R5396704
Beryllium (Be)-Dissolved	<0.010	DLDS	0.010	mg/L		04-MAR-21	R5396704
Bismuth (Bi)-Dissolved	<0.0050	DLDS	0.0050	mg/L		04-MAR-21	R5396704
Boron (B)-Dissolved	119		1.0	mg/L		04-MAR-21	R5396704
Cadmium (Cd)-Dissolved	0.00162		0.00050	mg/L		04-MAR-21	R5396704
Calcium (Ca)-Dissolved	22.0		5.0	mg/L		04-MAR-21	R5396704
Cesium (Cs)-Dissolved	0.112		0.0010	mg/L		04-MAR-21	R5396704
Chromium (Cr)-Dissolved	0.310		0.010	mg/L		04-MAR-21	R5396704
Cobalt (Co)-Dissolved	0.022		0.010	mg/L		04-MAR-21	R5396704
Copper (Cu)-Dissolved	<0.020	DLDS	0.020	mg/L		04-MAR-21	R5396704
Iron (Fe)-Dissolved	<1.0	DLDS	1.0	mg/L		04-MAR-21	R5396704
Lead (Pb)-Dissolved	<0.0050	DLDS	0.0050	mg/L		04-MAR-21	R5396704
Lithium (Li)-Dissolved	9.31		0.10	mg/L		04-MAR-21	R5396704
Magnesium (Mg)-Dissolved	61.6		0.50	mg/L		04-MAR-21	R5396704
Manganese (Mn)-Dissolved	0.740		0.010	mg/L		04-MAR-21	R5396704
Molybdenum (Mo)-Dissolved	5.60		0.0050	mg/L		04-MAR-21	R5396704

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562631-3 PRIMARY LEACHATE CELL 3B (PC3B) Sampled By: CLIENT on 01-MAR-21 Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Nickel (Ni)-Dissolved	1.33		0.050	mg/L		04-MAR-21	R5396704
Phosphorus (P)-Dissolved	11.2		5.0	mg/L		04-MAR-21	R5396704
Potassium (K)-Dissolved	3550		5.0	mg/L		04-MAR-21	R5396704
Rubidium (Rb)-Dissolved	5.28		0.020	mg/L		04-MAR-21	R5396704
Selenium (Se)-Dissolved	0.0927		0.0050	mg/L		04-MAR-21	R5396704
Silicon (Si)-Dissolved	46.5		5.0	mg/L		04-MAR-21	R5396704
Silver (Ag)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Sodium (Na)-Dissolved	7800		5.0	mg/L		04-MAR-21	R5396704
Strontium (Sr)-Dissolved	0.874		0.020	mg/L		04-MAR-21	R5396704
Sulfur (S)-Dissolved	688		50	mg/L		04-MAR-21	R5396704
Tellurium (Te)-Dissolved	<0.020	DLDS	0.020	mg/L		04-MAR-21	R5396704
Thallium (Tl)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Thorium (Th)-Dissolved	<0.010	DLDS	0.010	mg/L		04-MAR-21	R5396704
Tin (Sn)-Dissolved	<0.010	DLDS	0.010	mg/L		04-MAR-21	R5396704
Titanium (Ti)-Dissolved	<0.030	DLDS	0.030	mg/L		04-MAR-21	R5396704
Tungsten (W)-Dissolved	3.28		0.010	mg/L		04-MAR-21	R5396704
Uranium (U)-Dissolved	0.0011		0.0010	mg/L		04-MAR-21	R5396704
Vanadium (V)-Dissolved	0.597		0.050	mg/L		04-MAR-21	R5396704
Zinc (Zn)-Dissolved	<0.10	DLDS	0.10	mg/L		04-MAR-21	R5396704
Zirconium (Zr)-Dissolved	0.052		0.020	mg/L		04-MAR-21	R5396704
Fluoride in Water by IC							
Fluoride (F)	<2.0	DLDS	2.0	mg/L		02-MAR-21	R5397105
Ion Balance Calculation							
Ion Balance	108			%		07-MAR-21	
TDS (Calculated)	29000			mg/L		07-MAR-21	
Hardness (as CaCO3)	309			mg/L		07-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	<2.0	DLDS	2.0	mg/L		02-MAR-21	R5397105
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<2.2		2.2	mg/L		05-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<1.0	DLDS	1.0	mg/L		02-MAR-21	R5397105
Sulfate in Water by IC							
Sulfate (SO4)	1430	DLDS	30	mg/L		02-MAR-21	R5397105
pH, Conductivity and Total Alkalinity							
pH	9.38		0.10	pH		03-MAR-21	R5396436
Conductivity (EC)	37400		2.0	uS/cm		03-MAR-21	R5396436
Bicarbonate (HCO3)	6000	DLHC	50	mg/L		03-MAR-21	R5396436
Carbonate (CO3)	4040	DLHC	50	mg/L		03-MAR-21	R5396436
Hydroxide (OH)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Alkalinity, Total (as CaCO3)	11700	DLHC	20	mg/L		03-MAR-21	R5396436
L2562631-4 PRIMARY LEACHATE CELL 3C (PC3C) Sampled By: CLIENT on 01-MAR-21 Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0284		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Toluene	0.411	DLHC	0.025	mg/L	04-MAR-21	08-MAR-21	R5362917
EthylBenzene	0.220		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
m+p-Xylene	0.568	DLHC	0.025	mg/L	04-MAR-21	08-MAR-21	R5362917
o-Xylene	0.345		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562631-4 PRIMARY LEACHATE CELL 3C (PC3C)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
Styrene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
F1(C6-C10)	3.82		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
F1-BTEX	2.24		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
Xylenes	0.913		0.025	mg/L	04-MAR-21	08-MAR-21	R5362917
Surrogate: 1,4-Difluorobenzene (SS)	101.0		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 4-Bromofluorobenzene (SS)	128.3		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 3,4-Dichlorotoluene (SS)	86.2		70-130	%	04-MAR-21	08-MAR-21	R5362917
F2 (>C10-C16)							
F2 (C10-C16)	1.03		0.10	mg/L	03-MAR-21	03-MAR-21	R5396738
Surrogate: 2-Bromobenzotrifluoride	105.2		60-140	%	03-MAR-21	03-MAR-21	R5396738
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0042		0.0010	mg/L		03-MAR-21	R5396047
Miscellaneous Parameters							
Ammonia, Total (as N)	722	DLHC	50	mg/L		07-MAR-21	R5397710
Chemical Oxygen Demand	2340	DLHC	50	mg/L		06-MAR-21	R5397663
Hexavalent Chromium-Dissolved	<0.0025	DLM	0.0025	mg/L		03-MAR-21	R5396539
Dissolved Organic Carbon	585	DLHC	20	mg/L		07-MAR-21	R5398156
Phenols (4AAP)	1.96	DLHC	0.020	mg/L		03-MAR-21	R5397134
Total Kjeldahl Nitrogen	740	DLM	200	mg/L	03-MAR-21	04-MAR-21	R5396803
Phosphorus (P)-Total Dissolved	1.93	DLHC	0.10	mg/L		08-MAR-21	R5398171
Total Dissolved Solids	7540	DLHC	80	mg/L		07-MAR-21	R5398192
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		03-MAR-21	R5396156
Phosphorus (P)-Total	2.03	DLHC	0.10	mg/L	04-MAR-21	05-MAR-21	R5397364
Total Suspended Solids	28.4		3.0	mg/L		05-MAR-21	R5397093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2260	DLDS	50	mg/L		02-MAR-21	R5397105
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-MAR-21	R5395625
Aluminum (Al)-Dissolved	0.031		0.010	mg/L		04-MAR-21	R5396704
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Arsenic (As)-Dissolved	0.0125		0.0010	mg/L		04-MAR-21	R5396704
Barium (Ba)-Dissolved	0.101		0.0010	mg/L		04-MAR-21	R5396704
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Boron (B)-Dissolved	33.9		0.10	mg/L		04-MAR-21	R5396704
Cadmium (Cd)-Dissolved	<0.000050	DLDS	0.000050	mg/L		04-MAR-21	R5396704
Calcium (Ca)-Dissolved	45.4		0.50	mg/L		04-MAR-21	R5396704
Cesium (Cs)-Dissolved	0.00075		0.00010	mg/L		04-MAR-21	R5396704
Chromium (Cr)-Dissolved	0.0037		0.0010	mg/L		04-MAR-21	R5396704
Cobalt (Co)-Dissolved	0.0017		0.0010	mg/L		04-MAR-21	R5396704
Copper (Cu)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Iron (Fe)-Dissolved	0.22		0.10	mg/L		04-MAR-21	R5396704
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Lithium (Li)-Dissolved	1.62		0.010	mg/L		04-MAR-21	R5396704
Magnesium (Mg)-Dissolved	106		0.10	mg/L		04-MAR-21	R5396704
Manganese (Mn)-Dissolved	0.411		0.0010	mg/L		04-MAR-21	R5396704
Molybdenum (Mo)-Dissolved	0.0658		0.00050	mg/L		04-MAR-21	R5396704
Nickel (Ni)-Dissolved	0.383		0.0050	mg/L		04-MAR-21	R5396704
Phosphorus (P)-Dissolved	2.65		0.50	mg/L		04-MAR-21	R5396704

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562631-4 PRIMARY LEACHATE CELL 3C (PC3C) Sampled By: CLIENT on 01-MAR-21 Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Potassium (K)-Dissolved	450		0.50	mg/L		04-MAR-21	R5396704
Rubidium (Rb)-Dissolved	0.272		0.0020	mg/L		04-MAR-21	R5396704
Selenium (Se)-Dissolved	0.0267		0.00050	mg/L		04-MAR-21	R5396704
Silicon (Si)-Dissolved	9.68		0.50	mg/L		04-MAR-21	R5396704
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Sodium (Na)-Dissolved	2070		1.0	mg/L		04-MAR-21	R5396704
Strontium (Sr)-Dissolved	0.320		0.0020	mg/L		04-MAR-21	R5396704
Sulfur (S)-Dissolved	481		5.0	mg/L		04-MAR-21	R5396704
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		04-MAR-21	R5396704
Tungsten (W)-Dissolved	0.0471		0.0010	mg/L		04-MAR-21	R5396704
Uranium (U)-Dissolved	0.00438		0.00010	mg/L		04-MAR-21	R5396704
Vanadium (V)-Dissolved	4.22		0.0050	mg/L		04-MAR-21	R5396704
Zinc (Zn)-Dissolved	0.012		0.010	mg/L		04-MAR-21	R5396704
Zirconium (Zr)-Dissolved	0.0610		0.0020	mg/L		04-MAR-21	R5396704
Fluoride in Water by IC							
Fluoride (F)	<2.0	DLDS	2.0	mg/L		02-MAR-21	R5397105
Ion Balance Calculation							
Ion Balance	106			%		07-MAR-21	
TDS (Calculated)	7870			mg/L		07-MAR-21	
Hardness (as CaCO3)	550			mg/L		07-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	<2.0	DLDS	2.0	mg/L		02-MAR-21	R5397105
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<2.2		2.2	mg/L		05-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<1.0	DLDS	1.0	mg/L		02-MAR-21	R5397105
Sulfate in Water by IC							
Sulfate (SO4)	518	DLDS	30	mg/L		02-MAR-21	R5397105
pH, Conductivity and Total Alkalinity							
pH	8.83		0.10	pH		03-MAR-21	R5396436
Conductivity (EC)	13200		2.0	uS/cm		03-MAR-21	R5396436
Bicarbonate (HCO3)	3830	DLHC	50	mg/L		03-MAR-21	R5396436
Carbonate (CO3)	534	DLHC	50	mg/L		03-MAR-21	R5396436
Hydroxide (OH)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Alkalinity, Total (as CaCO3)	4030	DLHC	20	mg/L		03-MAR-21	R5396436
L2562631-5 PRIMARY LEACHATE CELL 3D (PC3D) Sampled By: CLIENT on 01-MAR-21 Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0147		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Toluene	0.0647		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
EthylBenzene	0.00363		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
m+p-Xylene	0.0189		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
o-Xylene	0.00828		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Styrene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
F1(C6-C10)	0.88		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562631-5 PRIMARY LEACHATE CELL 3D (PC3D)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
F1-BTEX	0.77		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
Xylenes	0.0272		0.00071	mg/L	04-MAR-21	08-MAR-21	R5362917
Surrogate: 1,4-Difluorobenzene (SS)	104.2		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 4-Bromofluorobenzene (SS)	113.0		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 3,4-Dichlorotoluene (SS)	89.7		70-130	%	04-MAR-21	08-MAR-21	R5362917
F2 (>C10-C16)							
F2 (C10-C16)	0.65		0.10	mg/L	03-MAR-21	03-MAR-21	R5396738
Surrogate: 2-Bromobenzotrifluoride	99.6		60-140	%	03-MAR-21	03-MAR-21	R5396738
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0214		0.0020	mg/L		03-MAR-21	R5396047
Miscellaneous Parameters							
Ammonia, Total (as N)	397	DLHC	50	mg/L		07-MAR-21	R5397710
Chemical Oxygen Demand	2910	DLHC	50	mg/L		06-MAR-21	R5397663
Hexavalent Chromium-Dissolved	<0.0025	DLM	0.0025	mg/L		03-MAR-21	R5396539
Dissolved Organic Carbon	765	DLHC	20	mg/L		07-MAR-21	R5398156
Phenols (4AAP)	2.14	DLHC	0.20	mg/L		03-MAR-21	R5397134
Total Kjeldahl Nitrogen	473	DLHC	20	mg/L	03-MAR-21	04-MAR-21	R5396803
Phosphorus (P)-Total Dissolved	1.00	DLHC	0.50	mg/L		08-MAR-21	R5398171
Total Dissolved Solids	11600	DLHC	80	mg/L		07-MAR-21	R5398192
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		03-MAR-21	R5396156
Phosphorus (P)-Total	0.98	DLHC	0.10	mg/L	04-MAR-21	05-MAR-21	R5397364
Total Suspended Solids	40.2		3.0	mg/L		05-MAR-21	R5397093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	5130	DLDS	50	mg/L		02-MAR-21	R5397105
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-MAR-21	R5395625
Aluminum (Al)-Dissolved	0.041		0.020	mg/L		04-MAR-21	R5396704
Antimony (Sb)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Arsenic (As)-Dissolved	0.0121		0.0020	mg/L		04-MAR-21	R5396704
Barium (Ba)-Dissolved	0.421		0.0020	mg/L		04-MAR-21	R5396704
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Boron (B)-Dissolved	40.0		0.20	mg/L		04-MAR-21	R5396704
Cadmium (Cd)-Dissolved	0.00023		0.00010	mg/L		04-MAR-21	R5396704
Calcium (Ca)-Dissolved	212		1.0	mg/L		04-MAR-21	R5396704
Cesium (Cs)-Dissolved	0.00218		0.00020	mg/L		04-MAR-21	R5396704
Chromium (Cr)-Dissolved	0.0158		0.0020	mg/L		04-MAR-21	R5396704
Cobalt (Co)-Dissolved	0.0038		0.0020	mg/L		04-MAR-21	R5396704
Copper (Cu)-Dissolved	<0.0040	DLDS	0.0040	mg/L		04-MAR-21	R5396704
Iron (Fe)-Dissolved	0.87		0.20	mg/L		04-MAR-21	R5396704
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Lithium (Li)-Dissolved	1.54		0.020	mg/L		04-MAR-21	R5396704
Magnesium (Mg)-Dissolved	233		0.10	mg/L		04-MAR-21	R5396704
Manganese (Mn)-Dissolved	1.83		0.0020	mg/L		04-MAR-21	R5396704
Molybdenum (Mo)-Dissolved	0.503		0.0010	mg/L		04-MAR-21	R5396704
Nickel (Ni)-Dissolved	3.32		0.010	mg/L		04-MAR-21	R5396704
Phosphorus (P)-Dissolved	1.6		1.0	mg/L		04-MAR-21	R5396704
Potassium (K)-Dissolved	535		1.0	mg/L		04-MAR-21	R5396704
Rubidium (Rb)-Dissolved	0.331		0.0040	mg/L		04-MAR-21	R5396704

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562631-5 PRIMARY LEACHATE CELL 3D (PC3D)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Selenium (Se)-Dissolved	0.0135		0.0010	mg/L		04-MAR-21	R5396704
Silicon (Si)-Dissolved	13.2		1.0	mg/L		04-MAR-21	R5396704
Silver (Ag)-Dissolved	<0.00020	DLDS	0.00020	mg/L		04-MAR-21	R5396704
Sodium (Na)-Dissolved	3290		1.0	mg/L		04-MAR-21	R5396704
Strontium (Sr)-Dissolved	2.19		0.0040	mg/L		04-MAR-21	R5396704
Sulfur (S)-Dissolved	220		10	mg/L		04-MAR-21	R5396704
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		04-MAR-21	R5396704
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		04-MAR-21	R5396704
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Titanium (Ti)-Dissolved	0.0087		0.0060	mg/L		04-MAR-21	R5396704
Tungsten (W)-Dissolved	0.0550		0.0020	mg/L		04-MAR-21	R5396704
Uranium (U)-Dissolved	0.00444		0.00020	mg/L		04-MAR-21	R5396704
Vanadium (V)-Dissolved	5.66		0.010	mg/L		04-MAR-21	R5396704
Zinc (Zn)-Dissolved	0.072		0.020	mg/L		04-MAR-21	R5396704
Zirconium (Zr)-Dissolved	0.0706		0.0040	mg/L		04-MAR-21	R5396704
Fluoride in Water by IC							
Fluoride (F)	<2.0	DLDS	2.0	mg/L		02-MAR-21	R5397105
Ion Balance Calculation							
Ion Balance	94.8			%		07-MAR-21	
TDS (Calculated)	11900			mg/L		07-MAR-21	
Hardness (as CaCO3)	1490			mg/L		07-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	<2.0	DLDS	2.0	mg/L		02-MAR-21	R5397105
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<2.2		2.2	mg/L		05-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<1.0	DLDS	1.0	mg/L		02-MAR-21	R5397105
Sulfate in Water by IC							
Sulfate (SO4)	227	DLDS	30	mg/L		02-MAR-21	R5397105
pH, Conductivity and Total Alkalinity							
pH	8.27		0.10	pH		03-MAR-21	R5396436
Conductivity (EC)	18600		2.0	uS/cm		03-MAR-21	R5396436
Bicarbonate (HCO3)	4710	DLHC	50	mg/L		03-MAR-21	R5396436
Carbonate (CO3)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Hydroxide (OH)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Alkalinity, Total (as CaCO3)	3860	DLHC	20	mg/L		03-MAR-21	R5396436
L2562631-6 PRIMARY LEACHATE CELL 4 (PC4)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.119		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Toluene	0.258		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
EthylBenzene	0.00951		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
m+p-Xylene	0.0275		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
o-Xylene	0.0168		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Styrene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
F1(C6-C10)	1.13		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
F1-BTEX	0.70		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
Xylenes	0.0442		0.00071	mg/L	04-MAR-21	08-MAR-21	R5362917

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562631-6 PRIMARY LEACHATE CELL 4 (PC4)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
Surrogate: 1,4-Difluorobenzene (SS)	103.0		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 4-Bromofluorobenzene (SS)	94.6		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 3,4-Dichlorotoluene (SS)	74.9		70-130	%	04-MAR-21	08-MAR-21	R5362917
F2 (>C10-C16)							
F2 (C10-C16)	4.62		0.10	mg/L	03-MAR-21	03-MAR-21	R5396738
Surrogate: 2-Bromobenzotrifluoride	102.5		60-140	%	03-MAR-21	03-MAR-21	R5396738
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0097		0.0020	mg/L		03-MAR-21	R5396047
Miscellaneous Parameters							
Ammonia, Total (as N)	425	DLHC	50	mg/L		07-MAR-21	R5397710
Chemical Oxygen Demand	7720	DLHC	100	mg/L		06-MAR-21	R5397663
Hexavalent Chromium-Dissolved	<0.0025	DLM	0.0025	mg/L		03-MAR-21	R5396539
Dissolved Organic Carbon	2210	DLHC	100	mg/L		07-MAR-21	R5398156
Phenols (4AAP)	2.01	DLHC	0.20	mg/L		03-MAR-21	R5397134
Total Kjeldahl Nitrogen	525	DLHC	20	mg/L	03-MAR-21	04-MAR-21	R5396803
Phosphorus (P)-Total Dissolved	1.37	DLHC	0.10	mg/L		08-MAR-21	R5398171
Total Dissolved Solids	11800	DLHC	80	mg/L		07-MAR-21	R5398192
Mercury (Hg)-Total	<0.000050		0.000050	mg/L		03-MAR-21	R5396156
Phosphorus (P)-Total	1.65	DLHC	0.10	mg/L	04-MAR-21	05-MAR-21	R5397364
Total Suspended Solids	65.6	DLHC	6.0	mg/L		05-MAR-21	R5397093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	4030	DLDS	50	mg/L		02-MAR-21	R5397105
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-MAR-21	R5395625
Aluminum (Al)-Dissolved	0.080		0.020	mg/L		04-MAR-21	R5396704
Antimony (Sb)-Dissolved	0.0027		0.0020	mg/L		04-MAR-21	R5396704
Arsenic (As)-Dissolved	0.0105		0.0020	mg/L		04-MAR-21	R5396704
Barium (Ba)-Dissolved	0.535		0.0020	mg/L		04-MAR-21	R5396704
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Boron (B)-Dissolved	18.2		0.20	mg/L		04-MAR-21	R5396704
Cadmium (Cd)-Dissolved	0.00012		0.00010	mg/L		04-MAR-21	R5396704
Calcium (Ca)-Dissolved	592		1.0	mg/L		04-MAR-21	R5396704
Cesium (Cs)-Dissolved	0.0227		0.00020	mg/L		04-MAR-21	R5396704
Chromium (Cr)-Dissolved	0.0088		0.0020	mg/L		04-MAR-21	R5396704
Cobalt (Co)-Dissolved	0.0092		0.0020	mg/L		04-MAR-21	R5396704
Copper (Cu)-Dissolved	<0.0040	DLDS	0.0040	mg/L		04-MAR-21	R5396704
Iron (Fe)-Dissolved	0.24		0.20	mg/L		04-MAR-21	R5396704
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Lithium (Li)-Dissolved	0.110		0.020	mg/L		04-MAR-21	R5396704
Magnesium (Mg)-Dissolved	227		0.10	mg/L		04-MAR-21	R5396704
Manganese (Mn)-Dissolved	7.68		0.0020	mg/L		04-MAR-21	R5396704
Molybdenum (Mo)-Dissolved	0.469		0.0010	mg/L		04-MAR-21	R5396704
Nickel (Ni)-Dissolved	0.182		0.010	mg/L		04-MAR-21	R5396704
Phosphorus (P)-Dissolved	2.8		1.0	mg/L		04-MAR-21	R5396704
Potassium (K)-Dissolved	313		1.0	mg/L		04-MAR-21	R5396704
Rubidium (Rb)-Dissolved	0.164		0.0040	mg/L		04-MAR-21	R5396704
Selenium (Se)-Dissolved	0.0071		0.0010	mg/L		04-MAR-21	R5396704
Silicon (Si)-Dissolved	15.9		1.0	mg/L		04-MAR-21	R5396704

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562631-6 PRIMARY LEACHATE CELL 4 (PC4)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Silver (Ag)-Dissolved	<0.00020	DLDS	0.00020	mg/L		04-MAR-21	R5396704
Sodium (Na)-Dissolved	2480		1.0	mg/L		04-MAR-21	R5396704
Strontium (Sr)-Dissolved	3.19		0.0040	mg/L		04-MAR-21	R5396704
Sulfur (S)-Dissolved	101		10	mg/L		04-MAR-21	R5396704
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		04-MAR-21	R5396704
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		04-MAR-21	R5396704
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Titanium (Ti)-Dissolved	0.0301		0.0060	mg/L		04-MAR-21	R5396704
Tungsten (W)-Dissolved	0.0762		0.0020	mg/L		04-MAR-21	R5396704
Uranium (U)-Dissolved	0.00313		0.00020	mg/L		04-MAR-21	R5396704
Vanadium (V)-Dissolved	0.052		0.010	mg/L		04-MAR-21	R5396704
Zinc (Zn)-Dissolved	0.046		0.020	mg/L		04-MAR-21	R5396704
Zirconium (Zr)-Dissolved	0.0279		0.0040	mg/L		04-MAR-21	R5396704
Fluoride in Water by IC							
Fluoride (F)	<2.0	DLDS	2.0	mg/L		02-MAR-21	R5397105
Ion Balance Calculation							
Ion Balance	102			%		07-MAR-21	
TDS (Calculated)	9960			mg/L		07-MAR-21	
Hardness (as CaCO3)	2410			mg/L		07-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	<2.0	DLDS	2.0	mg/L		02-MAR-21	R5397105
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<2.2		2.2	mg/L		05-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<1.0	DLDS	1.0	mg/L		02-MAR-21	R5397105
Sulfate in Water by IC							
Sulfate (SO4)	37	DLDS	30	mg/L		02-MAR-21	R5397105
pH, Conductivity and Total Alkalinity							
pH	7.56		0.10	pH		03-MAR-21	R5396436
Conductivity (EC)	16700		2.0	uS/cm		03-MAR-21	R5396436
Bicarbonate (HCO3)	4630		5.0	mg/L		03-MAR-21	R5396436
Carbonate (CO3)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Hydroxide (OH)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Alkalinity, Total (as CaCO3)	3800		2.0	mg/L		03-MAR-21	R5396436

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
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).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method.			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-T-COL-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
CR6-D-IC-ED	Water	Chromium, Dissolved Hexavalent (Cr +6)	APHA 3500-Cr C (Ion Chromatography)
This analysis is carried out using procedures adapted from method 3500-Cr C in "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from Method 1636 published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Results are based on a field-filtered, field-preserved sample.			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.			
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
P-TD-COL-CL	Water	Total Dissolved P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H2SO4 is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-ED	Water	Phenols (4AAP)	EPA 9066 AUTO-DISTILL-COLORIMETRIC
This automated method is based on the distillation of phenol and subsequent reaction of the distillate with an oxidizing agent (alkaline potassium ferricyanide), and 4-aminoantipyrine to form a red complex which is measured at 505 nm. The method will include ortho and meta-substituted phenols, and is collectively named 4AAP phenols.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C
A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-ED	Water	TKN (as N) by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



www.alsglobal.com

Chain of Custody

Canada



L2562631-COFC

COC Number: 20-899437

Page of

Report To Contact and company name below will appear on the final report		Reports / recipients			Turnaround Time (TAT) Requested				AFFIX ALS BARCODE LABEL HERE (ALS use only)	
Company: <u>Clean Harbors Canada</u>		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			<input checked="" type="checkbox"/> Routine (R) if received by 3pm M-F - no surcharges apply <input type="checkbox"/> 4 day (P4) if received by 3pm M-F - 20% rush surcharge minimum <input type="checkbox"/> 3 day (P3) if received by 3pm M-F - 25% rush surcharge minimum <input type="checkbox"/> 2 day (P2) if received by 3pm M-F - 50% rush surcharge minimum <input type="checkbox"/> 1 day (E) if received by 3pm M-F - 100% rush surcharge minimum <input type="checkbox"/> Same day (E2) if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests					
Contact: <u>Todd Webb, Stan Yuha</u>		Merge QC/QCI Reports with COA <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A								
Phone: <u>(780) 663-2513</u>		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX								
Company address below will appear on the final report		Email 1 or Fax <u>webb.todd@cleanharbors.com</u>			Date and Time Required for all EAP TATs:					
Street: <u>PO Box 390, 50114 Range Road 173</u>		Email 2 <u>yuha.stan@cleanharbors.com</u>			For all tests with rush TATs requested, please contact your AM to confirm availability.					
City/Province: <u>Rexley, AB</u>		Email 3			Analysis Request					
Postal Code: <u>T0B 4A0</u>		Invoice Recipients			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below					
Invoice To: Same as Report To <input type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			NUMBER OF CONTAINERS Table 4.4A: Leachate + Leak Detection Monitoring (Vertical text in grid)				SAMPLES ON HOLD EXTENDED STORAGE REQUIRED SUSPECTED HAZARD (see notes)	
Copy of Invoice with Report <input type="checkbox"/> YES <input type="checkbox"/> NO		Email 1 or Fax <u>Gooding, Robbi@Cleanharbors.com</u>								
Company: <u>Clean Harbors Canada</u>		Email 2								
Contact: <u>Robbi Gooding</u>										
Project Information		Oil and Gas Required Fields (client use)								
ALS Account # / Quote #		AFE/Cost Center: PO#								
Job #: <u>Primary Leachate Qtr 1</u>		Major/Minor Code: Routing Code:								
PO / AFE:		Requisitioner:								
LSD:		Location:								
ALS Lab Work Order # (ALS use only): <u>L2562631</u>		ALS Contact:								
ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (h:m)	Sample Type						
	<u>Primary Leachate Cell 2 (PC2)</u>	<u>01-Mar-21</u>								
	<u>Primary Leachate Cell 3A (PC3A)</u>	<u>01-Mar-21</u>								
	<u>Primary Leachate Cell 3B (PC3B)</u>	<u>01-Mar-21</u>								
	<u>Primary Leachate Cell 3C (PC3C)</u>	<u>01-Mar-21</u>								
	<u>Primary Leachate Cell 3D (PC3D)</u>	<u>01-Mar-21</u>								
	<u>Primary Leachate Cell 4 (PC4)</u>	<u>01-Mar-21</u>								
Drinking Water (DW) Samples (client use)		Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)			SAMPLE RECEIPT DETAILS (ALS use only)					
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO		<u>Analyze as per Quote QB2438</u> <u>Table 4.4A Package (attached)</u>			Cooling Method: <input type="checkbox"/> NONE <input type="checkbox"/> ICE <input type="checkbox"/> ICE PACKS <input type="checkbox"/> FROZEN <input type="checkbox"/> COOLING INITIATED					
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO					Submission Comments identified on Sample Receipt Notification: <input type="checkbox"/> YES <input type="checkbox"/> NO					
					Cooler Custody Seals Intact: <input type="checkbox"/> YES <input type="checkbox"/> N/A Sample Custody Seals Intact: <input type="checkbox"/> YES <input type="checkbox"/> N/A					
					INITIAL COOLER TEMPERATURES °C: <u>8.2</u> FINAL COOLER TEMPERATURES °C:					
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)					
Released by: <u>Todd Webb</u>	Date: <u>March 1, 2021</u>	Time: <u>16:00</u>	Received by: <u>[Signature]</u>	Date: <u>02 MAR 21</u>	Time: <u>12:06</u>	Received by:	Date:	Time:		

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS 2020 FORM 1

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.



Clean Harbors Canada Inc.
ATTN: Todd Webb/Stan Yuha
PO BOX 390
RYLEY AB TOB 4A0

Date Received: 17-MAR-21
Report Date: 25-MAR-21 17:04 (MT)
Version: FINAL

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2567553
Project P.O. #: 215319RY
Job Reference: PRIMARY LEACHATE QTR 1
C of C Numbers: 20-899441
Legal Site Desc:


Kieran Tordoff
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9450 17 Avenue NW, Edmonton, AB T6N 1M9 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2567553-1 PRIMARY LEACHATE CELL 3E (PC3E)							
Sampled By: CLIENT on 16-MAR-21 @ 10:00							
Matrix: Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0523		0.00050	mg/L	19-MAR-21	22-MAR-21	R5399312
Toluene	0.0300		0.00050	mg/L	19-MAR-21	22-MAR-21	R5399312
EthylBenzene	0.00299		0.00050	mg/L	19-MAR-21	22-MAR-21	R5399312
m+p-Xylene	0.00567		0.00050	mg/L	19-MAR-21	22-MAR-21	R5399312
o-Xylene	0.00381		0.00050	mg/L	19-MAR-21	22-MAR-21	R5399312
Styrene	<0.00050		0.00050	mg/L	19-MAR-21	22-MAR-21	R5399312
F1(C6-C10)	0.31		0.10	mg/L	19-MAR-21	22-MAR-21	R5399312
F1-BTEX	0.21		0.10	mg/L	19-MAR-21	22-MAR-21	R5399312
Xylenes	0.00949		0.00071	mg/L	19-MAR-21	22-MAR-21	R5399312
Surrogate: 1,4-Difluorobenzene (SS)	100.3		70-130	%	19-MAR-21	22-MAR-21	R5399312
Surrogate: 4-Bromofluorobenzene (SS)	110.8		70-130	%	19-MAR-21	22-MAR-21	R5399312
Surrogate: 3,4-Dichlorotoluene (SS)	77.2		70-130	%	19-MAR-21	22-MAR-21	R5399312
F2 (>C10-C16)							
F2 (C10-C16)	12.8		0.10	mg/L	18-MAR-21	18-MAR-21	R5408197
Surrogate: 2-Bromobenzotrifluoride	100.3		60-140	%	18-MAR-21	18-MAR-21	R5408197
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.00624		0.00050	mg/L		17-MAR-21	R5403115
Miscellaneous Parameters							
Ammonia, Total (as N)	1250	DLHC	50	mg/L		18-MAR-21	R5403281
Chemical Oxygen Demand	1970	DLHC	20	mg/L		22-MAR-21	R5407679
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		18-MAR-21	R5404237
Dissolved Organic Carbon	313	DLHC	10	mg/L		22-MAR-21	R5409956
Phenols (4AAP)	0.0627		0.0010	mg/L		18-MAR-21	R5402616
Total Kjeldahl Nitrogen	2030	DLHC	200	mg/L	19-MAR-21	20-MAR-21	R5406516
Phosphorus (P)-Total Dissolved	1.06	DLHC	0.10	mg/L		22-MAR-21	R5407760
Total Dissolved Solids	7960	RRV	80	mg/L		24-MAR-21	R5414324
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		19-MAR-21	R5404705
Phosphorus (P)-Total	1.59		0.20	mg/L	19-MAR-21	19-MAR-21	R5405059
Total Suspended Solids	11.0		3.0	mg/L		22-MAR-21	R5407977
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2960	DLDS	10	mg/L		17-MAR-21	R5403225
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					18-MAR-21	R5403057
Aluminum (Al)-Dissolved	0.0103		0.0050	mg/L		17-MAR-21	R5403115
Antimony (Sb)-Dissolved	0.00054		0.00050	mg/L		17-MAR-21	R5403115
Arsenic (As)-Dissolved	0.0107		0.00050	mg/L		17-MAR-21	R5403115
Barium (Ba)-Dissolved	0.158		0.00050	mg/L		17-MAR-21	R5403115
Beryllium (Be)-Dissolved	<0.00050	DLDS	0.00050	mg/L		17-MAR-21	R5403115
Bismuth (Bi)-Dissolved	<0.00025	DLDS	0.00025	mg/L		17-MAR-21	R5403115
Boron (B)-Dissolved	4.69		0.050	mg/L		17-MAR-21	R5403115
Cadmium (Cd)-Dissolved	0.000108		0.000025	mg/L		17-MAR-21	R5403115
Calcium (Ca)-Dissolved	38.1		0.50	mg/L		17-MAR-21	R5403115
Cesium (Cs)-Dissolved	0.00629		0.000050	mg/L		17-MAR-21	R5403115
Chromium (Cr)-Dissolved	0.00283		0.00050	mg/L		17-MAR-21	R5403115
Cobalt (Co)-Dissolved	0.00368		0.00050	mg/L		17-MAR-21	R5403115
Copper (Cu)-Dissolved	0.0115		0.0010	mg/L		17-MAR-21	R5403115
Iron (Fe)-Dissolved	0.208		0.050	mg/L		17-MAR-21	R5403115
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		17-MAR-21	R5403115

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2567553-1 PRIMARY LEACHATE CELL 3E (PC3E)							
Sampled By: CLIENT on 16-MAR-21 @ 10:00							
Matrix: Water							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.809		0.0050	mg/L		17-MAR-21	R5403115
Magnesium (Mg)-Dissolved	218		0.10	mg/L		17-MAR-21	R5403115
Manganese (Mn)-Dissolved	0.262		0.00050	mg/L		17-MAR-21	R5403115
Molybdenum (Mo)-Dissolved	0.365		0.00025	mg/L		17-MAR-21	R5403115
Nickel (Ni)-Dissolved	0.607		0.0025	mg/L		17-MAR-21	R5403115
Phosphorus (P)-Dissolved	1.73		0.25	mg/L		17-MAR-21	R5403115
Potassium (K)-Dissolved	298		0.50	mg/L		17-MAR-21	R5403115
Rubidium (Rb)-Dissolved	0.422		0.0010	mg/L		17-MAR-21	R5403115
Selenium (Se)-Dissolved	0.0112		0.00025	mg/L		17-MAR-21	R5403115
Silicon (Si)-Dissolved	10.9		0.25	mg/L		17-MAR-21	R5403115
Silver (Ag)-Dissolved	0.000423		0.00050	mg/L		17-MAR-21	R5403115
Sodium (Na)-Dissolved	2360		1.0	mg/L		17-MAR-21	R5403115
Strontium (Sr)-Dissolved	1.67		0.0010	mg/L		17-MAR-21	R5403115
Sulfur (S)-Dissolved	540		2.5	mg/L		17-MAR-21	R5403115
Tellurium (Te)-Dissolved	<0.0010	DLDS	0.0010	mg/L		17-MAR-21	R5403115
Thallium (Tl)-Dissolved	<0.000050	DLDS	0.000050	mg/L		17-MAR-21	R5403115
Thorium (Th)-Dissolved	<0.00050	DLDS	0.00050	mg/L		17-MAR-21	R5403115
Tin (Sn)-Dissolved	<0.00050	DLDS	0.00050	mg/L		17-MAR-21	R5403115
Titanium (Ti)-Dissolved	0.0043		0.0015	mg/L		17-MAR-21	R5403115
Tungsten (W)-Dissolved	0.0645		0.00050	mg/L		17-MAR-21	R5403115
Uranium (U)-Dissolved	0.00675		0.000050	mg/L		17-MAR-21	R5403115
Vanadium (V)-Dissolved	4.73		0.0025	mg/L		17-MAR-21	R5403115
Zinc (Zn)-Dissolved	0.0070		0.0050	mg/L		17-MAR-21	R5403115
Zirconium (Zr)-Dissolved	0.200		0.0010	mg/L		17-MAR-21	R5403115
Fluoride in Water by IC							
Fluoride (F)	1.49	DLDS	0.40	mg/L		17-MAR-21	R5403225
Ion Balance Calculation							
Ion Balance	91.1			%		21-MAR-21	
TDS (Calculated)	10800			mg/L		21-MAR-21	
Hardness (as CaCO3)	993			mg/L		21-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		17-MAR-21	R5403225
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		19-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		17-MAR-21	R5403225
Sulfate in Water by IC							
Sulfate (SO4)	500	DLDS	6.0	mg/L		17-MAR-21	R5403225
pH, Conductivity and Total Alkalinity							
pH	8.61		0.10	pH		17-MAR-21	R5403217
pH	8.64		0.10	pH		18-MAR-21	R5404381
Conductivity (EC)	17200		2.0	uS/cm		17-MAR-21	R5403217
Conductivity (EC)	17200		2.0	uS/cm		18-MAR-21	R5404381
Bicarbonate (HCO3)	7660		5.0	mg/L		18-MAR-21	R5404381
Carbonate (CO3)	637		5.0	mg/L		18-MAR-21	R5404381
Hydroxide (OH)	<5.0		5.0	mg/L		18-MAR-21	R5404381
Alkalinity, Total (as CaCO3)	7340		2.0	mg/L		18-MAR-21	R5404381

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
SPL	phenols - Sample was Preserved at the laboratory

Sample Parameter Qualifier Key:

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).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method.			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-T-COL-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
CR6-D-IC-ED	Water	Chromium, Dissolved Hexavalent (Cr +6)	APHA 3500-Cr C (Ion Chromatography)
This analysis is carried out using procedures adapted from method 3500-Cr C in "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from Method 1636 published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Results are based on a field-filtered, field-preserved sample.			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.			
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
P-TD-COL-CL	Water	Total Dissolved P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H2SO4 is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-ED	Water	Phenols (4AAP)	EPA 9066 AUTO-DISTILL-COLORIMETRIC
This automated method is based on the distillation of phenol and subsequent reaction of the distillate with an oxidizing agent (alkaline potassium ferricyanide), and 4-aminoantipyrine to form a red complex which is measured at 505 nm. The method will include ortho and meta-substituted phenols, and is collectively named 4AAP phenols.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C
A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-ED	Water	TKN (as N) by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

20-899441

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

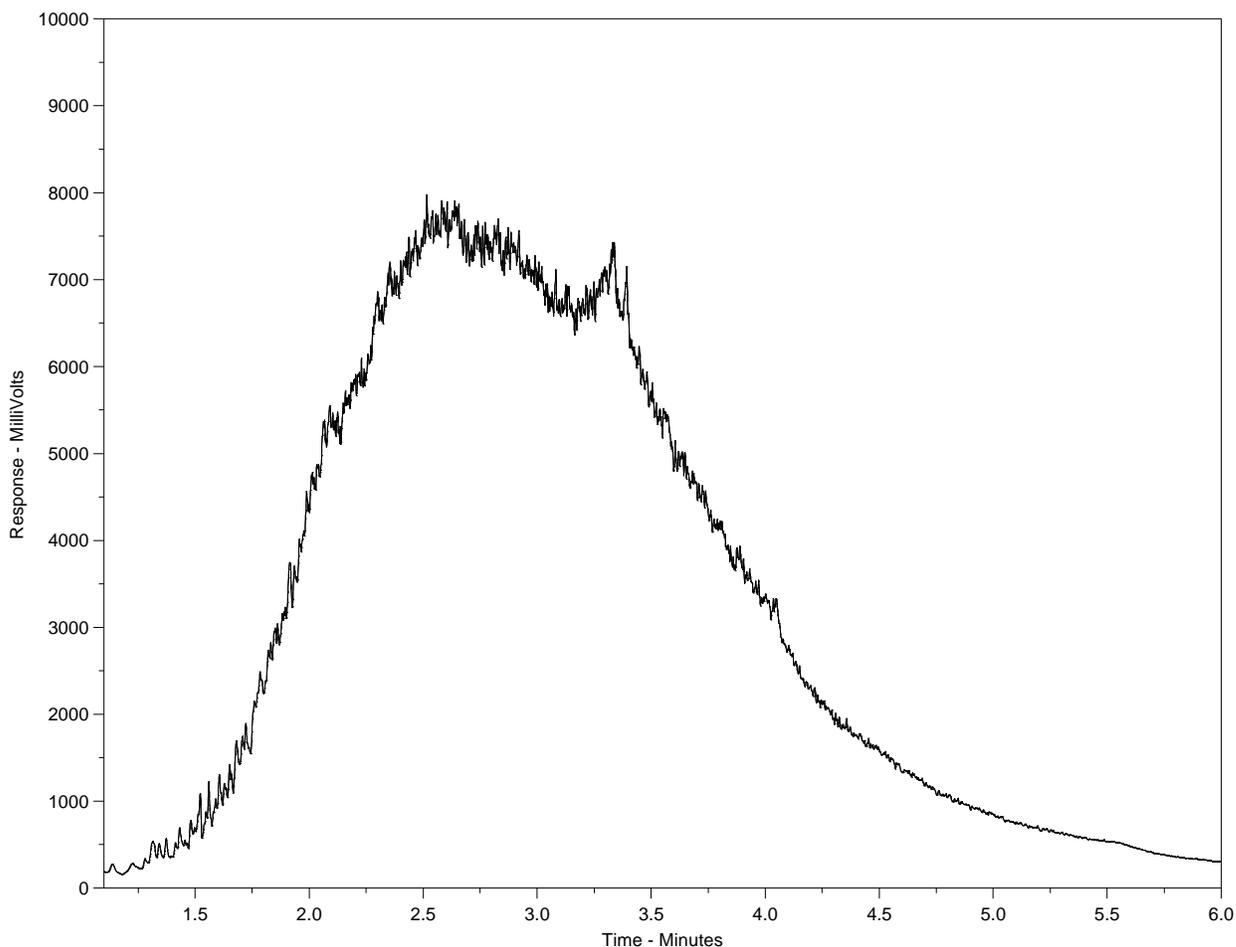
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Hydrocarbon Distribution Report



ALS Sample ID: L2567553-1
 Client ID: PRIMARY LEACHATE CELL 3E (PC3E)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Appendix D
Primary Leachate Analyses
Quarter 2



Clean Harbors Canada Inc.
ATTN: Todd Webb/Stan Yuha
PO BOX 390
RYLEY AB TOB 4A0

Date Received: 30-JUN-21
Report Date: 28-JUL-21 14:16 (MT)
Version: FINAL REV. 2

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2608028
Project P.O. #: 0000218828
Job Reference: PRIMARY LEACHATE QTR 2
C of C Numbers: 17-803235
Legal Site Desc:

Kieran Tordoff
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-1 PRIMARY LEACHATE CELL 2 (PC2)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX, Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX and Styrene							
Benzene	0.0510		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Toluene	0.00886		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Ethylbenzene	0.00056		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
o-Xylene	0.00214		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
m+p-Xylene	0.00197		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Styrene	<0.00050		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Surrogate: 4-Bromofluorobenzene	98.0		70-130	%	05-JUL-21	06-JUL-21	R5513006
Surrogate: 1,4-Difluorobenzene	103.3		70-130	%	05-JUL-21	06-JUL-21	R5513006
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	1.27		0.10	mg/L	05-JUL-21	06-JUL-21	R5513313
Surrogate: 2-Bromobenzotrifluoride	99.7		60-140	%	05-JUL-21	06-JUL-21	R5513313
F1 (C6-C10)							
F1(C6-C10)	0.96		0.10	mg/L	05-JUL-21	06-JUL-21	R5513047
F1-BTEX	0.89		0.10	mg/L	05-JUL-21	06-JUL-21	R5513047
Surrogate: 3,4-Dichlorotoluene	89.1		70-130	%	05-JUL-21	06-JUL-21	R5513047
Sum of Xylene Isomer Concentrations							
Xylenes	0.00411		0.00071	mg/L		06-JUL-21	
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.329		0.0050	mg/L		03-JUL-21	R5509577
Miscellaneous Parameters							
Ammonia, Total (as N)	910	DLHC	100	mg/L		05-JUL-21	R5513025
Chemical Oxygen Demand	2850	DLHC	10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	3190		100	mg/L		12-JUL-21	R5519437
Phenols (4AAP)	4.51	DLHC	0.10	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	1010	DLHC	2.0	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	3.52	DLHC	0.40	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	30700	DLDS	80	mg/L		06-JUL-21	R5513768
Mercury (Hg)-Total	<0.000050		0.000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	3.79	DLHC	0.40	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	13.6		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	10400	DLDS	50	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	0.088		0.050	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	0.0401		0.0050	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.0735		0.0050	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	1.24		0.0050	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.0025	DLDS	0.0025	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	61.9		0.50	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	0.00241		0.00025	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	37.2		2.5	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	0.00274		0.00050	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	0.265		0.0050	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	<0.010	DLDS	0.010	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-1 PRIMARY LEACHATE CELL 2 (PC2) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Iron (Fe)-Dissolved	<0.50	DLDS	0.50	mg/L		03-JUL-21	R5509577
Lead (Pb)-Dissolved	<0.0025	DLDS	0.0025	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	7.43		0.050	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	365		0.25	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	0.834		0.0050	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	12.5		0.0025	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	0.234		0.025	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	5.8		2.5	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	1240		2.5	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.210		0.010	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.0575		0.0025	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	9.7		2.5	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	8840		2.5	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	3.71		0.010	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	704		25	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.010	DLDS	0.010	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	0.179		0.015	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	14.0		0.0050	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.00178		0.00050	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	0.600		0.025	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	<0.050	DLDS	0.050	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	0.310		0.010	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	<2.0	DLDS	2.0	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	88.6	BL:INT		%		07-JUL-21	
TDS (Calculated)	29900			mg/L		07-JUL-21	
Hardness (as CaCO3)	1600			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	<2.0	DLDS	2.0	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<2.2		2.2	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<1.0	DLDS	1.0	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	1220	DLDS	30	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	8.60		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	34500		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	14000	DLHC	50	mg/L		02-JUL-21	R5509440
Carbonate (CO3)	919	DLHC	50	mg/L		02-JUL-21	R5509440
Hydroxide (OH)	<5.0		5.0	mg/L		02-JUL-21	R5509440
Alkalinity, Total (as CaCO3)	13000	DLHC	20	mg/L		02-JUL-21	R5509440
L2608028-2 PRIMARY LEACHATE CELL 3A (PC3A) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
BTEX, Styrene, F1 (C6-C10), F2 (>C10-C16)							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-2 PRIMARY LEACHATE CELL 3A (PC3A)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX and Styrene							
Benzene	0.148		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Toluene	0.0338		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Ethylbenzene	0.00375		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
o-Xylene	0.00689		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
m+p-Xylene	0.0129		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Styrene	<0.00050		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Surrogate: 4-Bromofluorobenzene	101.6		70-130	%	05-JUL-21	06-JUL-21	R5513006
Surrogate: 1,4-Difluorobenzene	99.4		70-130	%	05-JUL-21	06-JUL-21	R5513006
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	2.73		0.10	mg/L	05-JUL-21	06-JUL-21	R5513313
Surrogate: 2-Bromobenzotrifluoride	105.6		60-140	%	05-JUL-21	06-JUL-21	R5513313
F1 (C6-C10)							
F1(C6-C10)	0.83		0.10	mg/L	05-JUL-21	06-JUL-21	R5513047
F1-BTEX	0.63		0.10	mg/L	05-JUL-21	06-JUL-21	R5513047
Surrogate: 3,4-Dichlorotoluene	91.7		70-130	%	05-JUL-21	06-JUL-21	R5513047
Sum of Xylene Isomer Concentrations							
Xylenes	0.0198		0.00071	mg/L		06-JUL-21	
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.196		0.0050	mg/L		03-JUL-21	R5509577
Miscellaneous Parameters							
Ammonia, Total (as N)	824	DLHC	50	mg/L		05-JUL-21	R5513025
Chemical Oxygen Demand	2990	DLHC	10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	1030		10	mg/L		12-JUL-21	R5519437
Phenols (4AAP)	6.63	DLHC	0.10	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	758	DLHC	2.0	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	3.80	DLHC	0.40	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	16500	DLDS	80	mg/L		06-JUL-21	R5513768
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	3.99	DLHC	0.40	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	161		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	7580	DLDS	10	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	0.075		0.050	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	0.0075		0.0050	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.301		0.0050	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	1.73		0.0050	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.0025	DLDS	0.0025	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	31.8		0.50	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	<0.00025	DLDS	0.00025	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	269		2.5	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	0.00131		0.00050	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	0.185		0.0050	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.0073		0.0050	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	0.011		0.010	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	<0.50	DLDS	0.50	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-2 PRIMARY LEACHATE CELL 3A (PC3A) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lead (Pb)-Dissolved	<0.0025	DLDS	0.0025	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	2.32		0.050	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	401		0.25	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	1.70		0.0050	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	0.479		0.0025	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	0.418		0.025	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	6.8		2.5	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	734		2.5	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.528		0.010	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.0179		0.0025	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	18.3		2.5	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	4490		2.5	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	5.02		0.010	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	215		25	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.010	DLDS	0.010	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	0.060		0.015	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	1.63		0.0050	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	0.157		0.025	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	<0.050	DLDS	0.050	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	0.145		0.010	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	<0.40	DLDS	0.40	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	95.2			%		07-JUL-21	
TDS (Calculated)	17300			mg/L		07-JUL-21	
Hardness (as CaCO3)	2320			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	344	DLDS	6.0	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	7.96		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	25200		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	6990	DLHC	50	mg/L		02-JUL-21	R5509440
Carbonate (CO3)	<5.0		5.0	mg/L		02-JUL-21	R5509440
Hydroxide (OH)	<5.0		5.0	mg/L		02-JUL-21	R5509440
Alkalinity, Total (as CaCO3)	5730	DLHC	20	mg/L		02-JUL-21	R5509440
L2608028-3 PRIMARY LEACHATE CELL 3B (PC3B) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
BTEX, Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX and Styrene							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-3 PRIMARY LEACHATE CELL 3B (PC3B)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX and Styrene							
Benzene	0.0122		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Toluene	0.00922		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Ethylbenzene	0.00087		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
o-Xylene	0.00196		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
m+p-Xylene	0.00251		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Styrene	<0.00050		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Surrogate: 4-Bromofluorobenzene	108.0		70-130	%	05-JUL-21	06-JUL-21	R5513006
Surrogate: 1,4-Difluorobenzene	102.7		70-130	%	05-JUL-21	06-JUL-21	R5513006
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	1.89		0.10	mg/L	05-JUL-21	06-JUL-21	R5513313
Surrogate: 2-Bromobenzotrifluoride	106.9		60-140	%	05-JUL-21	06-JUL-21	R5513313
F1 (C6-C10)							
F1(C6-C10)	2.76		0.10	mg/L	05-JUL-21	06-JUL-21	R5513047
F1-BTEX	2.73		0.10	mg/L	05-JUL-21	06-JUL-21	R5513047
Surrogate: 3,4-Dichlorotoluene	120.5		70-130	%	05-JUL-21	06-JUL-21	R5513047
Sum of Xylene Isomer Concentrations							
Xylenes	0.00447		0.00071	mg/L		06-JUL-21	
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.603		0.0050	mg/L		03-JUL-21	R5509577
Miscellaneous Parameters							
Ammonia, Total (as N)	1940	DLHC	50	mg/L		02-JUL-21	R5509487
Chemical Oxygen Demand	3600	DLHC	10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	6460		100	mg/L		12-JUL-21	R5519437
Phenols (4AAP)	20.8	DLHC	0.50	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	2250	DLHC	10	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	3.75	DLHC	0.40	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	34300	DLDS	80	mg/L		06-JUL-21	R5513768
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	4.29	DLHC	0.40	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	5.0		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	9900	DLDS	50	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	0.053		0.050	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	0.0057		0.0050	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.0739		0.0050	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	0.512		0.0050	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.0025	DLDS	0.0025	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	144		0.50	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	0.00339		0.00025	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	14.0		2.5	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	0.114		0.00050	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	0.482		0.0050	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.0185		0.0050	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	0.047		0.010	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	1.00		0.50	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-3 PRIMARY LEACHATE CELL 3B (PC3B) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lead (Pb)-Dissolved	0.0039		0.0025	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	8.16		0.050	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	55.5		0.25	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	0.781		0.0050	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	18.7		0.0025	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	1.11		0.025	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	7.2		2.5	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	2720		2.5	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	4.27		0.010	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.0685		0.0025	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	31.6		2.5	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	0.00054		0.00050	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	8030		2.5	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	0.774		0.010	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	659		25	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.010	DLDS	0.010	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	0.0122		0.0050	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	0.172		0.015	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	15.0		0.0050	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.00113		0.00050	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	0.403		0.025	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	<0.050	DLDS	0.050	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	0.108		0.010	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	<2.0	DLDS	2.0	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	102			%		07-JUL-21	
TDS (Calculated)	29400			mg/L		07-JUL-21	
Hardness (as CaCO3)	264			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	<2.0	DLDS	2.0	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<2.2		2.2	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<1.0	DLDS	1.0	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	1460	DLDS	30	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	9.17		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	39800		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	7390	DLHC	50	mg/L		02-JUL-21	R5509440
Carbonate (CO3)	3630	DLHC	50	mg/L		02-JUL-21	R5509440
Hydroxide (OH)	<5.0		5.0	mg/L		02-JUL-21	R5509440
Alkalinity, Total (as CaCO3)	12100	DLHC	20	mg/L		02-JUL-21	R5509440
L2608028-4 PRIMARY LEACHATE CELL 3C (PC3C) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
BTEX, Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX and Styrene							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-4 PRIMARY LEACHATE CELL 3C (PC3C)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX and Styrene							
Benzene	0.0261		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Toluene	0.572		0.0025	mg/L	05-JUL-21	06-JUL-21	R5513006
Ethylbenzene	0.177		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
o-Xylene	0.301		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
m+p-Xylene	0.817		0.0025	mg/L	05-JUL-21	06-JUL-21	R5513006
Styrene	<0.00050		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Surrogate: 4-Bromofluorobenzene	102.4		70-130	%	05-JUL-21	06-JUL-21	R5513006
Surrogate: 1,4-Difluorobenzene	100.2		70-130	%	05-JUL-21	06-JUL-21	R5513006
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	1.32		0.10	mg/L	05-JUL-21	06-JUL-21	R5513313
Surrogate: 2-Bromobenzotrifluoride	109.5		60-140	%	05-JUL-21	06-JUL-21	R5513313
F1 (C6-C10)							
F1(C6-C10)	3.12		0.50	mg/L	05-JUL-21	06-JUL-21	R5513047
F1-BTEX	1.23		0.50	mg/L	05-JUL-21	06-JUL-21	R5513047
Surrogate: 3,4-Dichlorotoluene	98.8		70-130	%	05-JUL-21	06-JUL-21	R5513047
Sum of Xylene Isomer Concentrations							
Xylenes	1.12		0.0025	mg/L		06-JUL-21	
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0035		0.0010	mg/L		03-JUL-21	R5509577
Miscellaneous Parameters							
Ammonia, Total (as N)	784	DLHC	50	mg/L		02-JUL-21	R5509487
Chemical Oxygen Demand	2610	DLHC	10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	658		10	mg/L		12-JUL-21	R5519437
Phenols (4AAP)	1.91	DLHC	0.050	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	762	DLHC	2.0	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	1.99	DLHC	0.40	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	8490	DLDS	80	mg/L		06-JUL-21	R5513768
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	1.80	DLHC	0.40	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	5.8		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2520	DLDS	10	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	0.027		0.010	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.0394		0.0010	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	0.0718		0.0010	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	40.1		0.10	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	0.000124		0.000050	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	33.5		0.50	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	0.00077		0.00010	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	0.0032		0.0010	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.0021		0.0010	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	0.0218		0.0020	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	0.44		0.10	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-4 PRIMARY LEACHATE CELL 3C (PC3C) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	1.66		0.010	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	99.8		0.10	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	0.274		0.0010	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	0.650		0.00050	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	0.359		0.0050	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	2.34		0.50	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	434		0.50	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.271		0.0020	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.0534		0.00050	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	9.23		0.50	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	0.00013		0.00010	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	2150		1.0	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	0.261		0.0020	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	568		5.0	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	0.0055		0.0030	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	0.0479		0.0010	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.00333		0.00010	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	4.97		0.0050	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	0.011		0.010	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	0.0637		0.0020	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	<0.40	DLDS	0.40	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	104			%		07-JUL-21	
TDS (Calculated)	8180			mg/L		07-JUL-21	
Hardness (as CaCO3)	495			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	403	DLDS	6.0	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	8.73		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	13600		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	4340	DLHC	50	mg/L		02-JUL-21	R5509440
Carbonate (CO3)	407	DLHC	50	mg/L		02-JUL-21	R5509440
Hydroxide (OH)	<5.0		5.0	mg/L		02-JUL-21	R5509440
Alkalinity, Total (as CaCO3)	4240	DLHC	20	mg/L		02-JUL-21	R5509440
L2608028-5 PRIMARY LEACHATE CELL 3D (PC3D) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER BTEX, Styrene, F1 (C6-C10), F2 (>C10-C16) BTEX and Styrene							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-5 PRIMARY LEACHATE CELL 3D (PC3D)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX and Styrene							
Benzene	0.00856		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Toluene	0.0116		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Ethylbenzene	0.00110		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
o-Xylene	0.00253		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
m+p-Xylene	0.00428		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Styrene	<0.00050		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Surrogate: 4-Bromofluorobenzene	94.6		70-130	%	05-JUL-21	06-JUL-21	R5513006
Surrogate: 1,4-Difluorobenzene	103.7		70-130	%	05-JUL-21	06-JUL-21	R5513006
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	0.84		0.10	mg/L	05-JUL-21	06-JUL-21	R5513313
Surrogate: 2-Bromobenzotrifluoride	93.1		60-140	%	05-JUL-21	06-JUL-21	R5513313
F1 (C6-C10)							
F1(C6-C10)	0.46		0.10	mg/L	05-JUL-21	06-JUL-21	R5513047
F1-BTEX	0.44		0.10	mg/L	05-JUL-21	06-JUL-21	R5513047
Surrogate: 3,4-Dichlorotoluene	97.3		70-130	%	05-JUL-21	06-JUL-21	R5513047
Sum of Xylene Isomer Concentrations							
Xylenes	0.00681		0.00071	mg/L		06-JUL-21	
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0198		0.0020	mg/L		03-JUL-21	R5509577
Miscellaneous Parameters							
Ammonia, Total (as N)	337	DLHC	50	mg/L		05-JUL-21	R5513025
Chemical Oxygen Demand	2950	DLHC	10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	793		10	mg/L		12-JUL-21	R5519437
Phenols (4AAP)	4.88	DLHC	0.10	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	528	DLHC	2.0	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	1.11	DLHC	0.10	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	12300	DLDS	80	mg/L		06-JUL-21	R5513768
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	1.19	DLHC	0.10	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	5.4		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	5240	DLDS	10	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	0.043		0.020	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.0190		0.0020	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	0.373		0.0020	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	57.6		0.20	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	0.00055		0.00010	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	165		1.0	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	0.00262		0.00020	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	0.0173		0.0020	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.0049		0.0020	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	0.0286		0.0040	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	1.10		0.20	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-5 PRIMARY LEACHATE CELL 3D (PC3D) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	1.89		0.020	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	185		0.10	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	1.31		0.0020	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	3.01		0.0010	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	2.75		0.010	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	1.5		1.0	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	537		1.0	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.374		0.0040	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.0126		0.0010	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	14.3		1.0	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	3330		1.0	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	1.92		0.0040	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	182		10	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	0.0129		0.0060	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	0.0606		0.0020	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.00328		0.00020	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	4.95		0.010	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	0.033		0.020	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	0.0663		0.0040	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	<0.40	DLDS	0.40	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	85.8	BL:INT		%		07-JUL-21	
TDS (Calculated)	12300			mg/L		07-JUL-21	
Hardness (as CaCO3)	1170			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	212	DLDS	6.0	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	8.25		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	18800		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	5370	DLHC	50	mg/L		02-JUL-21	R5509440
Carbonate (CO3)	<5.0		5.0	mg/L		02-JUL-21	R5509440
Hydroxide (OH)	<5.0		5.0	mg/L		02-JUL-21	R5509440
Alkalinity, Total (as CaCO3)	4410	DLHC	20	mg/L		02-JUL-21	R5509440
L2608028-6 PRIMARY LEACHATE CELL 3E (PC3E) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER BTEX, Styrene, F1 (C6-C10), F2 (>C10-C16) BTEX and Styrene							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-6 PRIMARY LEACHATE CELL 3E (PC3E)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX and Styrene							
Benzene	0.0223		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Toluene	0.00636		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Ethylbenzene	0.00167		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
o-Xylene	0.0146		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
m+p-Xylene	0.0149		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Styrene	<0.00050		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Surrogate: 4-Bromofluorobenzene	103.3		70-130	%	05-JUL-21	06-JUL-21	R5513006
Surrogate: 1,4-Difluorobenzene	99.0		70-130	%	05-JUL-21	06-JUL-21	R5513006
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	29.5		0.10	mg/L	05-JUL-21	06-JUL-21	R5513313
Surrogate: 2-Bromobenzotrifluoride	132.4		60-140	%	05-JUL-21	06-JUL-21	R5513313
F1 (C6-C10)							
F1(C6-C10)	0.23		0.10	mg/L	05-JUL-21	06-JUL-21	R5513047
F1-BTEX	0.17		0.10	mg/L	05-JUL-21	06-JUL-21	R5513047
Surrogate: 3,4-Dichlorotoluene	92.0		70-130	%	05-JUL-21	06-JUL-21	R5513047
Sum of Xylene Isomer Concentrations							
Xylenes	0.0295		0.00071	mg/L		06-JUL-21	
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0078		0.0010	mg/L		03-JUL-21	R5509577
Miscellaneous Parameters							
Ammonia, Total (as N)	409	DLHC	50	mg/L		05-JUL-21	R5513025
Chemical Oxygen Demand	1680	DLHC	10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	155		10	mg/L		12-JUL-21	R5519437
Phenols (4AAP)	0.0371	SP	0.0010	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	464	DLHC	2.0	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	0.94	DLHC	0.10	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	7810	DLDS	80	mg/L		06-JUL-21	R5513768
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	0.83	DLHC	0.10	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	61.2		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2620	DLDS	10	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.0122		0.0010	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	0.301		0.0010	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	6.66		0.10	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	0.000206		0.000050	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	97.6		0.50	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	0.00424		0.00010	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	0.0046		0.0010	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.0054		0.0010	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	0.0044		0.0020	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	0.17		0.10	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-6 PRIMARY LEACHATE CELL 3E (PC3E) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	0.786		0.010	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	245		0.10	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	0.668		0.0010	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	1.10		0.00050	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	0.617		0.0050	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	0.92		0.50	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	237		0.50	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.302		0.0020	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.00233		0.00050	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	12.9		0.50	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	0.00016		0.00010	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	2180		1.0	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	2.64		0.0020	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	216		5.0	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	0.0065		0.0030	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	0.0498		0.0010	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.00932		0.00010	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	5.04		0.0050	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	<0.010	DLDS	0.010	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	0.0908		0.0020	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	<0.40	DLDS	0.40	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	93.5			%		07-JUL-21	
TDS (Calculated)	8360			mg/L		07-JUL-21	
Hardness (as CaCO3)	1250			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	586	DLDS	6.0	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	8.21		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	13100		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	4870	DLHC	50	mg/L		02-JUL-21	R5509440
Carbonate (CO3)	<5.0		5.0	mg/L		02-JUL-21	R5509440
Hydroxide (OH)	<5.0		5.0	mg/L		02-JUL-21	R5509440
Alkalinity, Total (as CaCO3)	3990	DLHC	20	mg/L		02-JUL-21	R5509440
L2608028-7 PRIMARY LEACHATE CELL 4 (PC4) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
BTEX, Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX and Styrene							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-7 PRIMARY LEACHATE CELL 4 (PC4)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX and Styrene							
Benzene	0.0693		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Toluene	0.159		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Ethylbenzene	0.00826		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
o-Xylene	0.0131		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
m+p-Xylene	0.0225		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Styrene	<0.00050		0.00050	mg/L	05-JUL-21	06-JUL-21	R5513006
Surrogate: 4-Bromofluorobenzene	105.1		70-130	%	05-JUL-21	06-JUL-21	R5513006
Surrogate: 1,4-Difluorobenzene	101.5		70-130	%	05-JUL-21	06-JUL-21	R5513006
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	4.89		0.10	mg/L	05-JUL-21	06-JUL-21	R5513313
Surrogate: 2-Bromobenzotrifluoride	105.8		60-140	%	05-JUL-21	06-JUL-21	R5513313
F1 (C6-C10)							
F1(C6-C10)	0.46		0.10	mg/L	05-JUL-21	06-JUL-21	R5513047
F1-BTEX	0.19		0.10	mg/L	05-JUL-21	06-JUL-21	R5513047
Surrogate: 3,4-Dichlorotoluene	109.0		70-130	%	05-JUL-21	06-JUL-21	R5513047
Sum of Xylene Isomer Concentrations							
Xylenes	0.0356		0.00071	mg/L		06-JUL-21	
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.00378		0.00050	mg/L		03-JUL-21	R5509577
Miscellaneous Parameters							
Ammonia, Total (as N)	214	DLHC	5.0	mg/L		02-JUL-21	R5509487
Chemical Oxygen Demand	2750	DLHC	10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	817		10	mg/L		12-JUL-21	R5519437
Phenols (4AAP)	2.42	DLHC	0.050	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	307	DLHC	2.0	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	0.95	DLHC	0.10	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	6780	DLDS	40	mg/L		06-JUL-21	R5513768
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	1.39	DLHC	0.10	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	24.8		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2000	DLDS	10	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	0.0840		0.0050	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	0.00159		0.00050	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.0108		0.00050	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	0.294		0.00050	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.00025	DLDS	0.00025	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	12.1		0.050	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	0.000231		0.000025	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	319		0.50	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	0.0147		0.000050	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	0.00402		0.00050	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.00629		0.00050	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	0.0030		0.0010	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	0.663		0.050	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608028-7 PRIMARY LEACHATE CELL 4 (PC4)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lead (Pb)-Dissolved	0.00026		0.00025	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	0.123		0.0050	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	154		0.10	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	2.81		0.00050	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	1.08		0.00025	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	0.215		0.0025	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	1.42		0.25	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	189		0.50	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.116		0.0010	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.00593		0.00025	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	12.0		0.25	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	0.000053		0.000050	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	1580		1.0	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	1.86		0.0010	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	187		2.5	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.000050	DLDS	0.000050	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	0.0160		0.0015	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	0.0486		0.00050	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.00856		0.000050	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	0.115		0.0025	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	0.0326		0.0050	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	0.0215		0.0010	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	<0.40	DLDS	0.40	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	104			%		07-JUL-21	
TDS (Calculated)	6030			mg/L		07-JUL-21	
Hardness (as CaCO3)	1430			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	250	DLDS	6.0	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	7.85		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	9920		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	3140		5.0	mg/L		30-JUN-21	R5506651
Carbonate (CO3)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Hydroxide (OH)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Alkalinity, Total (as CaCO3)	2570		2.0	mg/L		30-JUN-21	R5506651

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
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).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
SP	Sample was Preserved at the laboratory

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS-HS-MS-CL	Water	BTEX and Styrene	EPA 8260C/5021A
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection.			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-T-COL-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
CR6-D-IC-ED	Water	Chromium, Dissolved Hexavalent (Cr +6)	APHA 3500-Cr C (Ion Chromatography)
This analysis is carried out using procedures adapted from method 3500-Cr C in "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from Method 1636 published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Results are based on a field-filtered, field-preserved sample.			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F1-HS-FID-CL	Water	F1 (C6-C10)	EPA 5021A / CWS PHC Tier 1
This analysis is based on the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2001." For F1 (C6-C10) analysis, the water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a GC-FID for analysis.			
F2-4-ME-FID-CL	Water	CCME F2-4 Hydrocarbons	EPA 3511/ CCME PHC CWS GC-FID
Water samples are spiked with 2-BBTF surrogate, and extracted by reciprocal action shaker for 30 minutes using a single micro-extraction with hexane. Instrumental analysis is by GC-FID, as per the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Tier 1 Method, CCME, December 2001.			
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
P-TD-COL-ED	Water	Total Dissolved P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H2SO4 is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-ED	Water	Phenols (4AAP)	EPA 9066 AUTO-DISTILL-COLORIMETRIC
This automated method is based on the distillation of phenol and subsequent reaction of the distillate with an oxidizing agent (alkaline potassium ferricyanide), and 4-aminoantipyrine to form a red complex which is measured at 505 nm. The method will include ortho and meta-substituted phenols, and is collectively named 4AAP phenols.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-ED	Water	Total Dissolved Solids	APHA 2540 C
Gravimetric determination of solids in waters by filtration and evaporating filtrate to dryness at 180 degrees Celsius.			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-ED	Water	TKN (as N) by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			
XYLENES-CALC-CL	Water	Sum of Xylene Isomer Concentrations	CALCULATION
Calculation of Total Xylenes			
Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-803235

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

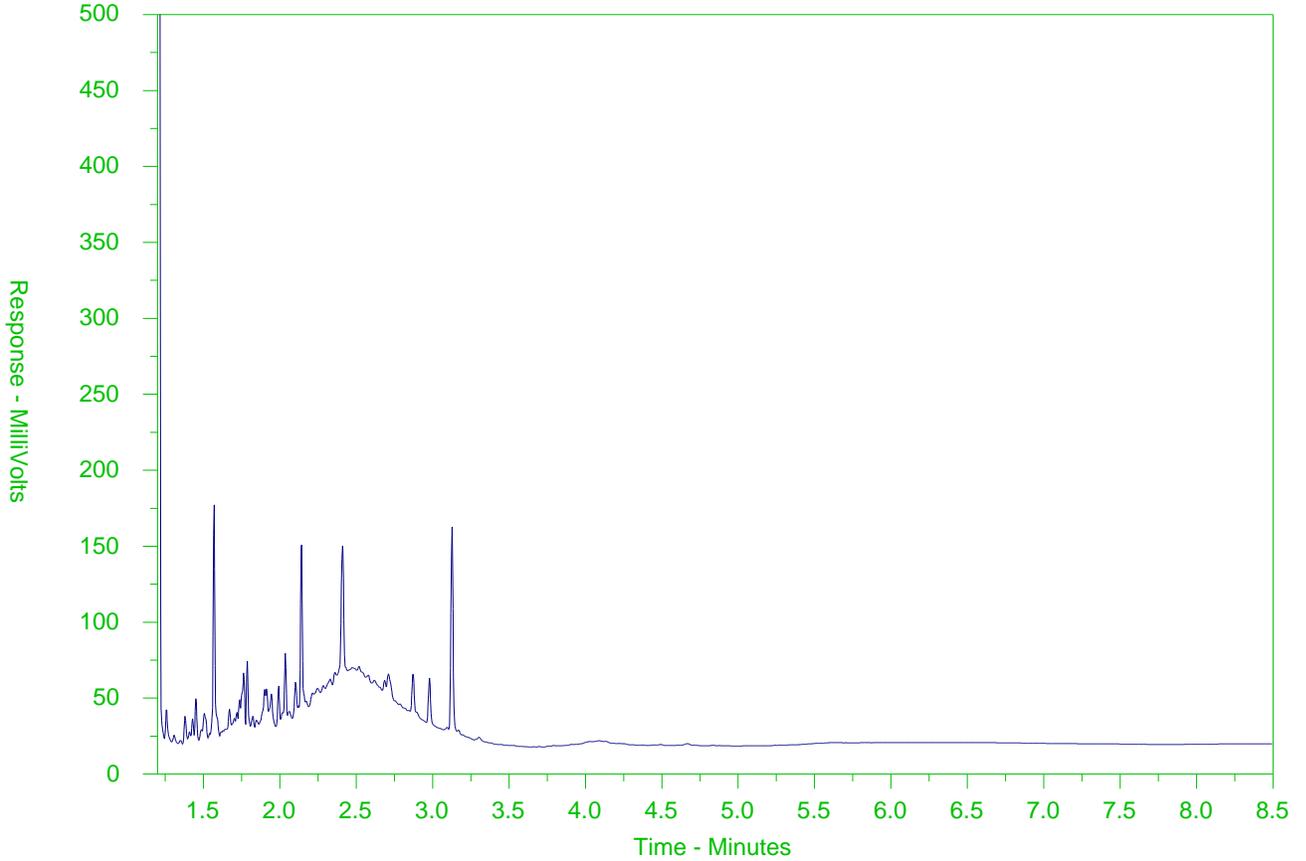
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2608028-1
 Client Sample ID: PRIMARY LEACHATE CELL 2 (PC2)



← F2 →		← F3 →		← F4 →	
nC10	nC16		nC34	nC50	
174°C	287°C		481°C	575°C	
346°F	549°F		898°F	1067°F	
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

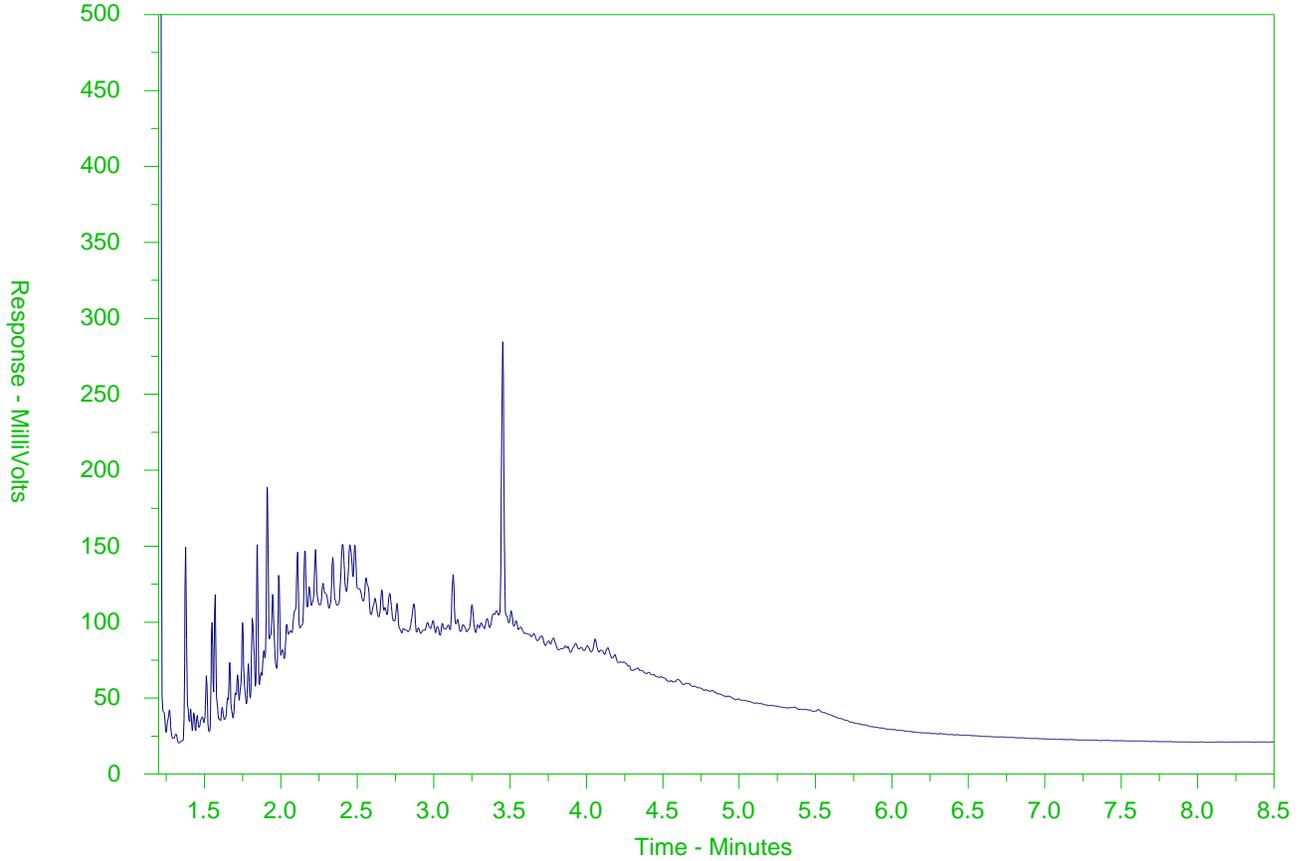
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2608028-2
 Client Sample ID: PRIMARY LEACHATE CELL 3A (PC3A)



← F2 →		← F3 →		← F4 →	
nC10	nC16			nC34	nC50
174°C	287°C			481°C	575°C
346°F	549°F			898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

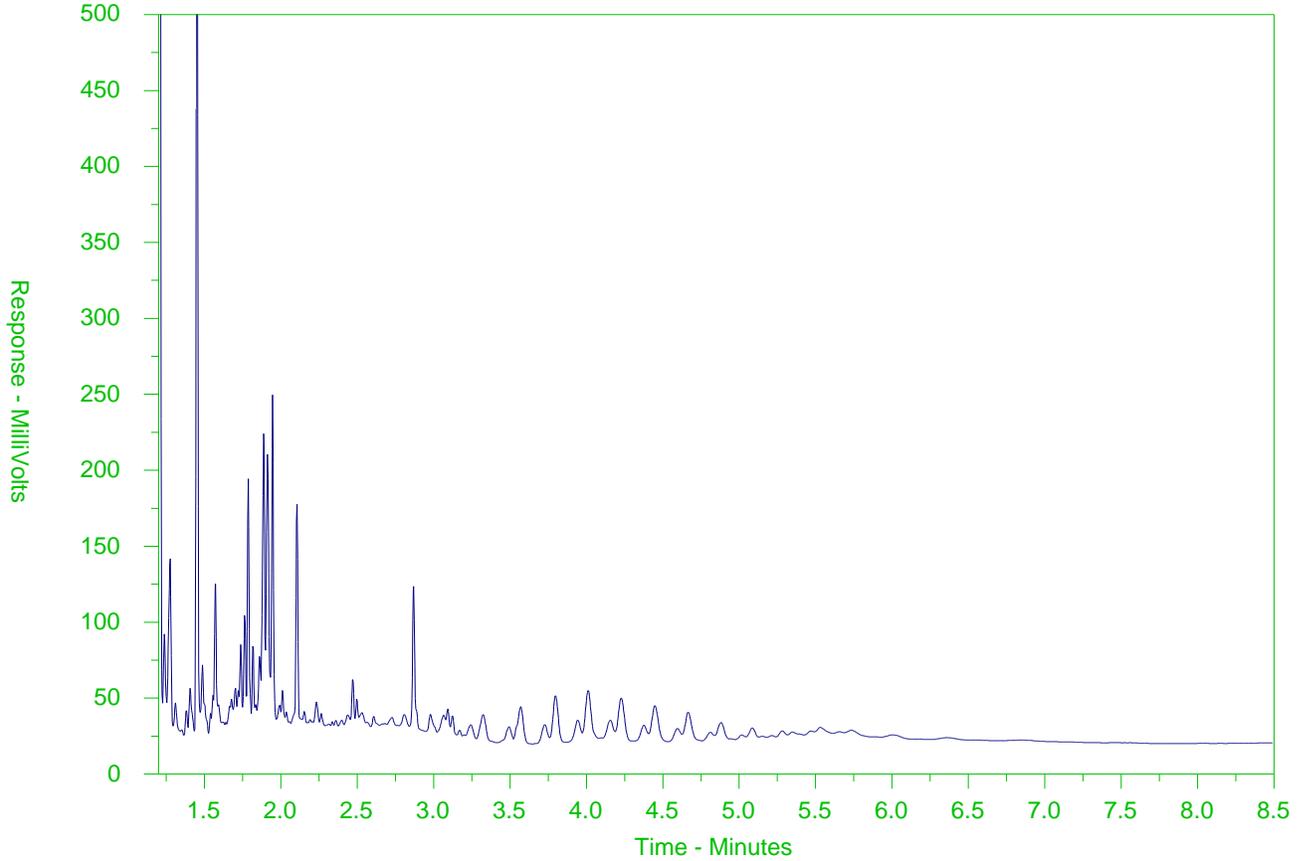
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2608028-3
 Client Sample ID: PRIMARY LEACHATE CELL 3B (PC3B)



← F2 →		← F3 →		← F4 →	
nC10	nC16			nC34	nC50
174°C	287°C			481°C	575°C
346°F	549°F			898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

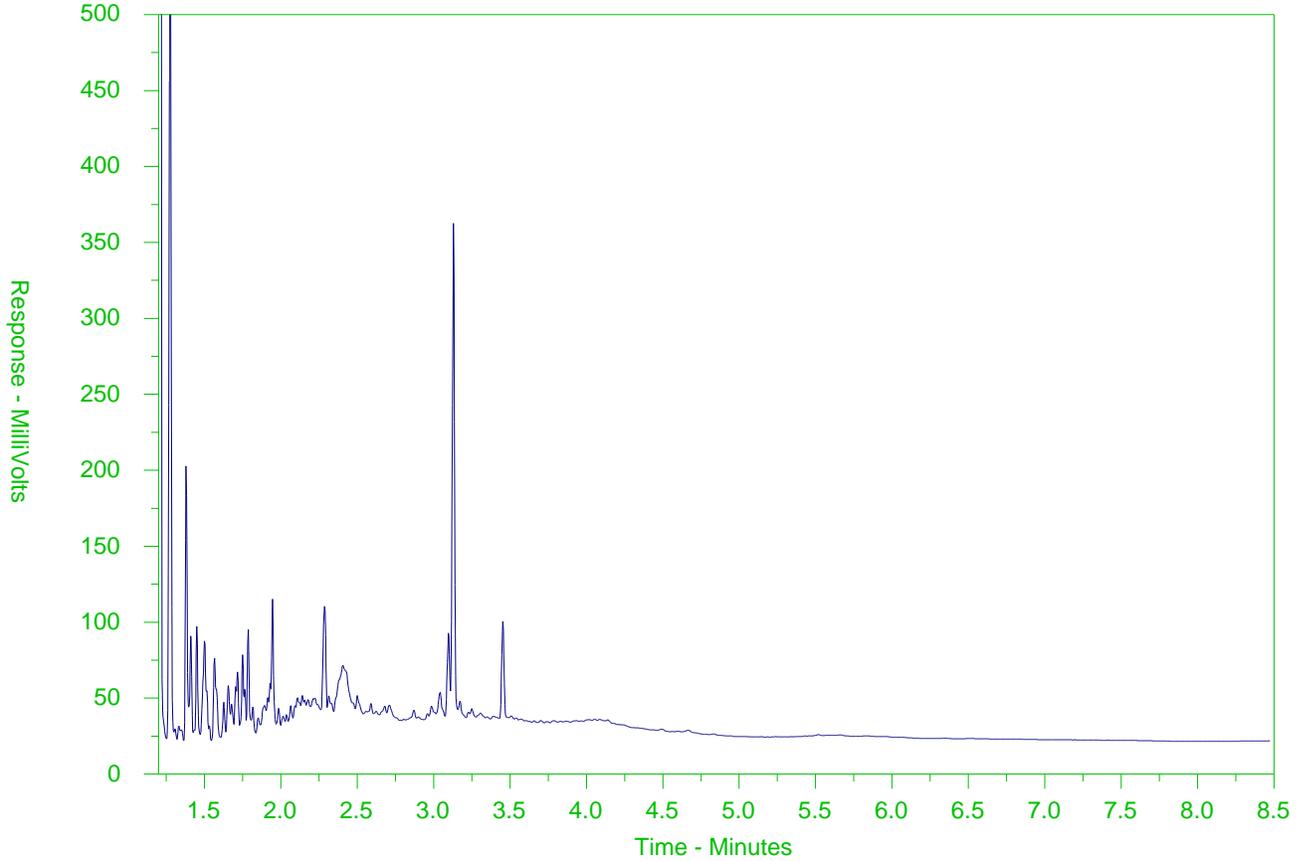
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2608028-4
 Client Sample ID: PRIMARY LEACHATE CELL 3C (PC3C)



← F2 →		← F3 →		← F4 →	
nC10	nC16			nC34	nC50
174°C	287°C			481°C	575°C
346°F	549°F			898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

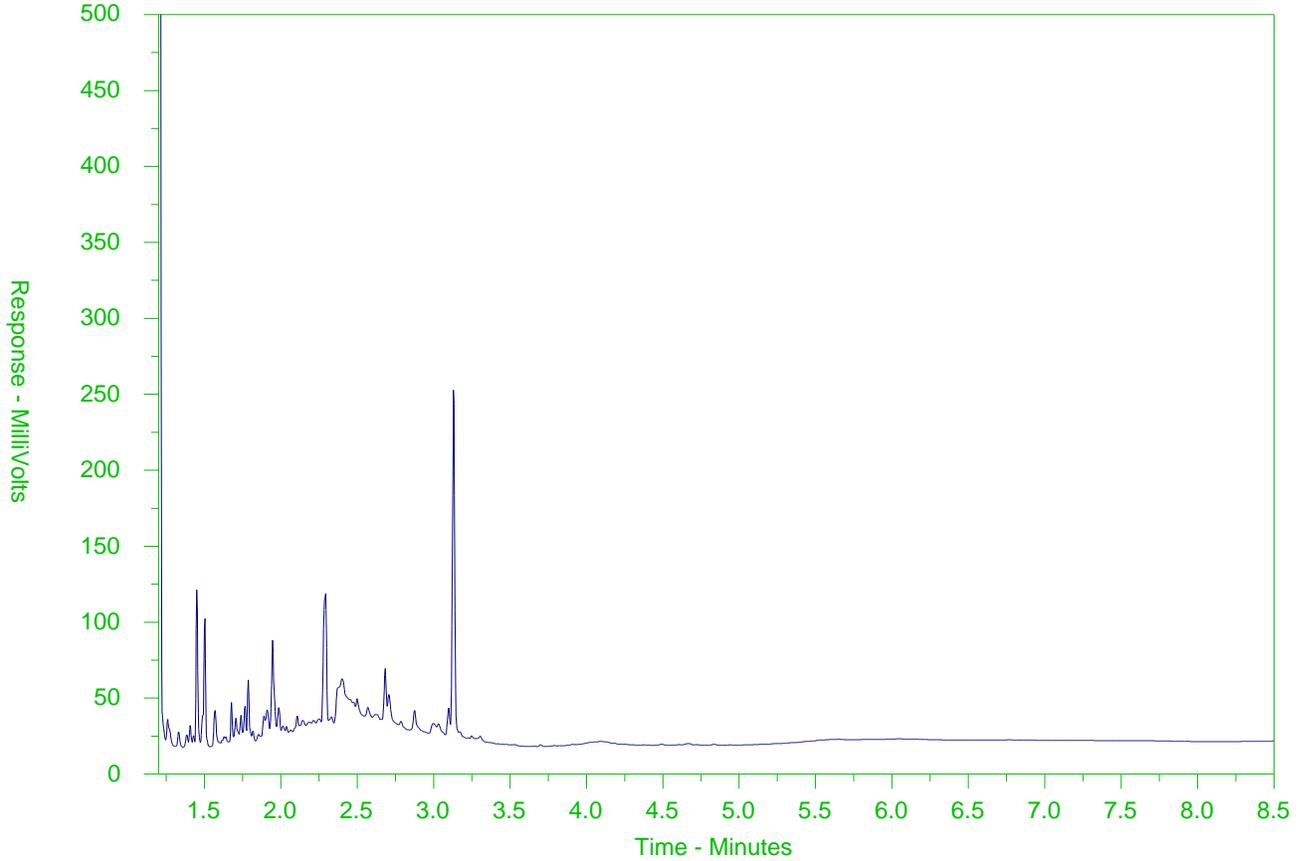
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2608028-5
 Client Sample ID: PRIMARY LEACHATE CELL 3D (PC3D)



← F2 →		← F3 →		← F4 →	
nC10	nC16	nC34	nC50		
174°C	287°C	481°C	575°C		
346°F	549°F	898°F	1067°F		
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →		
← Diesel/ Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

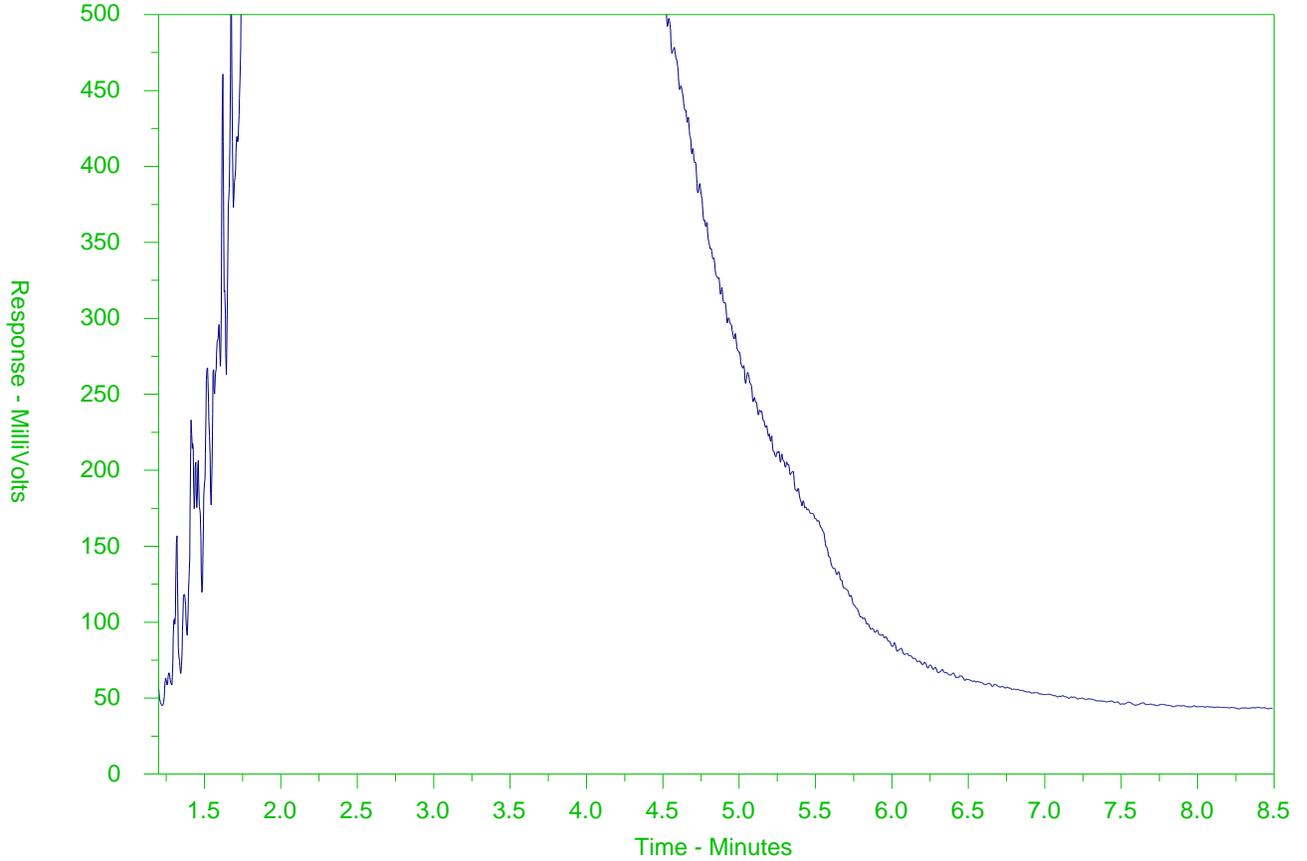
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2608028-6
 Client Sample ID: PRIMARY LEACHATE CELL 3E (PC3E)



← F2 →		← F3 →		← F4 →	
nC10	nC16	nC34	nC50		
174°C	287°C	481°C	575°C		
346°F	549°F	898°F	1067°F		
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →		
← Diesel/ Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

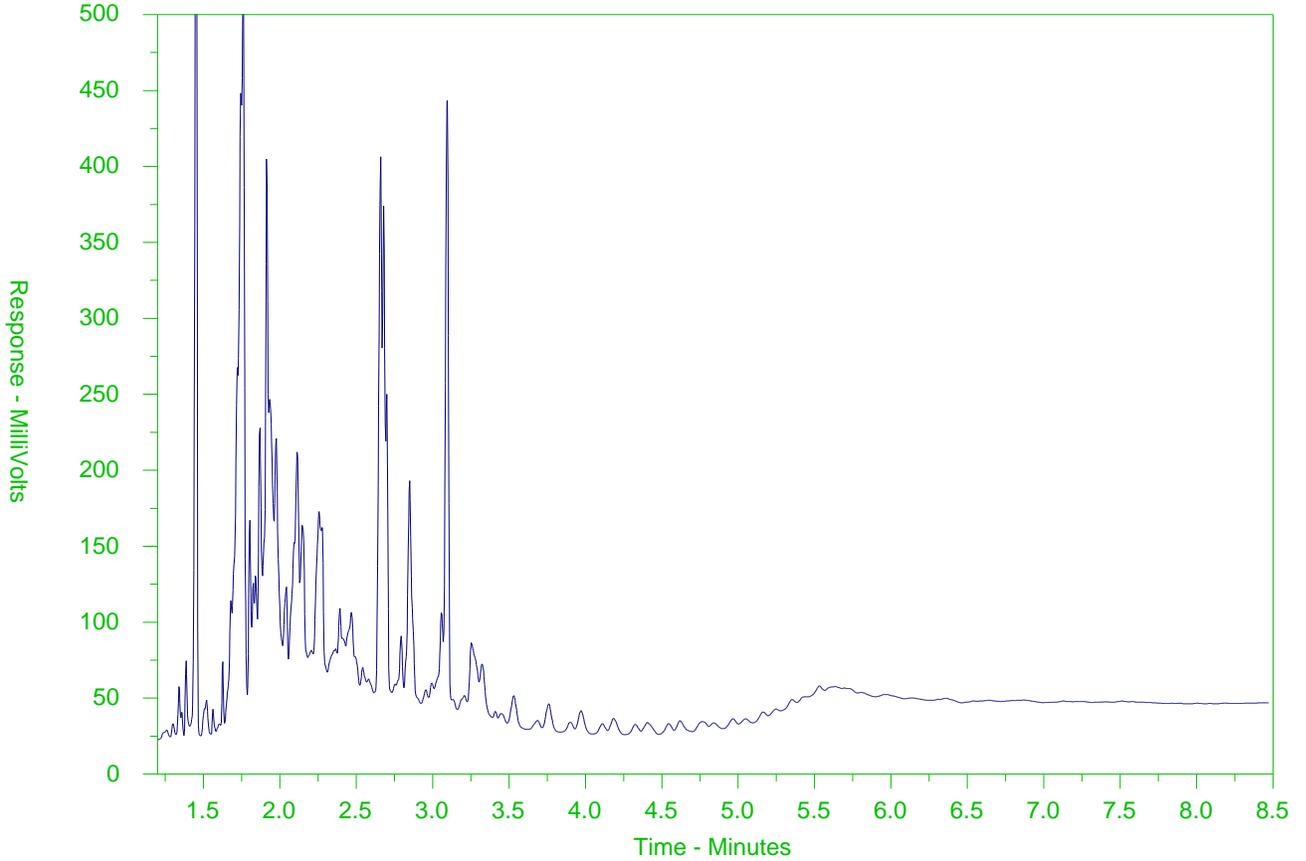
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2608028-7
 Client Sample ID: PRIMARY LEACHATE CELL 4 (PC4)



← F2 →		← F3 →		← F4 →	
nC10	nC16			nC34	nC50
174°C	287°C			481°C	575°C
346°F	549°F			898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.



L2608028-COFC

Report To Contact and company name below will appear on the final report		Report Format / Distribution			Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)						
Company: <u>Clean Harbors Canada</u>		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply						
Contact: <u>Todd Webb, Stan Yuha</u>		Quality Control (QC) Report with Report <input type="checkbox"/> YES <input type="checkbox"/> NO			PROBITY (Business Days) 4 day [P4-20%] <input type="checkbox"/>		EMERGENCY 1 Business day [E - 100%] <input type="checkbox"/>				
Phone: <u>(780) 663-2513</u>		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked			3 day [P3-25%] <input type="checkbox"/>		Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] <input type="checkbox"/>				
Company address below will appear on the final report		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm						
Street: <u>PO Box 390, 50114 Range Road 173</u>		Email 1 or Fax: <u>webb.todd@cleanharbors.com</u>			For tests that can not be performed according to the service level selected, you will be contacted.						
City/Province: <u>Ryley, AB</u>		Email 2: <u>yuha.stan@cleanharbors.com</u>			Analysis Request						
Postal Code: <u>T0B 4A0</u>		Email 3:									
Invoice To		Invoice Distribution			NUMBER OF CONTAINERS <u>Table 4.4A Leadate</u> <u>+ Leak Detection Monitoring</u> SAMPLES ON HOLD <small>SUSPECTED HAZARD (see Special Instructions)</small>						
Same as Report To <input type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX									
Copy of Invoice with Report <input type="checkbox"/> YES <input type="checkbox"/> NO		Email 1 or Fax: <u>Gooding.Robbi@cleanharbors.com</u>									
Company: <u>Clean Harbors Canada</u>		Email 2:									
Contact: <u>Robbi Gooding</u>		Project Information									
ALS Account # / Quote #:		<u>Oil and Gas Required Fields (client use)</u>									
Job #: <u>Primary leachate Qtr 2</u>		AFE/Cost Center: PO#									
PO / AFE:		Major/Minor Code: Routing Code:									
LSD:		Requisitioner:									
ALS Lab Work Order # (lab use only): <u>12608028</u>		Location:									
ALS Contact: <u>Murray</u>		Sampler: <u>Murray</u>									
ALS Sample # (lab use only)		Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mmm-yy)		Time (hh:mm)		Sample Type		
		<u>Primary Leachate Cell 2 (PC2)</u>			<u>28-JUN-21</u>						
		<u>Primary Leachate Cell 3A (PC3A)</u>			<u>28-JUN-21</u>						
		<u>Primary Leachate Cell 3B (PC3B)</u>			<u>28-JUN-21</u>						
		<u>Primary Leachate Cell 3C (PC3C)</u>			<u>28-JUN-21</u>						
		<u>Primary Leachate Cell 3D (PC3D)</u>			<u>28-JUN-21</u>						
		<u>Primary Leachate Cell 3E (PC3E)</u>			<u>28-JUN-21</u>						
		<u>Primary Leachate Cell 4 (PC4)</u>			<u>28-JUN-21</u>						
Drinking Water (DW) Samples' (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)			SAMPLE CONDITION AS RECEIVED (lab use only)						
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO		<u>Analyze as per Quote Q82438</u> <u>Table 4.4A package (attached)</u>			Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>						
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO					Ice Packs <input type="checkbox"/> Ice-Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>						
					Cooling-Initiated <input type="checkbox"/>						
					INITIAL COOLER TEMPERATURES °C						
					FINAL COOLER TEMPERATURES °C						
					R-7						
SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)					
Released by: <u>Todd Webb</u>		Date: <u>June 28, 2021</u>	Time: <u>15:00</u>	Received by: <u>Rm</u>		Date: <u>6/30/21</u>	Time: <u>14:50</u>	Received by:		Date:	Time:

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

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

"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

"major ions" means the following:

Calcium	Carbonate
Magnesium	Bicarbonate
Sodium	Chloride
Potassium	Sulfate

"nutrients" means the following:

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



L2608028-COFC

Appendix D
Primary Leachate Analyses
Quarter 3



Clean Harbors Canada Inc.
ATTN: Todd Webb/Stan Yuha
PO BOX 390
RYLEY AB TOB 4A0

Date Received: 27-SEP-21
Report Date: 18-JAN-22 14:51 (MT)
Version: FINAL REV. 2

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2644363
Project P.O. #: 0000220151
Job Reference: PRIMARY LEACHATE QTR 3
C of C Numbers: 17-790952
Legal Site Desc:


Kieran Tordoff
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9450 17 Avenue NW, Edmonton, AB T6N 1M9 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-1 PRIMARY LEACHATE CELL 1 (PC1)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0206		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	0.00142		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	0.00125		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	0.00216		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	0.00109		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	0.19		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	0.16		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	0.00325		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	100.1		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	80.1		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	109.0		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	1.50		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	111.3		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.408		0.0020	mg/L		02-OCT-21	R5606798
Miscellaneous Parameters							
Ammonia, Total (as N)	576	DLHC	50	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	2260	DLHC	50	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		04-OCT-21	R5608797
Dissolved Organic Carbon	500		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	<0.10	RRR	0.10	mg/L		04-OCT-21	R5608882
Note: SP Sample was Preserved at the laboratory., DLM Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).							
Phosphorus (P)-Total Dissolved	5.25	DLHC	0.40	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	11600	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	780		100	mg/L		26-OCT-21	R5608657
Mercury (Hg)-Total	0.000140		0.000050	mg/L		02-OCT-21	R5606731
Phosphorus (P)-Total	7.49	DLHC	0.40	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	526	DLHC	8.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2620	DLDS	10	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606925
Aluminum (Al)-Dissolved	0.179		0.020	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	0.0114		0.0020	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.0374		0.0020	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.250		0.0020	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	14.1		0.20	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	0.00430		0.00010	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	277		1.0	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	0.00070		0.00020	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	0.352		0.0020	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-1 PRIMARY LEACHATE CELL 1 (PC1)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Cobalt (Co)-Dissolved	0.131		0.0020	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	0.0429		0.0040	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	99.6		0.20	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	0.168		0.0010	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	0.371		0.020	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	316		0.10	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	16.5		0.0020	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	4.69		0.0010	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	8.34		0.010	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	6.4		1.0	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	369		1.0	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.0406		0.0040	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	0.0016		0.0010	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	12.7		1.0	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	0.00038		0.00020	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	2770		1.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	2.28		0.0040	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	830		10	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	0.0658		0.0060	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	0.0691		0.0020	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.0125		0.00020	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	11.4		0.010	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	2.50		0.020	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	0.198		0.0040	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	<0.40	DLDS	0.40	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	95.7			%		04-OCT-21	
TDS (Calculated)	11700			mg/L		04-OCT-21	
Hardness (as CaCO3)	1990			mg/L		04-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	27.4	DLDS	0.40	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	29.1		0.45	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	1.78	DLDS	0.20	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	2300	DLDS	6.0	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	8.01		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	17700		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	5890	DLHC	50	mg/L		01-OCT-21	R5606441
Carbonate (CO3)	<5.0	DLHC	5.0	mg/L		01-OCT-21	R5606441
Hydroxide (OH)	<5.0	DLHC	5.0	mg/L		01-OCT-21	R5606441
Alkalinity, Total (as CaCO3)	4830	DLHC	20	mg/L		01-OCT-21	R5606441

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-2 PRIMARY LEACHATE CELL 2 (PC2)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0633		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	0.0116		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	0.00160		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	0.00212		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	0.50		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	0.42		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	0.00372		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	106.2		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	86.2		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	88.1		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	0.13		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	94.8		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.334		0.010	mg/L		02-OCT-21	R5606798
Miscellaneous Parameters							
Ammonia, Total (as N)	889	DLHC	50	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	9160	DLHC	100	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		04-OCT-21	R5608797
Dissolved Organic Carbon	2680		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	4.86	RRR	0.10	mg/L		04-OCT-21	R5608882
Note: SP Sample was Preserved at the laboratory., DLHC Detection Limit Raised: Dilution required due to high concentration of test analyte(s).							
Phosphorus (P)-Total Dissolved	3.88	DLHC	0.10	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	31100	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	1060		100	mg/L		26-OCT-21	R5608657
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		02-OCT-21	R5606731
Phosphorus (P)-Total	4.05	DLHC	0.10	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	5.7		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	7920	DLDS	50	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606925
Aluminum (Al)-Dissolved	<0.10	DLDS	0.10	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	0.470		0.010	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.407		0.010	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	1.20		0.010	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.010	DLDS	0.010	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	64.6		1.0	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	0.0101		0.00050	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	42.6		5.0	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	0.0025		0.0010	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	0.316		0.010	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-2 PRIMARY LEACHATE CELL 2 (PC2)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Cobalt (Co)-Dissolved	0.010		0.010	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	0.039		0.020	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	<1.0	DLDS	1.0	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	7.53		0.10	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	339		0.50	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	0.871		0.010	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	41.3		0.0050	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	0.387		0.050	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	5.1		5.0	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	1190		5.0	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.185		0.020	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	0.0096		0.0050	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	9.7		5.0	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	7890		5.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	3.38		0.020	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	1940		50	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.020	DLDS	0.020	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.010	DLDS	0.010	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.010	DLDS	0.010	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	0.230		0.030	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	21.4		0.010	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.0017		0.0010	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	0.581		0.050	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	<0.10	DLDS	0.10	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	0.338		0.020	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	16.2	DLDS	2.0	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	91.0			%		04-OCT-21	
TDS (Calculated)	26500			mg/L		04-OCT-21	
Hardness (as CaCO3)	1500			mg/L		04-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	<2.0	DLDS	2.0	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<2.2		2.2	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<1.0	DLDS	1.0	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	982	DLDS	30	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	8.69		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	38900		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	14900	DLHC	50	mg/L		01-OCT-21	R5606441
Carbonate (CO3)	732	DLHC	50	mg/L		01-OCT-21	R5606441
Hydroxide (OH)	<5.0	DLHC	5.0	mg/L		01-OCT-21	R5606441
Alkalinity, Total (as CaCO3)	13500	DLHC	20	mg/L		01-OCT-21	R5606441

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-3 PRIMARY LEACHATE CELL 3A (PC3A)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.182		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	0.0501		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	0.00513		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	0.0189		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	0.0103		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	0.45		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	0.18		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	0.0292		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	102.7		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	91.9		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	79.1		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	4.75		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	99.4		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.246		0.010	mg/L		02-OCT-21	R5606798
Miscellaneous Parameters							
Ammonia, Total (as N)	734	DLHC	50	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	3930	DLHC	50	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		04-OCT-21	R5608797
Dissolved Organic Carbon	910		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	9.65	RRR	0.10	mg/L		04-OCT-21	R5608882
Note: SP Sample was Preserved at the laboratory., DLHC Detection Limit Raised: Dilution required due to high concentration of test analyte(s).							
Phosphorus (P)-Total Dissolved	4.60	DLHC	0.10	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	18900	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	780		100	mg/L		28-OCT-21	R5608657
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		02-OCT-21	R5606731
Phosphorus (P)-Total	4.33	DLHC	0.10	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	62.7		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	7860	DLDS	50	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606925
Aluminum (Al)-Dissolved	<0.10	DLDS	0.10	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	0.013		0.010	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.466		0.010	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	1.74		0.010	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.010	DLDS	0.010	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	37.1		1.0	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	245		5.0	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	0.0014		0.0010	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	0.187		0.010	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-3 PRIMARY LEACHATE CELL 3A (PC3A)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Cobalt (Co)-Dissolved	<0.010	DLDS	0.010	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	<0.020	DLDS	0.020	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	<1.0	DLDS	1.0	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	2.30		0.10	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	365		0.50	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	1.53		0.010	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	0.553		0.0050	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	0.425		0.050	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	6.2		5.0	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	826		5.0	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.655		0.020	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	0.0082		0.0050	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	18.0		5.0	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	4600		5.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	4.75		0.020	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	147		50	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.020	DLDS	0.020	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.010	DLDS	0.010	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.010	DLDS	0.010	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	0.073		0.030	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	1.38		0.010	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.0017		0.0010	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	0.150		0.050	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	<0.10	DLDS	0.10	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	0.199		0.020	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	<2.0	DLDS	2.0	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	90.0			%		04-OCT-21	
TDS (Calculated)	17800			mg/L		04-OCT-21	
Hardness (as CaCO3)	2110			mg/L		04-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	<2.0	DLDS	2.0	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<2.2		2.2	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<1.0	DLDS	1.0	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	98	DLDS	30	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	7.96		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	30000		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	7770	DLHC	50	mg/L		01-OCT-21	R5606441
Carbonate (CO3)	<5.0	DLHC	5.0	mg/L		01-OCT-21	R5606441
Hydroxide (OH)	<5.0	DLHC	5.0	mg/L		01-OCT-21	R5606441
Alkalinity, Total (as CaCO3)	6370	DLHC	20	mg/L		01-OCT-21	R5606441

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-4 PRIMARY LEACHATE CELL 3B (PC3B)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0134		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	0.0120		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	0.00099		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	0.00259		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	0.00278		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	0.92		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	0.89		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	0.00537		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	100.2		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	93.1		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	72.1		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	2.50		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	103.6		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.555		0.010	mg/L		02-OCT-21	R5606798
Miscellaneous Parameters							
Ammonia, Total (as N)	1780	DLHC	50	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	17100	DLHC	100	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	0.0051	DLM	0.0025	mg/L		04-OCT-21	R5608797
Dissolved Organic Carbon	4870		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	24.7	DLHC	0.50	mg/L		05-OCT-21	R5608882
Phosphorus (P)-Total Dissolved	4.87	DLHC	0.40	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	36000	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	2310		100	mg/L		26-OCT-21	R5608657
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		02-OCT-21	R5606731
Phosphorus (P)-Total	5.07	DLHC	0.40	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	21.9		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	9710	DLDS	50	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606925
Aluminum (Al)-Dissolved	<0.10	DLDS	0.10	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	0.011		0.010	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.131		0.010	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.450		0.010	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.010	DLDS	0.010	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	136		1.0	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	0.0114		0.00050	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	12.8		5.0	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	0.104		0.0010	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	0.432		0.010	mg/L		03-OCT-21	R5607158
Cobalt (Co)-Dissolved	0.023		0.010	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	0.023		0.020	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	1.3		1.0	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	0.0075		0.0050	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-4 PRIMARY LEACHATE CELL 3B (PC3B) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	8.12		0.10	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	35.8		0.50	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	0.723		0.010	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	44.4		0.0050	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	1.20		0.050	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	9.0		5.0	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	2780		5.0	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	4.35		0.020	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	0.0739		0.0050	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	39.3		5.0	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	7440		5.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	0.683		0.020	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	675		50	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.020	DLDS	0.020	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.010	DLDS	0.010	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.010	DLDS	0.010	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	0.137		0.030	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	6.29		0.010	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.0010		0.0010	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	0.407		0.050	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	<0.10	DLDS	0.10	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	0.064		0.020	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	7.8	DLDS	2.0	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	94.1			%		04-OCT-21	
TDS (Calculated)	29000			mg/L		04-OCT-21	
Hardness (as CaCO3)	179			mg/L		04-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	<2.0	DLDS	2.0	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<2.2		2.2	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<1.0	DLDS	1.0	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	1380	DLDS	30	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	9.32		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	43700		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	6870	DLHC	50	mg/L		01-OCT-21	R5606441
Carbonate (CO3)	4280	DLHC	50	mg/L		01-OCT-21	R5606441
Hydroxide (OH)	<5.0	DLHC	5.0	mg/L		01-OCT-21	R5606441
Alkalinity, Total (as CaCO3)	12800	DLHC	20	mg/L		01-OCT-21	R5606441
L2644363-5 PRIMARY LEACHATE CELL 3C (PC3C) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0234		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-5 PRIMARY LEACHATE CELL 3C (PC3C)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Toluene	0.329		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	0.105		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	0.336		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	0.201		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	1.43		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	0.44		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	0.537		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	104.7		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	110.1		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	71.0		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	3.64		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	110.5		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0048		0.0020	mg/L		02-OCT-21	R5606798
Miscellaneous Parameters							
Ammonia, Total (as N)	640	DLHC	50	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	1830	DLHC	100	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		04-OCT-21	R5608797
Dissolved Organic Carbon	380		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	0.94	RRR	0.10	mg/L		04-OCT-21	R5608882
Note: SP Sample was Preserved at the laboratory., DLHC Detection Limit Raised: Dilution required due to high concentration of test analyte(s).							
Phosphorus (P)-Total Dissolved	2.11	DLHC	0.10	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	9010	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	641		20	mg/L		26-OCT-21	R5608657
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		02-OCT-21	R5606731
Phosphorus (P)-Total	2.04	DLHC	0.10	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	12.5		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2890	DLDS	10	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606935
Aluminum (Al)-Dissolved	<0.020	DLDS	0.020	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.0269		0.0020	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.110		0.0020	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	55.6		0.20	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	0.00021		0.00010	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	47.7		1.0	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	0.00068		0.00020	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	0.0039		0.0020	mg/L		03-OCT-21	R5607158
Cobalt (Co)-Dissolved	0.0030		0.0020	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	0.0131		0.0040	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-5 PRIMARY LEACHATE CELL 3C (PC3C) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Iron (Fe)-Dissolved	0.54		0.20	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	1.60		0.020	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	135		0.10	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	0.556		0.0020	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	0.789		0.0010	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	0.837		0.010	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	2.7		1.0	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	441		1.0	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.257		0.0040	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	0.0089		0.0010	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	9.6		1.0	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	2380		1.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	0.388		0.0040	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	887		10	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	0.0066		0.0060	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	0.0570		0.0020	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.00530		0.00020	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	5.37		0.010	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	<0.020	DLDS	0.020	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	0.101		0.0040	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	4.82	DLDS	0.40	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	97.3			%		04-OCT-21	
TDS (Calculated)	9020			mg/L		04-OCT-21	
Hardness (as CaCO3)	675			mg/L		04-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	558	DLDS	6.0	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	8.69		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	15800		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	4320	DLHC	50	mg/L		01-OCT-21	R5606441
Carbonate (CO3)	437	DLHC	50	mg/L		01-OCT-21	R5606441
Hydroxide (OH)	<5.0	DLHC	5.0	mg/L		01-OCT-21	R5606441
Alkalinity, Total (as CaCO3)	4270	DLHC	20	mg/L		01-OCT-21	R5606441
L2644363-6 PRIMARY LEACHATE CELL 3D (PC3D) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER BTEX, Styrene & F1-F2							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-6 PRIMARY LEACHATE CELL 3D (PC3D)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0110		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	0.0119		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	0.00122		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	0.00295		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	0.00237		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	0.28		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	0.25		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	0.00532		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	105.8		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	90.7		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	84.1		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	0.75		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	94.7		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0239		0.0020	mg/L		02-OCT-21	R5606798
Miscellaneous Parameters							
Ammonia, Total (as N)	537	DLHC	50	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	2760	DLHC	100	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		04-OCT-21	R5608797
Dissolved Organic Carbon	630		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	4.15	RRR	0.10	mg/L		04-OCT-21	R5608882
Note: SP Sample was Preserved at the laboratory., DLHC Detection Limit Raised: Dilution required due to high concentration of test analyte(s).							
Phosphorus (P)-Total Dissolved	1.10	DLHC	0.10	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	12500	DLDS	80	mg/L		12-OCT-21	R5615563
Total Kjeldahl Nitrogen	458		20	mg/L		21-OCT-21	R5608657
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		02-OCT-21	R5606731
Phosphorus (P)-Total	1.20	DLHC	0.10	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	9.3		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	4620	RRV	10	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606935
Aluminum (Al)-Dissolved	0.035		0.020	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.0232		0.0020	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.392		0.0020	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	59.3		0.20	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	0.00103		0.00010	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	171		1.0	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	0.00299		0.00020	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	0.0192		0.0020	mg/L		03-OCT-21	R5607158
Cobalt (Co)-Dissolved	0.0055		0.0020	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-6 PRIMARY LEACHATE CELL 3D (PC3D)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Copper (Cu)-Dissolved	0.0578		0.0040	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	1.15		0.20	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	1.88		0.020	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	193		0.10	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	1.26		0.0020	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	4.09		0.0010	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	2.41		0.010	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	1.7		1.0	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	537		1.0	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.385		0.0040	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	0.0100		0.0010	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	14.0		1.0	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	3360		1.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	1.98		0.0040	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	248		10	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	0.0153		0.0060	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	0.0626		0.0020	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.00332		0.00020	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	4.58		0.010	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	0.029		0.020	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	0.0695		0.0040	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	4.24	DLDS	0.40	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	101			%		07-OCT-21	
TDS (Calculated)	11700			mg/L		07-OCT-21	
Hardness (as CaCO3)	1220			mg/L		07-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	185	RRV	6.0	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	7.97		0.10	pH		07-OCT-21	R5613741
Conductivity (EC)	19000		2.0	uS/cm		07-OCT-21	R5613741
Bicarbonate (HCO3)	5290	DLHC	50	mg/L		07-OCT-21	R5613741
Carbonate (CO3)	<5.0		5.0	mg/L		07-OCT-21	R5613741
Hydroxide (OH)	<5.0		5.0	mg/L		07-OCT-21	R5613741
Alkalinity, Total (as CaCO3)	4340	DLHC	20	mg/L		07-OCT-21	R5613741
L2644363-7 PRIMARY LEACHATE CELL 3E (PC3E)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-7 PRIMARY LEACHATE CELL 3E (PC3E)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0210		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	0.00365		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	0.00171		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	0.00307		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	0.00482		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	0.12		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	0.00789		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	101.6		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	103.3		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	75.3		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	23.1		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	105.2		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0047		0.0020	mg/L		03-OCT-21	R5607158
Miscellaneous Parameters							
Ammonia, Total (as N)	429	DLHC	50	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	1110	DLHC	50	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		04-OCT-21	R5608797
Dissolved Organic Carbon	120		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	0.11	RRR	0.10	mg/L		04-OCT-21	R5608882
Note: SP Sample was Preserved at the laboratory., DLM Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).							
Phosphorus (P)-Total Dissolved	0.801		0.020	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	7640	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	404		20	mg/L		21-OCT-21	R5608657
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-OCT-21	R5606731
Phosphorus (P)-Total	0.781		0.020	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	33.7		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2670	RRV	10	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606935
Aluminum (Al)-Dissolved	<0.020	DLDS	0.020	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.0080		0.0020	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.287		0.0020	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	5.38		0.20	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	0.00026		0.00010	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	86.9		1.0	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	0.00423		0.00020	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	0.0022		0.0020	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-7 PRIMARY LEACHATE CELL 3E (PC3E)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Cobalt (Co)-Dissolved	0.0044		0.0020	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	0.0045		0.0040	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	<0.20	DLDS	0.20	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	0.697		0.020	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	246		0.10	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	0.627		0.0020	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	0.879		0.0010	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	0.662		0.010	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	<1.0	DLDS	1.0	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	237		1.0	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.308		0.0040	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	0.0021		0.0010	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	13.3		1.0	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	2200		1.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	2.37		0.0040	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	188		10	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	<0.0060	DLDS	0.0060	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	0.0234		0.0020	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.00765		0.00020	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	5.15		0.010	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	<0.020	DLDS	0.020	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	0.0836		0.0040	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	2.07	DLDS	0.40	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	95.8			%		05-NOV-21	
TDS (Calculated)	8240			mg/L		05-NOV-21	
Hardness (as CaCO3)	1230			mg/L		05-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	397	RRV	6.0	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	8.00		0.10	pH		05-OCT-21	R5610012
Conductivity (EC)	11200		2.0	uS/cm		05-OCT-21	R5610012
Bicarbonate (HCO3)	4890		50	mg/L		05-OCT-21	R5610012
Carbonate (CO3)	<5.0		5.0	mg/L		05-OCT-21	R5610012
Hydroxide (OH)	<5.0		5.0	mg/L		05-OCT-21	R5610012
Alkalinity, Total (as CaCO3)	4010		20	mg/L		05-OCT-21	R5610012

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-8 PRIMARY LEACHATE CELL 4 (PC4)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.110		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	0.259		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	0.0195		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	0.0463		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	0.0274		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	1.24		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	0.78		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	0.0736		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	115.1		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	90.2		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	74.7		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	3.80		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	94.8		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0057		0.0020	mg/L		03-OCT-21	R5607158
Miscellaneous Parameters							
Ammonia, Total (as N)	322	DLHC	50	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	4870	DLHC	50	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		04-OCT-21	R5608797
Dissolved Organic Carbon	1250		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	3.12	RRR	0.10	mg/L		04-OCT-21	R5608882
Note: SP Sample was Preserved at the laboratory., DLHC Detection Limit Raised: Dilution required due to high concentration of test analyte(s).							
Phosphorus (P)-Total Dissolved	1.23	DLHC	0.10	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	9480	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	359		20	mg/L		21-OCT-21	R5608657
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		02-OCT-21	R5606731
Phosphorus (P)-Total	1.34	DLHC	0.10	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	16.1		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	3120	DLDS	10	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606935
Aluminum (Al)-Dissolved	0.082		0.020	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.0354		0.0020	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.360		0.0020	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	18.4		0.20	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	0.00075		0.00010	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	342		1.0	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	0.0159		0.00020	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	0.0046		0.0020	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644363-8 PRIMARY LEACHATE CELL 4 (PC4)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Cobalt (Co)-Dissolved	0.0084		0.0020	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	0.0052		0.0040	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	0.74		0.20	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	0.120		0.020	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	194		0.10	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	1.99		0.0020	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	3.08		0.0010	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	0.370		0.010	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	2.9		1.0	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	262		1.0	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.179		0.0040	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	0.0060		0.0010	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	14.0		1.0	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	2330		1.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	2.30		0.0040	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	319		10	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	0.0282		0.0060	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	0.0698		0.0020	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.00361		0.00020	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	0.607		0.010	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	<0.020	DLDS	0.020	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	0.0356		0.0040	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	1.70	DLDS	0.40	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	101			%		04-OCT-21	
TDS (Calculated)	8500			mg/L		04-OCT-21	
Hardness (as CaCO3)	1650			mg/L		04-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	50.5	DLDS	6.0	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	8.20		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	14500		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	4470		5.0	mg/L		28-SEP-21	R5604420
Carbonate (CO3)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Hydroxide (OH)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Alkalinity, Total (as CaCO3)	3670		2.0	mg/L		28-SEP-21	R5604420

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

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).
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRR	Refer to Report Remarks for issues regarding this analysis
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
<p>The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method.</p>			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
<p>Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO₂ which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.</p>			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
COD-T-COL-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
<p>This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.</p>			
CR-CR6-DIS-WT	Water	Dissolved Hexavalent Chromium in Water	EPA 7199
<p>This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Chromium (III) is calculated as the difference between the total chromium and the chromium (VI) results.</p>			
<p>Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).</p>			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
<p>Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.</p>			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
<p>Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.</p>			
<p>Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.</p>			
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
<p>Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.</p>			
<p>Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.</p>			
NH3-COL-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)
<p>This analysis is carried out using procedures adapted from APHA Method 4500 NH₃ "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.</p>			
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
P-TD-COL-ED	Water	Total Dissolved P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H2SO4 is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-ED	Water	Total Dissolved Solids	APHA 2540 C
Gravimetric determination of solids in waters by filtration and evaporating filtrate to dryness at 180 degrees Celsius.			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-CL	Water	Total Kjeldahl Nitrogen by Fluorescence	APHA 4500-NORG (TKN)
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-790952

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

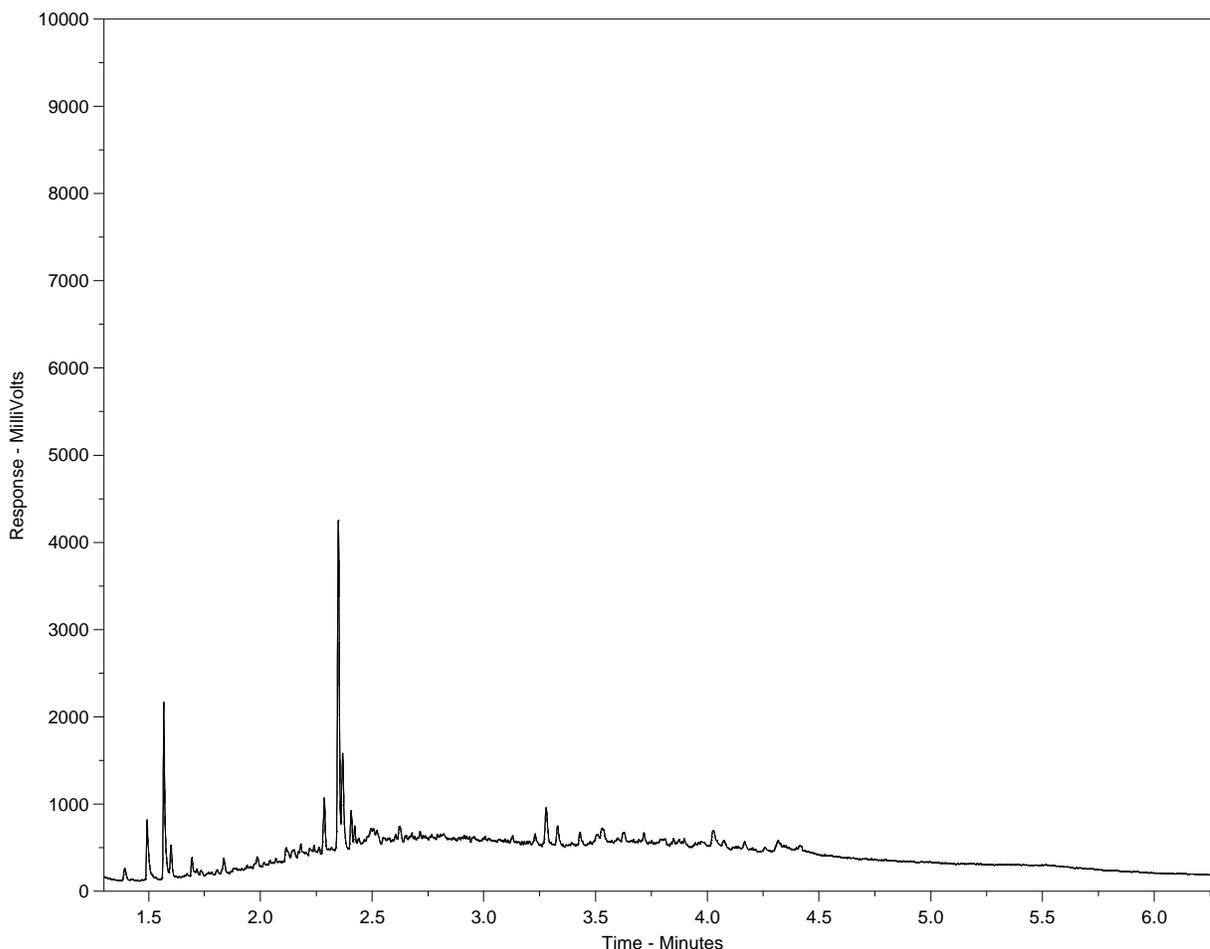
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Hydrocarbon Distribution Report



ALS Sample ID: L2644363-1
 Client ID: PRIMARY LEACHATE CELL 1 (PC1)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

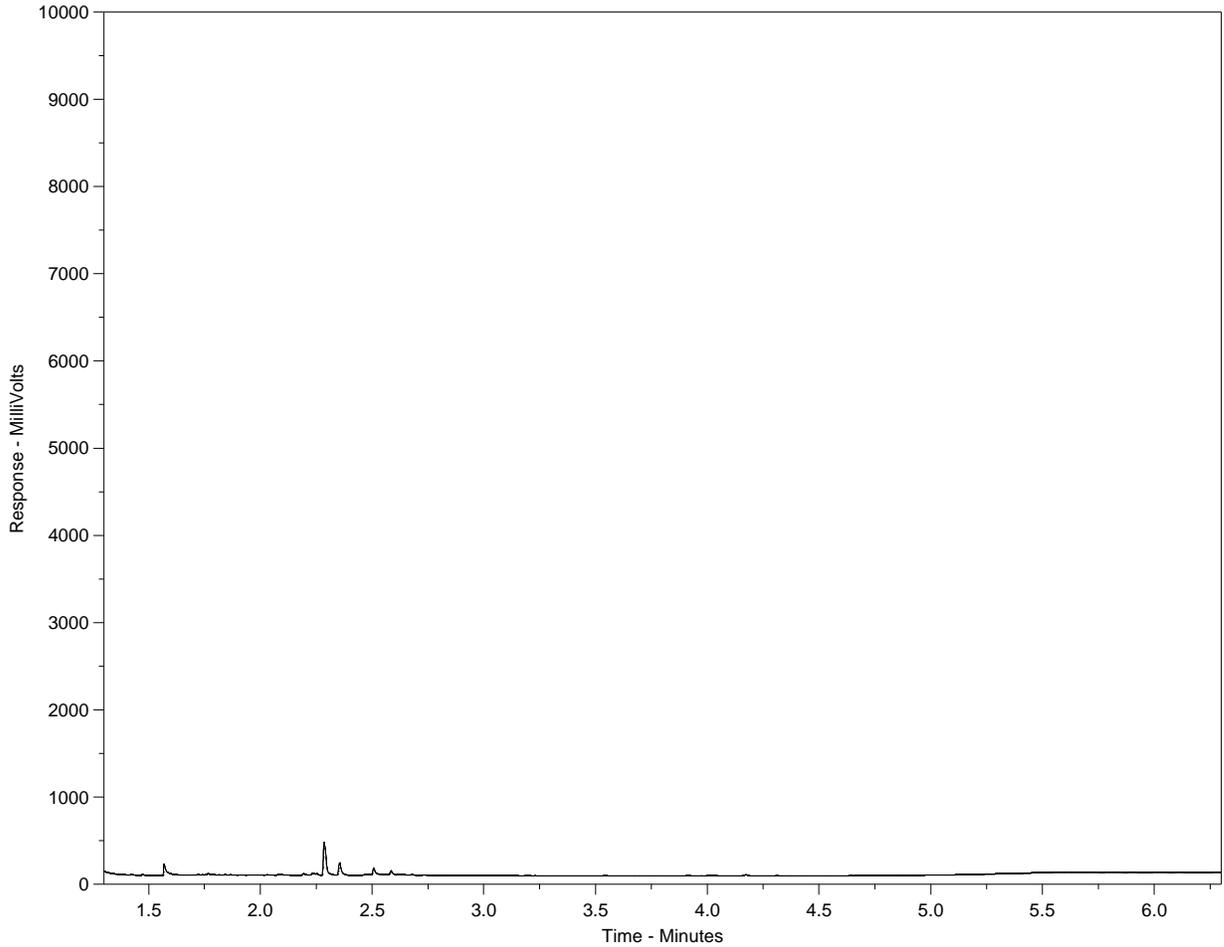
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644363-2
 Client ID: PRIMARY LEACHATE CELL 2 (PC2)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

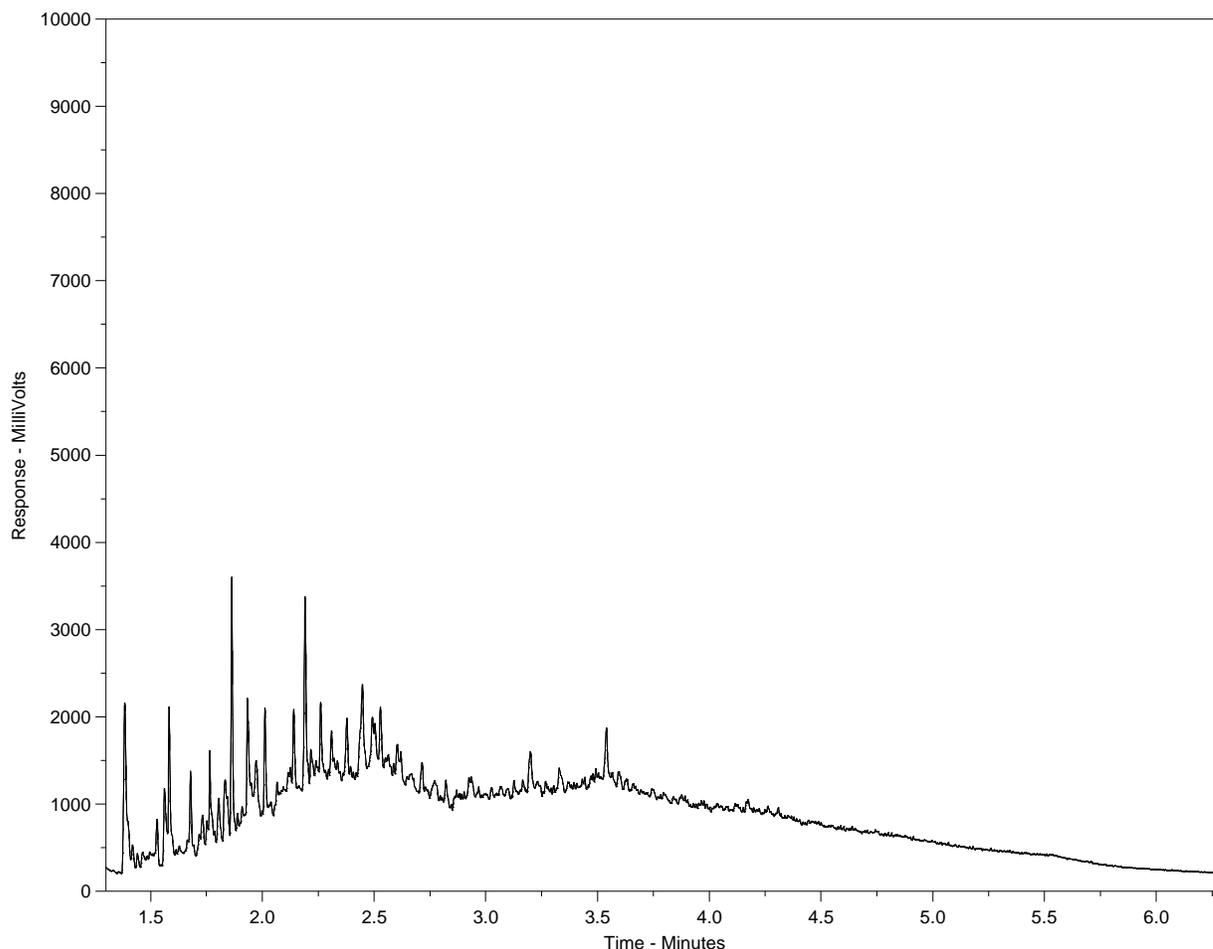
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644363-3
 Client ID: PRIMARY LEACHATE CELL 3A (PC3A)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34	nC50		
174°C	287°C			481°C	575°C		
346°F	549°F			898°F	1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

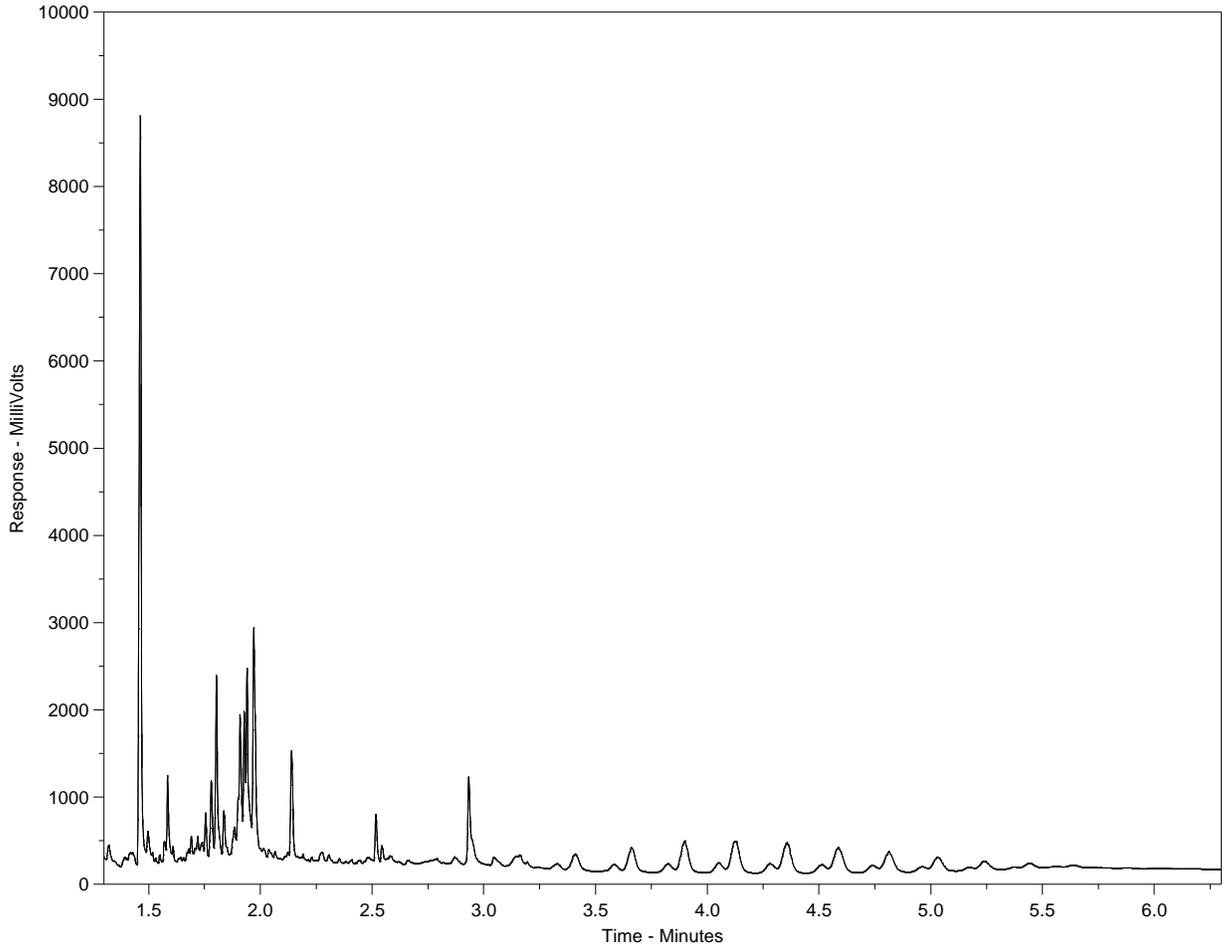
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644363-4
 Client ID: PRIMARY LEACHATE CELL 3B (PC3B)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34	nC50		
174°C	287°C			481°C	575°C		
346°F	549°F			898°F	1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

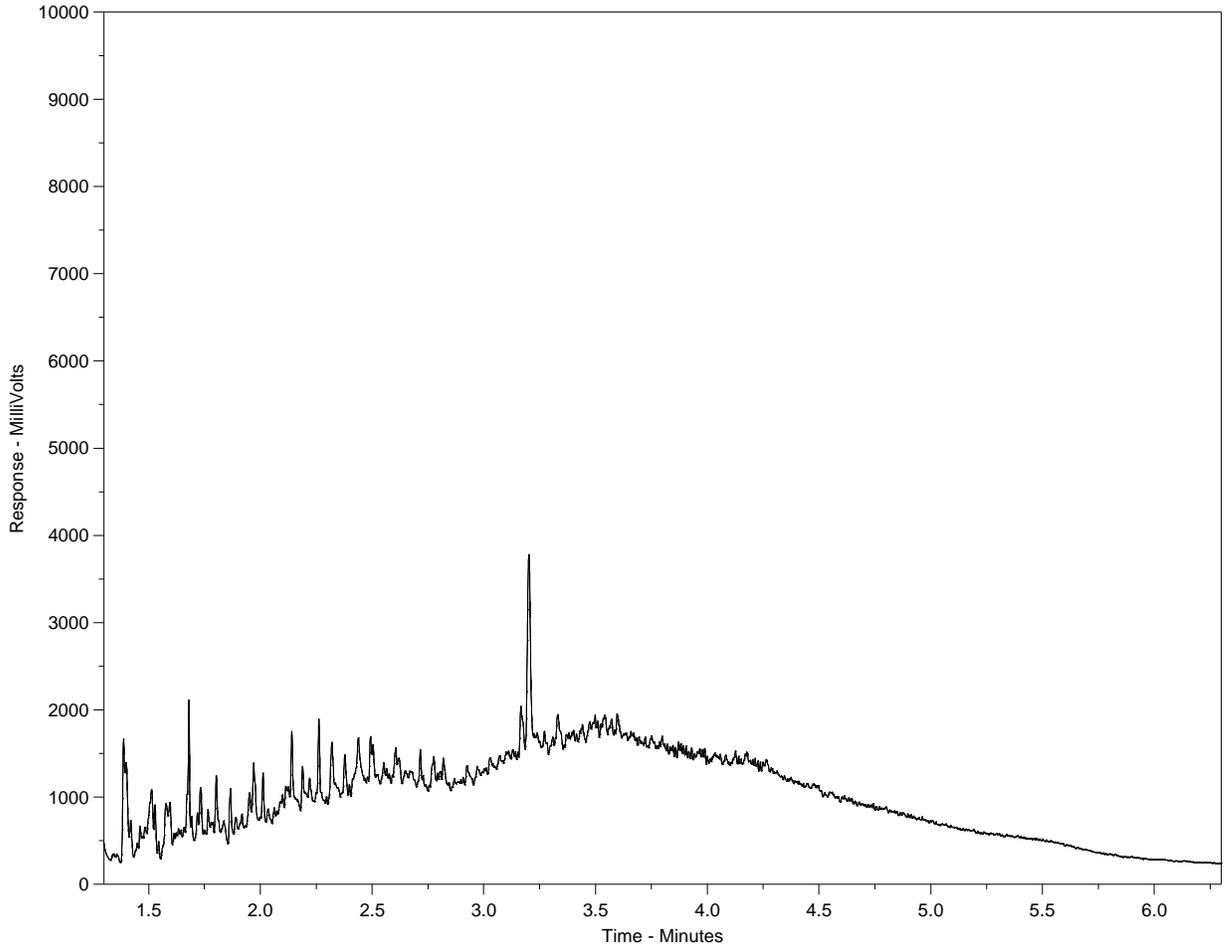
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644363-5
 Client ID: PRIMARY LEACHATE CELL 3C (PC3A)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34	nC50		
174°C	287°C			481°C	575°C		
346°F	549°F			898°F	1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

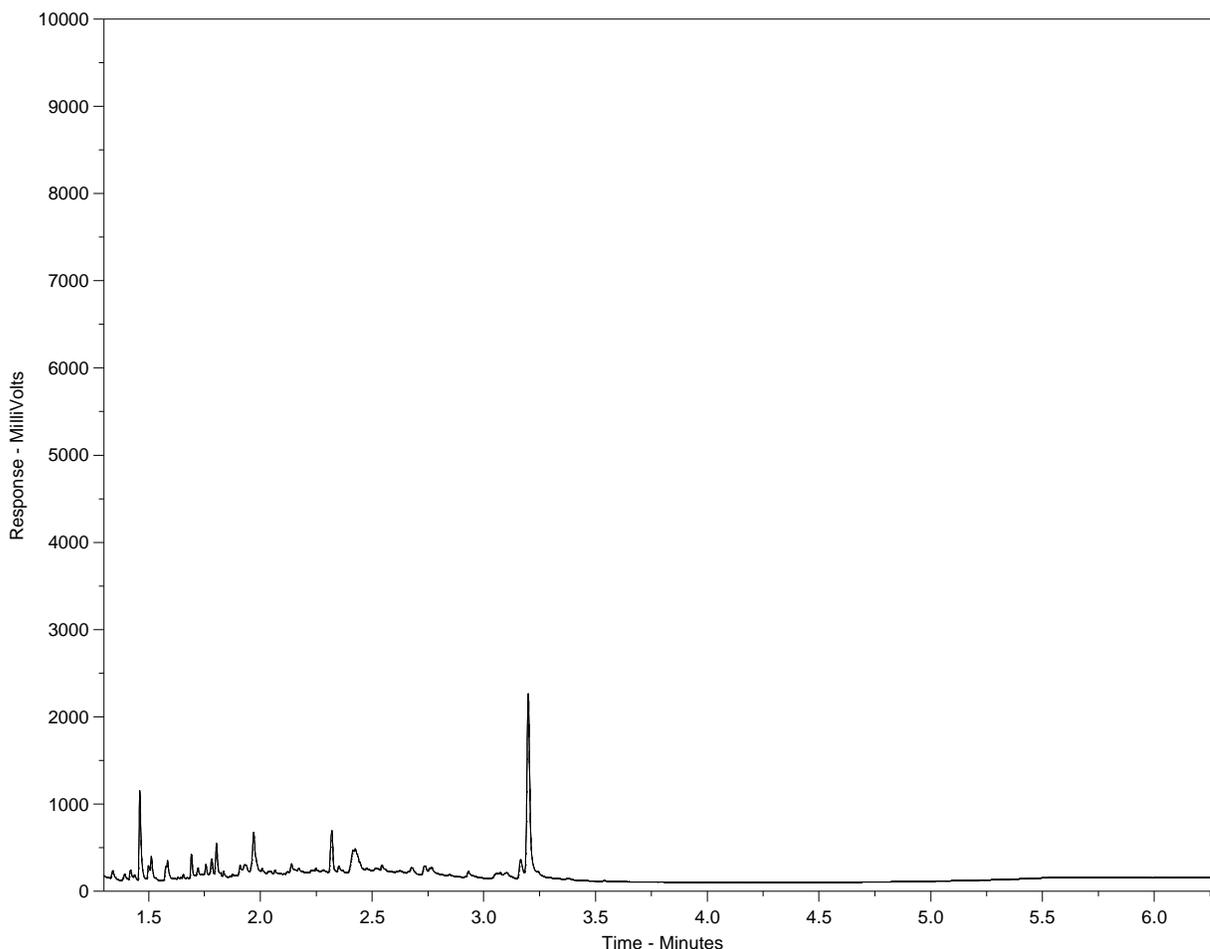
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644363-6
 Client ID: PRIMARY LEACHATE CELL 3D (PC3D)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

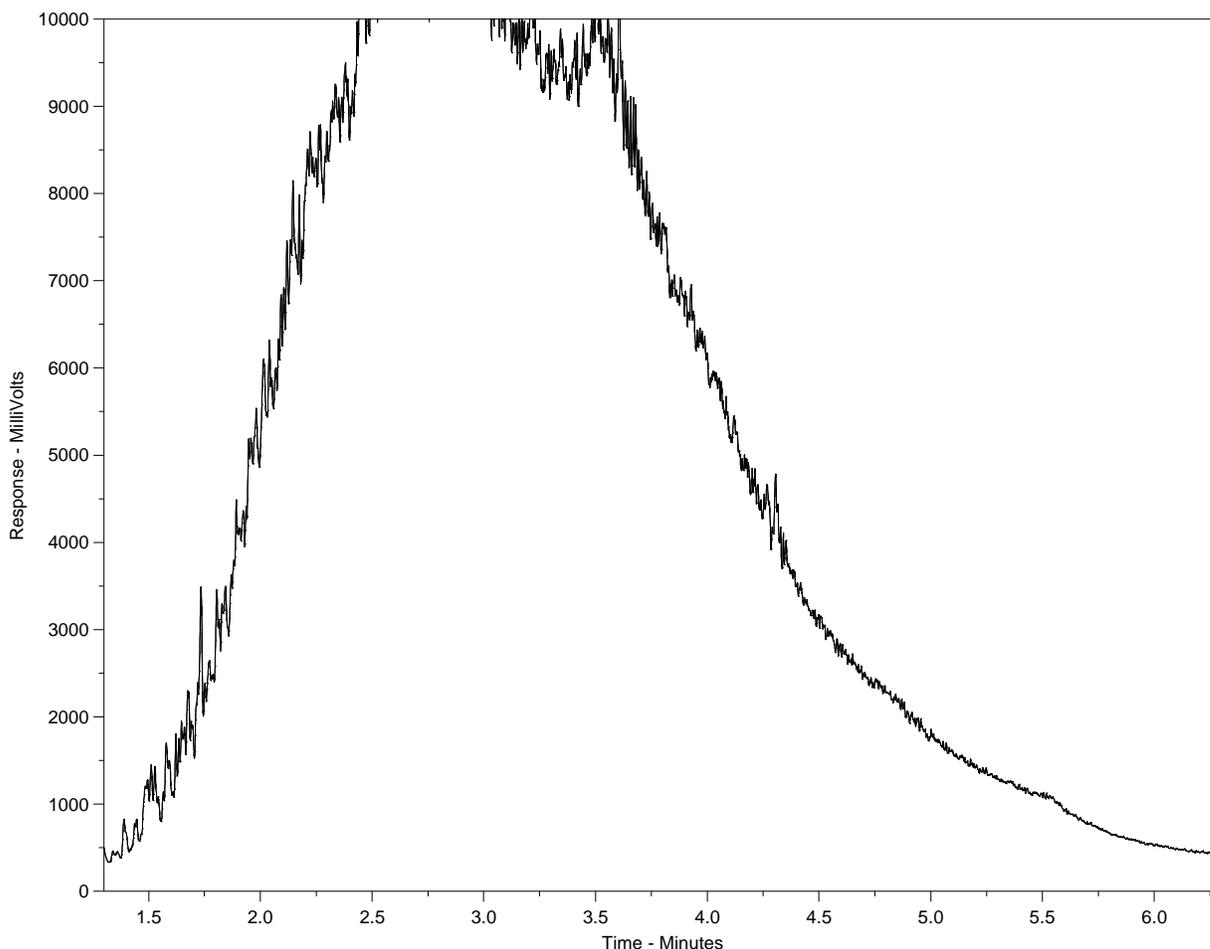
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644363-7
 Client ID: PRIMARY LEACHATE CELL 3E (PC3E)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		1067°F		
← Gasoline →		← Diesel/ Jet Fuels →				← Motor Oils/ Lube Oils/ Grease →	

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

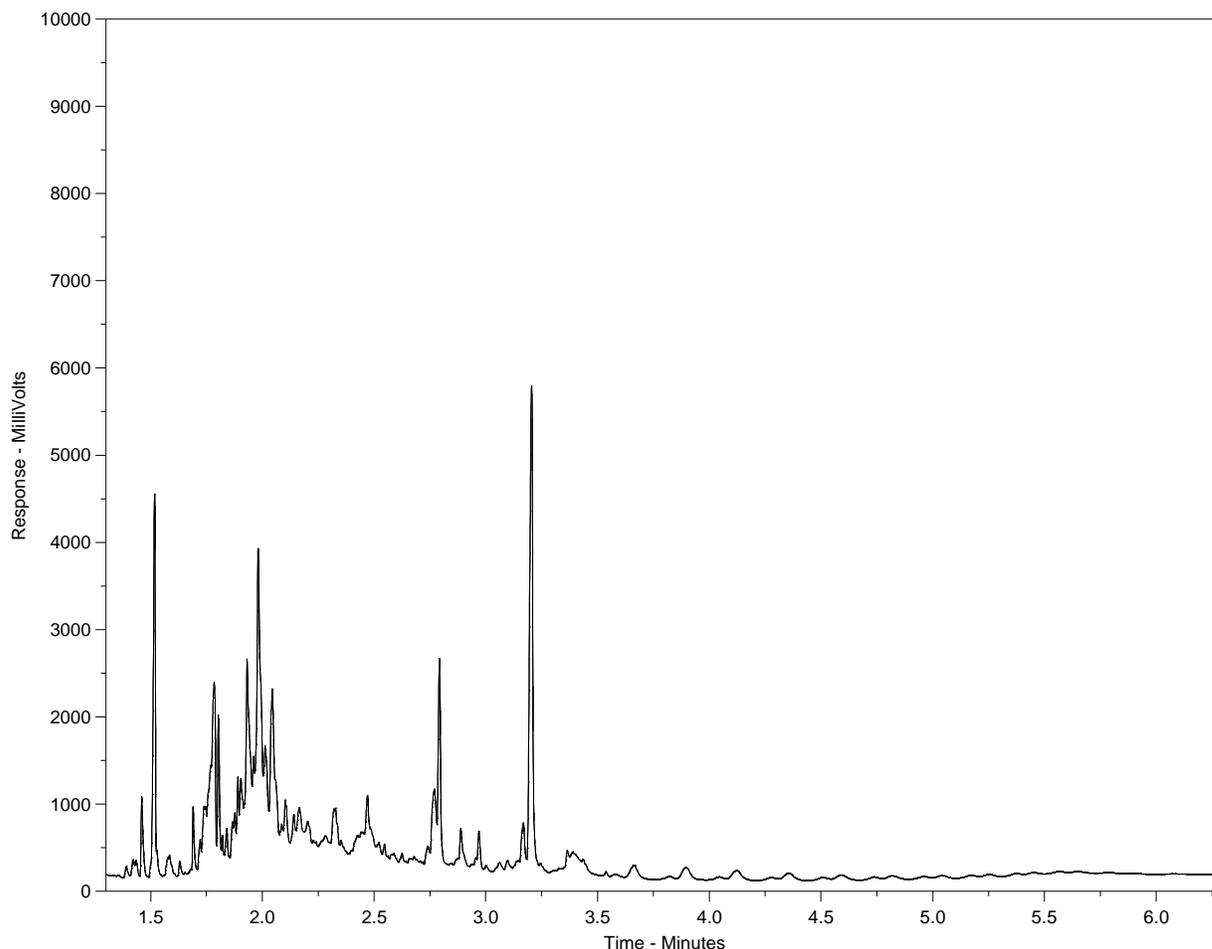
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644363-8
 Client ID: PRIMARY LEACHATE CELL 4 (PC4)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Appendix D
Primary Leachate Analyses
Quarter 4



Clean Harbors Canada Inc.
ATTN: Todd Webb
PO BOX 390
RYLEY AB TOB 4A0

Date Received: 16-NOV-21
Report Date: 25-NOV-21 18:15 (MT)
Version: FINAL

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2663223
Project P.O. #: 221434
Job Reference: PRIMARY LEACHATE QTR 4
C of C Numbers: 17-790636
Legal Site Desc:

Kieran Tordoff
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9450 17 Avenue NW, Edmonton, AB T6N 1M9 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2663223-1 PRIMARY LEACHATE CELL 3C (PC3C)							
Sampled By: CLIENT on 15-NOV-21 @ 10:00							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0231		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
Toluene	0.254		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
EthylBenzene	0.0827		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
m+p-Xylene	0.366		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
o-Xylene	0.149		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
Styrene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
F1(C6-C10)	1.48		0.10	mg/L	23-NOV-21	23-NOV-21	R5653949
F1-BTEX	0.60		0.10	mg/L	23-NOV-21	23-NOV-21	R5653949
Xylenes	0.515		0.00071	mg/L	23-NOV-21	23-NOV-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	100.1		70-130	%	23-NOV-21	23-NOV-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	92.2		70-130	%	23-NOV-21	23-NOV-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	109.7		70-130	%	23-NOV-21	23-NOV-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	1.86		0.10	mg/L	19-NOV-21	19-NOV-21	R5654977
Surrogate: 2-Bromobenzotrifluoride	105.5		60-140	%	19-NOV-21	19-NOV-21	R5654977
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	<0.0050	DLM	0.0050	mg/L		18-NOV-21	R5653935
Miscellaneous Parameters							
Ammonia, Total (as N)	570		250	mg/L		23-NOV-21	R5656585
Chemical Oxygen Demand	2030		20	mg/L		18-NOV-21	R5654248
Chromium (VI)-Dissolved	<0.010	DLM	0.010	mg/L		19-NOV-21	R5655035
Dissolved Organic Carbon	400		10	mg/L		22-NOV-21	R5655947
Phenols (4AAP)	0.692	DLHC	0.010	mg/L		18-NOV-21	R5653973
Phosphorus (P)-Total Dissolved	2.22	DLHC	0.10	mg/L	18-NOV-21	21-NOV-21	R5655767
Total Dissolved Solids	12300		10	mg/L		25-NOV-21	R5657462
Total Kjeldahl Nitrogen	420		100	mg/L		22-NOV-21	R5654859
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		19-NOV-21	R5654494
Phosphorus (P)-Total	2.25	DLHC	0.10	mg/L	18-NOV-21	21-NOV-21	R5655767
Total Suspended Solids	15.8	DLHC	8.0	mg/L		19-NOV-21	R5654835
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	3160	DLDS	5.0	mg/L		17-NOV-21	R5653641
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					17-NOV-21	R5652360
Aluminum (Al)-Dissolved	<0.050	DLM	0.050	mg/L		18-NOV-21	R5653935
Antimony (Sb)-Dissolved	<0.0050	DLM	0.0050	mg/L		18-NOV-21	R5653935
Arsenic (As)-Dissolved	0.0250		0.0050	mg/L		18-NOV-21	R5653935
Barium (Ba)-Dissolved	0.122		0.0050	mg/L		18-NOV-21	R5653935
Beryllium (Be)-Dissolved	<0.0050	DLM	0.0050	mg/L		18-NOV-21	R5653935
Bismuth (Bi)-Dissolved	<0.0025	DLM	0.0025	mg/L		18-NOV-21	R5653935
Boron (B)-Dissolved	57.2		0.50	mg/L		18-NOV-21	R5653935
Cadmium (Cd)-Dissolved	<0.00025	DLM	0.00025	mg/L		18-NOV-21	R5653935
Calcium (Ca)-Dissolved	44.7		2.5	mg/L		18-NOV-21	R5653935
Cesium (Cs)-Dissolved	0.00059		0.00050	mg/L		18-NOV-21	R5653935
Chromium (Cr)-Dissolved	<0.0050	DLM	0.0050	mg/L		18-NOV-21	R5653935
Cobalt (Co)-Dissolved	<0.0050	DLM	0.0050	mg/L		18-NOV-21	R5653935
Copper (Cu)-Dissolved	0.015		0.010	mg/L		18-NOV-21	R5653935
Iron (Fe)-Dissolved	<0.50	DLM	0.50	mg/L		18-NOV-21	R5653935
Lead (Pb)-Dissolved	<0.0025	DLM	0.0025	mg/L		18-NOV-21	R5653935

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2663223-1 PRIMARY LEACHATE CELL 3C (PC3C) Sampled By: CLIENT on 15-NOV-21 @ 10:00 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	1.70		0.050	mg/L		18-NOV-21	R5653935
Magnesium (Mg)-Dissolved	116		0.25	mg/L		18-NOV-21	R5653935
Manganese (Mn)-Dissolved	0.491		0.0050	mg/L		18-NOV-21	R5653935
Molybdenum (Mo)-Dissolved	0.370		0.0025	mg/L		18-NOV-21	R5653935
Nickel (Ni)-Dissolved	0.833		0.025	mg/L		18-NOV-21	R5653935
Phosphorus (P)-Dissolved	<2.5	DLM	2.5	mg/L		18-NOV-21	R5653935
Potassium (K)-Dissolved	447		2.5	mg/L		18-NOV-21	R5653935
Rubidium (Rb)-Dissolved	0.284		0.010	mg/L		18-NOV-21	R5653935
Selenium (Se)-Dissolved	0.0047		0.0025	mg/L		18-NOV-21	R5653935
Silicon (Si)-Dissolved	9.0		2.5	mg/L		18-NOV-21	R5653935
Silver (Ag)-Dissolved	<0.00050	DLM	0.00050	mg/L		18-NOV-21	R5653935
Sodium (Na)-Dissolved	2650		2.5	mg/L		18-NOV-21	R5653935
Strontium (Sr)-Dissolved	0.380		0.010	mg/L		18-NOV-21	R5653935
Sulfur (S)-Dissolved	251		25	mg/L		18-NOV-21	R5653935
Tellurium (Te)-Dissolved	<0.010	DLM	0.010	mg/L		18-NOV-21	R5653935
Thallium (Tl)-Dissolved	<0.00050	DLM	0.00050	mg/L		18-NOV-21	R5653935
Thorium (Th)-Dissolved	<0.0050	DLM	0.0050	mg/L		18-NOV-21	R5653935
Tin (Sn)-Dissolved	<0.0050	DLM	0.0050	mg/L		18-NOV-21	R5653935
Titanium (Ti)-Dissolved	<0.015	DLM	0.015	mg/L		18-NOV-21	R5653935
Tungsten (W)-Dissolved	0.0610		0.0050	mg/L		18-NOV-21	R5653935
Uranium (U)-Dissolved	0.00487		0.00050	mg/L		18-NOV-21	R5653935
Vanadium (V)-Dissolved	5.49		0.025	mg/L		18-NOV-21	R5653935
Zinc (Zn)-Dissolved	<0.050	DLM	0.050	mg/L		18-NOV-21	R5653935
Zirconium (Zr)-Dissolved	0.092		0.010	mg/L		18-NOV-21	R5653935
Fluoride in Water by IC							
Fluoride (F)	4.26	DLDS	0.20	mg/L		17-NOV-21	R5653641
Ion Balance Calculation							
Ion Balance	93.9			%		25-NOV-21	
TDS (Calculated)	9630			mg/L		25-NOV-21	
Hardness (as CaCO3)	589			mg/L		25-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLDS	0.20	mg/L		17-NOV-21	R5653641
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.22		0.22	mg/L		18-NOV-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		17-NOV-21	R5653641
Sulfate in Water by IC							
Sulfate (SO4)	440	DLDS	3.0	mg/L		17-NOV-21	R5653641
pH, Conductivity and Total Alkalinity							
pH	8.52		0.10	pH		17-NOV-21	R5653816
Conductivity (EC)	16000		2.0	uS/cm		17-NOV-21	R5653816
Bicarbonate (HCO3)	5010	DLHC	50	mg/L		20-NOV-21	R5654929
Carbonate (CO3)	306	DLHC	50	mg/L		20-NOV-21	R5654929
Hydroxide (OH)	<50	DLHC	50	mg/L		20-NOV-21	R5654929
Alkalinity, Total (as CaCO3)	4620	DLHC	20	mg/L		20-NOV-21	R5654929
L2663223-2 PRIMARY LEACHATE CELL 3D (PC3D) Sampled By: CLIENT on 15-NOV-21 @ 10:00 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0129		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2663223-2 PRIMARY LEACHATE CELL 3D (PC3D)							
Sampled By: CLIENT on 15-NOV-21 @ 10:00							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Toluene	0.0113		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
EthylBenzene	0.00108		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
m+p-Xylene	0.00350		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
o-Xylene	0.00230		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
Styrene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
F1(C6-C10)	0.35		0.10	mg/L	23-NOV-21	23-NOV-21	R5653949
F1-BTEX	0.32		0.10	mg/L	23-NOV-21	23-NOV-21	R5653949
Xylenes	0.00580		0.00071	mg/L	23-NOV-21	23-NOV-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	99.1		70-130	%	23-NOV-21	23-NOV-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	84.2		70-130	%	23-NOV-21	23-NOV-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	111.9		70-130	%	23-NOV-21	23-NOV-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	0.66		0.10	mg/L	19-NOV-21	19-NOV-21	R5654977
Surrogate: 2-Bromobenzotrifluoride	100.7		60-140	%	19-NOV-21	19-NOV-21	R5654977
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0204		0.0050	mg/L		18-NOV-21	R5653935
Miscellaneous Parameters							
Ammonia, Total (as N)	436		50	mg/L		23-NOV-21	R5656585
Chemical Oxygen Demand	3270		40	mg/L		18-NOV-21	R5654248
Chromium (VI)-Dissolved	<0.010	DLM	0.010	mg/L		19-NOV-21	R5655035
Dissolved Organic Carbon	795		10	mg/L		22-NOV-21	R5655947
Phenols (4AAP)	4.66	DLHC	0.10	mg/L		18-NOV-21	R5653973
Phosphorus (P)-Total Dissolved	1.23	DLHC	0.10	mg/L	18-NOV-21	21-NOV-21	R5655767
Total Dissolved Solids	13600		10	mg/L		25-NOV-21	R5657462
Total Kjeldahl Nitrogen	472		20	mg/L		19-NOV-21	R5654859
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		19-NOV-21	R5654494
Phosphorus (P)-Total	1.40	DLHC	0.10	mg/L	18-NOV-21	21-NOV-21	R5655767
Total Suspended Solids	41.3	DLHC	8.0	mg/L		19-NOV-21	R5654835
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	4800	DLDS	5.0	mg/L		17-NOV-21	R5653641
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					17-NOV-21	R5652360
Aluminum (Al)-Dissolved	<0.050	DLM	0.050	mg/L		18-NOV-21	R5653935
Antimony (Sb)-Dissolved	<0.0050	DLM	0.0050	mg/L		18-NOV-21	R5653935
Arsenic (As)-Dissolved	0.0249		0.0050	mg/L		18-NOV-21	R5653935
Barium (Ba)-Dissolved	0.391		0.0050	mg/L		18-NOV-21	R5653935
Beryllium (Be)-Dissolved	<0.0050	DLM	0.0050	mg/L		18-NOV-21	R5653935
Bismuth (Bi)-Dissolved	<0.0025	DLM	0.0025	mg/L		18-NOV-21	R5653935
Boron (B)-Dissolved	51.6		0.50	mg/L		18-NOV-21	R5653935
Cadmium (Cd)-Dissolved	0.00076		0.00025	mg/L		18-NOV-21	R5653935
Calcium (Ca)-Dissolved	169		2.5	mg/L		18-NOV-21	R5653935
Cesium (Cs)-Dissolved	0.00314		0.00050	mg/L		18-NOV-21	R5653935
Chromium (Cr)-Dissolved	0.0192		0.0050	mg/L		18-NOV-21	R5653935
Cobalt (Co)-Dissolved	0.0057		0.0050	mg/L		18-NOV-21	R5653935
Copper (Cu)-Dissolved	0.027		0.010	mg/L		18-NOV-21	R5653935
Iron (Fe)-Dissolved	1.12		0.50	mg/L		18-NOV-21	R5653935
Lead (Pb)-Dissolved	<0.0025	DLM	0.0025	mg/L		18-NOV-21	R5653935
Lithium (Li)-Dissolved	1.86		0.050	mg/L		18-NOV-21	R5653935
Magnesium (Mg)-Dissolved	183		0.25	mg/L		18-NOV-21	R5653935

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2663223-2 PRIMARY LEACHATE CELL 3D (PC3D) Sampled By: CLIENT on 15-NOV-21 @ 10:00 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Manganese (Mn)-Dissolved	1.41		0.0050	mg/L		18-NOV-21	R5653935
Molybdenum (Mo)-Dissolved	3.85		0.0025	mg/L		18-NOV-21	R5653935
Nickel (Ni)-Dissolved	2.65		0.025	mg/L		18-NOV-21	R5653935
Phosphorus (P)-Dissolved	<2.5	DLM	2.5	mg/L		18-NOV-21	R5653935
Potassium (K)-Dissolved	531		2.5	mg/L		18-NOV-21	R5653935
Rubidium (Rb)-Dissolved	0.390		0.010	mg/L		18-NOV-21	R5653935
Selenium (Se)-Dissolved	0.0082		0.0025	mg/L		18-NOV-21	R5653935
Silicon (Si)-Dissolved	12.6		2.5	mg/L		18-NOV-21	R5653935
Silver (Ag)-Dissolved	<0.00050	DLM	0.00050	mg/L		18-NOV-21	R5653935
Sodium (Na)-Dissolved	3350		2.5	mg/L		18-NOV-21	R5653935
Strontium (Sr)-Dissolved	2.00		0.010	mg/L		18-NOV-21	R5653935
Sulfur (S)-Dissolved	130		25	mg/L		18-NOV-21	R5653935
Tellurium (Te)-Dissolved	<0.010	DLM	0.010	mg/L		18-NOV-21	R5653935
Thallium (Tl)-Dissolved	<0.00050	DLM	0.00050	mg/L		18-NOV-21	R5653935
Thorium (Th)-Dissolved	<0.0050	DLM	0.0050	mg/L		18-NOV-21	R5653935
Tin (Sn)-Dissolved	<0.0050	DLM	0.0050	mg/L		18-NOV-21	R5653935
Titanium (Ti)-Dissolved	0.015		0.015	mg/L		18-NOV-21	R5653935
Tungsten (W)-Dissolved	0.0569		0.0050	mg/L		18-NOV-21	R5653935
Uranium (U)-Dissolved	0.00368		0.00050	mg/L		18-NOV-21	R5653935
Vanadium (V)-Dissolved	4.99		0.025	mg/L		18-NOV-21	R5653935
Zinc (Zn)-Dissolved	<0.050	DLM	0.050	mg/L		18-NOV-21	R5653935
Zirconium (Zr)-Dissolved	0.067		0.010	mg/L		18-NOV-21	R5653935
Fluoride in Water by IC							
Fluoride (F)	3.87	DLDS	0.20	mg/L		17-NOV-21	R5653641
Ion Balance Calculation							
Ion Balance	94.3			%		25-NOV-21	
TDS (Calculated)	11900			mg/L		25-NOV-21	
Hardness (as CaCO3)	1180			mg/L		25-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLDS	0.20	mg/L		17-NOV-21	R5653641
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.22		0.22	mg/L		18-NOV-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		17-NOV-21	R5653641
Sulfate in Water by IC							
Sulfate (SO4)	210	DLDS	3.0	mg/L		17-NOV-21	R5653641
pH, Conductivity and Total Alkalinity							
pH	8.09		0.10	pH		17-NOV-21	R5653816
Conductivity (EC)	19400		2.0	uS/cm		17-NOV-21	R5653816
Bicarbonate (HCO3)	5300	DLHC	50	mg/L		20-NOV-21	R5654929
Carbonate (CO3)	<50	DLHC	50	mg/L		20-NOV-21	R5654929
Hydroxide (OH)	<50	DLHC	50	mg/L		20-NOV-21	R5654929
Alkalinity, Total (as CaCO3)	4340	DLHC	20	mg/L		20-NOV-21	R5654929
L2663223-3 PRIMARY LEACHATE CELL 3E (PC3E) Sampled By: CLIENT on 15-NOV-21 @ 10:00 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0253		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
Toluene	0.00304		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
EthylBenzene	0.00138		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2663223-3 PRIMARY LEACHATE CELL 3E (PC3E)							
Sampled By: CLIENT on 15-NOV-21 @ 10:00							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
m+p-Xylene	0.00264		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
o-Xylene	0.00257		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
Styrene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
F1(C6-C10)	0.14		0.10	mg/L	23-NOV-21	23-NOV-21	R5653949
F1-BTEX	0.11		0.10	mg/L	23-NOV-21	23-NOV-21	R5653949
Xylenes	0.00521		0.00071	mg/L	23-NOV-21	23-NOV-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	100.6		70-130	%	23-NOV-21	23-NOV-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	97.0		70-130	%	23-NOV-21	23-NOV-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	97.0		70-130	%	23-NOV-21	23-NOV-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	43.9		0.10	mg/L	19-NOV-21	19-NOV-21	R5654977
Surrogate: 2-Bromobenzotrifluoride	117.1		60-140	%	19-NOV-21	19-NOV-21	R5654977
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0094		0.0010	mg/L		18-NOV-21	R5653935
Miscellaneous Parameters							
Ammonia, Total (as N)	397		50	mg/L		23-NOV-21	R5656585
Chemical Oxygen Demand	1410		10	mg/L		18-NOV-21	R5654248
Chromium (VI)-Dissolved	<0.010	DLM	0.010	mg/L		22-NOV-21	R5655616
Dissolved Organic Carbon	128		10	mg/L		22-NOV-21	R5655947
Phenols (4AAP)	0.0250		0.0010	mg/L		18-NOV-21	R5653973
Phosphorus (P)-Total Dissolved	1.07		0.020	mg/L	18-NOV-21	23-NOV-21	R5655767
Total Dissolved Solids	8770		10	mg/L		25-NOV-21	R5657462
Total Kjeldahl Nitrogen	412		20	mg/L		19-NOV-21	R5654859
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		19-NOV-21	R5654494
Phosphorus (P)-Total	0.946		0.020	mg/L	18-NOV-21	21-NOV-21	R5655767
Total Suspended Solids	20.8	DLHC	8.0	mg/L		19-NOV-21	R5654835
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2680	DLDS	5.0	mg/L		17-NOV-21	R5653641
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					17-NOV-21	R5652360
Aluminum (Al)-Dissolved	0.010		0.010	mg/L		18-NOV-21	R5653935
Antimony (Sb)-Dissolved	<0.0010	DLM	0.0010	mg/L		18-NOV-21	R5653935
Arsenic (As)-Dissolved	0.0067		0.0010	mg/L		18-NOV-21	R5653935
Barium (Ba)-Dissolved	0.310		0.0010	mg/L		18-NOV-21	R5653935
Beryllium (Be)-Dissolved	<0.0010	DLM	0.0010	mg/L		18-NOV-21	R5653935
Bismuth (Bi)-Dissolved	<0.00050	DLM	0.00050	mg/L		18-NOV-21	R5653935
Boron (B)-Dissolved	5.01		0.10	mg/L		18-NOV-21	R5653935
Cadmium (Cd)-Dissolved	0.000200		0.000050	mg/L		18-NOV-21	R5653935
Calcium (Ca)-Dissolved	99.5		0.50	mg/L		18-NOV-21	R5653935
Cesium (Cs)-Dissolved	0.00380		0.00010	mg/L		18-NOV-21	R5653935
Chromium (Cr)-Dissolved	0.0026		0.0010	mg/L		18-NOV-21	R5653935
Cobalt (Co)-Dissolved	0.0040		0.0010	mg/L		18-NOV-21	R5653935
Copper (Cu)-Dissolved	0.0047		0.0020	mg/L		18-NOV-21	R5653935
Iron (Fe)-Dissolved	0.15		0.10	mg/L		18-NOV-21	R5653935
Lead (Pb)-Dissolved	<0.00050	DLM	0.00050	mg/L		18-NOV-21	R5653935
Lithium (Li)-Dissolved	0.818		0.010	mg/L		18-NOV-21	R5653935
Magnesium (Mg)-Dissolved	248		0.10	mg/L		18-NOV-21	R5653935
Manganese (Mn)-Dissolved	0.719		0.0010	mg/L		18-NOV-21	R5653935
Molybdenum (Mo)-Dissolved	0.882		0.00050	mg/L		18-NOV-21	R5653935

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2663223-3 PRIMARY LEACHATE CELL 3E (PC3E)							
Sampled By: CLIENT on 15-NOV-21 @ 10:00							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Nickel (Ni)-Dissolved	0.643		0.0050	mg/L		18-NOV-21	R5653935
Phosphorus (P)-Dissolved	0.98		0.50	mg/L		18-NOV-21	R5653935
Potassium (K)-Dissolved	243		0.50	mg/L		18-NOV-21	R5653935
Rubidium (Rb)-Dissolved	0.307		0.0020	mg/L		18-NOV-21	R5653935
Selenium (Se)-Dissolved	0.00148		0.00050	mg/L		18-NOV-21	R5653935
Silicon (Si)-Dissolved	12.4		0.50	mg/L		18-NOV-21	R5653935
Silver (Ag)-Dissolved	0.00013		0.00010	mg/L		18-NOV-21	R5653935
Sodium (Na)-Dissolved	2280		1.0	mg/L		18-NOV-21	R5653935
Strontium (Sr)-Dissolved	2.78		0.0020	mg/L		18-NOV-21	R5653935
Sulfur (S)-Dissolved	187		5.0	mg/L		18-NOV-21	R5653935
Tellurium (Te)-Dissolved	<0.0020	DLM	0.0020	mg/L		18-NOV-21	R5653935
Thallium (Tl)-Dissolved	<0.00010	DLM	0.00010	mg/L		18-NOV-21	R5653935
Thorium (Th)-Dissolved	<0.0010	DLM	0.0010	mg/L		18-NOV-21	R5653935
Tin (Sn)-Dissolved	<0.0010	DLM	0.0010	mg/L		18-NOV-21	R5653935
Titanium (Ti)-Dissolved	0.0037		0.0030	mg/L		18-NOV-21	R5653935
Tungsten (W)-Dissolved	0.0246		0.0010	mg/L		18-NOV-21	R5653935
Uranium (U)-Dissolved	0.00901		0.00010	mg/L		18-NOV-21	R5653935
Vanadium (V)-Dissolved	5.03		0.0050	mg/L		18-NOV-21	R5653935
Zinc (Zn)-Dissolved	<0.010	DLM	0.010	mg/L		18-NOV-21	R5653935
Zirconium (Zr)-Dissolved	0.0879		0.0020	mg/L		18-NOV-21	R5653935
Fluoride in Water by IC							
Fluoride (F)	1.82	DLDS	0.20	mg/L		17-NOV-21	R5653641
Ion Balance Calculation							
Ion Balance	94.7			%		25-NOV-21	
TDS (Calculated)	8490			mg/L		25-NOV-21	
Hardness (as CaCO3)	1270			mg/L		25-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLDS	0.20	mg/L		17-NOV-21	R5653641
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.22		0.22	mg/L		18-NOV-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		17-NOV-21	R5653641
Sulfate in Water by IC							
Sulfate (SO4)	431	DLDS	3.0	mg/L		17-NOV-21	R5653641
pH, Conductivity and Total Alkalinity							
pH	8.01		0.10	pH		17-NOV-21	R5653816
Conductivity (EC)	13700		2.0	uS/cm		17-NOV-21	R5653816
Bicarbonate (HCO3)	5080	DLHC	50	mg/L		20-NOV-21	R5654929
Carbonate (CO3)	<50	DLHC	50	mg/L		20-NOV-21	R5654929
Hydroxide (OH)	<50	DLHC	50	mg/L		20-NOV-21	R5654929
Alkalinity, Total (as CaCO3)	4170	DLHC	20	mg/L		20-NOV-21	R5654929

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

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).
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method.			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry
Samples are analyzed using the closed reflux colourimetric method			
CR-CR6-DIS-WT	Water	Dissolved Hexavalent Chromium in Water	EPA 7199
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Chromium (III) is calculated as the difference between the total chromium and the chromium (VI) results.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
P-TD-COL-ED	Water	Total Dissolved P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H ₂ SO ₄ is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-ED	Water	Phenols (4AAP)	EPA 9066 AUTO-DISTILL-COLORIMETRIC
This automated method is based on the distillation of phenol and subsequent reaction of the distillate with an oxidizing agent (alkaline potassium ferricyanide), and 4-aminoantipyrine to form a red complex which is measured at 505 nm. The method will include ortho and meta-substituted phenols, and is collectively named 4AAP phenols.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-ED	Water	Total Dissolved Solids	APHA 2540 C
Gravimetric determination of solids in waters by filtration and evaporating filtrate to dryness at 180 degrees Celsius.			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-CL	Water	Total Kjeldahl Nitrogen by Fluorescence	APHA 4500-NORG (TKN)
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-790636

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

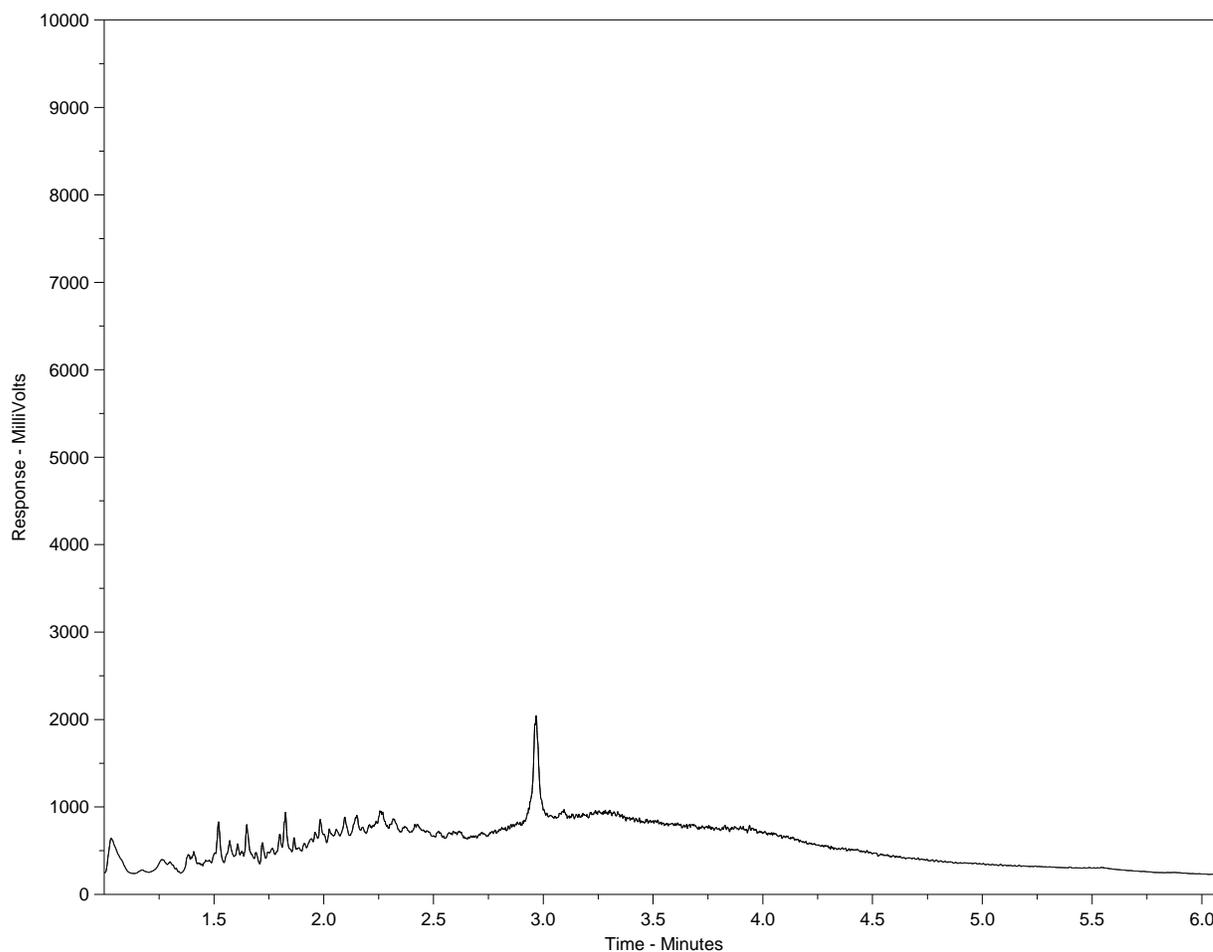
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Hydrocarbon Distribution Report



ALS Sample ID: L2663223-1
 Client ID: PRIMARY LEACHATE CELL 3C (PC3C)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

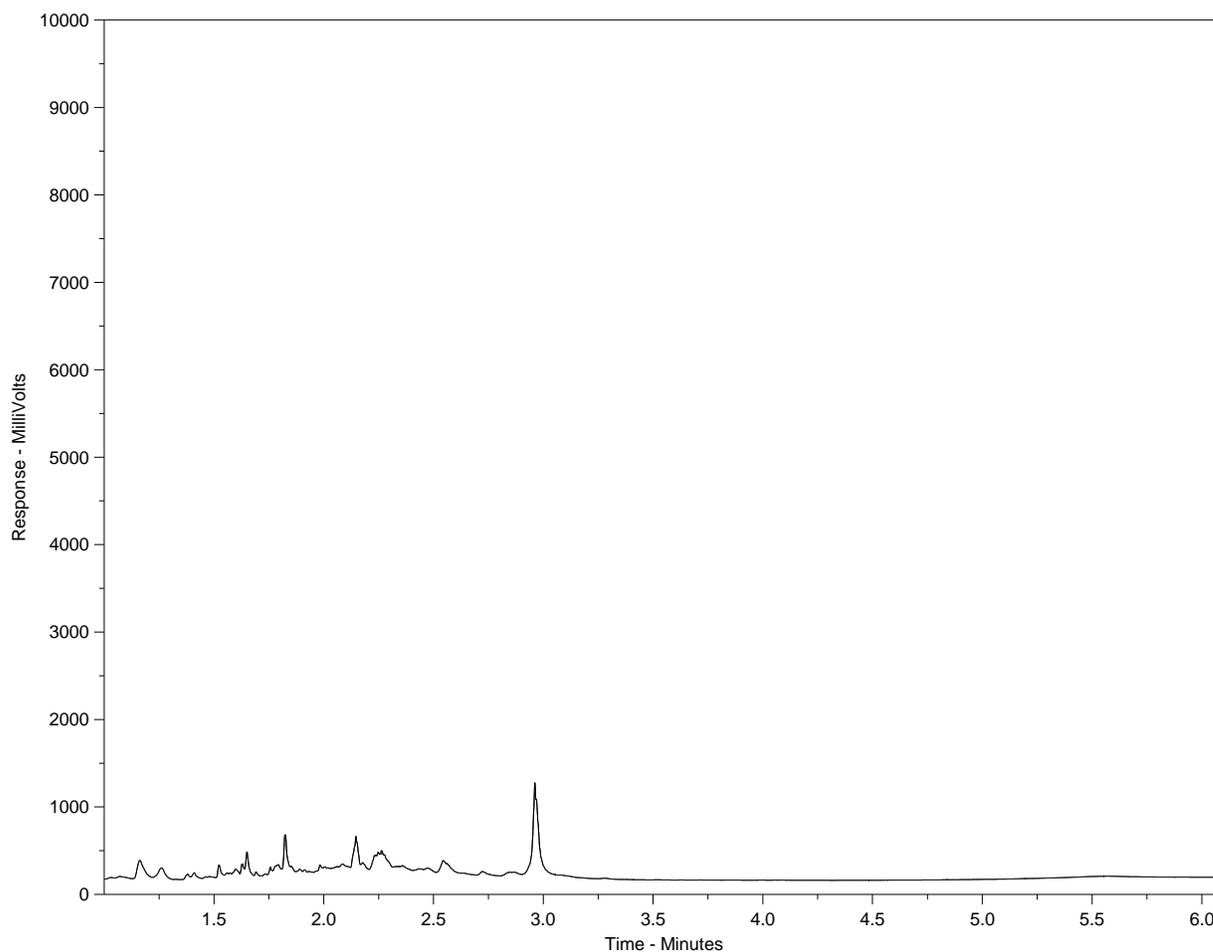
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2663223-2
 Client ID: PRIMARY LEACHATE CELL 3D (PC3D)



F2		F3		F4		-F4-	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

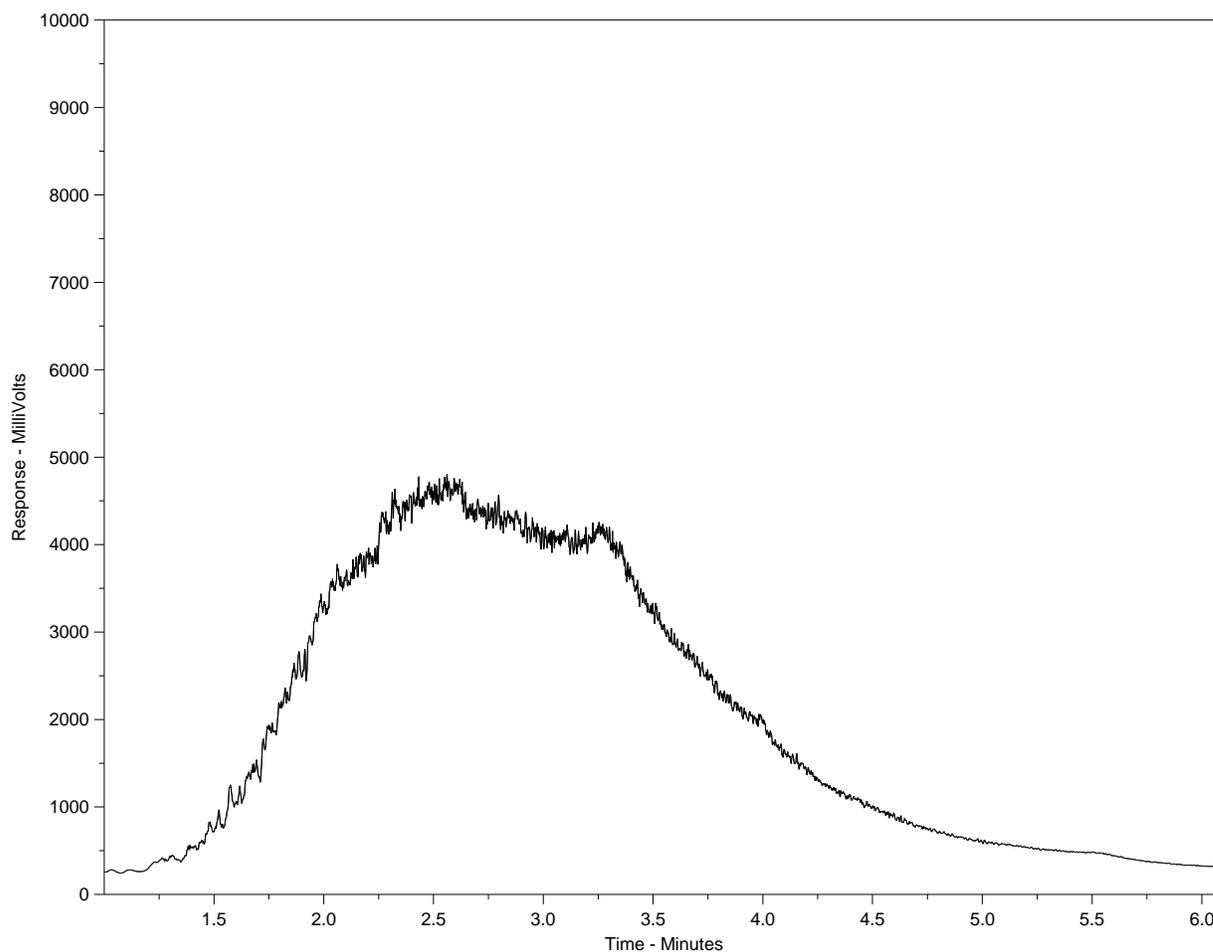
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2663223-3
 Client ID: PRIMARY LEACHATE CELL 3E (PC3E)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.



Chain of Custody (COC) / Analytic Request Form



COC Number: 17 - 790636

Page 1 of 1

Canada Toll Free: 1 800 668 9878

L2663223-COFC

www.alsglobal.com

Report To Contact and company name below will appear on the final report		Report Format / Distribution		Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)																																																																																																																															
Company: <u>Clean Harbors Canada</u>		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)		Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply																																																																																																																															
Contact: <u>Todd Webb, Stan Yeha</u>		Quality Control (QC) Report with Report <input type="checkbox"/> YES <input type="checkbox"/> NO		PRIORITY (Business days)		EMERGENCY																																																																																																																													
Phone: <u>(780) 663-2513</u>		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		4 day [P4-20%] <input type="checkbox"/>		1 Business day [E - 100%] <input type="checkbox"/>																																																																																																																													
Company address below will appear on the final report		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		3 day [P3-25%] <input type="checkbox"/>		Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] <input type="checkbox"/>																																																																																																																													
Street: <u>PO Box 370, 50114 Range Road 173</u>		Email 1 or Fax: <u>webb.todd@cleanharbors.com</u>		Date and Time Required for all E&P TATs:		dd-mmm-yy hh:mm																																																																																																																													
City/Province: <u>Ryley, AB</u>		Email 2: <u>yeha.stan@cleanharbors.com</u>		For tests that can not be performed according to the service level selected, you will be contacted.																																																																																																																															
Postal Code: <u>T0B 4A0</u>		Email 3:		Analysis Request																																																																																																																															
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Copy of Invoice with Report <input type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		<table border="1"> <tr> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">NUMBER OF CONTAINERS</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">Table 4.4A Leachate + Leak Detection Monitoring</td> <td colspan="12"></td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">SAMPLES ON HOLD</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">SUSPECTED HAZARD (see Special Instructions)</td> </tr> <tr><td colspan="12"></td></tr> </table>				NUMBER OF CONTAINERS	Table 4.4A Leachate + Leak Detection Monitoring													SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)																																																																																																												
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Company: <u>Clean Harbors Canada</u>		Email 1 or Fax: <u>Geeding.Rebbi@cleanharbors.com</u>																																																																																																																																	
Contact: <u>Robbie Geeding</u>		Email 2:																																																																																																																																	
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ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type																																																																																																																															
	<u>Primary Leachate Cell 3C (PC3C)</u>	<u>15-Nov-21</u>	<u>10:00</u>																																																																																																																																
	<u>Primary Leachate Cell 3D (PC3D)</u>	<u>15-Nov-21</u>	<u>10:00</u>																																																																																																																																
	<u>Primary Leachate Cell 3E (PC3E)</u>	<u>15-Nov-21</u>	<u>10:00</u>																																																																																																																																
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)																																																																																																																																	
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO		<u>Analyze as per Quote Q82438</u> <u>Table 4.4A package (attached). Separate report</u> <u>then COC 790954</u>																																																																																																																																	
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO																																																																																																																																			
		Drinking Water (DW) Samples¹ (client use)		SAMPLE CONDITION AS RECEIVED (lab use only)																																																																																																																															
		Frozen <input type="checkbox"/>		SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>		Ice Packs <input checked="" type="checkbox"/>																																																																																																																													
		Ice Cubes <input type="checkbox"/>		Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>		Cooling Initiated <input type="checkbox"/>																																																																																																																													
		INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C																																																																																																																															
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SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)		FINAL SHIPMENT RECEPTION (lab use only)																																																																																																																															
Released by: <u>Todd Webb</u>		Received by: <u>[Signature]</u>		Received by: <u>[Signature]</u>		Received by: <u>[Signature]</u>																																																																																																																													
Date: <u>Nov 15, 2021</u>		Date: <u>16-Nov-21</u>		Date: <u>16-Nov-21</u>		Date: <u>16-Nov-21</u>																																																																																																																													
Time: <u>11:00</u>		Time: <u>3:00</u>		Time: <u>3:00</u>		Time: <u>3:00</u>																																																																																																																													

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

11/16/2016 FROTH

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



Clean Harbors Canada Inc.
ATTN: Todd Webb/Stan Yuha
PO BOX 390
RYLEY AB TOB 4A0

Date Received: 30-NOV-21
Report Date: 09-DEC-21 16:05 (MT)
Version: FINAL

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2667910
Project P.O. #: 221434
Job Reference: PRIMARY LEACHATE QTR 4
C of C Numbers: 20-973262
Legal Site Desc:

Kieran Tordoff
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9450 17 Avenue NW, Edmonton, AB T6N 1M9 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667910-1 PRIMARY LEACHATE CELL 1 (PC1)							
Sampled By: M on 29-NOV-21 @ 11:00							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.0159	DLM	0.016	mg/L	03-DEC-21	03-DEC-21	R5653949
Toluene	<0.00288	DLM	0.0029	mg/L	03-DEC-21	03-DEC-21	R5653949
EthylBenzene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
m+p-Xylene	<0.00113	DLM	0.0011	mg/L	03-DEC-21	03-DEC-21	R5653949
o-Xylene	<0.00068	DLM	0.00068	mg/L	03-DEC-21	03-DEC-21	R5653949
Styrene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
F1(C6-C10)	<0.41	DLM	0.41	mg/L	03-DEC-21	03-DEC-21	R5653949
F1-BTEX	0.38		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
Xylenes	0.00179		0.00071	mg/L	03-DEC-21	03-DEC-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	102.8		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	84.8		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	126.7		70-130	%	03-DEC-21	03-DEC-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	1.01		0.10	mg/L	01-DEC-21	01-DEC-21	R5664282
Surrogate: 2-Bromobenzotrifluoride	97.2		60-140	%	01-DEC-21	01-DEC-21	R5664282
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.414		0.0020	mg/L		02-DEC-21	R5662176
Miscellaneous Parameters							
Ammonia, Total (as N)	570		250	mg/L		02-DEC-21	R5663578
Chemical Oxygen Demand	2310	DLHC	200	mg/L		07-DEC-21	R5669320
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		03-DEC-21	R5665804
Dissolved Organic Carbon	747		20	mg/L		02-DEC-21	R5663856
Phenols (4AAP)	0.0378		0.0010	mg/L		01-DEC-21	R5661817
Phosphorus (P)-Total Dissolved	7.99	DLHC	0.10	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Dissolved Solids	11400	DLHC	20	mg/L		03-DEC-21	R5664636
Total Kjeldahl Nitrogen	840		100	mg/L		04-DEC-21	R5664865
Mercury (Hg)-Total	0.000213		0.000050	mg/L		01-DEC-21	R5660207
Phosphorus (P)-Total	9.11	DLHC	0.10	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Suspended Solids	383		3.0	mg/L		03-DEC-21	R5664956
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2830	RRV	10	mg/L		01-DEC-21	R5661417
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-DEC-21	R5660853
Aluminum (Al)-Dissolved	0.258		0.020	mg/L		02-DEC-21	R5662176
Antimony (Sb)-Dissolved	0.0097		0.0020	mg/L		02-DEC-21	R5662176
Arsenic (As)-Dissolved	0.0399		0.0020	mg/L		02-DEC-21	R5662176
Barium (Ba)-Dissolved	0.294		0.0020	mg/L		02-DEC-21	R5662176
Beryllium (Be)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Bismuth (Bi)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Boron (B)-Dissolved	14.3		0.20	mg/L		02-DEC-21	R5662176
Cadmium (Cd)-Dissolved	0.00442		0.00010	mg/L		02-DEC-21	R5662176
Calcium (Ca)-Dissolved	249		1.0	mg/L		02-DEC-21	R5662176
Cesium (Cs)-Dissolved	0.00083		0.00020	mg/L		02-DEC-21	R5662176
Chromium (Cr)-Dissolved	0.368		0.0020	mg/L		02-DEC-21	R5662176
Cobalt (Co)-Dissolved	0.117		0.0020	mg/L		02-DEC-21	R5662176
Copper (Cu)-Dissolved	0.0471		0.0040	mg/L		02-DEC-21	R5662176
Iron (Fe)-Dissolved	93.8		0.20	mg/L		02-DEC-21	R5662176
Lead (Pb)-Dissolved	0.144		0.0010	mg/L		02-DEC-21	R5662176

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667910-1 PRIMARY LEACHATE CELL 1 (PC1) Sampled By: M on 29-NOV-21 @ 11:00 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.375		0.020	mg/L		02-DEC-21	R5662176
Magnesium (Mg)-Dissolved	318		0.10	mg/L		02-DEC-21	R5662176
Manganese (Mn)-Dissolved	16.7		0.0020	mg/L		02-DEC-21	R5662176
Molybdenum (Mo)-Dissolved	4.92		0.0010	mg/L		02-DEC-21	R5662176
Nickel (Ni)-Dissolved	8.61		0.010	mg/L		02-DEC-21	R5662176
Phosphorus (P)-Dissolved	8.5		1.0	mg/L		02-DEC-21	R5662176
Potassium (K)-Dissolved	403		1.0	mg/L		02-DEC-21	R5662176
Rubidium (Rb)-Dissolved	0.0458		0.0040	mg/L		02-DEC-21	R5662176
Selenium (Se)-Dissolved	0.0016		0.0010	mg/L		02-DEC-21	R5662176
Silicon (Si)-Dissolved	12.2		1.0	mg/L		02-DEC-21	R5662176
Silver (Ag)-Dissolved	0.00032		0.00020	mg/L		02-DEC-21	R5662176
Sodium (Na)-Dissolved	2840		1.0	mg/L		02-DEC-21	R5662176
Strontium (Sr)-Dissolved	2.20		0.0040	mg/L		02-DEC-21	R5662176
Sulfur (S)-Dissolved	801		10	mg/L		02-DEC-21	R5662176
Tellurium (Te)-Dissolved	<0.0040	DLM	0.0040	mg/L		02-DEC-21	R5662176
Thallium (Tl)-Dissolved	<0.00020	DLM	0.00020	mg/L		02-DEC-21	R5662176
Thorium (Th)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Tin (Sn)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Titanium (Ti)-Dissolved	0.0696		0.0060	mg/L		02-DEC-21	R5662176
Tungsten (W)-Dissolved	0.0481		0.0020	mg/L		02-DEC-21	R5662176
Uranium (U)-Dissolved	0.0102		0.00020	mg/L		02-DEC-21	R5662176
Vanadium (V)-Dissolved	12.5		0.010	mg/L		02-DEC-21	R5662176
Zinc (Zn)-Dissolved	2.30		0.020	mg/L		02-DEC-21	R5662176
Zirconium (Zr)-Dissolved	0.203		0.0040	mg/L		02-DEC-21	R5662176
Fluoride in Water by IC							
Fluoride (F)	5.27	DLDS	0.40	mg/L		01-DEC-21	R5661417
Ion Balance Calculation							
Ion Balance	155	BL:INT		%		04-DEC-21	
TDS (Calculated)	9450			mg/L		04-DEC-21	
Hardness (as CaCO3)	1930			mg/L		04-DEC-21	
Nitrate in Water by IC							
Nitrate (as N)	45.5	DLDS	0.40	mg/L		01-DEC-21	R5661417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	47.5		0.45	mg/L		02-DEC-21	
Nitrite in Water by IC							
Nitrite (as N)	1.99	DLDS	0.20	mg/L		01-DEC-21	R5661417
Sulfate in Water by IC							
Sulfate (SO4)	2590	RRV	6.0	mg/L		01-DEC-21	R5661417
pH, Conductivity and Total Alkalinity							
pH	7.68	RRV	0.10	pH		01-DEC-21	R5660860
Conductivity (EC)	17600	RRV	2.0	uS/cm		01-DEC-21	R5660860
Bicarbonate (HCO3)	6350	RRV	50	mg/L		01-DEC-21	R5660860
Carbonate (CO3)	<50	DLA	50	mg/L		01-DEC-21	R5660860
Hydroxide (OH)	<50	DLA	50	mg/L		01-DEC-21	R5660860
Alkalinity, Total (as CaCO3)	5210	RRV	20	mg/L		01-DEC-21	R5660860
L2667910-2 PRIMARY LEACHATE CELL 2 (PC2) Sampled By: M on 29-NOV-21 @ 11:00 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.0632	DLM	0.063	mg/L	03-DEC-21	03-DEC-21	R5653949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667910-2 PRIMARY LEACHATE CELL 2 (PC2)							
Sampled By: M on 29-NOV-21 @ 11:00							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Toluene	<0.00766	DLM	0.0077	mg/L	03-DEC-21	03-DEC-21	R5653949
EthylBenzene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
m+p-Xylene	<0.00144	DLM	0.0014	mg/L	03-DEC-21	03-DEC-21	R5653949
o-Xylene	<0.00176	DLM	0.0018	mg/L	03-DEC-21	03-DEC-21	R5653949
Styrene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
F1(C6-C10)	<0.54	DLM	0.54	mg/L	03-DEC-21	03-DEC-21	R5653949
F1-BTEX	0.46		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
Xylenes	0.00317		0.00071	mg/L	03-DEC-21	03-DEC-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	104.2		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	86.9		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	119.0		70-130	%	03-DEC-21	03-DEC-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	1.49		0.10	mg/L	01-DEC-21	01-DEC-21	R5664282
Surrogate: 2-Bromobenzotrifluoride	99.2		60-140	%	01-DEC-21	01-DEC-21	R5664282
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.394		0.010	mg/L		02-DEC-21	R5662176
Miscellaneous Parameters							
Ammonia, Total (as N)	860		250	mg/L		02-DEC-21	R5663578
Chemical Oxygen Demand	9380	DLHC	200	mg/L		07-DEC-21	R5669320
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		03-DEC-21	R5665804
Dissolved Organic Carbon	2380		100	mg/L		02-DEC-21	R5663856
Phenols (4AAP)	4.67	DLHC	0.10	mg/L		01-DEC-21	R5661817
Phosphorus (P)-Total Dissolved	5.39	DLHC	0.10	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Dissolved Solids	27700	DLHC	20	mg/L		03-DEC-21	R5664636
Total Kjeldahl Nitrogen	920		100	mg/L		04-DEC-21	R5664865
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		01-DEC-21	R5660207
Phosphorus (P)-Total	5.46	DLHC	0.10	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Suspended Solids	30.4		3.0	mg/L		03-DEC-21	R5664956
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	8370	DLDS	10	mg/L		01-DEC-21	R5661417
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-DEC-21	R5660853
Aluminum (Al)-Dissolved	<0.10	DLM	0.10	mg/L		02-DEC-21	R5662176
Antimony (Sb)-Dissolved	0.579		0.010	mg/L		02-DEC-21	R5662176
Arsenic (As)-Dissolved	0.519		0.010	mg/L		02-DEC-21	R5662176
Barium (Ba)-Dissolved	1.16		0.010	mg/L		02-DEC-21	R5662176
Beryllium (Be)-Dissolved	<0.010	DLM	0.010	mg/L		02-DEC-21	R5662176
Bismuth (Bi)-Dissolved	<0.0050	DLM	0.0050	mg/L		02-DEC-21	R5662176
Boron (B)-Dissolved	64.8		1.0	mg/L		02-DEC-21	R5662176
Cadmium (Cd)-Dissolved	0.00968		0.00050	mg/L		02-DEC-21	R5662176
Calcium (Ca)-Dissolved	38.0		5.0	mg/L		02-DEC-21	R5662176
Cesium (Cs)-Dissolved	0.0016		0.0010	mg/L		02-DEC-21	R5662176
Chromium (Cr)-Dissolved	0.346		0.010	mg/L		02-DEC-21	R5662176
Cobalt (Co)-Dissolved	0.011		0.010	mg/L		02-DEC-21	R5662176
Copper (Cu)-Dissolved	0.043		0.020	mg/L		02-DEC-21	R5662176
Iron (Fe)-Dissolved	<1.0	DLM	1.0	mg/L		02-DEC-21	R5662176
Lead (Pb)-Dissolved	<0.0050	DLM	0.0050	mg/L		02-DEC-21	R5662176
Lithium (Li)-Dissolved	8.05		0.10	mg/L		02-DEC-21	R5662176
Magnesium (Mg)-Dissolved	360		0.50	mg/L		02-DEC-21	R5662176

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667910-2 PRIMARY LEACHATE CELL 2 (PC2) Sampled By: M on 29-NOV-21 @ 11:00 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Manganese (Mn)-Dissolved	1.01		0.010	mg/L		02-DEC-21	R5662176
Molybdenum (Mo)-Dissolved	47.0		0.0050	mg/L		02-DEC-21	R5662176
Nickel (Ni)-Dissolved	0.438		0.050	mg/L		02-DEC-21	R5662176
Phosphorus (P)-Dissolved	6.3		5.0	mg/L		02-DEC-21	R5662176
Potassium (K)-Dissolved	1300		5.0	mg/L		02-DEC-21	R5662176
Rubidium (Rb)-Dissolved	0.192		0.020	mg/L		02-DEC-21	R5662176
Selenium (Se)-Dissolved	0.0076		0.0050	mg/L		02-DEC-21	R5662176
Silicon (Si)-Dissolved	9.3		5.0	mg/L		02-DEC-21	R5662176
Silver (Ag)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Sodium (Na)-Dissolved	9210		5.0	mg/L		02-DEC-21	R5662176
Strontium (Sr)-Dissolved	3.30		0.020	mg/L		02-DEC-21	R5662176
Sulfur (S)-Dissolved	908		50	mg/L		02-DEC-21	R5662176
Tellurium (Te)-Dissolved	<0.020	DLM	0.020	mg/L		02-DEC-21	R5662176
Thallium (Tl)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Thorium (Th)-Dissolved	<0.010	DLM	0.010	mg/L		02-DEC-21	R5662176
Tin (Sn)-Dissolved	0.013		0.010	mg/L		02-DEC-21	R5662176
Titanium (Ti)-Dissolved	0.246		0.030	mg/L		02-DEC-21	R5662176
Tungsten (W)-Dissolved	19.0		0.010	mg/L		02-DEC-21	R5662176
Uranium (U)-Dissolved	0.0019		0.0010	mg/L		02-DEC-21	R5662176
Vanadium (V)-Dissolved	0.681		0.050	mg/L		02-DEC-21	R5662176
Zinc (Zn)-Dissolved	<0.10	DLM	0.10	mg/L		02-DEC-21	R5662176
Zirconium (Zr)-Dissolved	0.369		0.020	mg/L		02-DEC-21	R5662176
Fluoride in Water by IC							
Fluoride (F)	4.49	DLDS	0.40	mg/L		01-DEC-21	R5661417
Ion Balance Calculation							
Ion Balance	94.4			%		04-DEC-21	
TDS (Calculated)	29400			mg/L		04-DEC-21	
Hardness (as CaCO3)	1580			mg/L		04-DEC-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-21	R5661417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-DEC-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-21	R5661417
Sulfate in Water by IC							
Sulfate (SO4)	1150	DLDS	6.0	mg/L		01-DEC-21	R5661417
pH, Conductivity and Total Alkalinity							
pH	8.54		0.10	pH		01-DEC-21	R5660860
Conductivity (EC)	36800		2.0	uS/cm		01-DEC-21	R5660860
Bicarbonate (HCO3)	15800		5.0	mg/L		01-DEC-21	R5660860
Carbonate (CO3)	1160		5.0	mg/L		01-DEC-21	R5660860
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Alkalinity, Total (as CaCO3)	14900	DLHC	20	mg/L		01-DEC-21	R5660860
L2667910-3 PRIMARY LEACHATE CELL 3A (PC3A) Sampled By: M on 29-NOV-21 @ 11:00 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.190	DLM	0.19	mg/L	03-DEC-21	03-DEC-21	R5653949
Toluene	<0.0506	DLM	0.051	mg/L	03-DEC-21	03-DEC-21	R5653949
EthylBenzene	<0.00346	DLM	0.0035	mg/L	03-DEC-21	03-DEC-21	R5653949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667910-3 PRIMARY LEACHATE CELL 3A (PC3A)							
Sampled By: M on 29-NOV-21 @ 11:00							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
m+p-Xylene	<0.0191	DLM	0.019	mg/L	03-DEC-21	03-DEC-21	R5653949
o-Xylene	<0.00804	DLM	0.0080	mg/L	03-DEC-21	03-DEC-21	R5653949
Styrene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
F1(C6-C10)	<0.47	DLM	0.47	mg/L	03-DEC-21	03-DEC-21	R5653949
F1-BTEX	0.19		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
Xylenes	0.0270		0.00071	mg/L	03-DEC-21	03-DEC-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	99.4		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	96.6		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	107.1		70-130	%	03-DEC-21	03-DEC-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	7.24		0.10	mg/L	01-DEC-21	01-DEC-21	R5664282
Surrogate: 2-Bromobenzotrifluoride	107.8		60-140	%	01-DEC-21	01-DEC-21	R5664282
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.207		0.0050	mg/L		02-DEC-21	R5662176
Miscellaneous Parameters							
Ammonia, Total (as N)	710		500	mg/L		02-DEC-21	R5663578
Chemical Oxygen Demand	2820	DLHC	200	mg/L		07-DEC-21	R5669320
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		03-DEC-21	R5665804
Dissolved Organic Carbon	673		20	mg/L		02-DEC-21	R5663856
Phenols (4AAP)	7.03	DLHC	0.10	mg/L		01-DEC-21	R5661817
Phosphorus (P)-Total Dissolved	4.68	DLHC	0.10	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Dissolved Solids	14000	DLHC	20	mg/L		03-DEC-21	R5664636
Total Kjeldahl Nitrogen	740		100	mg/L		04-DEC-21	R5664865
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		01-DEC-21	R5660207
Phosphorus (P)-Total	4.64	DLHC	0.10	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Suspended Solids	278	DLHC	8.0	mg/L		03-DEC-21	R5664956
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	7400	DLDS	10	mg/L		01-DEC-21	R5661417
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-DEC-21	R5660853
Aluminum (Al)-Dissolved	<0.050	DLM	0.050	mg/L		02-DEC-21	R5662176
Antimony (Sb)-Dissolved	<0.0050	DLM	0.0050	mg/L		02-DEC-21	R5662176
Arsenic (As)-Dissolved	0.250		0.0050	mg/L		02-DEC-21	R5662176
Barium (Ba)-Dissolved	1.61		0.0050	mg/L		02-DEC-21	R5662176
Beryllium (Be)-Dissolved	<0.0050	DLM	0.0050	mg/L		02-DEC-21	R5662176
Bismuth (Bi)-Dissolved	<0.0025	DLM	0.0025	mg/L		02-DEC-21	R5662176
Boron (B)-Dissolved	31.8		0.50	mg/L		02-DEC-21	R5662176
Cadmium (Cd)-Dissolved	<0.00025	DLM	0.00025	mg/L		02-DEC-21	R5662176
Calcium (Ca)-Dissolved	229		2.5	mg/L		02-DEC-21	R5662176
Cesium (Cs)-Dissolved	0.00104		0.00050	mg/L		02-DEC-21	R5662176
Chromium (Cr)-Dissolved	0.184		0.0050	mg/L		02-DEC-21	R5662176
Cobalt (Co)-Dissolved	0.0074		0.0050	mg/L		02-DEC-21	R5662176
Copper (Cu)-Dissolved	0.012		0.010	mg/L		02-DEC-21	R5662176
Iron (Fe)-Dissolved	<0.50	DLM	0.50	mg/L		02-DEC-21	R5662176
Lead (Pb)-Dissolved	<0.0025	DLM	0.0025	mg/L		02-DEC-21	R5662176
Lithium (Li)-Dissolved	2.23		0.050	mg/L		02-DEC-21	R5662176
Magnesium (Mg)-Dissolved	387		0.25	mg/L		02-DEC-21	R5662176
Manganese (Mn)-Dissolved	2.06		0.0050	mg/L		02-DEC-21	R5662176
Molybdenum (Mo)-Dissolved	0.265		0.0025	mg/L		02-DEC-21	R5662176

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667910-3 PRIMARY LEACHATE CELL 3A (PC3A)							
Sampled By: M on 29-NOV-21 @ 11:00							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Nickel (Ni)-Dissolved	0.409		0.025	mg/L		02-DEC-21	R5662176
Phosphorus (P)-Dissolved	6.1		2.5	mg/L		02-DEC-21	R5662176
Potassium (K)-Dissolved	805		2.5	mg/L		02-DEC-21	R5662176
Rubidium (Rb)-Dissolved	0.570		0.010	mg/L		02-DEC-21	R5662176
Selenium (Se)-Dissolved	0.0055		0.0025	mg/L		02-DEC-21	R5662176
Silicon (Si)-Dissolved	17.2		2.5	mg/L		02-DEC-21	R5662176
Silver (Ag)-Dissolved	<0.00050	DLM	0.00050	mg/L		02-DEC-21	R5662176
Sodium (Na)-Dissolved	4530		2.5	mg/L		02-DEC-21	R5662176
Strontium (Sr)-Dissolved	4.73		0.010	mg/L		02-DEC-21	R5662176
Sulfur (S)-Dissolved	217		25	mg/L		02-DEC-21	R5662176
Tellurium (Te)-Dissolved	<0.010	DLM	0.010	mg/L		02-DEC-21	R5662176
Thallium (Tl)-Dissolved	<0.00050	DLM	0.00050	mg/L		02-DEC-21	R5662176
Thorium (Th)-Dissolved	<0.0050	DLM	0.0050	mg/L		02-DEC-21	R5662176
Tin (Sn)-Dissolved	<0.0050	DLM	0.0050	mg/L		02-DEC-21	R5662176
Titanium (Ti)-Dissolved	0.055		0.015	mg/L		02-DEC-21	R5662176
Tungsten (W)-Dissolved	1.45		0.0050	mg/L		02-DEC-21	R5662176
Uranium (U)-Dissolved	0.00172		0.00050	mg/L		02-DEC-21	R5662176
Vanadium (V)-Dissolved	0.151		0.025	mg/L		02-DEC-21	R5662176
Zinc (Zn)-Dissolved	<0.050	DLM	0.050	mg/L		02-DEC-21	R5662176
Zirconium (Zr)-Dissolved	0.165		0.010	mg/L		02-DEC-21	R5662176
Fluoride in Water by IC							
Fluoride (F)	1.06	DLDS	0.40	mg/L		01-DEC-21	R5661417
Ion Balance Calculation							
Ion Balance	90.7			%		04-DEC-21	
TDS (Calculated)	17600			mg/L		04-DEC-21	
Hardness (as CaCO3)	2170			mg/L		04-DEC-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-21	R5661417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-DEC-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-21	R5661417
Sulfate in Water by IC							
Sulfate (SO4)	445	DLDS	6.0	mg/L		01-DEC-21	R5661417
pH, Conductivity and Total Alkalinity							
pH	7.68		0.10	pH		01-DEC-21	R5660860
Conductivity (EC)	26200		2.0	uS/cm		01-DEC-21	R5660860
Bicarbonate (HCO3)	7660		5.0	mg/L		01-DEC-21	R5660860
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Alkalinity, Total (as CaCO3)	6280	DLHC	20	mg/L		01-DEC-21	R5660860
L2667910-4 PRIMARY LEACHATE CELL 3B (PC3B)							
Sampled By: M on 29-NOV-21 @ 11:00							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0163		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
Toluene	0.0101		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
EthylBenzene	0.00080		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
m+p-Xylene	0.00274		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
o-Xylene	0.00234		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667910-4 PRIMARY LEACHATE CELL 3B (PC3B)							
Sampled By: M on 29-NOV-21 @ 11:00							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Styrene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
F1(C6-C10)	1.48		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
F1-BTEX	1.45		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
Xylenes	0.00509		0.00071	mg/L	03-DEC-21	03-DEC-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	101.9		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	90.7		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	102.9		70-130	%	03-DEC-21	03-DEC-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	2.46		0.10	mg/L	01-DEC-21	01-DEC-21	R5664282
Surrogate: 2-Bromobenzotrifluoride	101.7		60-140	%	01-DEC-21	01-DEC-21	R5664282
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.620		0.010	mg/L		02-DEC-21	R5662176
Miscellaneous Parameters							
Ammonia, Total (as N)	1930		500	mg/L		02-DEC-21	R5663578
Chemical Oxygen Demand	14900	DLHC	200	mg/L		07-DEC-21	R5669320
Chromium (VI)-Dissolved	0.0039	DLM	0.0025	mg/L		03-DEC-21	R5665804
Dissolved Organic Carbon	4850		100	mg/L		02-DEC-21	R5663856
Phenols (4AAP)	22.5	DLHC	0.50	mg/L		01-DEC-21	R5661817
Phosphorus (P)-Total Dissolved	4.89	DLHC	0.10	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Dissolved Solids	24800	DLHC	20	mg/L		03-DEC-21	R5664636
Total Kjeldahl Nitrogen	2150		100	mg/L		04-DEC-21	R5664865
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		01-DEC-21	R5660207
Phosphorus (P)-Total	4.91	DLHC	0.10	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Suspended Solids	8.8		3.0	mg/L		03-DEC-21	R5664956
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	10300	DLDS	10	mg/L		01-DEC-21	R5661417
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-DEC-21	R5660853
Aluminum (Al)-Dissolved	<0.10	DLM	0.10	mg/L		02-DEC-21	R5662176
Antimony (Sb)-Dissolved	<0.010	DLM	0.010	mg/L		02-DEC-21	R5662176
Arsenic (As)-Dissolved	0.142		0.010	mg/L		02-DEC-21	R5662176
Barium (Ba)-Dissolved	0.552		0.010	mg/L		02-DEC-21	R5662176
Beryllium (Be)-Dissolved	<0.010	DLM	0.010	mg/L		02-DEC-21	R5662176
Bismuth (Bi)-Dissolved	<0.0050	DLM	0.0050	mg/L		02-DEC-21	R5662176
Boron (B)-Dissolved	146		1.0	mg/L		02-DEC-21	R5662176
Cadmium (Cd)-Dissolved	0.00745		0.00050	mg/L		02-DEC-21	R5662176
Calcium (Ca)-Dissolved	12.7		5.0	mg/L		02-DEC-21	R5662176
Cesium (Cs)-Dissolved	0.112		0.0010	mg/L		02-DEC-21	R5662176
Chromium (Cr)-Dissolved	0.610		0.010	mg/L		02-DEC-21	R5662176
Cobalt (Co)-Dissolved	0.023		0.010	mg/L		02-DEC-21	R5662176
Copper (Cu)-Dissolved	0.065		0.020	mg/L		02-DEC-21	R5662176
Iron (Fe)-Dissolved	1.3		1.0	mg/L		02-DEC-21	R5662176
Lead (Pb)-Dissolved	0.0072		0.0050	mg/L		02-DEC-21	R5662176
Lithium (Li)-Dissolved	9.20		0.10	mg/L		02-DEC-21	R5662176
Magnesium (Mg)-Dissolved	48.7		0.50	mg/L		02-DEC-21	R5662176
Manganese (Mn)-Dissolved	0.755		0.010	mg/L		02-DEC-21	R5662176
Molybdenum (Mo)-Dissolved	33.5		0.0050	mg/L		02-DEC-21	R5662176
Nickel (Ni)-Dissolved	1.31		0.050	mg/L		02-DEC-21	R5662176
Phosphorus (P)-Dissolved	9.4		5.0	mg/L		02-DEC-21	R5662176

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667910-4 PRIMARY LEACHATE CELL 3B (PC3B) Sampled By: M on 29-NOV-21 @ 11:00 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Potassium (K)-Dissolved	3150		5.0	mg/L		02-DEC-21	R5662176
Rubidium (Rb)-Dissolved	4.94		0.020	mg/L		02-DEC-21	R5662176
Selenium (Se)-Dissolved	0.0721		0.0050	mg/L		02-DEC-21	R5662176
Silicon (Si)-Dissolved	41.5		5.0	mg/L		02-DEC-21	R5662176
Silver (Ag)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Sodium (Na)-Dissolved	8790		5.0	mg/L		02-DEC-21	R5662176
Strontium (Sr)-Dissolved	0.793		0.020	mg/L		02-DEC-21	R5662176
Sulfur (S)-Dissolved	726		50	mg/L		02-DEC-21	R5662176
Tellurium (Te)-Dissolved	<0.020	DLM	0.020	mg/L		02-DEC-21	R5662176
Thallium (Tl)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Thorium (Th)-Dissolved	<0.010	DLM	0.010	mg/L		02-DEC-21	R5662176
Tin (Sn)-Dissolved	0.015		0.010	mg/L		02-DEC-21	R5662176
Titanium (Ti)-Dissolved	0.248		0.030	mg/L		02-DEC-21	R5662176
Tungsten (W)-Dissolved	14.0		0.010	mg/L		02-DEC-21	R5662176
Uranium (U)-Dissolved	0.0013		0.0010	mg/L		02-DEC-21	R5662176
Vanadium (V)-Dissolved	0.457		0.050	mg/L		02-DEC-21	R5662176
Zinc (Zn)-Dissolved	<0.10	DLM	0.10	mg/L		02-DEC-21	R5662176
Zirconium (Zr)-Dissolved	0.107		0.020	mg/L		02-DEC-21	R5662176
Fluoride in Water by IC							
Fluoride (F)	3.37	DLDS	0.40	mg/L		01-DEC-21	R5661417
Ion Balance Calculation							
Ion Balance	104			%		04-DEC-21	
TDS (Calculated)	31700			mg/L		04-DEC-21	
Hardness (as CaCO3)	232			mg/L		04-DEC-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-21	R5661417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-DEC-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-21	R5661417
Sulfate in Water by IC							
Sulfate (SO4)	1560	DLDS	6.0	mg/L		01-DEC-21	R5661417
pH, Conductivity and Total Alkalinity							
pH	9.38		0.10	pH		01-DEC-21	R5660860
Conductivity (EC)	40200		2.0	uS/cm		01-DEC-21	R5660860
Bicarbonate (HCO3)	7230		5.0	mg/L		01-DEC-21	R5660860
Carbonate (CO3)	4260		5.0	mg/L		01-DEC-21	R5660860
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Alkalinity, Total (as CaCO3)	13000	DLHC	20	mg/L		01-DEC-21	R5660860
L2667910-5 PRIMARY LEACHATE CELL 4 (PC4) Sampled By: M on 29-NOV-21 @ 11:00 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.0886	DLM	0.089	mg/L	03-DEC-21	03-DEC-21	R5653949
Toluene	<0.187	DLM	0.19	mg/L	03-DEC-21	03-DEC-21	R5653949
EthylBenzene	<0.0104	DLM	0.010	mg/L	03-DEC-21	03-DEC-21	R5653949
m+p-Xylene	<0.0288	DLM	0.029	mg/L	03-DEC-21	03-DEC-21	R5653949
o-Xylene	<0.0156	DLM	0.016	mg/L	03-DEC-21	03-DEC-21	R5653949
Styrene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
F1(C6-C10)	<1.19	DLM	1.2	mg/L	03-DEC-21	03-DEC-21	R5653949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667910-5 PRIMARY LEACHATE CELL 4 (PC4)							
Sampled By: M on 29-NOV-21 @ 11:00							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
F1-BTEX	0.85		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
Xylenes	0.0441		0.00071	mg/L	03-DEC-21	03-DEC-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	116.2		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	86.5		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	109.7		70-130	%	03-DEC-21	03-DEC-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	5.35		0.10	mg/L	01-DEC-21	01-DEC-21	R5664282
Surrogate: 2-Bromobenzotrifluoride	99.9		60-140	%	01-DEC-21	01-DEC-21	R5664282
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0051		0.0010	mg/L		02-DEC-21	R5662176
Miscellaneous Parameters							
Ammonia, Total (as N)	360		130	mg/L		02-DEC-21	R5663578
Chemical Oxygen Demand	4160	DLHC	200	mg/L		07-DEC-21	R5669320
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		03-DEC-21	R5665804
Dissolved Organic Carbon	1040		20	mg/L		02-DEC-21	R5663856
Phenols (4AAP)	3.08	DLHC	0.10	mg/L		01-DEC-21	R5661817
Phosphorus (P)-Total Dissolved	1.73	DLHC	0.050	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Dissolved Solids	7810	DLHC	20	mg/L		03-DEC-21	R5664636
Total Kjeldahl Nitrogen	420		100	mg/L		04-DEC-21	R5664865
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		01-DEC-21	R5660207
Phosphorus (P)-Total	2.17	DLHC	0.050	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Suspended Solids	31.0		3.0	mg/L		03-DEC-21	R5664956
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	3460	DLDS	10	mg/L		01-DEC-21	R5661417
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-DEC-21	R5660853
Aluminum (Al)-Dissolved	0.074		0.010	mg/L		02-DEC-21	R5662176
Antimony (Sb)-Dissolved	0.0020		0.0010	mg/L		02-DEC-21	R5662176
Arsenic (As)-Dissolved	0.0230		0.0010	mg/L		02-DEC-21	R5662176
Barium (Ba)-Dissolved	0.405		0.0010	mg/L		02-DEC-21	R5662176
Beryllium (Be)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Bismuth (Bi)-Dissolved	<0.00050	DLM	0.00050	mg/L		02-DEC-21	R5662176
Boron (B)-Dissolved	20.9		0.10	mg/L		02-DEC-21	R5662176
Cadmium (Cd)-Dissolved	0.000487		0.000050	mg/L		02-DEC-21	R5662176
Calcium (Ca)-Dissolved	309		0.50	mg/L		02-DEC-21	R5662176
Cesium (Cs)-Dissolved	0.0139		0.00010	mg/L		02-DEC-21	R5662176
Chromium (Cr)-Dissolved	0.0051		0.0010	mg/L		02-DEC-21	R5662176
Cobalt (Co)-Dissolved	0.0072		0.0010	mg/L		02-DEC-21	R5662176
Copper (Cu)-Dissolved	0.0125		0.0020	mg/L		02-DEC-21	R5662176
Iron (Fe)-Dissolved	0.58		0.10	mg/L		02-DEC-21	R5662176
Lead (Pb)-Dissolved	<0.00050	DLM	0.00050	mg/L		02-DEC-21	R5662176
Lithium (Li)-Dissolved	0.115		0.010	mg/L		02-DEC-21	R5662176
Magnesium (Mg)-Dissolved	206		0.10	mg/L		02-DEC-21	R5662176
Manganese (Mn)-Dissolved	2.25		0.0010	mg/L		02-DEC-21	R5662176
Molybdenum (Mo)-Dissolved	2.11		0.00050	mg/L		02-DEC-21	R5662176
Nickel (Ni)-Dissolved	0.306		0.0050	mg/L		02-DEC-21	R5662176
Phosphorus (P)-Dissolved	3.54		0.50	mg/L		02-DEC-21	R5662176
Potassium (K)-Dissolved	277		0.50	mg/L		02-DEC-21	R5662176
Rubidium (Rb)-Dissolved	0.164		0.0020	mg/L		02-DEC-21	R5662176

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667910-5 PRIMARY LEACHATE CELL 4 (PC4) Sampled By: M on 29-NOV-21 @ 11:00 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Selenium (Se)-Dissolved	0.00426		0.00050	mg/L		02-DEC-21	R5662176
Silicon (Si)-Dissolved	14.1		0.50	mg/L		02-DEC-21	R5662176
Silver (Ag)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Sodium (Na)-Dissolved	2460		1.0	mg/L		02-DEC-21	R5662176
Strontium (Sr)-Dissolved	2.54		0.0020	mg/L		02-DEC-21	R5662176
Sulfur (S)-Dissolved	133		5.0	mg/L		02-DEC-21	R5662176
Tellurium (Te)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Thallium (Tl)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Thorium (Th)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Tin (Sn)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Titanium (Ti)-Dissolved	0.0256		0.0030	mg/L		02-DEC-21	R5662176
Tungsten (W)-Dissolved	0.0868		0.0010	mg/L		02-DEC-21	R5662176
Uranium (U)-Dissolved	0.00164		0.00010	mg/L		02-DEC-21	R5662176
Vanadium (V)-Dissolved	0.562		0.0050	mg/L		02-DEC-21	R5662176
Zinc (Zn)-Dissolved	0.034		0.010	mg/L		02-DEC-21	R5662176
Zirconium (Zr)-Dissolved	0.0368		0.0020	mg/L		02-DEC-21	R5662176
Fluoride in Water by IC							
Fluoride (F)	0.60	DLDS	0.40	mg/L		01-DEC-21	R5661417
Ion Balance Calculation							
Ion Balance	98.2			%		04-DEC-21	
TDS (Calculated)	9070			mg/L		04-DEC-21	
Hardness (as CaCO3)	1620			mg/L		04-DEC-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-21	R5661417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-DEC-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-21	R5661417
Sulfate in Water by IC							
Sulfate (SO4)	75.1	DLDS	6.0	mg/L		01-DEC-21	R5661417
pH, Conductivity and Total Alkalinity							
pH	7.53		0.10	pH		01-DEC-21	R5660860
Conductivity (EC)	14700		2.0	uS/cm		01-DEC-21	R5660860
Bicarbonate (HCO3)	4650		5.0	mg/L		01-DEC-21	R5660860
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Alkalinity, Total (as CaCO3)	3810	DLHC	20	mg/L		01-DEC-21	R5660860

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
DLA	Detection Limit adjusted for required dilution
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).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method.			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-T-COL-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
CR-CR6-DIS-WT	Water	Dissolved Hexavalent Chromium in Water	EPA 7199
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Chromium (III) is calculated as the difference between the total chromium and the chromium (VI) results.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
P-TD-COL-ED	Water	Total Dissolved P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H2SO4 is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-ED	Water	Phenols (4AAP)	EPA 9066 AUTO-DISTILL-COLORIMETRIC
This automated method is based on the distillation of phenol and subsequent reaction of the distillate with an oxidizing agent (alkaline potassium ferricyanide), and 4-aminoantipyrine to form a red complex which is measured at 505 nm. The method will include ortho and meta-substituted phenols, and is collectively named 4AAP phenols.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-ED	Water	Total Dissolved Solids	APHA 2540 C
Gravimetric determination of solids in waters by filtration and evaporating filtrate to dryness at 180 degrees Celsius.			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-CL	Water	Total Kjeldahl Nitrogen by Fluorescence	APHA 4500-NORG (TKN)
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

20-973262

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

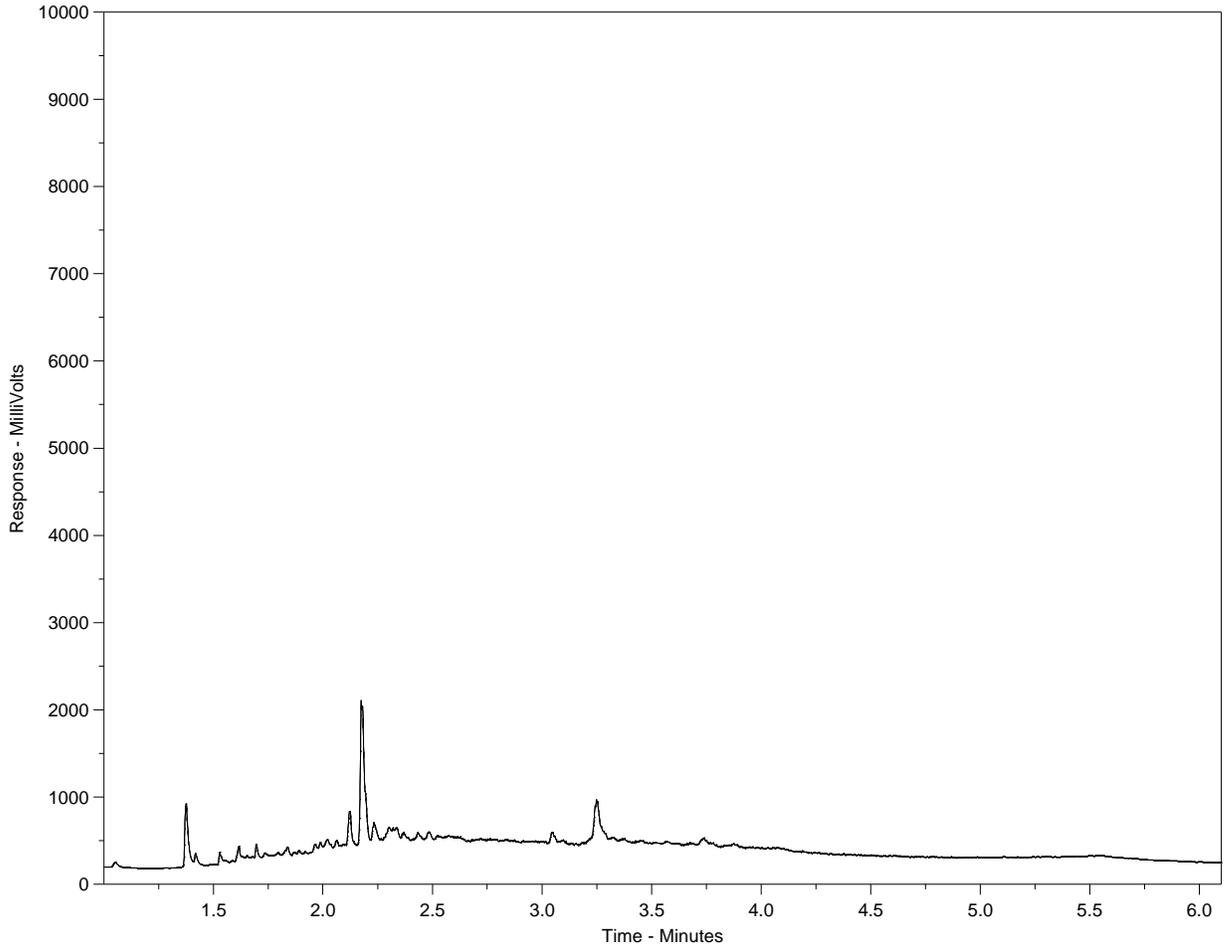
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Hydrocarbon Distribution Report



ALS Sample ID: L2667910-1
 Client ID: PRIMARY LEACHATE CELL 1 (PC1)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

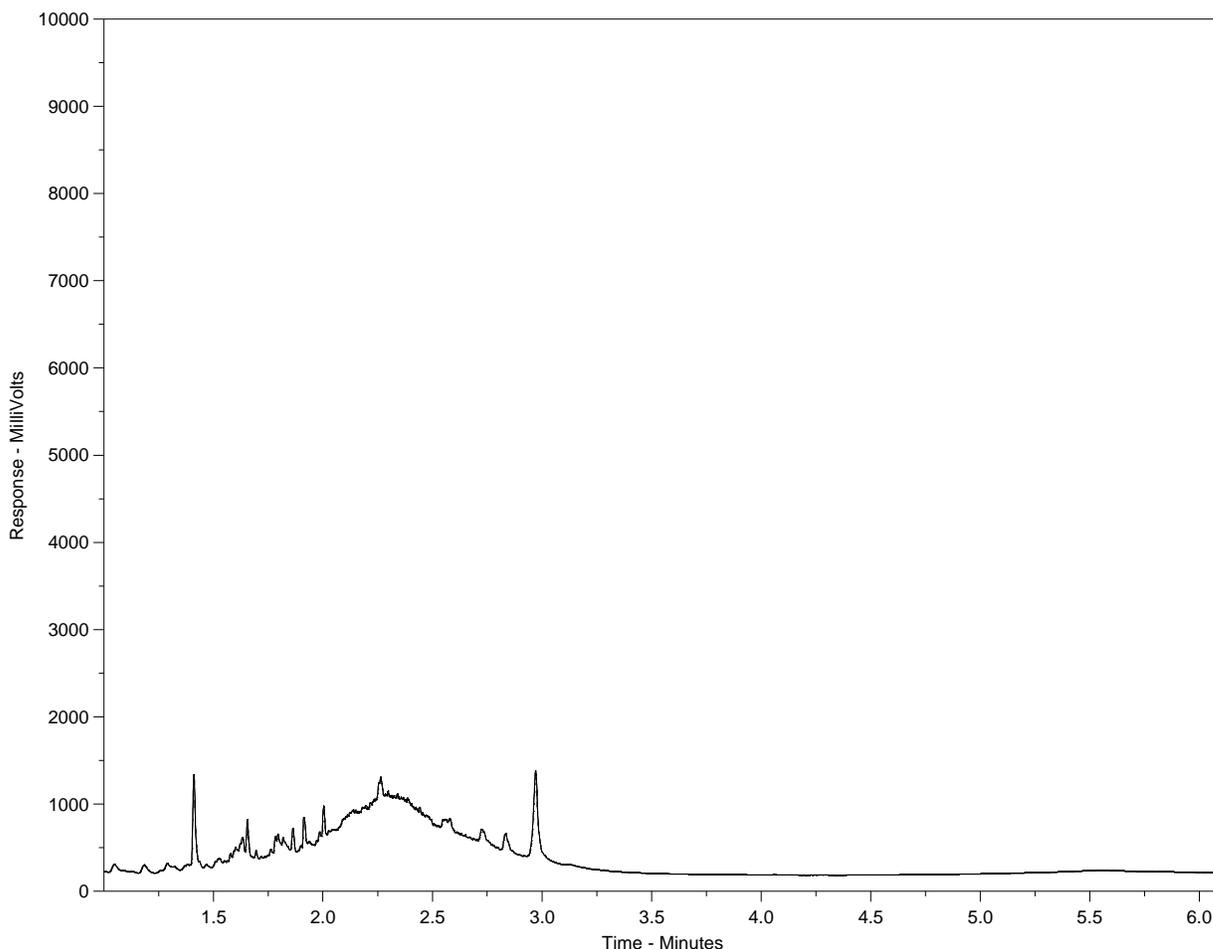
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2667910-2
 Client ID: PRIMARY LEACHATE CELL 2 (PC2)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

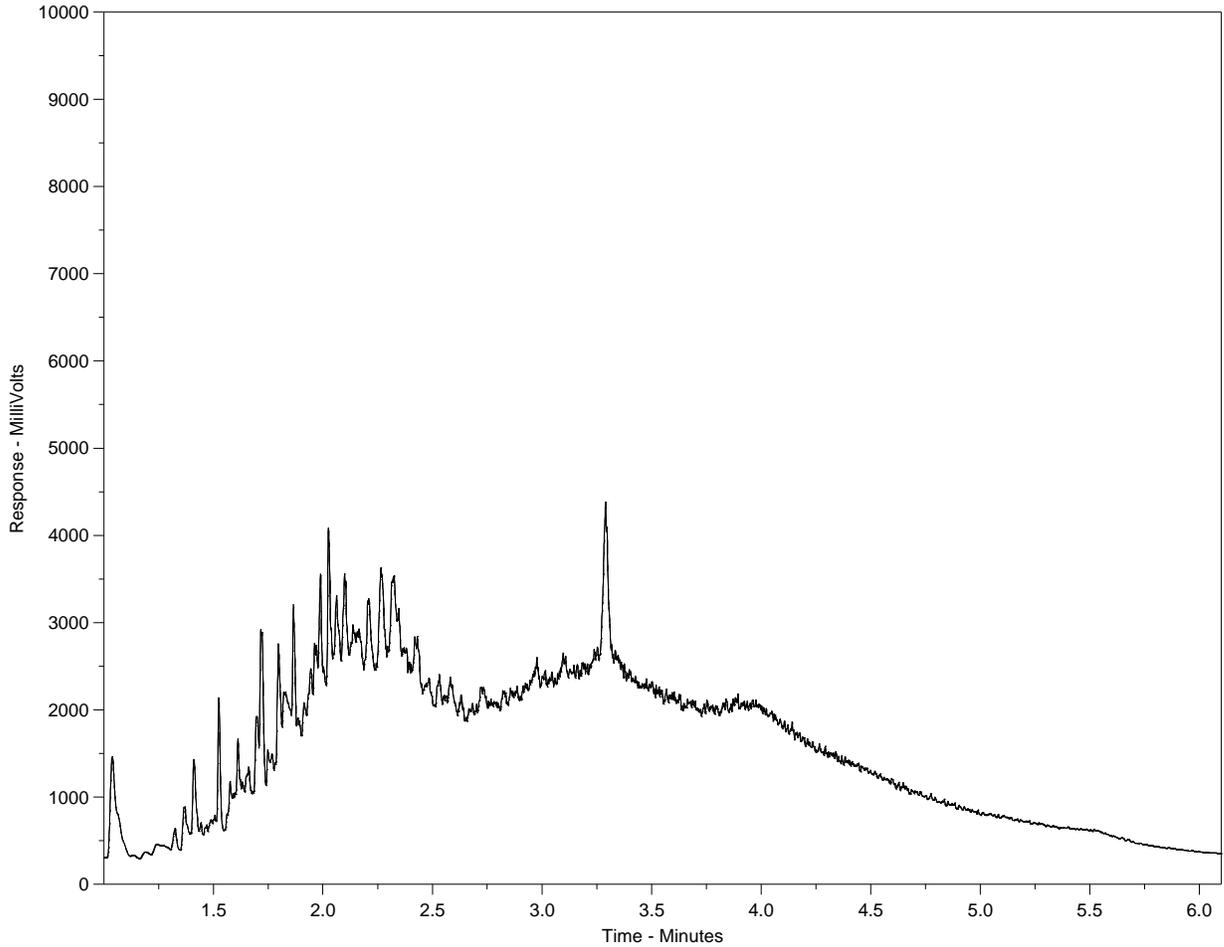
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2667910-3
 Client ID: PRIMARY LEACHATE CELL 3A (PC3A)



← F2 →		← F3 →		← F4 →		← F4 →
nC10	nC16	nC34	nC50			
174°C	287°C	481°C	575°C			
346°F	549°F	898°F	1067°F			
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →						

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

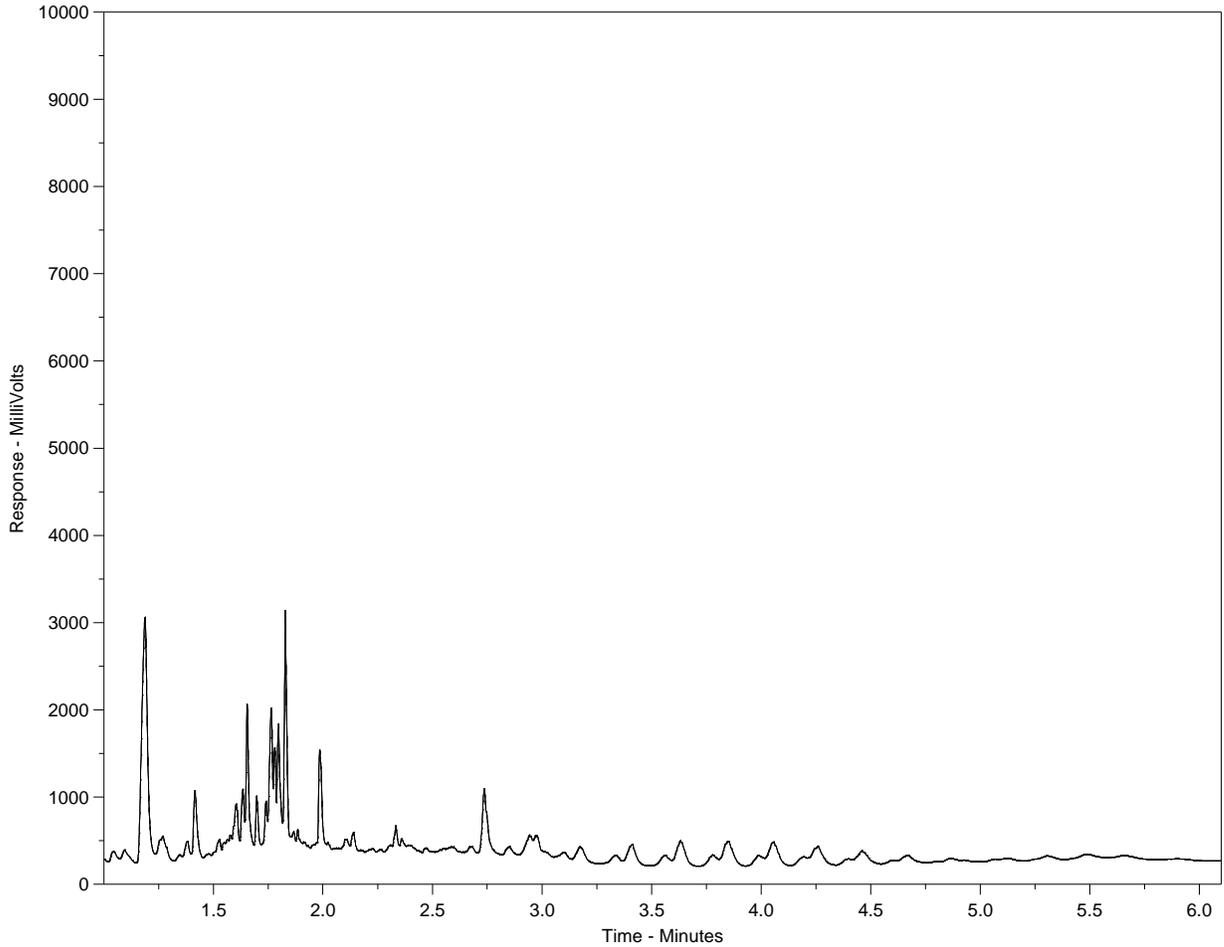
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2667910-4
 Client ID: PRIMARY LEACHATE CELL 3B (PC3B)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

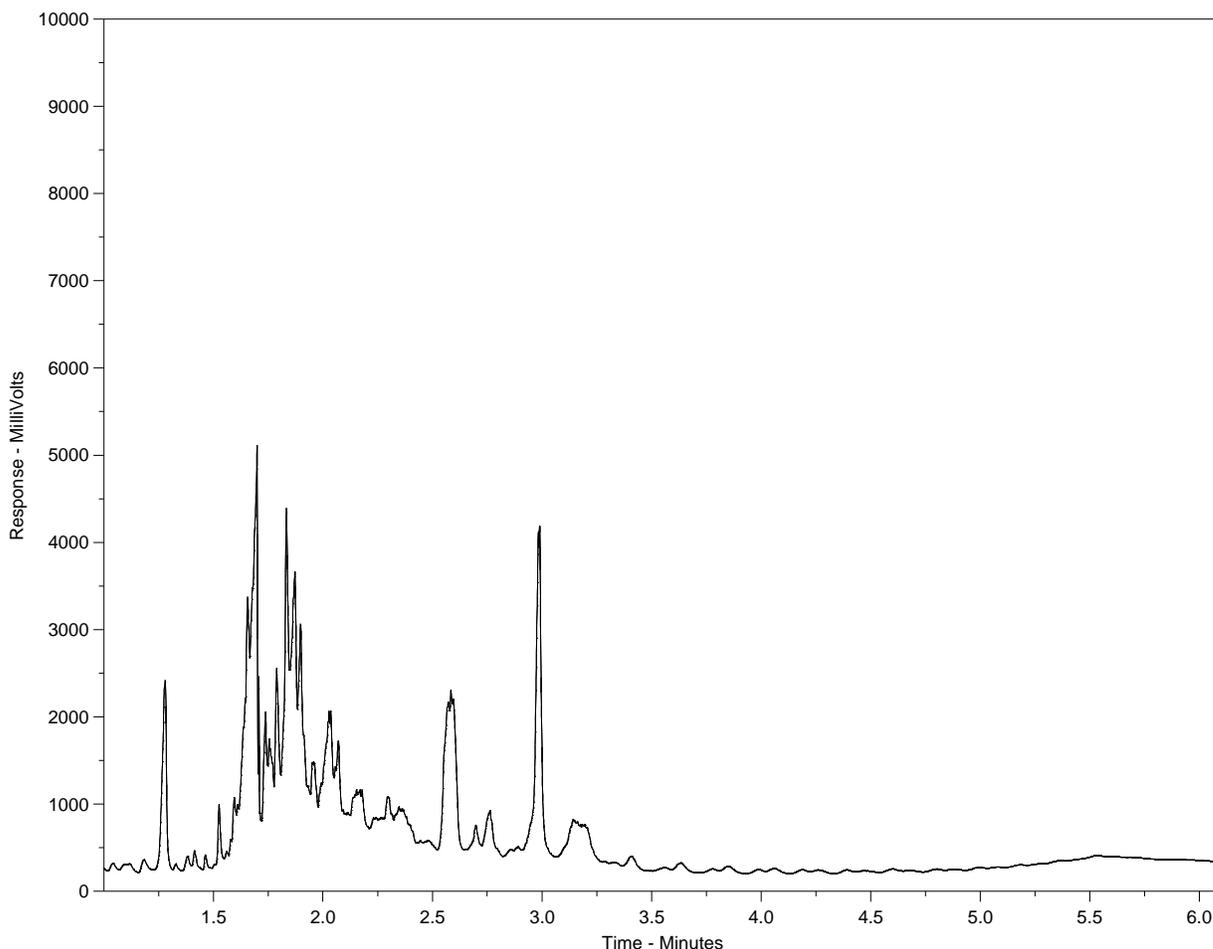
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2667910-5
 Client ID: PRIMARY LEACHATE CELL 4 (PC4)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

APPENDIX E

Volume of Leachate Removed

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4	
2021-02-07									
2021-02-08		1261	0	4300	10473	0	**	14240	1791
2021-02-09		172	967	1800	3365	0	**	4679	583
2021-02-10		455	130	0	3392	0	**	4676	568
2021-02-11		615	1302	2880	3287	0	**	4446	497
2021-02-12		1622	523	1800	3247	0	**	4262	523
2021-02-13									
2021-02-14									
2021-02-15									
2021-02-16		332	1970	7200	6187	0	**	16669	2554
2021-02-17		252	751	1800	3450	0	**	3682	626
2021-02-18		107	807	1800	4669	0	**	3406	529
2021-02-19		640	300	1800	4649	0	**	3712	5000
2021-02-20		1555	1219	5760	12609	4250		13474	15000
2021-02-21									
2021-02-22									
2021-02-23		1278	900	1800	3930	969		5804	5000
2021-02-24		247	349	1800	3766	19347		5476	9000
2021-02-25		757	564	1800	3690	4526		5995	5000
2021-02-26		540	528	1800	3891	14366		6348	5000
2021-02-27									
2021-02-28									
2021-03-01	no water	1381	1117	1080	897	8102		18493	12000
2021-03-02		225	470	0	0	2030		49	6000
2021-03-03		470	850	0	0	2670		0	5000
2021-03-04		848	277	7200	4528	2096		0	5000
2021-03-05		429	62	5720	5611	1858		0	5000
2021-03-06									
2021-03-07									
2021-03-08		1293	114	6200	892	6131		0	14000
2021-03-09		65	140	0	0	1872		0	3000
2021-03-10		0	169	0	0	1884		0	5000
2021-03-11		0	0	0	4735	1964		0	3500
2021-03-12		0	0	0	7025	1826		0	0
2021-03-13									
2021-03-14									
2021-03-15		0	0	0	19828	5101		0	0

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2021-03-16		0	0	4366	5928	0	575	0
2021-03-17		0	0	3369	5511	0	3163	2465
2021-03-18		0	0	3240	0	0	4175	2100
2021-03-19		0	0	2771	4119	8321	5850	0
2021-03-20								
2021-03-21								
2021-03-22		1521	371	6581	15639	6447	17696	4932
2021-03-23		422	3729	1800	4798	2000	6212	5000
2021-03-24		442	2946	2185	5532	2309	5417	13000
2021-03-25		374	1055	1844	3581	1471	3000	3000
2021-03-26		368	777	1800	4142	1979	6675	7000
2021-03-27								
2021-03-28								
2021-03-29		1158	2079	5693	11954	5732	704	8000
2021-03-30		381	409	1932	3482	1866	0	* 5000
2021-03-31		349	222	1715	3446	1440	65647	4000
2021-04-01		368	270	1814	3537	1549	18512	4000
2021-04-02								
2021-04-03								
2021-04-04								
2021-04-05		1373	755	6900	13519	6738	5368	4000
2021-04-06		349	176	1833	3297	1605	16556	14000
2021-04-07		344	180	1791	3229	1613	10190	4000
2021-04-08		357	222	1440	3375	1671	8719	5000
2021-04-09		354	190	1800	3134	619	10176	4000
2021-04-10								
2021-04-11								
2021-04-12		988	90	5000	9396	4550	14283	12000
2021-04-13		286	984	1400	2897	1150	179	4000
2021-04-14		291	758	1450	2980	1191	1392	4000
2021-04-15		306	388	1300	3078	1315	7906	4000
2021-04-16		311	242	1800	3091	371	4667	4000
2021-04-17								
2021-04-18								
2021-04-19		911	0	4834	8962	0	3365	12000
2021-04-20		304	1120	0	2988	0	1331	3000
2021-04-21		304	886	2869	3123	0	3457	6000

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2021-04-22		368	878	2245	3200	0	0	4000
2021-04-23		374	610	2034	2902	0	4131	5000
2021-04-24								
2021-04-25								
2021-04-26		1026	181	5500	9281	0	16476	14000
2021-04-27		389	1232	2000	3143	6685	18203	5000
2021-04-28		318	966	1414	2847	14515	3972	3000
2021-04-29		318	701	1600	2973	3912	9887	3000
2021-04-30		306	465	1560	3043	606	5260	5000
2021-05-01								
2021-05-02								
2021-05-03		966	1189	5000	8974	4430	14095	13000
2021-05-04		303	496	1800	2908	1287	10990	3000
2021-05-05		300	755	1300	2958	1489	4885	4000
2021-05-06		308	430	1480	2860	1552	8286	4000
2021-05-07		293	283	1800	2971	1643	0	5000
2021-05-08								
2021-05-09								
2021-05-10		954	795	4500	8634	5304	7609	14000
2021-05-11		285	496	1530	2902	1755	10369	6000
2021-05-12		290	789	1500	2851	1834	4850	5000
2021-05-13		291	555	1388	2915	1808	12939	4000
2021-05-14		619	317	1633	2897	1858	2665	4000
2021-05-15								
2021-05-16								
2021-05-17		1014	684	5000	8854	5469	13020	12000
2021-05-18		343	272	1864	3028	2055	12044	5000
2021-05-19		4334	279	1662	2965	1961	2900	5000
2021-05-20		376	198	1561	2762	2243	602	11000
2021-05-21		308	179	1400	2838	2124	6668	9000
2021-05-22								
2021-05-23								
2021-05-24								
2021-05-25		1586	74	6078	12365	8569	7631	5381
2021-05-26		179	1218	1863	1074	2532	6992	1857
2021-05-27		576	942	1371	2840	2313	6854	17510
2021-05-28		382	1095	1860	4159	2975	6232	14800

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2021-07-05		856	671	3163	14408	6085	11317	7500
2021-07-06		268	203	914	4293	1871	3265	6000
2021-07-07		243	118	977	4225	1930	3324	6000
2021-07-08		266	197	967	4054	2173	4093	7000
2021-07-09		290	195	1151	4008	2169	8238	5000
2021-07-10								
2021-07-11								
2021-07-12		797	553	3060	11025	6045	10483	17000
2021-07-13		233	260	840	3470	1978	3311	5000
2021-07-14		256	265	1001	3399	2023	3484	5000
2021-07-15		273	188	1202	3488	2203	3941	7000
2021-07-16		245	333	1188	3303	2258	4112	5000
2021-07-17								
2021-07-18								
2021-07-19		759	662	2942	10462	6883	0	15000
2021-07-20		247	207	957	3049	2055	15384	6000
2021-07-21		196	194	892	1872	1054	0	4000
2021-07-22		296	264	1369	4444	4445	6813	0
2021-07-23		190	153	781	1611	971	8684	5000
2021-07-24								
2021-07-25								
2021-07-26		717	621	3107	5658	6058	11003	13000
2021-07-27		241	255	1092	3262	2312	3472	4000
2021-07-28		219	148	881	2477	1783	3401	5000
2021-07-29		245	266	955	2771	2130	2954	5000
2021-07-30		247	220	995	2877	1910	3244	5000
2021-07-31								
2021-08-01								
2021-08-02								
2021-08-03		1116	757	3984	11449	7948	12488	15000
2021-08-04		204	158	1162	2919	2125	3464	5000
2021-08-05		230	219	1007	2907	2081	3367	6000
2021-08-06		232	240	0	3020	2189	3534	5000
2021-08-07								
2021-08-08								
2021-08-09		715	735	6264	8821	6656	10726	15000
2021-08-10		233	159	1007	2984	2143	3501	5000

Date	Cell 1	Cell 2		Cell 3A		Cell 3B		Cell 3C		Cell 3D		Cell 3E		Cell 4
2021-08-11		242		91		1348		2938		2176		3655		5000
2021-08-12		210		205		858		2824		2025		3128		7000
2021-08-13		202		193		903		2738		1867		2543		5000
2021-08-14														
2021-08-15														
2021-08-16		678		502		3008		8876		6401		9504		16000
2021-08-17		274		317		1280		3969		3322		4609		6000
2021-08-18		216		222		928		3010		2017		3051		5000
2021-08-19		197		145		954		2704		2083		2926		5000
2021-08-20		0		192		821		2703		2078		2953		6000
2021-08-21														
2021-08-22														
2021-08-23		0		589		2990		7971		5520		8486		21000
2021-08-24		0		154		858		2579		2099		3185		10000
2021-08-25		200		280		958		2953		1896		2621		6000
2021-08-26		0		133		955		2987		2013		3042		13000
2021-08-27		0		183		880		3090		2165		3454		12000
2021-08-28														
2021-08-29														
2021-08-30		0		638		2910		9014		6498		9798		36000
2021-08-31		0	*	402		982		3174		2230		3456		13000
2021-09-01		0	*	343		1487		3114		2289		0	*	12000
2021-09-02		0	*	189		932		2910		2191		8826		10000
2021-09-03		0	*	187		941		2851		1916		2970		11000
2021-09-04														
2021-09-05														
2021-09-06														
2021-09-07		0		788		3827		12273		7911		12178		24000
2021-09-08		500		193		888		2969		1935		2566		1000
2021-09-09		256		192		867		3166		1934		2944		0
2021-09-10		338		186		1089		3103		2058		3233		0
2021-09-11														
2021-09-12														
2021-09-13		881		650		0		9229		5587		8790		37000
2021-09-14		285		142		0	*	3068		1924		3124		9000
2021-09-15		271		161		0	*	3318		2100		3234		7000
2021-09-16		316		253		0	*	3226		2164		1170		7000

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2021-10-24								
2021-10-25		838	726	3965	9744	6142	9481	15000
2021-10-26		220	0	** 1341	2983	2194	3474	7000
2021-10-27		274	0	** 0	** 0	** 2296	3079	7000
2021-10-28		244	2295	880	3607	1526	3174	5000
2021-10-29		264	1574	840	0	* 1810	2316	5000
2021-10-30								
2021-10-31								
2021-11-01		715	5835	2576	0	* 4488	6855	13000
2021-11-02		205	955	798	0	* 1562	2249	6000
2021-11-03		253	1697	957	0	1657	2658	6600
2021-11-04		250	1846	1135	3888	1734	2875	6000
2021-11-05		291	2141	1142	2146	1978	3403	6000
2021-11-06								
2021-11-07								
2021-11-08		822	7466	3194	12552	5426	8808	16000
2021-11-09		249	1216	903	3891	1631	2333	7000
2021-11-10		259	2854	1111	4393	1744	2860	6000
2021-11-11		254	2022	897	3324	1636	2530	0
2021-11-12		206	1302	831	0	1426	2105	0
2021-11-13								
2021-11-14								
2021-11-15		803	5621	3026	12954	5183	8008	16000
2021-11-16		305	3584	1256	4040	1995	3220	3000
2021-11-17		231	1137	2210	1674	1803	2807	8000
2021-11-18		200	1740	888	0	1473	1833	5000
2021-11-19		284	4235	1104	0	2291	2428	5000
2021-11-20								
2021-11-21								
2021-11-22		693	6321	2905	0	4930	37+69	15000
2021-11-23		235	1197	970	0	1677	0	6000
2021-11-24		301	3246	1071	0	2837	0	5000
2021-11-25		185	1792	0	2612	770	0	5000
2021-11-26		255	2452	0	7638	1904	0	6000
2021-11-27								
2021-11-28								
2021-11-29	50	718	5564	6612	18114	5394	30458	16000

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2021-11-30		231	2342	1104	5313	1705	2532	6000
2021-12-01		255	2230	1168	5306	1940	2886	6000
2021-12-02		265	3055	1188	5826	2514	2948	5000
2021-12-03		226	1785	804	9304	1243	2248	5000
2021-12-04								
2021-12-05								
2021-12-06		702	5997	2865	13376	4982	6381	14000
2021-12-07		237	1884	1006	3731	1787	2352	6000
2021-12-08		274	2699	1194	4376	1977	3149	6000
2021-12-09		285	2667	1419	4093	2799	4155	7000
2021-12-10		295	2350	1231	5183	2470	4931	6000
2021-12-11								
2021-12-12								
2021-12-13		764	6304	3253	2768	4812	9434	15000
2021-12-14		236	1406	876	0	1546	2733	5251
2021-12-15		274	3108	1004	0	2666	2817	5000
2021-12-16		217	1330	747	0	1109	2656	5000
2021-12-17		249	3233	925	0	1559	1951	6000
2021-12-18								
2021-12-19								
2021-12-20		743	5969	2973	14635	5578	6750	16812
2021-12-21		0	64	871	3235	1087	1134	7000
2021-12-22		0	0	0	4748	1927	0	5000
2021-12-23		0	0	0	4671	1910	0	5000
2021-12-24		0	0	0	4398	2109	14369	0
2021-12-25								
2021-12-26								
2021-12-27								
2021-12-28		0	0	0	0	0	0	0
2021-12-29		0	0	0	0	0	0	0
2021-12-30		0	0	0	0	0	0	0
2021-12-31		0	0	0	0	0	0	0
Total Primary(L)	150	104,198	212,788	472,891	1,156,832	682,465	1,566,082	1,684,790
		* Repairs	** Meter Service		^ Pump/Line Issues		^^ Pump Replacement	

APPENDIX F

Leak Detection Liquid Analysis

Clean Harbors Canada, Inc. - Approval 10348-02							
2021 Annual Report							
Section 1.5 Secondary Leachate							
Field pH & Electrical Conductivity Measurements							
	Qtr 1				Qtr 2		
	Date	pH	Conductivity (uS/cm)		Date	pH	Conductivity (uS/cm)
Cell 1	Not Sampled			Cell 1	Not Sampled		
Cell 2	2021-03-01	6.9	15430	Cell 2	2021-06-28	7.0	15390
Cell 3A	2021-03-01	7.3	14550	Cell 3A	2021-06-28	7.4	13850
Cell 3B	2021-03-16	8.5	19660	Cell 3B	2021-06-28	7.9	15130
Cell 3C	2021-03-01	7.8	10900	Cell 3C	2021-06-28	7.9	11080
Cell 3D	2021-03-01	7.6	11910	Cell 3D	2021-06-28	7.3	12060
Cell 3E	2021-03-01	7.9	12450	Cell 3E	2021-06-28	8.1	6879
Cell 4	2021-03-01	7.5	12240	Cell 4	2021-06-28	7.7	13330
	Qtr 3				Qtr 4		
	Date	pH	Conductivity (uS/cm)		Date	pH	Conductivity (uS/cm)
Cell 1	Not sampled			Cell 1	2021-11-30	7.5	8115
Cell 2	2021-09-27	6.8	15680	Cell 2	2021-11-30	6.5	16230
Cell 3A	2021-09-27	7.4	12220	Cell 3A	2021-11-30	7.3	12380
Cell 3B	2021-09-27	7.8	14870	Cell 3B	2021-11-30	7.9	16360
Cell 3C	2021-09-27	7.8	11210	Cell 3C	2021-11-15	7.9	11840
Cell 3D	2021-09-27	7.5	11970	Cell 3D	2021-11-15	7.1	12380
Cell 3E	2021-09-27	8.1	7604	Cell 3E	2021-11-15	8.0	7535

APPENDIX F

Leak Detection Liquid Analysis

Quarter 1



Clean Harbors Canada Inc.
ATTN: Todd Webb
PO BOX 390
RYLEY AB TOB 4A0

Date Received: 02-MAR-21
Report Date: 09-MAR-21 16:55 (MT)
Version: FINAL

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2562630
Project P.O. #: 215320RY
Job Reference: SECONDARY LEACHATE QTR 1
C of C Numbers:
Legal Site Desc:

Kieran Tordoff
Account Manager

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ADDRESS: 9450 17 Avenue NW, Edmonton, AB T6N 1M9 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562630-1 SECONDARY LEACHATE CELL 2 (SC2)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Toluene	0.00221	RRV	0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
EthylBenzene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
m+p-Xylene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
o-Xylene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Styrene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
F1(C6-C10)	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
F1-BTEX	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
Xylenes	<0.00071		0.00071	mg/L	04-MAR-21	08-MAR-21	R5362917
Surrogate: 1,4-Difluorobenzene (SS)	97.6		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 4-Bromofluorobenzene (SS)	92.0		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 3,4-Dichlorotoluene (SS)	99.6		70-130	%	04-MAR-21	08-MAR-21	R5362917
F2 (>C10-C16)							
F2 (C10-C16)	0.15		0.10	mg/L	03-MAR-21	03-MAR-21	R5396738
Surrogate: 2-Bromobenzotrifluoride	97.4		60-140	%	03-MAR-21	03-MAR-21	R5396738
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0858		0.0010	mg/L		07-MAR-21	R5397688
Miscellaneous Parameters							
Ammonia, Total (as N)	18.5	DLHC	0.50	mg/L		07-MAR-21	R5397710
Chemical Oxygen Demand	298		10	mg/L		03-MAR-21	R5395494
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-MAR-21	R5396539
Dissolved Organic Carbon	142	DLHC	10	mg/L		08-MAR-21	R5398692
Phenols (4AAP)	0.0064		0.0010	mg/L		03-MAR-21	R5397134
Total Kjeldahl Nitrogen	25.5	DLHC	0.60	mg/L	03-MAR-21	05-MAR-21	R5396803
Phosphorus (P)-Total Dissolved	1.44	DLHC	0.10	mg/L		08-MAR-21	R5398171
Total Dissolved Solids	13300	DLHC	80	mg/L		07-MAR-21	R5398192
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		03-MAR-21	R5396156
Phosphorus (P)-Total	2.78	DLHC	0.10	mg/L	04-MAR-21	04-MAR-21	R5396741
Total Suspended Solids	58.6		3.0	mg/L		05-MAR-21	R5397093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	239	DLDS	2.5	mg/L		02-MAR-21	R5397105
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					06-MAR-21	R5397553
Dissolved Metals Filtration Location	FIELD					02-MAR-21	R5395625
Dissolved Metals Filtration Location	FIELD					07-MAR-21	R5397653
Aluminum (Al)-Dissolved	0.433		0.010	mg/L		04-MAR-21	R5396704
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Arsenic (As)-Dissolved	0.0038		0.0010	mg/L		04-MAR-21	R5396704
Barium (Ba)-Dissolved	0.0176		0.0010	mg/L		04-MAR-21	R5396704
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Boron (B)-Dissolved	0.72		0.10	mg/L		04-MAR-21	R5396704
Cadmium (Cd)-Dissolved	0.000060		0.000050	mg/L		04-MAR-21	R5396704
Calcium (Ca)-Dissolved	395		0.50	mg/L		04-MAR-21	R5396704
Cesium (Cs)-Dissolved	0.00075		0.00010	mg/L		04-MAR-21	R5396704
Chromium (Cr)-Dissolved	0.0077		0.0010	mg/L		07-MAR-21	R5397688
Cobalt (Co)-Dissolved	0.0077		0.0010	mg/L		04-MAR-21	R5396704
Copper (Cu)-Dissolved	0.0029		0.0020	mg/L		04-MAR-21	R5396704

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562630-1 SECONDARY LEACHATE CELL 2 (SC2)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Iron (Fe)-Dissolved	8.30		0.10	mg/L		04-MAR-21	R5396704
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Lithium (Li)-Dissolved	0.583		0.010	mg/L		04-MAR-21	R5396704
Magnesium (Mg)-Dissolved	272		0.10	mg/L		04-MAR-21	R5396704
Manganese (Mn)-Dissolved	11.6		0.0010	mg/L		04-MAR-21	R5396704
Molybdenum (Mo)-Dissolved	0.263		0.00050	mg/L		04-MAR-21	R5396704
Nickel (Ni)-Dissolved	0.0420		0.0050	mg/L		04-MAR-21	R5396704
Phosphorus (P)-Dissolved	3.59		0.50	mg/L		04-MAR-21	R5396704
Potassium (K)-Dissolved	42.2		0.50	mg/L		04-MAR-21	R5396704
Rubidium (Rb)-Dissolved	0.0385		0.0020	mg/L		04-MAR-21	R5396704
Selenium (Se)-Dissolved	0.00103		0.00050	mg/L		04-MAR-21	R5396704
Silicon (Si)-Dissolved	15.8		0.50	mg/L		04-MAR-21	R5396704
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Sodium (Na)-Dissolved	3400		1.0	mg/L		04-MAR-21	R5396704
Strontium (Sr)-Dissolved	6.70		0.0020	mg/L		04-MAR-21	R5396704
Sulfur (S)-Dissolved	3410		5.0	mg/L		04-MAR-21	R5396704
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		04-MAR-21	R5396704
Tungsten (W)-Dissolved	0.298		0.0010	mg/L		04-MAR-21	R5396704
Uranium (U)-Dissolved	0.00940		0.00010	mg/L		04-MAR-21	R5396704
Vanadium (V)-Dissolved	0.0102		0.0050	mg/L		04-MAR-21	R5396704
Zinc (Zn)-Dissolved	0.082		0.010	mg/L		04-MAR-21	R5396704
Zirconium (Zr)-Dissolved	0.0027		0.0020	mg/L		04-MAR-21	R5396704
Fluoride in Water by IC							
Fluoride (F)	3.34	DLDS	0.10	mg/L		02-MAR-21	R5397105
Ion Balance Calculation							
Ion Balance	84.4	BL:INT		%		08-MAR-21	
TDS (Calculated)	14800			mg/L		08-MAR-21	
Hardness (as CaCO3)	2110			mg/L		08-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		02-MAR-21	R5397105
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.11		0.11	mg/L		06-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		02-MAR-21	R5397105
Sulfate in Water by IC							
Sulfate (SO4)	10200	DLDS	30	mg/L		02-MAR-21	R5397105
pH, Conductivity and Total Alkalinity							
pH	7.26		0.10	pH		03-MAR-21	R5396436
Conductivity (EC)	12700		2.0	uS/cm		03-MAR-21	R5396436
Bicarbonate (HCO3)	528		5.0	mg/L		03-MAR-21	R5396436
Carbonate (CO3)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Hydroxide (OH)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Alkalinity, Total (as CaCO3)	433		2.0	mg/L		03-MAR-21	R5396436
L2562630-2 SECONDARY LEACHATE CELL 3A (SC3A)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene & F1-F2							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562630-2 SECONDARY LEACHATE CELL 3A (SC3A)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.00136	RRV	0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Toluene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
EthylBenzene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
m+p-Xylene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
o-Xylene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Styrene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
F1(C6-C10)	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
F1-BTEX	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
Xylenes	<0.00071		0.00071	mg/L	04-MAR-21	08-MAR-21	R5362917
Surrogate: 1,4-Difluorobenzene (SS)	99.2		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 4-Bromofluorobenzene (SS)	85.2		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 3,4-Dichlorotoluene (SS)	103.9		70-130	%	04-MAR-21	08-MAR-21	R5362917
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	03-MAR-21	03-MAR-21	R5396738
Surrogate: 2-Bromobenzotrifluoride	96.2		60-140	%	03-MAR-21	03-MAR-21	R5396738
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0206		0.0010	mg/L		03-MAR-21	R5396047
Miscellaneous Parameters							
Ammonia, Total (as N)	6.3	DLHC	1.0	mg/L		07-MAR-21	R5397710
Chemical Oxygen Demand	268		10	mg/L		03-MAR-21	R5395494
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-MAR-21	R5396539
Dissolved Organic Carbon	91	DLM	10	mg/L		08-MAR-21	R5398692
Phenols (4AAP)	0.0013		0.0010	mg/L		03-MAR-21	R5397134
Total Kjeldahl Nitrogen	14.2		0.20	mg/L	03-MAR-21	04-MAR-21	R5396803
Phosphorus (P)-Total Dissolved	0.0223		0.0050	mg/L		08-MAR-21	R5398171
Total Dissolved Solids	12900	DLHC	80	mg/L		07-MAR-21	R5398192
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		03-MAR-21	R5396156
Phosphorus (P)-Total	0.164		0.020	mg/L	04-MAR-21	04-MAR-21	R5396741
Total Suspended Solids	81.0		3.0	mg/L		05-MAR-21	R5397093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	221	DLDS	2.5	mg/L		02-MAR-21	R5397105
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-MAR-21	R5395625
Aluminum (Al)-Dissolved	0.018		0.010	mg/L		04-MAR-21	R5396704
Antimony (Sb)-Dissolved	<0.0010		0.0010	mg/L		04-MAR-21	R5396704
Arsenic (As)-Dissolved	0.0046		0.0010	mg/L		04-MAR-21	R5396704
Barium (Ba)-Dissolved	0.0685		0.0010	mg/L		04-MAR-21	R5396704
Beryllium (Be)-Dissolved	<0.0010		0.0010	mg/L		04-MAR-21	R5396704
Bismuth (Bi)-Dissolved	<0.00050		0.00050	mg/L		04-MAR-21	R5396704
Boron (B)-Dissolved	0.20		0.10	mg/L		04-MAR-21	R5396704
Cadmium (Cd)-Dissolved	0.000058		0.000050	mg/L		04-MAR-21	R5396704
Calcium (Ca)-Dissolved	400		0.50	mg/L		04-MAR-21	R5396704
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L		04-MAR-21	R5396704
Chromium (Cr)-Dissolved	0.0029		0.0010	mg/L		04-MAR-21	R5396704
Cobalt (Co)-Dissolved	0.0089		0.0010	mg/L		04-MAR-21	R5396704
Copper (Cu)-Dissolved	<0.0020		0.0020	mg/L		04-MAR-21	R5396704
Iron (Fe)-Dissolved	5.30		0.10	mg/L		04-MAR-21	R5396704
Lead (Pb)-Dissolved	<0.00050		0.00050	mg/L		04-MAR-21	R5396704
Lithium (Li)-Dissolved	0.440		0.010	mg/L		04-MAR-21	R5396704

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562630-2 SECONDARY LEACHATE CELL 3A (SC3A) Sampled By: CLIENT on 01-MAR-21 Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Magnesium (Mg)-Dissolved	297		0.10	mg/L		04-MAR-21	R5396704
Manganese (Mn)-Dissolved	5.51		0.0010	mg/L		04-MAR-21	R5396704
Molybdenum (Mo)-Dissolved	0.268		0.00050	mg/L		04-MAR-21	R5396704
Nickel (Ni)-Dissolved	0.0970		0.0050	mg/L		04-MAR-21	R5396704
Phosphorus (P)-Dissolved	<0.50		0.50	mg/L		04-MAR-21	R5396704
Potassium (K)-Dissolved	21.2		0.50	mg/L		04-MAR-21	R5396704
Rubidium (Rb)-Dissolved	0.0244		0.0020	mg/L		04-MAR-21	R5396704
Selenium (Se)-Dissolved	0.00080		0.00050	mg/L		04-MAR-21	R5396704
Silicon (Si)-Dissolved	7.40		0.50	mg/L		04-MAR-21	R5396704
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L		04-MAR-21	R5396704
Sodium (Na)-Dissolved	3170		1.0	mg/L		04-MAR-21	R5396704
Strontium (Sr)-Dissolved	5.38		0.0020	mg/L		04-MAR-21	R5396704
Sulfur (S)-Dissolved	3050		5.0	mg/L		04-MAR-21	R5396704
Tellurium (Te)-Dissolved	<0.0020		0.0020	mg/L		04-MAR-21	R5396704
Thallium (Tl)-Dissolved	<0.00010		0.00010	mg/L		04-MAR-21	R5396704
Thorium (Th)-Dissolved	<0.0010		0.0010	mg/L		04-MAR-21	R5396704
Tin (Sn)-Dissolved	0.0027		0.0010	mg/L		04-MAR-21	R5396704
Titanium (Ti)-Dissolved	<0.0030		0.0030	mg/L		04-MAR-21	R5396704
Tungsten (W)-Dissolved	0.0173		0.0010	mg/L		04-MAR-21	R5396704
Uranium (U)-Dissolved	0.0418		0.00010	mg/L		04-MAR-21	R5396704
Vanadium (V)-Dissolved	<0.0050		0.0050	mg/L		04-MAR-21	R5396704
Zinc (Zn)-Dissolved	0.061		0.010	mg/L		04-MAR-21	R5396704
Zirconium (Zr)-Dissolved	0.0062		0.0020	mg/L		04-MAR-21	R5396704
Fluoride in Water by IC							
Fluoride (F)	0.96	DLDS	0.10	mg/L		02-MAR-21	R5397105
Ion Balance Calculation							
Ion Balance	86.2	BL:INT		%		07-MAR-21	
TDS (Calculated)	13700			mg/L		07-MAR-21	
Hardness (as CaCO3)	2220			mg/L		07-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		02-MAR-21	R5397105
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.11		0.11	mg/L		06-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		02-MAR-21	R5397105
Sulfate in Water by IC							
Sulfate (SO4)	9010	DLDS	30	mg/L		02-MAR-21	R5397105
pH, Conductivity and Total Alkalinity							
pH	7.72		0.10	pH		03-MAR-21	R5396436
Conductivity (EC)	12100		2.0	uS/cm		03-MAR-21	R5396436
Bicarbonate (HCO3)	1150		5.0	mg/L		03-MAR-21	R5396436
Carbonate (CO3)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Hydroxide (OH)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Alkalinity, Total (as CaCO3)	944		2.0	mg/L		03-MAR-21	R5396436
L2562630-3 SECONDARY LEACHATE CELL 3C (SC3C) Sampled By: CLIENT on 01-MAR-21 Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Toluene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562630-3 SECONDARY LEACHATE CELL 3C (SC3C)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
EthylBenzene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
m+p-Xylene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
o-Xylene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Styrene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
F1(C6-C10)	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
F1-BTEX	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
Xylenes	<0.00071		0.00071	mg/L	04-MAR-21	08-MAR-21	R5362917
Surrogate: 1,4-Difluorobenzene (SS)	98.9		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 4-Bromofluorobenzene (SS)	93.0		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 3,4-Dichlorotoluene (SS)	106.2		70-130	%	04-MAR-21	08-MAR-21	R5362917
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	03-MAR-21	03-MAR-21	R5396738
Surrogate: 2-Bromobenzotrifluoride	95.6		60-140	%	03-MAR-21	03-MAR-21	R5396738
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0025		0.0010	mg/L		03-MAR-21	R5396047
Miscellaneous Parameters							
Ammonia, Total (as N)	5.6	DLHC	1.0	mg/L		07-MAR-21	R5397710
Chemical Oxygen Demand	262		10	mg/L		03-MAR-21	R5395494
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-MAR-21	R5396539
Dissolved Organic Carbon	92	DLM	10	mg/L		08-MAR-21	R5398692
Phenols (4AAP)	<0.0010		0.0010	mg/L		03-MAR-21	R5397134
Total Kjeldahl Nitrogen	11.7		0.20	mg/L	03-MAR-21	04-MAR-21	R5396803
Phosphorus (P)-Total Dissolved	0.0342		0.0050	mg/L		08-MAR-21	R5398171
Total Dissolved Solids	8900	DLHC	80	mg/L		07-MAR-21	R5398192
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		03-MAR-21	R5396156
Phosphorus (P)-Total	0.058		0.020	mg/L	04-MAR-21	04-MAR-21	R5396741
Total Suspended Solids	10.0		3.0	mg/L		05-MAR-21	R5397093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	232	DLDS	2.5	mg/L		02-MAR-21	R5397105
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-MAR-21	R5395625
Aluminum (Al)-Dissolved	0.011		0.010	mg/L		04-MAR-21	R5396704
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Arsenic (As)-Dissolved	0.0022		0.0010	mg/L		04-MAR-21	R5396704
Barium (Ba)-Dissolved	0.0386		0.0010	mg/L		04-MAR-21	R5396704
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Boron (B)-Dissolved	0.90		0.10	mg/L		04-MAR-21	R5396704
Cadmium (Cd)-Dissolved	<0.000050	DLDS	0.000050	mg/L		04-MAR-21	R5396704
Calcium (Ca)-Dissolved	311		0.50	mg/L		04-MAR-21	R5396704
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Chromium (Cr)-Dissolved	0.0012		0.0010	mg/L		04-MAR-21	R5396704
Cobalt (Co)-Dissolved	0.0024		0.0010	mg/L		04-MAR-21	R5396704
Copper (Cu)-Dissolved	0.0047		0.0020	mg/L		04-MAR-21	R5396704
Iron (Fe)-Dissolved	<0.10	DLDS	0.10	mg/L		04-MAR-21	R5396704
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Lithium (Li)-Dissolved	0.226		0.010	mg/L		04-MAR-21	R5396704
Magnesium (Mg)-Dissolved	234		0.10	mg/L		04-MAR-21	R5396704
Manganese (Mn)-Dissolved	1.23		0.0010	mg/L		04-MAR-21	R5396704

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562630-3 SECONDARY LEACHATE CELL 3C (SC3C) Sampled By: CLIENT on 01-MAR-21 Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Molybdenum (Mo)-Dissolved	0.0438		0.00050	mg/L		04-MAR-21	R5396704
Nickel (Ni)-Dissolved	0.0292		0.0050	mg/L		04-MAR-21	R5396704
Phosphorus (P)-Dissolved	<0.50	DLDS	0.50	mg/L		04-MAR-21	R5396704
Potassium (K)-Dissolved	19.6		0.50	mg/L		04-MAR-21	R5396704
Rubidium (Rb)-Dissolved	0.0060		0.0020	mg/L		04-MAR-21	R5396704
Selenium (Se)-Dissolved	0.00085		0.00050	mg/L		04-MAR-21	R5396704
Silicon (Si)-Dissolved	7.51		0.50	mg/L		04-MAR-21	R5396704
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Sodium (Na)-Dissolved	2190		1.0	mg/L		04-MAR-21	R5396704
Strontium (Sr)-Dissolved	2.96		0.0020	mg/L		04-MAR-21	R5396704
Sulfur (S)-Dissolved	1960		5.0	mg/L		04-MAR-21	R5396704
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		04-MAR-21	R5396704
Tungsten (W)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Uranium (U)-Dissolved	0.0298		0.00010	mg/L		04-MAR-21	R5396704
Vanadium (V)-Dissolved	0.269		0.0050	mg/L		04-MAR-21	R5396704
Zinc (Zn)-Dissolved	0.092		0.010	mg/L		04-MAR-21	R5396704
Zirconium (Zr)-Dissolved	0.0045		0.0020	mg/L		04-MAR-21	R5396704
Fluoride in Water by IC							
Fluoride (F)	0.67	DLDS	0.10	mg/L		02-MAR-21	R5397105
Ion Balance Calculation							
Ion Balance	85.7	BL:INT		%		07-MAR-21	
TDS (Calculated)	9580			mg/L		07-MAR-21	
Hardness (as CaCO3)	1740			mg/L		07-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	2.07	DLDS	0.10	mg/L		02-MAR-21	R5397105
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.07		0.11	mg/L		06-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		02-MAR-21	R5397105
Sulfate in Water by IC							
Sulfate (SO4)	5870	DLDS	30	mg/L		02-MAR-21	R5397105
pH, Conductivity and Total Alkalinity							
pH	8.12		0.10	pH		03-MAR-21	R5396436
Conductivity (EC)	9190		2.0	uS/cm		03-MAR-21	R5396436
Bicarbonate (HCO3)	1460		5.0	mg/L		03-MAR-21	R5396436
Carbonate (CO3)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Hydroxide (OH)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Alkalinity, Total (as CaCO3)	1190		2.0	mg/L		03-MAR-21	R5396436
L2562630-4 SECONDARY LEACHATE CELL 3D (SC3D) Sampled By: CLIENT on 01-MAR-21 Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Toluene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
EthylBenzene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
m+p-Xylene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562630-4 SECONDARY LEACHATE CELL 3D (SC3D)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
o-Xylene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Styrene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
F1(C6-C10)	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
F1-BTEX	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
Xylenes	<0.00071		0.00071	mg/L	04-MAR-21	08-MAR-21	R5362917
Surrogate: 1,4-Difluorobenzene (SS)	97.5		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 4-Bromofluorobenzene (SS)	88.8		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 3,4-Dichlorotoluene (SS)	111.2		70-130	%	04-MAR-21	08-MAR-21	R5362917
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	03-MAR-21	03-MAR-21	R5396738
Surrogate: 2-Bromobenzotrifluoride	95.3		60-140	%	03-MAR-21	03-MAR-21	R5396738
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0033		0.0010	mg/L		03-MAR-21	R5396047
Miscellaneous Parameters							
Ammonia, Total (as N)	2.37	RRV	0.50	mg/L		08-MAR-21	R5398121
Chemical Oxygen Demand	243		10	mg/L		03-MAR-21	R5395494
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-MAR-21	R5396539
Dissolved Organic Carbon	67.7		1.0	mg/L		07-MAR-21	R5398156
Phenols (4AAP)	0.0016		0.0010	mg/L		03-MAR-21	R5397134
Total Kjeldahl Nitrogen	<0.20	TKNI	0.20	mg/L	03-MAR-21	05-MAR-21	R5396803
Phosphorus (P)-Total Dissolved	0.512	DLHC	0.050	mg/L		08-MAR-21	R5398171
Total Dissolved Solids	8160	DLHC	80	mg/L		07-MAR-21	R5398192
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		03-MAR-21	R5396156
Phosphorus (P)-Total	0.551		0.020	mg/L	04-MAR-21	04-MAR-21	R5396741
Total Suspended Solids	<3.0		3.0	mg/L		05-MAR-21	R5397093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2300	DLDS	2.5	mg/L		02-MAR-21	R5397105
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-MAR-21	R5395625
Aluminum (Al)-Dissolved	0.043		0.010	mg/L		04-MAR-21	R5396704
Antimony (Sb)-Dissolved	0.0011		0.0010	mg/L		04-MAR-21	R5396704
Arsenic (As)-Dissolved	0.0138		0.0010	mg/L		04-MAR-21	R5396704
Barium (Ba)-Dissolved	0.140		0.0010	mg/L		04-MAR-21	R5396704
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Boron (B)-Dissolved	8.25		0.10	mg/L		04-MAR-21	R5396704
Cadmium (Cd)-Dissolved	0.00124		0.00050	mg/L		04-MAR-21	R5396704
Calcium (Ca)-Dissolved	511		0.50	mg/L		04-MAR-21	R5396704
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Chromium (Cr)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Cobalt (Co)-Dissolved	0.0101		0.0010	mg/L		04-MAR-21	R5396704
Copper (Cu)-Dissolved	0.0198		0.0020	mg/L		04-MAR-21	R5396704
Iron (Fe)-Dissolved	0.18		0.10	mg/L		04-MAR-21	R5396704
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Lithium (Li)-Dissolved	0.629		0.010	mg/L		04-MAR-21	R5396704
Magnesium (Mg)-Dissolved	342		0.10	mg/L		04-MAR-21	R5396704
Manganese (Mn)-Dissolved	2.87		0.0010	mg/L		04-MAR-21	R5396704
Molybdenum (Mo)-Dissolved	4.16		0.00050	mg/L		04-MAR-21	R5396704
Nickel (Ni)-Dissolved	0.954		0.0050	mg/L		04-MAR-21	R5396704

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562630-4 SECONDARY LEACHATE CELL 3D (SC3D) Sampled By: CLIENT on 01-MAR-21 Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Phosphorus (P)-Dissolved	0.57		0.50	mg/L		04-MAR-21	R5396704
Potassium (K)-Dissolved	174		0.50	mg/L		04-MAR-21	R5396704
Rubidium (Rb)-Dissolved	0.0420		0.0020	mg/L		04-MAR-21	R5396704
Selenium (Se)-Dissolved	0.00540		0.00050	mg/L		04-MAR-21	R5396704
Silicon (Si)-Dissolved	10.4		0.50	mg/L		04-MAR-21	R5396704
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Sodium (Na)-Dissolved	1430		1.0	mg/L		04-MAR-21	R5396704
Strontium (Sr)-Dissolved	2.72		0.0020	mg/L		04-MAR-21	R5396704
Sulfur (S)-Dissolved	639		5.0	mg/L		04-MAR-21	R5396704
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Titanium (Ti)-Dissolved	0.0043		0.0030	mg/L		04-MAR-21	R5396704
Tungsten (W)-Dissolved	0.0027		0.0010	mg/L		04-MAR-21	R5396704
Uranium (U)-Dissolved	0.00784		0.00010	mg/L		04-MAR-21	R5396704
Vanadium (V)-Dissolved	30.7		0.0050	mg/L		04-MAR-21	R5396704
Zinc (Zn)-Dissolved	0.113		0.010	mg/L		04-MAR-21	R5396704
Zirconium (Zr)-Dissolved	0.0033		0.0020	mg/L		04-MAR-21	R5396704
Fluoride in Water by IC							
Fluoride (F)	1.84	DLDS	0.10	mg/L		02-MAR-21	R5397105
Ion Balance Calculation							
Ion Balance	91.0			%		08-MAR-21	
TDS (Calculated)	8250			mg/L		08-MAR-21	
Hardness (as CaCO3)	2680			mg/L		08-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	353	DLDS	0.10	mg/L		02-MAR-21	R5397105
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	353		0.11	mg/L		05-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	0.178	DLDS	0.050	mg/L		02-MAR-21	R5397105
Sulfate in Water by IC							
Sulfate (SO4)	1750	DLDS	30	mg/L		02-MAR-21	R5397105
pH, Conductivity and Total Alkalinity							
pH	7.84		0.10	pH		03-MAR-21	R5396436
Conductivity (EC)	10200		2.0	uS/cm		03-MAR-21	R5396436
Bicarbonate (HCO3)	355		5.0	mg/L		03-MAR-21	R5396436
Carbonate (CO3)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Hydroxide (OH)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Alkalinity, Total (as CaCO3)	291		2.0	mg/L		03-MAR-21	R5396436
L2562630-5 SECONDARY LEACHATE CELL 3E (SC3E) Sampled By: CLIENT on 01-MAR-21 Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.00177	RRV	0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Toluene	0.00111	RRV	0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
EthylBenzene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
m+p-Xylene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
o-Xylene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Styrene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562630-5 SECONDARY LEACHATE CELL 3E (SC3E)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
F1(C6-C10)	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
F1-BTEX	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
Xylenes	<0.00071		0.00071	mg/L	04-MAR-21	08-MAR-21	R5362917
Surrogate: 1,4-Difluorobenzene (SS)	96.2		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 4-Bromofluorobenzene (SS)	89.8		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 3,4-Dichlorotoluene (SS)	105.1		70-130	%	04-MAR-21	08-MAR-21	R5362917
F2 (>C10-C16)							
F2 (C10-C16)	0.26		0.10	mg/L	03-MAR-21	03-MAR-21	R5396738
Surrogate: 2-Bromobenzotrifluoride	97.8		60-140	%	03-MAR-21	03-MAR-21	R5396738
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0133		0.0010	mg/L		03-MAR-21	R5396047
Miscellaneous Parameters							
Ammonia, Total (as N)	328	DLHC	50	mg/L		07-MAR-21	R5397710
Chemical Oxygen Demand	82		10	mg/L		03-MAR-21	R5395494
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-MAR-21	R5396539
Dissolved Organic Carbon	66.2		1.0	mg/L		07-MAR-21	R5398156
Phenols (4AAP)	0.0439		0.0010	mg/L		03-MAR-21	R5397134
Total Kjeldahl Nitrogen	376	DLHC	20	mg/L	03-MAR-21	04-MAR-21	R5396803
Phosphorus (P)-Total Dissolved	0.765	DLHC	0.050	mg/L		08-MAR-21	R5398171
Total Dissolved Solids	6700	DLHC	80	mg/L		07-MAR-21	R5398192
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		03-MAR-21	R5396156
Phosphorus (P)-Total	0.902		0.020	mg/L	04-MAR-21	04-MAR-21	R5396741
Total Suspended Solids	368	DLHC	6.0	mg/L		05-MAR-21	R5397093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	1810	DLDS	2.5	mg/L		02-MAR-21	R5397105
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-MAR-21	R5395625
Aluminum (Al)-Dissolved	0.127		0.010	mg/L		04-MAR-21	R5396704
Antimony (Sb)-Dissolved	0.0013		0.0010	mg/L		04-MAR-21	R5396704
Arsenic (As)-Dissolved	0.0123		0.0010	mg/L		04-MAR-21	R5396704
Barium (Ba)-Dissolved	0.164		0.0010	mg/L		04-MAR-21	R5396704
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Boron (B)-Dissolved	7.04		0.10	mg/L		04-MAR-21	R5396704
Cadmium (Cd)-Dissolved	0.00111		0.000050	mg/L		04-MAR-21	R5396704
Calcium (Ca)-Dissolved	79.3		0.50	mg/L		04-MAR-21	R5396704
Cesium (Cs)-Dissolved	0.00134		0.00010	mg/L		04-MAR-21	R5396704
Chromium (Cr)-Dissolved	0.0019		0.0010	mg/L		04-MAR-21	R5396704
Cobalt (Co)-Dissolved	0.0065		0.0010	mg/L		04-MAR-21	R5396704
Copper (Cu)-Dissolved	0.0321		0.0020	mg/L		04-MAR-21	R5396704
Iron (Fe)-Dissolved	0.42		0.10	mg/L		04-MAR-21	R5396704
Lead (Pb)-Dissolved	0.00059		0.00050	mg/L		04-MAR-21	R5396704
Lithium (Li)-Dissolved	0.732		0.010	mg/L		04-MAR-21	R5396704
Magnesium (Mg)-Dissolved	227		0.10	mg/L		04-MAR-21	R5396704
Manganese (Mn)-Dissolved	0.389		0.0010	mg/L		04-MAR-21	R5396704
Molybdenum (Mo)-Dissolved	4.13		0.00050	mg/L		04-MAR-21	R5396704
Nickel (Ni)-Dissolved	0.455		0.0050	mg/L		04-MAR-21	R5396704
Phosphorus (P)-Dissolved	0.97		0.50	mg/L		04-MAR-21	R5396704
Potassium (K)-Dissolved	274		0.50	mg/L		04-MAR-21	R5396704

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562630-5 SECONDARY LEACHATE CELL 3E (SC3E) Sampled By: CLIENT on 01-MAR-21 Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Rubidium (Rb)-Dissolved	0.184		0.0020	mg/L		04-MAR-21	R5396704
Selenium (Se)-Dissolved	0.00158		0.00050	mg/L		04-MAR-21	R5396704
Silicon (Si)-Dissolved	8.24		0.50	mg/L		04-MAR-21	R5396704
Silver (Ag)-Dissolved	0.00026		0.00010	mg/L		04-MAR-21	R5396704
Sodium (Na)-Dissolved	1790		1.0	mg/L		04-MAR-21	R5396704
Strontium (Sr)-Dissolved	2.01		0.0020	mg/L		04-MAR-21	R5396704
Sulfur (S)-Dissolved	513		5.0	mg/L		04-MAR-21	R5396704
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Titanium (Ti)-Dissolved	0.0107		0.0030	mg/L		04-MAR-21	R5396704
Tungsten (W)-Dissolved	0.0237		0.0010	mg/L		04-MAR-21	R5396704
Uranium (U)-Dissolved	0.0242		0.00010	mg/L		04-MAR-21	R5396704
Vanadium (V)-Dissolved	4.59		0.0050	mg/L		04-MAR-21	R5396704
Zinc (Zn)-Dissolved	0.047		0.010	mg/L		04-MAR-21	R5396704
Zirconium (Zr)-Dissolved	0.140		0.0020	mg/L		04-MAR-21	R5396704
Fluoride in Water by IC							
Fluoride (F)	4.21	DLDS	0.10	mg/L		02-MAR-21	R5397105
Ion Balance Calculation							
Ion Balance	88.6	BL:INT		%		07-MAR-21	
TDS (Calculated)	7650			mg/L		07-MAR-21	
Hardness (as CaCO3)	1130			mg/L		07-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	4.00	DLDS	0.10	mg/L		02-MAR-21	R5397105
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	5.34		0.11	mg/L		06-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	1.35	DLDS	0.050	mg/L		02-MAR-21	R5397105
Sulfate in Water by IC							
Sulfate (SO4)	1490	DLDS	30	mg/L		02-MAR-21	R5397105
pH, Conductivity and Total Alkalinity							
pH	8.20		0.10	pH		03-MAR-21	R5396436
Conductivity (EC)	11000		2.0	uS/cm		03-MAR-21	R5396436
Bicarbonate (HCO3)	3970		5.0	mg/L		03-MAR-21	R5396436
Carbonate (CO3)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Hydroxide (OH)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Alkalinity, Total (as CaCO3)	3250		2.0	mg/L		03-MAR-21	R5396436
L2562630-6 SECONDARY LEACHATE CELL 4 (SC4) Sampled By: CLIENT on 01-MAR-21 Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Toluene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
EthylBenzene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
m+p-Xylene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
o-Xylene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
Styrene	<0.00050		0.00050	mg/L	04-MAR-21	08-MAR-21	R5362917
F1(C6-C10)	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917
F1-BTEX	<0.10		0.10	mg/L	04-MAR-21	08-MAR-21	R5362917

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562630-6 SECONDARY LEACHATE CELL 4 (SC4)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
Xylenes	<0.00071		0.00071	mg/L	04-MAR-21	08-MAR-21	R5362917
Surrogate: 1,4-Difluorobenzene (SS)	99.2		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 4-Bromofluorobenzene (SS)	93.0		70-130	%	04-MAR-21	08-MAR-21	R5362917
Surrogate: 3,4-Dichlorotoluene (SS)	106.8		70-130	%	04-MAR-21	08-MAR-21	R5362917
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	03-MAR-21	03-MAR-21	R5396738
Surrogate: 2-Bromobenzotrifluoride	97.1		60-140	%	03-MAR-21	03-MAR-21	R5396738
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0230		0.0010	mg/L		03-MAR-21	R5396047
Miscellaneous Parameters							
Ammonia, Total (as N)	1.03	DLHC	0.50	mg/L		07-MAR-21	R5397710
Chemical Oxygen Demand	219		10	mg/L		03-MAR-21	R5395494
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-MAR-21	R5396539
Dissolved Organic Carbon	74.4		1.0	mg/L		07-MAR-21	R5398156
Phenols (4AAP)	0.0018		0.0010	mg/L		03-MAR-21	R5397134
Total Kjeldahl Nitrogen	4.93		0.20	mg/L	03-MAR-21	04-MAR-21	R5396803
Phosphorus (P)-Total Dissolved	0.308	DLHC	0.050	mg/L		08-MAR-21	R5398171
Total Dissolved Solids	7800	DLHC	80	mg/L		07-MAR-21	R5398192
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		03-MAR-21	R5396156
Phosphorus (P)-Total	0.335		0.020	mg/L	04-MAR-21	04-MAR-21	R5396741
Total Suspended Solids	19.0		3.0	mg/L		05-MAR-21	R5397093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	1370	DLDS	2.5	mg/L		02-MAR-21	R5397105
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-MAR-21	R5395625
Aluminum (Al)-Dissolved	0.082		0.010	mg/L		04-MAR-21	R5396704
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Arsenic (As)-Dissolved	0.0018		0.0010	mg/L		04-MAR-21	R5396704
Barium (Ba)-Dissolved	0.0607		0.0010	mg/L		04-MAR-21	R5396704
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Boron (B)-Dissolved	1.69		0.10	mg/L		04-MAR-21	R5396704
Cadmium (Cd)-Dissolved	0.000459		0.000050	mg/L		04-MAR-21	R5396704
Calcium (Ca)-Dissolved	453		0.50	mg/L		04-MAR-21	R5396704
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Chromium (Cr)-Dissolved	0.0012		0.0010	mg/L		04-MAR-21	R5396704
Cobalt (Co)-Dissolved	0.0041		0.0010	mg/L		04-MAR-21	R5396704
Copper (Cu)-Dissolved	0.0127		0.0020	mg/L		04-MAR-21	R5396704
Iron (Fe)-Dissolved	0.17		0.10	mg/L		04-MAR-21	R5396704
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		04-MAR-21	R5396704
Lithium (Li)-Dissolved	0.277		0.010	mg/L		04-MAR-21	R5396704
Magnesium (Mg)-Dissolved	243		0.10	mg/L		04-MAR-21	R5396704
Manganese (Mn)-Dissolved	2.21		0.0010	mg/L		04-MAR-21	R5396704
Molybdenum (Mo)-Dissolved	1.42		0.00050	mg/L		04-MAR-21	R5396704
Nickel (Ni)-Dissolved	0.0585		0.0050	mg/L		04-MAR-21	R5396704
Phosphorus (P)-Dissolved	<0.50	DLDS	0.50	mg/L		04-MAR-21	R5396704
Potassium (K)-Dissolved	20.3		0.50	mg/L		04-MAR-21	R5396704
Rubidium (Rb)-Dissolved	0.0033		0.0020	mg/L		04-MAR-21	R5396704
Selenium (Se)-Dissolved	0.00164		0.00050	mg/L		04-MAR-21	R5396704

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2562630-6 SECONDARY LEACHATE CELL 4 (SC4)							
Sampled By: CLIENT on 01-MAR-21							
Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Silicon (Si)-Dissolved	7.11		0.50	mg/L		04-MAR-21	R5396704
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Sodium (Na)-Dissolved	2210		1.0	mg/L		04-MAR-21	R5396704
Strontium (Sr)-Dissolved	4.39		0.0020	mg/L		04-MAR-21	R5396704
Sulfur (S)-Dissolved	1850		5.0	mg/L		04-MAR-21	R5396704
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		04-MAR-21	R5396704
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		04-MAR-21	R5396704
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		04-MAR-21	R5396704
Tungsten (W)-Dissolved	<0.0010	DLDS	0.0010	mg/L		04-MAR-21	R5396704
Uranium (U)-Dissolved	0.100		0.00010	mg/L		04-MAR-21	R5396704
Vanadium (V)-Dissolved	0.0177		0.0050	mg/L		04-MAR-21	R5396704
Zinc (Zn)-Dissolved	0.048		0.010	mg/L		04-MAR-21	R5396704
Zirconium (Zr)-Dissolved	0.0029		0.0020	mg/L		04-MAR-21	R5396704
Fluoride in Water by IC							
Fluoride (F)	0.83	DLDS	0.10	mg/L		02-MAR-21	R5397105
Ion Balance Calculation							
Ion Balance	82.3	BL:INT		%		07-MAR-21	
TDS (Calculated)	10300			mg/L		07-MAR-21	
Hardness (as CaCO3)	2130			mg/L		07-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	1.81	DLDS	0.10	mg/L		02-MAR-21	R5397105
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.05		0.11	mg/L		06-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	0.241	DLDS	0.050	mg/L		02-MAR-21	R5397105
Sulfate in Water by IC							
Sulfate (SO4)	5670	DLDS	30	mg/L		02-MAR-21	R5397105
pH, Conductivity and Total Alkalinity							
pH	7.87		0.10	pH		03-MAR-21	R5396436
Conductivity (EC)	10800		2.0	uS/cm		03-MAR-21	R5396436
Bicarbonate (HCO3)	758		5.0	mg/L		03-MAR-21	R5396436
Carbonate (CO3)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Hydroxide (OH)	<5.0		5.0	mg/L		03-MAR-21	R5396436
Alkalinity, Total (as CaCO3)	621		2.0	mg/L		03-MAR-21	R5396436

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
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).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method.			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-T-COL-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
CR6-D-IC-ED	Water	Chromium, Dissolved Hexavalent (Cr +6)	APHA 3500-Cr C (Ion Chromatography)
This analysis is carried out using procedures adapted from method 3500-Cr C in "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from Method 1636 published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.			
Results are based on a field-filtered, field-preserved sample.			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.			
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
P-TD-COL-CL	Water	Total Dissolved P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H ₂ SO ₄ is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-ED	Water	Phenols (4AAP)	EPA 9066 AUTO-DISTILL-COLORIMETRIC
This automated method is based on the distillation of phenol and subsequent reaction of the distillate with an oxidizing agent (alkaline potassium ferricyanide), and 4-aminoantipyrine to form a red complex which is measured at 505 nm. The method will include ortho and meta-substituted phenols, and is collectively named 4AAP phenols.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C
A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-ED	Water	TKN (as N) by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



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Chain of Cust



Ci

L2562630-COFC

COC Number: 20 - 899438

Page of

Report To Contact and company name below will appear on the final report		Reports / Recipients			Turnaround Time (TAT) Requested			AFFIX ALS BARCODE LABEL HERE (ALS use only)												
Company: <u>Clean Harbors Canada</u>		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			<input checked="" type="checkbox"/> Routine [R] if received by 3pm M-F - no surcharges apply															
Contact: <u>Todd Webb Stan Yuha</u>		Merge QC/QCI Reports with COA <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A			<input type="checkbox"/> 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum															
Phone: <u>(780) 663-2513</u>		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked			<input type="checkbox"/> 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum															
Company address below will appear on the final report		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			<input type="checkbox"/> 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum															
Street:		Email 1 or Fax <u>webb.todd@cleanharbors.com</u>			<input type="checkbox"/> 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum															
City/Province:		Email 2 <u>yuha.stan@cleanharbors.com</u>			<input type="checkbox"/> Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests															
Postal Code:		Email 3			Date and Time Required for all ESP TATs:															
Invoice To		Invoice Recipients			For all tests with rush TATs requested, please contact your AM to confirm availability.															
Same as Report To <input type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Analysis Request															
Copy of Invoice with Report <input type="checkbox"/> YES <input type="checkbox"/> NO		Email 1 or Fax <u>Gooding.Robbi@cleanharbors.com</u>			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below															
Company: <u>Clean Harbors Canada</u>		Email 2			NUMBER OF CONTAINERS <u>Table 4.4A Leachate Leak Detection Monitoring</u>													SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
Contact: <u>Robbi Gooding</u>		Oil and Gas Required Fields (client use)																		
Project Information		AFE/Cost Center:																		
ALS Account # / Quote #:		PO#																		
Job #: <u>Secondary Leachate Qtr 1</u>		Major/Minor Code:																		
PO / AFE:		Routing Code:																		
LSD:		Requisitioner:																		
ALS Lab Work Order # (ALS use only): <u>L2562630</u>		Location:																		
ALS Contact:		Sampler:																		
Sample Identification and/or Coordinates (This description will appear on the report)		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type																
<u>Secondary Leachate Cell 2 (SC2)</u>		<u>01-Mar-21</u>																		
<u>Secondary Leachate Cell 3A (SC3A)</u>		<u>01-Mar-21</u>																		
<u>Secondary Leachate Cell 3C (SC3C)</u>		<u>01-Mar-21</u>																		
<u>Secondary Leachate Cell 3D (SC3D)</u>		<u>01-Mar-21</u>																		
<u>Secondary Leachate Cell 3E (SC3E)</u>		<u>01-Mar-21</u>																		
<u>Secondary Leachate Cell 4 (SC4)</u>		<u>01-Mar-21</u>																		
Drinking Water (DW) Samples¹ (client use)		Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)			SAMPLE RECEIPT DETAILS (ALS use only)															
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO		<u>Analyze as per Quote Q02438 Table 4.4A Package (attached)</u>			Cooling Method: <input type="checkbox"/> NONE <input type="checkbox"/> ICE <input type="checkbox"/> ICE PACKS <input type="checkbox"/> FROZEN <input type="checkbox"/> COOLING INITIATED															
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO					Submission Comments identified on Sample Receipt Notification: <input type="checkbox"/> YES <input type="checkbox"/> NO															
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)															
Released by: <u>Todd Webb</u>		Date: <u>March 1 - 2021</u>	Time: <u>16:00</u>	Received by: <u>[Signature]</u>	Date: <u>02.MAR.21</u>	Time: <u>12:05</u>														

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS 7207 (Rev. 1)

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.



Clean Harbors Canada Inc.
ATTN: Todd Webb/Stan Yuha
PO BOX 390
RYLEY AB TOB 4A0

Date Received: 17-MAR-21
Report Date: 25-MAR-21 16:30 (MT)
Version: FINAL

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2567551
Project P.O. #: 215320RY
Job Reference: SECONDARY LEACHATE QTR 1
C of C Numbers: 20-899440
Legal Site Desc:


Kieran Tordoff
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9450 17 Avenue NW, Edmonton, AB T6N 1M9 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2567551-1 SECONDARY LEACHATE CELL 3B (SC3B)							
Sampled By: CLIENT on 16-MAR-21 @ 10:00							
Matrix: Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.00065		0.00050	mg/L	19-MAR-21	22-MAR-21	R5399312
Toluene	0.00732		0.00050	mg/L	19-MAR-21	22-MAR-21	R5399312
EthylBenzene	<0.00050		0.00050	mg/L	19-MAR-21	22-MAR-21	R5399312
m+p-Xylene	<0.00050		0.00050	mg/L	19-MAR-21	22-MAR-21	R5399312
o-Xylene	<0.00050		0.00050	mg/L	19-MAR-21	22-MAR-21	R5399312
Styrene	<0.00050		0.00050	mg/L	19-MAR-21	22-MAR-21	R5399312
F1(C6-C10)	<0.10		0.10	mg/L	19-MAR-21	22-MAR-21	R5399312
F1-BTEX	<0.10		0.10	mg/L	19-MAR-21	22-MAR-21	R5399312
Xylenes	<0.00071		0.00071	mg/L	19-MAR-21	22-MAR-21	R5399312
Surrogate: 1,4-Difluorobenzene (SS)	100.0		70-130	%	19-MAR-21	22-MAR-21	R5399312
Surrogate: 4-Bromofluorobenzene (SS)	90.9		70-130	%	19-MAR-21	22-MAR-21	R5399312
Surrogate: 3,4-Dichlorotoluene (SS)	115.1		70-130	%	19-MAR-21	22-MAR-21	R5399312
F2 (>C10-C16)							
F2 (C10-C16)	0.28		0.10	mg/L	18-MAR-21	18-MAR-21	R5408197
Surrogate: 2-Bromobenzotrifluoride	100.7		60-140	%	18-MAR-21	18-MAR-21	R5408197
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0786		0.00050	mg/L		17-MAR-21	R5403115
Miscellaneous Parameters							
Ammonia, Total (as N)	230	DLHC	25	mg/L		18-MAR-21	R5403281
Chemical Oxygen Demand	1360	DLM	20	mg/L		22-MAR-21	R5407679
Hexavalent Chromium-Dissolved	0.00140		0.00050	mg/L		18-MAR-21	R5404237
Dissolved Organic Carbon	400	DLHC	10	mg/L		22-MAR-21	R5409956
Phenols (4AAP)	1110	DLHC	0.050	mg/L		18-MAR-21	R5402616
Total Kjeldahl Nitrogen	355	DLHC	20	mg/L	19-MAR-21	20-MAR-21	R5406516
Phosphorus (P)-Total Dissolved	5.46	DLHC	0.50	mg/L		22-MAR-21	R5407760
Total Dissolved Solids	14000		80	mg/L		24-MAR-21	R5414324
Mercury (Hg)-Total	<0.000050		0.000050	mg/L		19-MAR-21	R5404705
Phosphorus (P)-Total	8.26		0.20	mg/L	19-MAR-21	19-MAR-21	R5405059
Total Suspended Solids	35.0		3.0	mg/L		22-MAR-21	R5407977
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	1820	DLDS	10	mg/L		17-MAR-21	R5403225
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					18-MAR-21	R5403057
Aluminum (Al)-Dissolved	0.0117		0.0050	mg/L		17-MAR-21	R5403115
Antimony (Sb)-Dissolved	0.00173		0.00050	mg/L		17-MAR-21	R5403115
Arsenic (As)-Dissolved	0.0222		0.00050	mg/L		17-MAR-21	R5403115
Barium (Ba)-Dissolved	0.137		0.00050	mg/L		17-MAR-21	R5403115
Beryllium (Be)-Dissolved	<0.00050	DLDS	0.00050	mg/L		17-MAR-21	R5403115
Bismuth (Bi)-Dissolved	<0.00025	DLDS	0.00025	mg/L		17-MAR-21	R5403115
Boron (B)-Dissolved	26.7		0.050	mg/L		17-MAR-21	R5403115
Cadmium (Cd)-Dissolved	0.000805		0.000025	mg/L		17-MAR-21	R5403115
Calcium (Ca)-Dissolved	211		0.50	mg/L		17-MAR-21	R5403115
Cesium (Cs)-Dissolved	0.0141		0.000050	mg/L		17-MAR-21	R5403115
Chromium (Cr)-Dissolved	0.0693		0.00050	mg/L		17-MAR-21	R5403115
Cobalt (Co)-Dissolved	0.00440		0.00050	mg/L		17-MAR-21	R5403115
Copper (Cu)-Dissolved	0.0184		0.0010	mg/L		17-MAR-21	R5403115
Iron (Fe)-Dissolved	1.33		0.050	mg/L		17-MAR-21	R5403115
Lead (Pb)-Dissolved	0.00084		0.00025	mg/L		17-MAR-21	R5403115

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2567551-1 SECONDARY LEACHATE CELL 3B (SC3B)							
Sampled By: CLIENT on 16-MAR-21 @ 10:00							
Matrix: Water							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	1.71		0.0050	mg/L		17-MAR-21	R5403115
Magnesium (Mg)-Dissolved	274		0.10	mg/L		17-MAR-21	R5403115
Manganese (Mn)-Dissolved	0.822		0.00050	mg/L		17-MAR-21	R5403115
Molybdenum (Mo)-Dissolved	2.83		0.00025	mg/L		17-MAR-21	R5403115
Nickel (Ni)-Dissolved	0.199		0.0025	mg/L		17-MAR-21	R5403115
Phosphorus (P)-Dissolved	7.98		0.25	mg/L		17-MAR-21	R5403115
Potassium (K)-Dissolved	479		0.50	mg/L		17-MAR-21	R5403115
Rubidium (Rb)-Dissolved	0.728		0.0010	mg/L		17-MAR-21	R5403115
Selenium (Se)-Dissolved	0.00920		0.00025	mg/L		17-MAR-21	R5403115
Silicon (Si)-Dissolved	12.8		0.25	mg/L		17-MAR-21	R5403115
Silver (Ag)-Dissolved	0.000079		0.000050	mg/L		17-MAR-21	R5403115
Sodium (Na)-Dissolved	4050		1.0	mg/L		17-MAR-21	R5403115
Strontium (Sr)-Dissolved	3.55		0.0010	mg/L		17-MAR-21	R5403115
Sulfur (S)-Dissolved	2850		2.5	mg/L		17-MAR-21	R5403115
Tellurium (Te)-Dissolved	<0.0010	DLDS	0.0010	mg/L		17-MAR-21	R5403115
Thallium (Tl)-Dissolved	<0.000050	DLDS	0.000050	mg/L		17-MAR-21	R5403115
Thorium (Th)-Dissolved	<0.00050	DLDS	0.00050	mg/L		17-MAR-21	R5403115
Tin (Sn)-Dissolved	0.00382		0.00050	mg/L		17-MAR-21	R5403115
Titanium (Ti)-Dissolved	0.0250		0.0015	mg/L		17-MAR-21	R5403115
Tungsten (W)-Dissolved	1.71		0.00050	mg/L		17-MAR-21	R5403115
Uranium (U)-Dissolved	0.0226		0.000050	mg/L		17-MAR-21	R5403115
Vanadium (V)-Dissolved	0.0565		0.0025	mg/L		17-MAR-21	R5403115
Zinc (Zn)-Dissolved	0.0213		0.0050	mg/L		17-MAR-21	R5403115
Zirconium (Zr)-Dissolved	0.0182		0.0010	mg/L		17-MAR-21	R5403115
Fluoride in Water by IC							
Fluoride (F)	<0.40	DLDS	0.40	mg/L		17-MAR-21	R5403225
Ion Balance Calculation							
Ion Balance	93.9			%		23-MAR-21	
TDS (Calculated)	15600			mg/L		23-MAR-21	
Hardness (as CaCO3)	1660			mg/L		23-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		17-MAR-21	R5403225
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		19-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		17-MAR-21	R5403225
Sulfate in Water by IC							
Sulfate (SO4)	7080	DLDS	6.0	mg/L		17-MAR-21	R5403225
pH, Conductivity and Total Alkalinity							
pH	8.05		0.10	pH		22-MAR-21	R5409712
Conductivity (EC)	17000		2.0	uS/cm		22-MAR-21	R5409712
Bicarbonate (HCO3)	3330		5.0	mg/L		22-MAR-21	R5409712
Carbonate (CO3)	<5.0		5.0	mg/L		22-MAR-21	R5409712
Hydroxide (OH)	<5.0		5.0	mg/L		22-MAR-21	R5409712
Alkalinity, Total (as CaCO3)	2730		2.0	mg/L		22-MAR-21	R5409712

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
SPL	phenols - Sample was Preserved at the laboratory

Sample Parameter Qualifier Key:

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).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method.			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-T-COL-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
CR6-D-IC-ED	Water	Chromium, Dissolved Hexavalent (Cr +6)	APHA 3500-Cr C (Ion Chromatography)
This analysis is carried out using procedures adapted from method 3500-Cr C in "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from Method 1636 published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Results are based on a field-filtered, field-preserved sample.			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.			
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
P-TD-COL-CL	Water	Total Dissolved P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H2SO4 is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-ED	Water	Phenols (4AAP)	EPA 9066 AUTO-DISTILL-COLORIMETRIC
This automated method is based on the distillation of phenol and subsequent reaction of the distillate with an oxidizing agent (alkaline potassium ferricyanide), and 4-aminoantipyrine to form a red complex which is measured at 505 nm. The method will include ortho and meta-substituted phenols, and is collectively named 4AAP phenols.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C
A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-ED	Water	TKN (as N) by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

20-899440

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

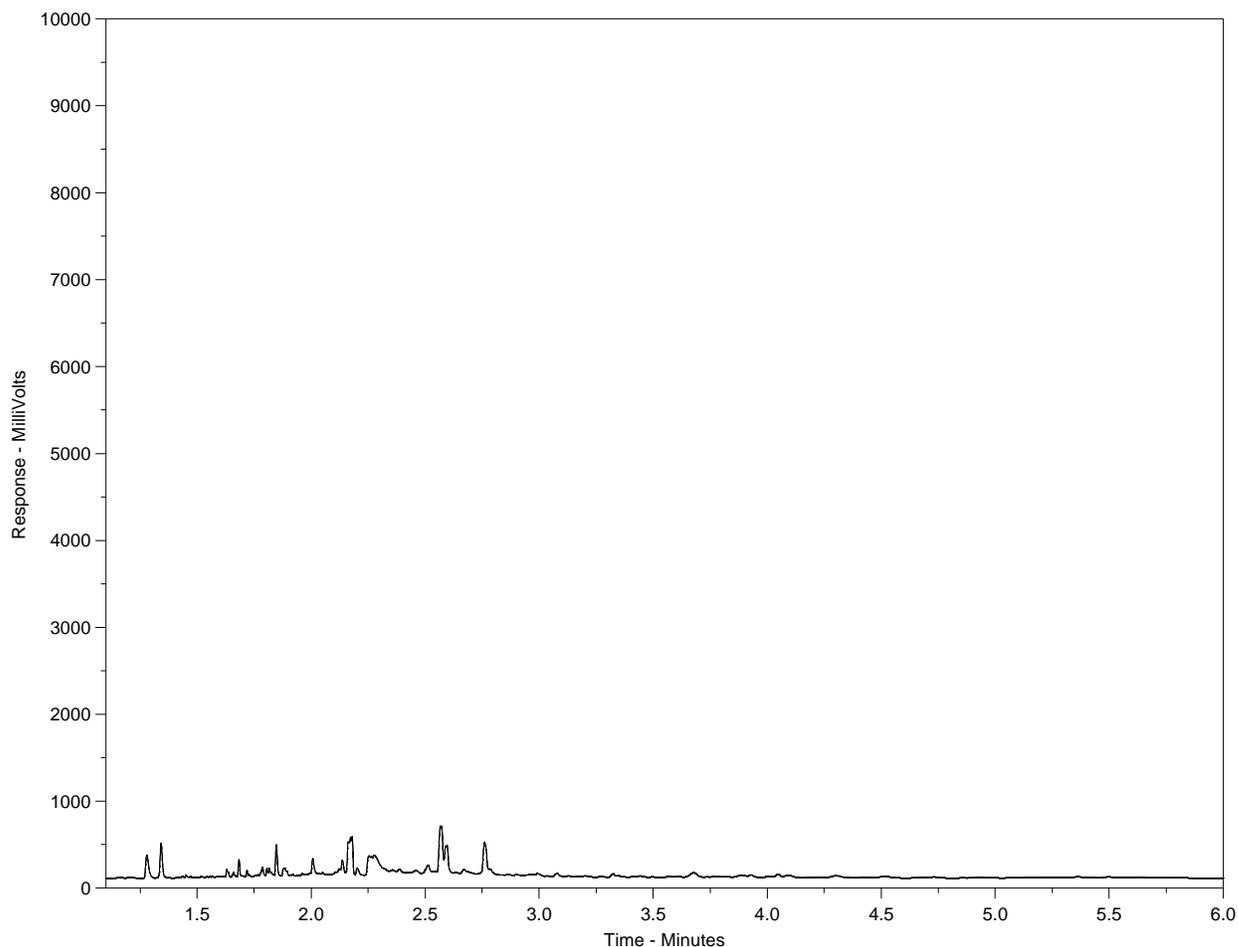
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Hydrocarbon Distribution Report



ALS Sample ID: L2567551-1
 Client ID: SECONDARY LEACHATE CELL 3B (SC3B)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.



Chain of Custody (COC)



COC Number: 20 - 899440

Canada Toll Fr

L2567551-COFC

Page of

Report To Contact and company name below will appear on the final report		Reports / Receptions			Turnaround Time (TAT) Requested		AFFIX ALS BARCODE LABEL HERE (ALS use only)							
Company:	Clean Harbors Canada	Select Report Format:	<input checked="" type="checkbox"/> PDF <input type="checkbox"/> EXCEL <input checked="" type="checkbox"/> EDD (DIGITAL)	<input type="checkbox"/> Routine [R] if received by 3pm M-F - no surcharges apply										
Contact:	Todd Webb, Stan Yula	Merge QC/QCI Reports with COA	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum										
Phone:	(800) 663-7513	<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		<input type="checkbox"/> 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum										
Company address below will appear on the final report		Select Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX	<input type="checkbox"/> 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum										
Street:	P.O. Box 390, Soltz Range Road #73	Email 1 or Fax:	webb.todd@cleanharbors.com	<input type="checkbox"/> 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum										
City/Province:	Ryley, AB	Email 2:	yula.stan@cleanharbors.com	<input type="checkbox"/> Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests										
Postal Code:	T0B 4A0	Email 3:		Date and Time Required for all E&P TATs:										
Invoice To:	Same as Report To <input type="checkbox"/> YES <input type="checkbox"/> NO	Invoice Recipients			For all tests with rush TATs requested, please contact your AM to confirm availability.									
	Copy of Invoice with Report <input type="checkbox"/> YES <input type="checkbox"/> NO	Select Invoice Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX	Analysis Request										
Company:	Clean Harbors Canada	Email 1 or Fax:	Gooding, Robbi@cleanharbors.com	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below										
Contact:	Robbi Gooding	Email 2:		NUMBER OF CONTAINERS Table 4.4A - Leachate + Leak Detection Monitoring					SAMPLES ON HOLD EXTENDED STORAGE REQUIRED SUSPECTED HAZARD (see notes)					
Project Information		Oil and Gas Required Fields (client use)												
ALS Account # / Quote #:		AFE/Cost Center:	PO#											
Job #:	Secondary Leachate Qtr 1	Major/Minor Code:	Routing Code:											
PO / AFE:		Requisitioner:												
LSD:		Location:												
ALS Lab Work Order # (ALS use only):	L2567551	ALS Contact:	Sampler:											
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				
	Secondary Leachate Cell 3B (SC3B)	16-Mar-21	10:00											
Drinking Water (DW) Samples¹ (client use)		Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)								SAMPLE RECEIPT DETAILS (ALS use only)				
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO		Analyze as per Quote Q82438, Table 4.4A Package (attached) Note spelling of "harbors" in email addresses.			Cooling Method: <input type="checkbox"/> NONE <input type="checkbox"/> ICE <input type="checkbox"/> ICE PACKS <input type="checkbox"/> FROZEN <input type="checkbox"/> COOLING INITIATED									
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO					Submission Comments identified on Sample Receipt Notification: <input type="checkbox"/> YES <input type="checkbox"/> NO									
					Cooler Custody Seals Intact: <input type="checkbox"/> YES <input type="checkbox"/> N/A Sample Custody Seals Intact: <input type="checkbox"/> YES <input type="checkbox"/> N/A									
					INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C							
					11.0									
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)									
Released by:	Todd Webb	Date:	March 16, 2021	Time:	14:00	Received by:	[Signature]	Date:	17-MAR-21	Time:	9:13			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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.

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

APPENDIX F

Leak Detection Liquid Analysis

Quarter 2



Clean Harbors Canada Inc.
ATTN: Todd Webb/Stan /Yuha
PO BOX 390
RYLEY AB TOB 4A0

Date Received: 30-JUN-21
Report Date: 12-JUL-21 16:11 (MT)
Version: FINAL

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2608135
Project P.O. #: NOT SUBMITTED
Job Reference: SECONDARY LEACHATE QTR 2
C of C Numbers: 17-805839
Legal Site Desc:


Kieran Tordoff
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9450 17 Avenue NW, Edmonton, AB T6N 1M9 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-1 SECONDARY LEACHATE CELL 2 (SC2)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
Toluene	0.00075		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
EthylBenzene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
m+p-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
o-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
Styrene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
F1(C6-C10)	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
F1-BTEX	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
Xylenes	<0.00071		0.00071	mg/L	02-JUL-21	08-JUL-21	R5508763
Surrogate: 1,4-Difluorobenzene (SS)	98.1		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 4-Bromofluorobenzene (SS)	94.3		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 3,4-Dichlorotoluene (SS)	96.1		70-130	%	02-JUL-21	08-JUL-21	R5508763
F2 (>C10-C16)							
F2 (C10-C16)	0.16		0.10	mg/L	30-JUN-21	30-JUN-21	R5508656
Surrogate: 2-Bromobenzotrifluoride	96.1		60-140	%	30-JUN-21	30-JUN-21	R5508656
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.127		0.0010	mg/L		03-JUL-21	R5509577
Miscellaneous Parameters							
Ammonia, Total (as N)	11.0	DLHC	0.50	mg/L		02-JUL-21	R5509487
Chemical Oxygen Demand	458		10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	91.2		1.0	mg/L		11-JUL-21	R5517686
Phenols (4AAP)	0.0262		0.0010	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	30.2		0.20	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	1.55	DLHC	0.10	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	14000	DLDS	80	mg/L		06-JUL-21	R5513768
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	6.31	DLHC	0.40	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	122	DLHC	5.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	248	DLDS	5.0	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	0.012		0.010	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.0034		0.0010	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	0.0828		0.0010	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	1.32		0.10	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	0.000063		0.000050	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	408		0.50	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	0.00099		0.00010	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	0.0023		0.0010	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.0091		0.0010	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	7.24		0.10	mg/L		03-JUL-21	R5509577
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-1 SECONDARY LEACHATE CELL 2 (SC2)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.604		0.010	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	251		0.10	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	11.4		0.0010	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	0.517		0.00050	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	0.0530		0.0050	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	1.86		0.50	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	39.4		0.50	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.0335		0.0020	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.00133		0.00050	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	12.0		0.50	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	3400		1.0	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	7.19		0.0020	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	3170		5.0	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	0.247		0.0010	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.0327		0.00010	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	0.0066		0.0050	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	0.048		0.010	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	2.79	DLDS	0.20	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	89.7	BL:INT		%		07-JUL-21	
TDS (Calculated)	14100			mg/L		07-JUL-21	
Hardness (as CaCO3)	2050			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLDS	0.20	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.22		0.22	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	9480	DLDS	3.0	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	7.23		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	13900		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	500		5.0	mg/L		30-JUN-21	R5506651
Carbonate (CO3)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Hydroxide (OH)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Alkalinity, Total (as CaCO3)	410		2.0	mg/L		30-JUN-21	R5506651
L2608135-2 SECONDARY LEACHATE CELL 3A (SC3A)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.00056		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-2 SECONDARY LEACHATE CELL 3A (SC3A)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Toluene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
EthylBenzene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
m+p-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
o-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
Styrene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
F1(C6-C10)	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
F1-BTEX	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
Xylenes	<0.00071		0.00071	mg/L	02-JUL-21	08-JUL-21	R5508763
Surrogate: 1,4-Difluorobenzene (SS)	97.1		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 4-Bromofluorobenzene (SS)	96.0		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 3,4-Dichlorotoluene (SS)	101.2		70-130	%	02-JUL-21	08-JUL-21	R5508763
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	30-JUN-21	30-JUN-21	R5508656
Surrogate: 2-Bromobenzotrifluoride	92.9		60-140	%	30-JUN-21	30-JUN-21	R5508656
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0151		0.0010	mg/L		03-JUL-21	R5509577
Miscellaneous Parameters							
Ammonia, Total (as N)	7.76	DLHC	0.50	mg/L		02-JUL-21	R5509487
Chemical Oxygen Demand	292		10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	98.8		1.0	mg/L		11-JUL-21	R5517686
Phenols (4AAP)	0.0030		0.0010	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	16.1		0.20	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	0.081		0.020	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	12700	DLDS	80	mg/L		06-JUL-21	R5513768
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	0.164		0.020	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	29.0		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	339	DLDS	5.0	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	0.032		0.010	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	0.0024		0.0010	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.0030		0.0010	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	0.0590		0.0010	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	0.72		0.10	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	0.000065		0.000050	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	402		0.50	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	0.0036		0.0010	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.0061		0.0010	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	0.0021		0.0020	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	0.38		0.10	mg/L		03-JUL-21	R5509577
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	0.501		0.010	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	271		0.10	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-2 SECONDARY LEACHATE CELL 3A (SC3A) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Manganese (Mn)-Dissolved	5.94		0.0010	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	0.223		0.00050	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	0.181		0.0050	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	<0.50	DLDS	0.50	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	26.7		0.50	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.0263		0.0020	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.00102		0.00050	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	6.88		0.50	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	2970		1.0	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	5.37		0.0020	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	2590		5.0	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	0.0149		0.0010	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	0.0150		0.0010	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.0737		0.00010	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	0.057		0.010	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	0.0054		0.0020	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	1.32	DLDS	0.20	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	93.2			%		07-JUL-21	
TDS (Calculated)	12100			mg/L		07-JUL-21	
Hardness (as CaCO3)	2120			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLDS	0.20	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.22		0.22	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	7570	DLDS	3.0	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	7.74		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	12400		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	1110		5.0	mg/L		30-JUN-21	R5506651
Carbonate (CO3)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Hydroxide (OH)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Alkalinity, Total (as CaCO3)	912		2.0	mg/L		30-JUN-21	R5506651
L2608135-3 SECONDARY LEACHATE CELL 3A (SC3B) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
Toluene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
EthylBenzene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-3 SECONDARY LEACHATE CELL 3A (SC3B)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
m+p-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
o-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
Styrene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
F1(C6-C10)	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
F1-BTEX	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
Xylenes	<0.00071		0.00071	mg/L	02-JUL-21	08-JUL-21	R5508763
Surrogate: 1,4-Difluorobenzene (SS)	95.0		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 4-Bromofluorobenzene (SS)	95.6		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 3,4-Dichlorotoluene (SS)	97.3		70-130	%	02-JUL-21	08-JUL-21	R5508763
F2 (>C10-C16)							
F2 (C10-C16)	0.26		0.10	mg/L	30-JUN-21	30-JUN-21	R5508656
Surrogate: 2-Bromobenzotrifluoride	97.2		60-140	%	30-JUN-21	30-JUN-21	R5508656
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0145		0.0010	mg/L		03-JUL-21	R5509577
Miscellaneous Parameters							
Ammonia, Total (as N)	39.9	DLHC	1.0	mg/L		02-JUL-21	R5509487
Chemical Oxygen Demand	459		10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	148		10	mg/L		11-JUL-21	R5517686
Phenols (4AAP)	0.0749		0.0010	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	57.0		0.20	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	6.86	DLHC	0.40	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	13000	DLDS	80	mg/L		06-JUL-21	R5513768
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	7.28	DLHC	0.40	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	8.4		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	682	DLDS	5.0	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	0.017		0.010	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.0073		0.0010	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	0.104		0.0010	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	8.05		0.10	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	0.000090		0.000050	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	331		0.50	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	0.00320		0.00010	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	0.0117		0.0010	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.0024		0.0010	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	0.0021		0.0020	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	0.39		0.10	mg/L		03-JUL-21	R5509577
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	0.609		0.010	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	272		0.10	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	1.49		0.0010	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	0.520		0.00050	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-3 SECONDARY LEACHATE CELL 3A (SC3B) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Nickel (Ni)-Dissolved	0.0648		0.0050	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	7.38		0.50	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	139		0.50	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.214		0.0020	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.00226		0.00050	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	9.59		0.50	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	3230		1.0	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	4.36		0.0020	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	2450		5.0	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	0.0015		0.0010	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	0.0047		0.0030	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	0.339		0.0010	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.0122		0.00010	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	0.0155		0.0050	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	0.027		0.010	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	0.0054		0.0020	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	<0.20	DLDS	0.20	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	93.5			%		07-JUL-21	
TDS (Calculated)	12800			mg/L		07-JUL-21	
Hardness (as CaCO3)	1950			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLDS	0.20	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.22		0.22	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	7250	DLDS	3.0	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	8.06		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	13200		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	1740		5.0	mg/L		30-JUN-21	R5506651
Carbonate (CO3)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Hydroxide (OH)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Alkalinity, Total (as CaCO3)	1420		2.0	mg/L		30-JUN-21	R5506651
L2608135-4 SECONDARY LEACHATE CELL 3C (SC3C) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
Toluene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
EthylBenzene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
m+p-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
o-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-4 SECONDARY LEACHATE CELL 3C (SC3C)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Styrene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
F1(C6-C10)	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
F1-BTEX	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
Xylenes	<0.00071		0.00071	mg/L	02-JUL-21	08-JUL-21	R5508763
Surrogate: 1,4-Difluorobenzene (SS)	96.4		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 4-Bromofluorobenzene (SS)	93.6		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 3,4-Dichlorotoluene (SS)	105.6		70-130	%	02-JUL-21	08-JUL-21	R5508763
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	30-JUN-21	30-JUN-21	R5508656
Surrogate: 2-Bromobenzotrifluoride	100.3		60-140	%	30-JUN-21	30-JUN-21	R5508656
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0021		0.0010	mg/L		05-JUL-21	R5510297
Miscellaneous Parameters							
Ammonia, Total (as N)	4.74	DLHC	0.50	mg/L		02-JUL-21	R5509487
Chemical Oxygen Demand	274		10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	98.3		1.0	mg/L		11-JUL-21	R5517686
Phenols (4AAP)	0.0024		0.0010	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	10.8		0.20	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	0.032		0.020	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	4720	DLDS	20	mg/L		06-JUL-21	R5513796
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	0.055		0.020	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	4.2		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	227	DLDS	5.0	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	0.0053		0.0050	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.00217		0.00050	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	0.0378		0.00050	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.00025	DLDS	0.00025	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	1.31		0.050	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	320		0.50	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	0.000072		0.000050	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	0.00097		0.00050	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.00112		0.00050	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	0.0144		0.0010	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	0.064		0.050	mg/L		03-JUL-21	R5509577
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	0.214		0.0050	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	235		0.10	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	1.40		0.00050	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	0.0249		0.00025	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	0.0195		0.0025	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	<0.25	DLDS	0.25	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-4 SECONDARY LEACHATE CELL 3C (SC3C) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Potassium (K)-Dissolved	18.7		0.50	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.0065		0.0010	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.00098		0.00025	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	8.30		0.25	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	2390		1.0	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	3.09		0.0010	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	1970		2.5	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.000050	DLDS	0.000050	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	<0.0015	DLDS	0.0015	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	0.00094		0.00050	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.0280		0.000050	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	0.0141		0.0025	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	0.0864		0.0050	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	0.0045		0.0010	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	0.91	DLDS	0.20	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	96.4			%		07-JUL-21	
TDS (Calculated)	9450			mg/L		07-JUL-21	
Hardness (as CaCO3)	1770			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	2.68	DLDS	0.20	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.68		0.22	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	5550	DLDS	3.0	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	8.03		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	9580		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	1410		5.0	mg/L		30-JUN-21	R5506651
Carbonate (CO3)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Hydroxide (OH)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Alkalinity, Total (as CaCO3)	1160		2.0	mg/L		30-JUN-21	R5506651
L2608135-5 SECONDARY LEACHATE CELL 3D (SC3D) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
Toluene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
EthylBenzene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
m+p-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
o-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
Styrene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
F1(C6-C10)	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-5 SECONDARY LEACHATE CELL 3D (SC3D)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
F1-BTEX	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
Xylenes	<0.00071		0.00071	mg/L	02-JUL-21	08-JUL-21	R5508763
Surrogate: 1,4-Difluorobenzene (SS)	97.0		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 4-Bromofluorobenzene (SS)	93.4		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 3,4-Dichlorotoluene (SS)	105.1		70-130	%	02-JUL-21	08-JUL-21	R5508763
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	30-JUN-21	30-JUN-21	R5508656
Surrogate: 2-Bromobenzotrifluoride	94.2		60-140	%	30-JUN-21	30-JUN-21	R5508656
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0031		0.0010	mg/L		05-JUL-21	R5510297
Miscellaneous Parameters							
Ammonia, Total (as N)	2.47		0.050	mg/L		02-JUL-21	R5509487
Chemical Oxygen Demand	252		10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	34.3		1.0	mg/L		11-JUL-21	R5517686
Phenols (4AAP)	0.0017		0.0010	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	<6.0	TKNI	6.0	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	0.478		0.020	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	9970	DLDS	80	mg/L		06-JUL-21	R5513796
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	0.431		0.020	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	<3.0		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2300	DLDS	10	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.0125		0.0010	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	0.164		0.0010	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	10.9		0.10	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	0.00124		0.000050	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	557		0.50	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.0054		0.0010	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	0.0215		0.0020	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	<0.10	DLDS	0.10	mg/L		03-JUL-21	R5509577
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	0.619		0.010	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	366		0.10	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	3.08		0.0010	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	5.41		0.00050	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	0.913		0.0050	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	<0.50	DLDS	0.50	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	190		0.50	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.0442		0.0020	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-5 SECONDARY LEACHATE CELL 3D (SC3D) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Selenium (Se)-Dissolved	0.00509		0.00050	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	11.3		0.50	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	1600		1.0	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	2.97		0.0020	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	626		5.0	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	0.0053		0.0030	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	0.0031		0.0010	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.00646		0.00010	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	32.0		0.0050	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	0.092		0.010	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	2.38	DLDS	0.40	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	97.9			%		07-JUL-21	
TDS (Calculated)	8610			mg/L		07-JUL-21	
Hardness (as CaCO3)	2900			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	329	DLDS	0.40	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	330		0.45	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	0.34	DLDS	0.20	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	1940	DLDS	6.0	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	7.60		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	10200		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	396		5.0	mg/L		30-JUN-21	R5506651
Carbonate (CO3)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Hydroxide (OH)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Alkalinity, Total (as CaCO3)	325		2.0	mg/L		30-JUN-21	R5506651
L2608135-6 SECONDARY LEACHATE CELL 3E (SC3E) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
Toluene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
EthylBenzene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
m+p-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
o-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
Styrene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
F1(C6-C10)	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
F1-BTEX	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
Xylenes	<0.00071		0.00071	mg/L	02-JUL-21	08-JUL-21	R5508763

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-6 SECONDARY LEACHATE CELL 3E (SC3E)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Surrogate: 1,4-Difluorobenzene (SS)	96.5		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 4-Bromofluorobenzene (SS)	85.7		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 3,4-Dichlorotoluene (SS)	89.0		70-130	%	02-JUL-21	08-JUL-21	R5508763
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	30-JUN-21	30-JUN-21	R5508656
Surrogate: 2-Bromobenzotrifluoride	96.1		60-140	%	30-JUN-21	30-JUN-21	R5508656
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0030		0.0010	mg/L		05-JUL-21	R5510297
Miscellaneous Parameters							
Ammonia, Total (as N)	0.088		0.050	mg/L		02-JUL-21	R5509487
Chemical Oxygen Demand	102		10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	35.4		1.0	mg/L		11-JUL-21	R5517686
Phenols (4AAP)	<0.0010		0.0010	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	2.26		0.20	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	0.074		0.020	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	5150	DLDS	20	mg/L		06-JUL-21	R5513796
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	0.129		0.020	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	91.2		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	433	DLDS	5.0	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	0.0086		0.0050	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	0.00079		0.00050	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.00197		0.00050	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	0.0885		0.00050	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.00025	DLDS	0.00025	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	1.48		0.050	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	0.000155		0.000025	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	113		0.50	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	<0.000050	DLDS	0.000050	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.00118		0.00050	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	0.0250		0.0010	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	<0.050	DLDS	0.050	mg/L		03-JUL-21	R5509577
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	0.294		0.0050	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	129		0.10	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	0.0263		0.00050	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	0.459		0.00025	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	0.117		0.0025	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	<0.25	DLDS	0.25	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	25.7		0.50	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.0055		0.0010	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.00136		0.00025	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	5.14		0.25	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-6 SECONDARY LEACHATE CELL 3E (SC3E) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	1380		1.0	mg/L		03-JUL-21	R5509577
Strontium (Sr)-Dissolved	1.76		0.0010	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	953		2.5	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.000050	DLDS	0.000050	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	<0.0015	DLDS	0.0015	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	0.00065		0.00050	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.0357		0.000050	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	0.159		0.0025	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	0.0976		0.0050	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	1.00	DLDS	0.20	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	95.1			%		07-JUL-21	
TDS (Calculated)	5230			mg/L		07-JUL-21	
Hardness (as CaCO3)	813			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	8.32	DLDS	0.20	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	8.32		0.22	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	2850	DLDS	3.0	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	8.19		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	6080		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	532		5.0	mg/L		30-JUN-21	R5506651
Carbonate (CO3)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Hydroxide (OH)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Alkalinity, Total (as CaCO3)	436		2.0	mg/L		30-JUN-21	R5506651
L2608135-7 SECONDARY LEACHATE CELL 4 (SC4) Sampled By: MURRAY on 28-JUN-21 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050	RRV	0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
Toluene	0.00204		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
EthylBenzene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
m+p-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
o-Xylene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
Styrene	<0.00050		0.00050	mg/L	02-JUL-21	08-JUL-21	R5508763
F1(C6-C10)	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
F1-BTEX	<0.10		0.10	mg/L	02-JUL-21	08-JUL-21	R5508763
Xylenes	<0.00071		0.00071	mg/L	02-JUL-21	08-JUL-21	R5508763
Surrogate: 1,4-Difluorobenzene (SS)	95.6		70-130	%	02-JUL-21	08-JUL-21	R5508763
Surrogate: 4-Bromofluorobenzene (SS)	92.7		70-130	%	02-JUL-21	08-JUL-21	R5508763

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-7 SECONDARY LEACHATE CELL 4 (SC4)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Surrogate: 3,4-Dichlorotoluene (SS)	74.3		70-130	%	02-JUL-21	08-JUL-21	R5508763
F2 (>C10-C16)							
F2 (C10-C16)	0.14		0.10	mg/L	30-JUN-21	30-JUN-21	R5508656
Surrogate: 2-Bromobenzotrifluoride	95.3		60-140	%	30-JUN-21	30-JUN-21	R5508656
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0070		0.0010	mg/L		05-JUL-21	R5510297
Miscellaneous Parameters							
Ammonia, Total (as N)	0.176		0.050	mg/L		02-JUL-21	R5509487
Chemical Oxygen Demand	236		10	mg/L		07-JUL-21	R5514171
Hexavalent Chromium-Dissolved	<0.00050		0.00050	mg/L		03-JUL-21	R5513299
Dissolved Organic Carbon	74.2		1.0	mg/L		11-JUL-21	R5517686
Phenols (4AAP)	0.0011		0.0010	mg/L		30-JUN-21	R5507657
Total Kjeldahl Nitrogen	3.61		0.20	mg/L	02-JUL-21	03-JUL-21	R5510256
Phosphorus (P)-Total Dissolved	0.212		0.020	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Dissolved Solids	10600	DLDS	80	mg/L		06-JUL-21	R5513796
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-JUL-21	R5508266
Phosphorus (P)-Total	0.268		0.020	mg/L	06-JUL-21	07-JUL-21	R5514190
Total Suspended Solids	<3.0		3.0	mg/L		06-JUL-21	R5514093
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	1070	DLDS	5.0	mg/L		30-JUN-21	R5507896
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-JUL-21	R5509297
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		03-JUL-21	R5509577
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Arsenic (As)-Dissolved	0.0016		0.0010	mg/L		03-JUL-21	R5509577
Barium (Ba)-Dissolved	0.0490		0.0010	mg/L		03-JUL-21	R5509577
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Boron (B)-Dissolved	1.59		0.10	mg/L		03-JUL-21	R5509577
Cadmium (Cd)-Dissolved	0.000325		0.000050	mg/L		03-JUL-21	R5509577
Calcium (Ca)-Dissolved	483		0.50	mg/L		03-JUL-21	R5509577
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Chromium (Cr)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Cobalt (Co)-Dissolved	0.0030		0.0010	mg/L		03-JUL-21	R5509577
Copper (Cu)-Dissolved	0.0025		0.0020	mg/L		03-JUL-21	R5509577
Iron (Fe)-Dissolved	<0.10	DLDS	0.10	mg/L		03-JUL-21	R5509577
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-JUL-21	R5509577
Lithium (Li)-Dissolved	0.348		0.010	mg/L		03-JUL-21	R5509577
Magnesium (Mg)-Dissolved	267		0.10	mg/L		03-JUL-21	R5509577
Manganese (Mn)-Dissolved	1.83		0.0010	mg/L		03-JUL-21	R5509577
Molybdenum (Mo)-Dissolved	1.84		0.00050	mg/L		03-JUL-21	R5509577
Nickel (Ni)-Dissolved	0.0474		0.0050	mg/L		03-JUL-21	R5509577
Phosphorus (P)-Dissolved	<0.50	DLDS	0.50	mg/L		03-JUL-21	R5509577
Potassium (K)-Dissolved	21.4		0.50	mg/L		03-JUL-21	R5509577
Rubidium (Rb)-Dissolved	0.0035		0.0020	mg/L		03-JUL-21	R5509577
Selenium (Se)-Dissolved	0.00166		0.00050	mg/L		03-JUL-21	R5509577
Silicon (Si)-Dissolved	6.96		0.50	mg/L		03-JUL-21	R5509577
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Sodium (Na)-Dissolved	2720		1.0	mg/L		03-JUL-21	R5509577

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2608135-7 SECONDARY LEACHATE CELL 4 (SC4)							
Sampled By: MURRAY on 28-JUN-21							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Strontium (Sr)-Dissolved	5.19		0.0020	mg/L		03-JUL-21	R5509577
Sulfur (S)-Dissolved	2180		5.0	mg/L		03-JUL-21	R5509577
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-JUL-21	R5509577
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-JUL-21	R5509577
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-JUL-21	R5509577
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		03-JUL-21	R5509577
Tungsten (W)-Dissolved	0.0029		0.0010	mg/L		03-JUL-21	R5509577
Uranium (U)-Dissolved	0.122		0.00010	mg/L		03-JUL-21	R5509577
Vanadium (V)-Dissolved	0.0104		0.0050	mg/L		03-JUL-21	R5509577
Zinc (Zn)-Dissolved	0.067		0.010	mg/L		03-JUL-21	R5509577
Zirconium (Zr)-Dissolved	0.0028		0.0020	mg/L		03-JUL-21	R5509577
Fluoride in Water by IC							
Fluoride (F)	1.19	DLDS	0.20	mg/L		30-JUN-21	R5507896
Ion Balance Calculation							
Ion Balance	96.6			%		07-JUL-21	
TDS (Calculated)	11100			mg/L		07-JUL-21	
Hardness (as CaCO3)	2310			mg/L		07-JUL-21	
Nitrate in Water by IC							
Nitrate (as N)	0.46	DLDS	0.20	mg/L		30-JUN-21	R5507896
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.46		0.22	mg/L		02-JUL-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		30-JUN-21	R5507896
Sulfate in Water by IC							
Sulfate (SO4)	6110	DLDS	3.0	mg/L		30-JUN-21	R5507896
pH, Conductivity and Total Alkalinity							
pH	7.93		0.10	pH		30-JUN-21	R5506651
Conductivity (EC)	11500		2.0	uS/cm		30-JUN-21	R5506651
Bicarbonate (HCO3)	808		5.0	mg/L		30-JUN-21	R5506651
Carbonate (CO3)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Hydroxide (OH)	<5.0		5.0	mg/L		30-JUN-21	R5506651
Alkalinity, Total (as CaCO3)	663		2.0	mg/L		30-JUN-21	R5506651

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
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).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method.			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-T-COL-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
CR6-D-IC-ED	Water	Chromium, Dissolved Hexavalent (Cr +6)	APHA 3500-Cr C (Ion Chromatography)
This analysis is carried out using procedures adapted from method 3500-Cr C in "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from Method 1636 published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Results are based on a field-filtered, field-preserved sample.			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.			
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
P-TD-COL-ED	Water	Total Dissolved P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H ₂ SO ₄ is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-ED	Water	Phenols (4AAP)	EPA 9066 AUTO-DISTILL-COLORIMETRIC
This automated method is based on the distillation of phenol and subsequent reaction of the distillate with an oxidizing agent (alkaline potassium ferricyanide), and 4-aminoantipyrine to form a red complex which is measured at 505 nm. The method will include ortho and meta-substituted phenols, and is collectively named 4AAP phenols.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-ED	Water	Total Dissolved Solids	APHA 2540 C
Gravimetric determination of solids in waters by filtration and evaporating filtrate to dryness at 180 degrees Celsius.			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-ED	Water	TKN (as N) by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-805839

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

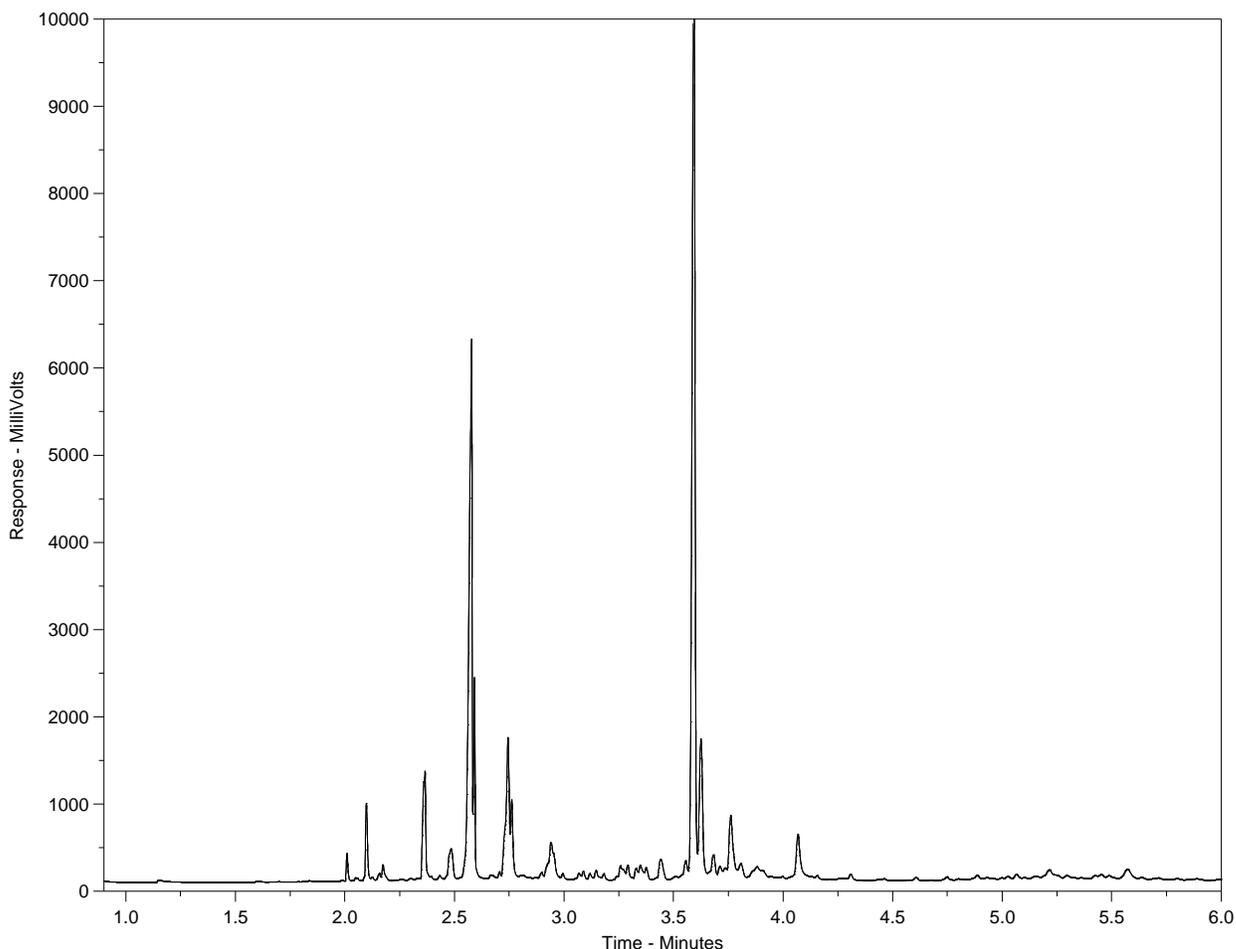
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Hydrocarbon Distribution Report



ALS Sample ID: L2608135-1
 Client ID: SECONDARY LEACGATE CELL 2 (SC2)



← F2 →		← F3 →		← F4 →		← >F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →				← Motor Oils/ Lube Oils/ Grease →	

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

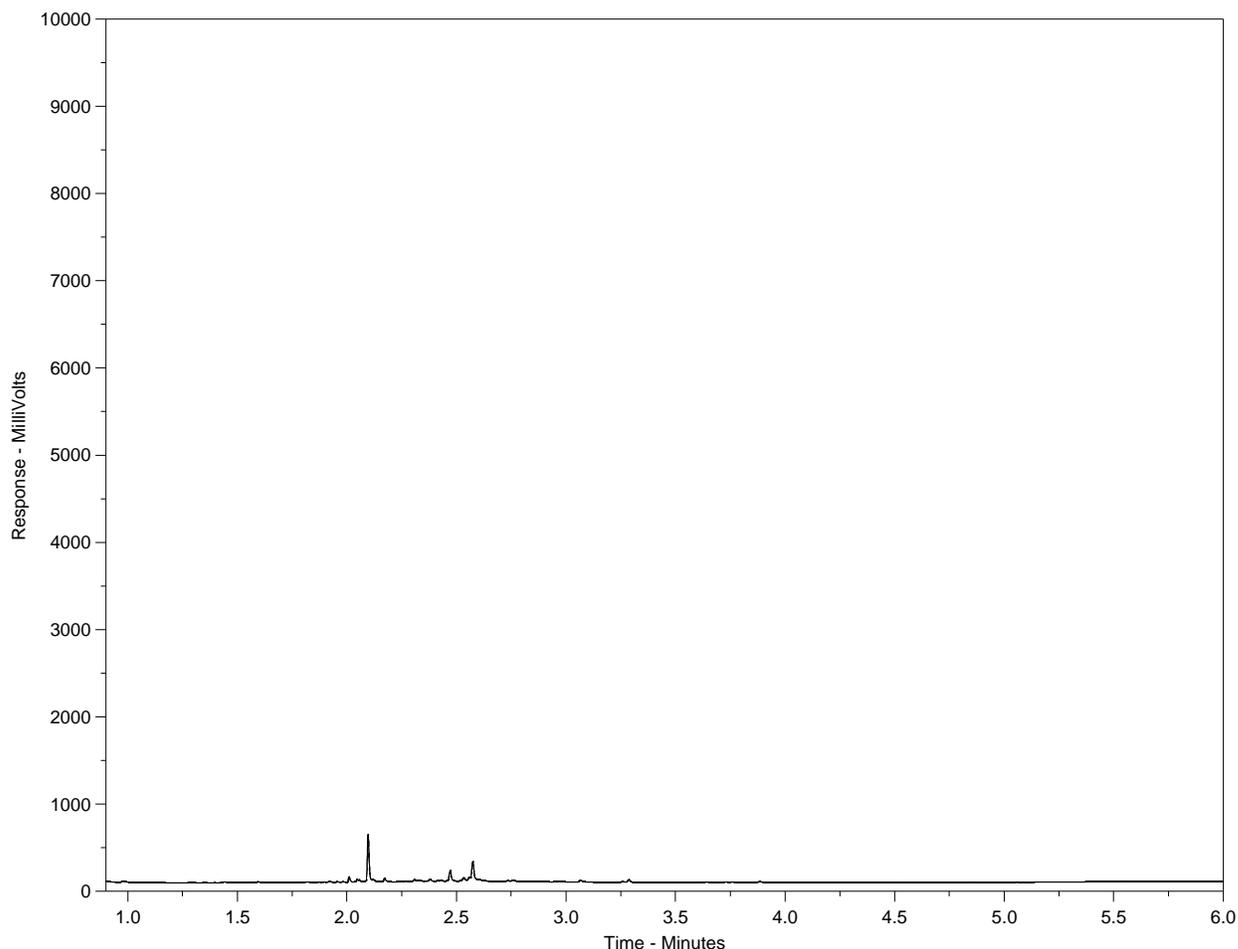
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2608135-2
 Client ID: SECONDARY LEACGATE CELL 3A (SC3A)



← F2 →		← F3 →		← F4 →		← >F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

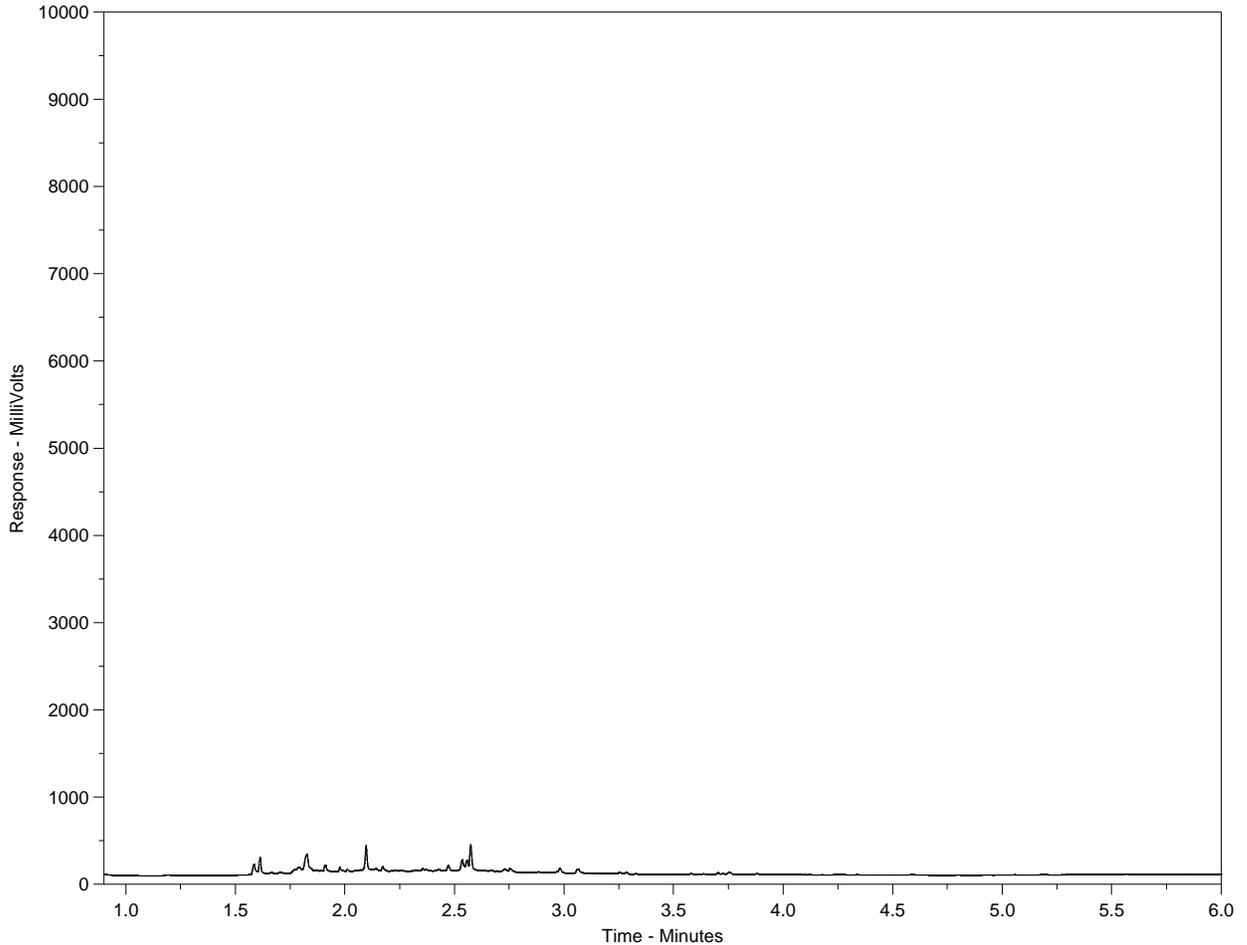
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2608135-3
 Client ID: SECONDARY LEACGATE CELL 3A (SC3B)



← F2 →		← F3 →		← F4 →		← >F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

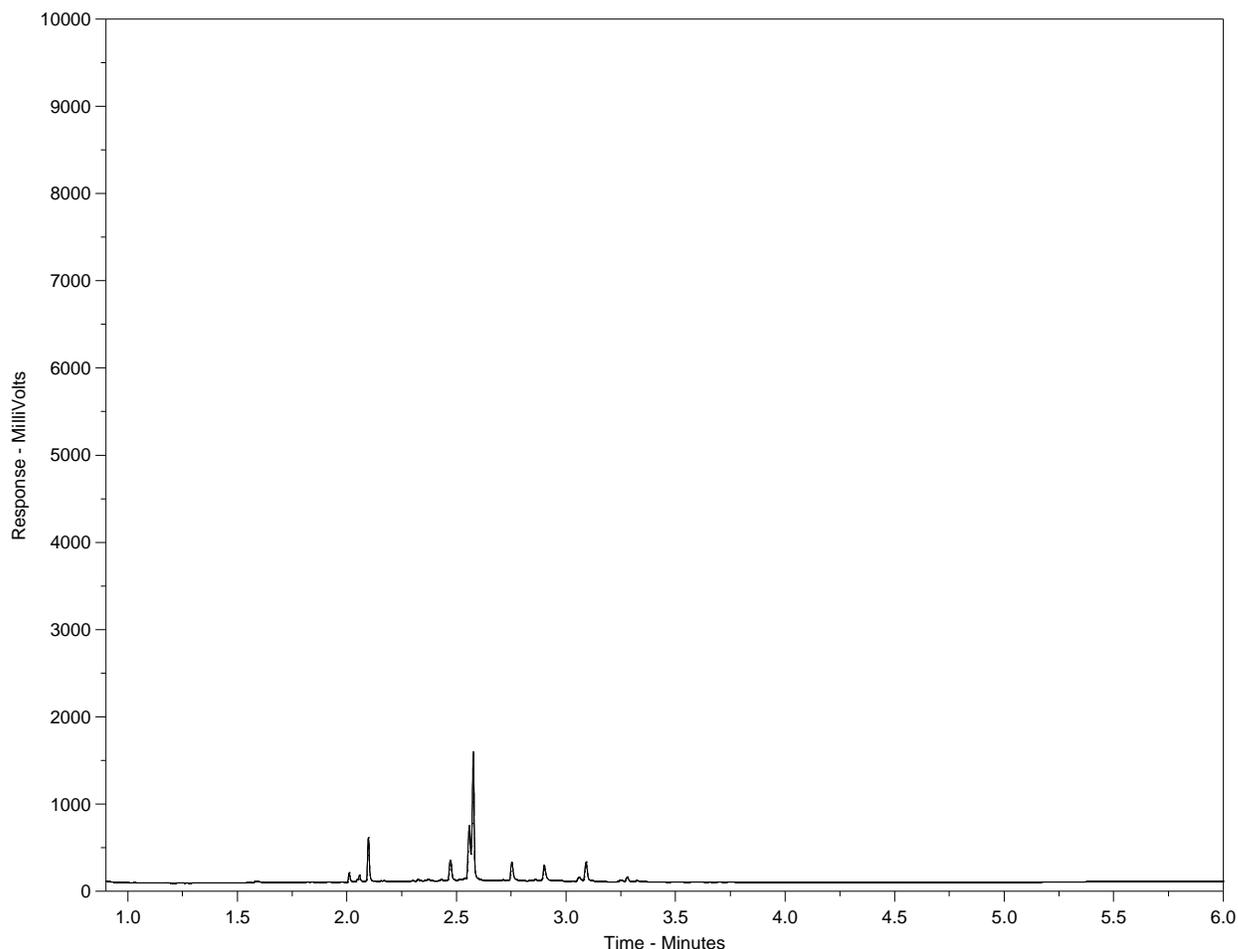
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2608135-4
 Client ID: SECONDARY LEACGATE CELL 3C (SC3C)



← F2 →		← F3 →		← F4 →		← >F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →				← Motor Oils/ Lube Oils/ Grease →	

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

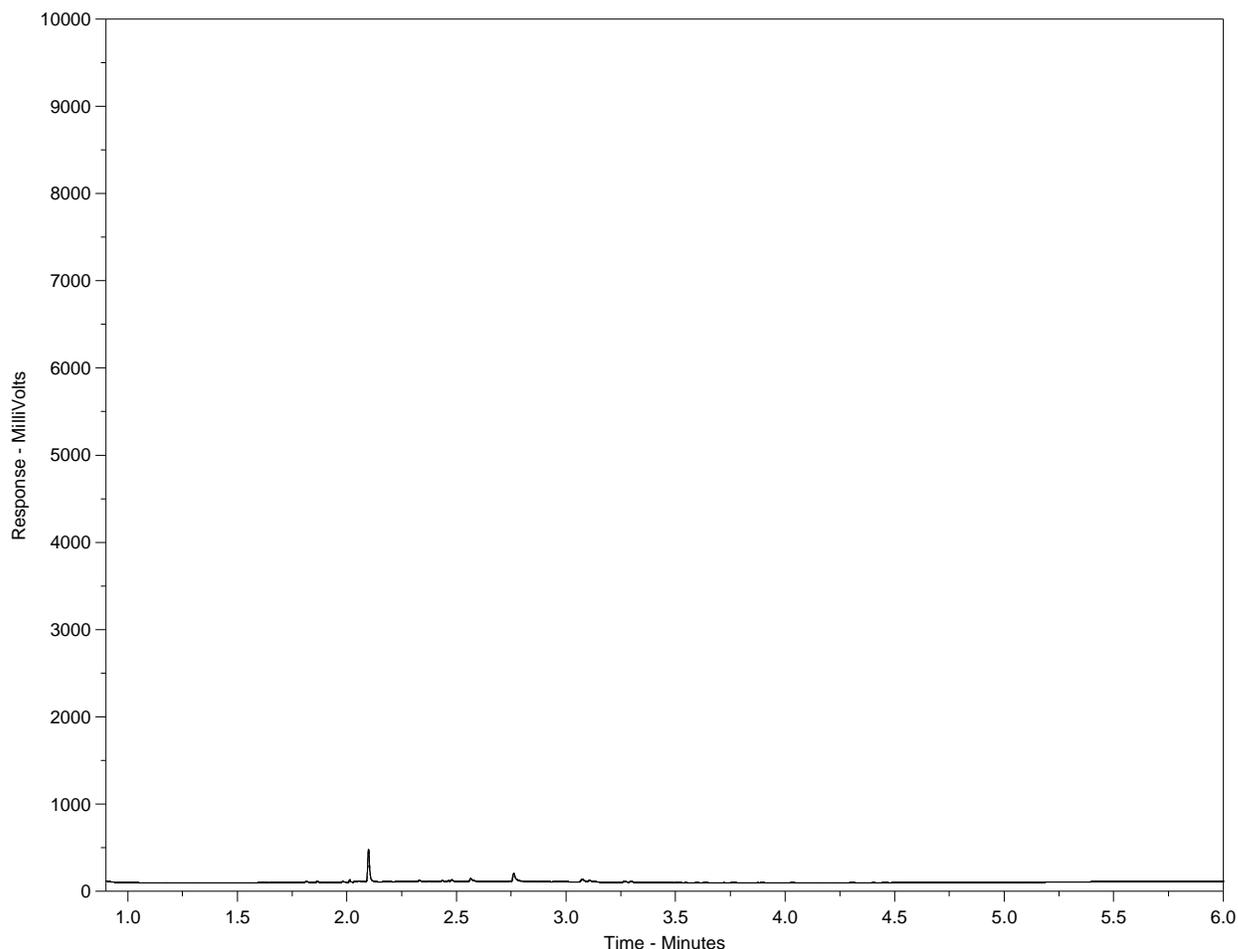
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2608135-5
 Client ID: SECONDARY LEACGATE CELL 3D (SC3D)



← F2 →		← F3 →		← F4 →		← >F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

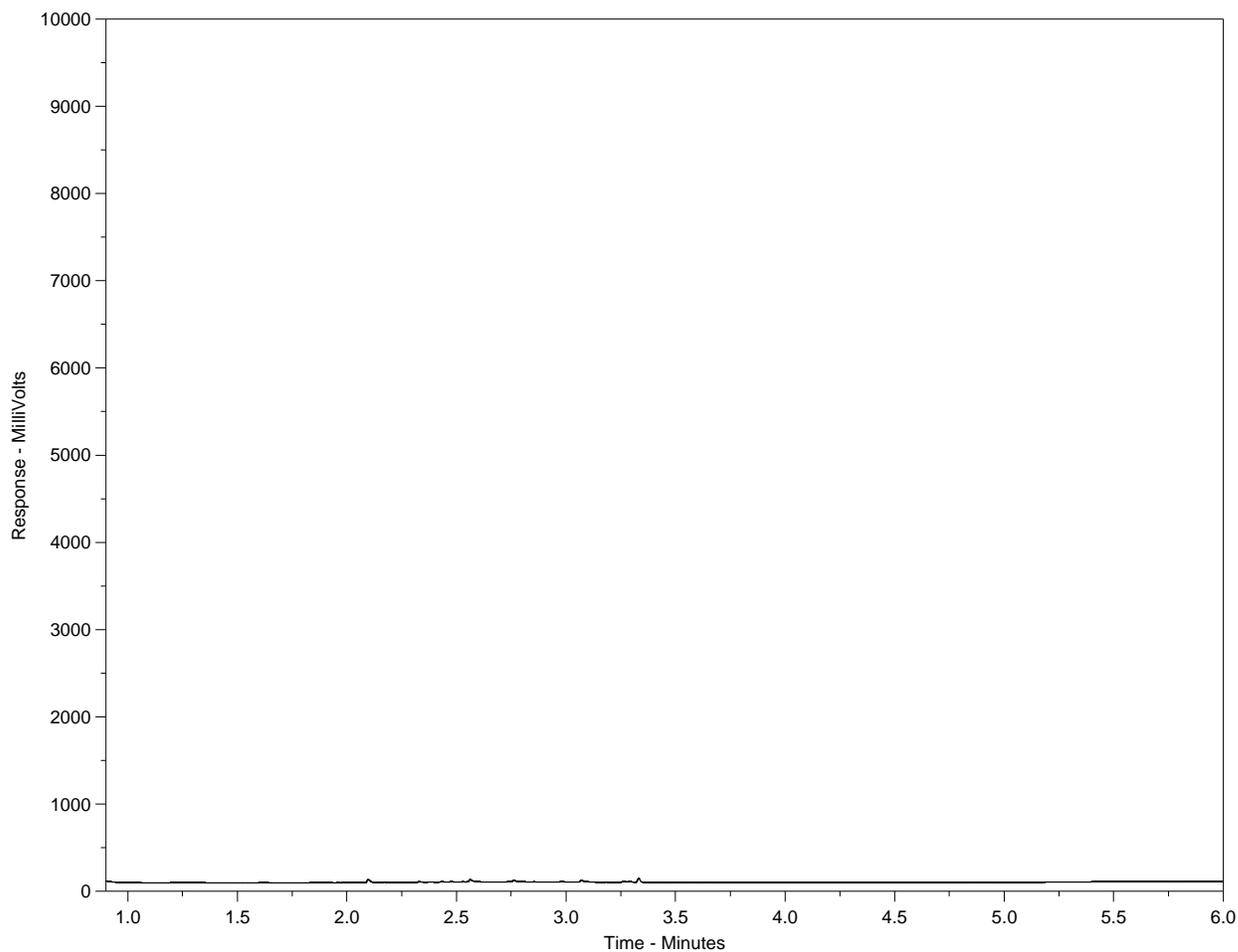
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2608135-6
 Client ID: SECONDARY LEACGATE CELL 3E (SC3E)



← F2 →		← F3 →		← F4 →		← >F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

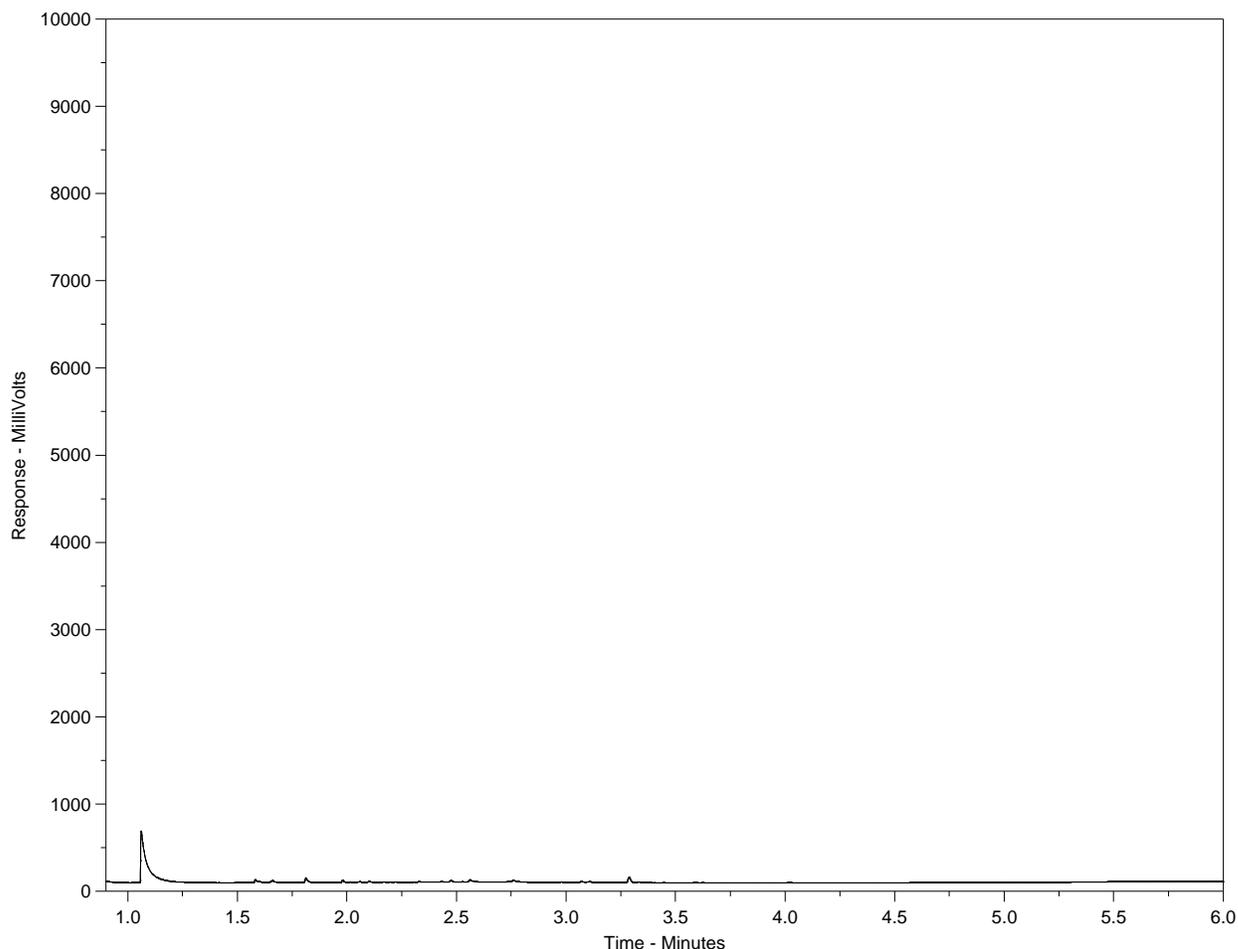
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2608135-7
 Client ID: SECONDARY LEACGATE CELL 4 (SC4)



← F2 →		← F3 →		← F4 →		← >F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

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

"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

"major ions" means the following:

Calcium	Carbonate
Magnesium	Bicarbonate
Sodium	Chloride
Potassium	Sulfate

"nutrients" means the following:

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



L2608135-COFC

APPENDIX F

Leak Detection Liquid Analysis

Quarter 3



Clean Harbors Canada Inc.
ATTN: Todd Webb/Stan Yuha
PO BOX 390
RYLEY AB TOB 4A0

Date Received: 27-SEP-21
Report Date: 18-JAN-22 14:51 (MT)
Version: FINAL REV. 2

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2644364
Project P.O. #: 0000220151
Job Reference: SECONDARY LEACHATE QTR3
C of C Numbers: 17-790953
Legal Site Desc:

Kieran Tordoff
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9450 17 Avenue NW, Edmonton, AB T6N 1M9 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-1 SECONDARY LEACHATE CELL 2 (SC2)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	<0.00071		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	102.3		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	77.8		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	89.1		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	0.16		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	98.7		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0081		0.0020	mg/L		03-OCT-21	R5607158
Miscellaneous Parameters							
Ammonia, Total (as N)	9.2	RRV	5.0	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	219	DLM	20	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		01-OCT-21	R5607091
Dissolved Organic Carbon	<100		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	0.0013		0.0010	mg/L		30-SEP-21	R5605685
Phosphorus (P)-Total Dissolved	0.737		0.020	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	14300	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	1.26		0.20	mg/L		01-OCT-21	R5608657
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		29-SEP-21	R5604602
Phosphorus (P)-Total	1.73	DLHC	0.10	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	27.3		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	301	DLDS	10	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606935
Aluminum (Al)-Dissolved	0.073		0.020	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.0027		0.0020	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.0268		0.0020	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	1.25		0.20	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	442		1.0	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	0.00111		0.00020	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Cobalt (Co)-Dissolved	0.0113		0.0020	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	1.53		0.20	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-1 SECONDARY LEACHATE CELL 2 (SC2) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.636		0.020	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	249		0.10	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	14.4		0.0020	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	0.287		0.0010	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	0.045		0.010	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	<1.0	DLDS	1.0	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	39.8		1.0	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.0357		0.0040	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	16.6		1.0	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	3510		1.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	7.82		0.0040	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	3260		10	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	<0.0060	DLDS	0.0060	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	0.128		0.0020	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.00551		0.00020	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	0.018		0.010	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	0.052		0.020	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	2.34	DLDS	0.40	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	88.0	BL:INT		%		04-OCT-21	
TDS (Calculated)	14800			mg/L		04-OCT-21	
Hardness (as CaCO3)	2130			mg/L		04-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	10100	DLDS	6.0	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	7.47		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	15200		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	289		5.0	mg/L		28-SEP-21	R5604420
Carbonate (CO3)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Hydroxide (OH)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Alkalinity, Total (as CaCO3)	237		2.0	mg/L		28-SEP-21	R5604420
L2644364-2 SECONDARY LEACHATE CELL 3A (SC3A) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.00071		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-2 SECONDARY LEACHATE CELL 3A (SC3A)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Toluene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	0.00072		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	<0.00071		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	102.1		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	76.6		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	108.5		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	1.21		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	99.0		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0136		0.0010	mg/L		03-OCT-21	R5607158
Miscellaneous Parameters							
Ammonia, Total (as N)	10.3	RRV	5.0	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	305	DLM	20	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		01-OCT-21	R5607091
Dissolved Organic Carbon	<100		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	<0.010	DLM	0.010	mg/L		30-SEP-21	R5605685
Phosphorus (P)-Total Dissolved	0.061		0.020	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	10300	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	<0.20		0.20	mg/L		01-OCT-21	R5608657
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		29-SEP-21	R5604602
Phosphorus (P)-Total	0.249		0.020	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	32.9		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	456	DLDS	10	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606935
Aluminum (Al)-Dissolved	0.049		0.010	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	0.0032		0.0010	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.0044		0.0010	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.0579		0.0010	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	0.34		0.10	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	0.000053		0.000050	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	377		0.50	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	0.0072		0.0010	mg/L		03-OCT-21	R5607158
Cobalt (Co)-Dissolved	0.0064		0.0010	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	1.11		0.10	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	0.457		0.010	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	235		0.10	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-2 SECONDARY LEACHATE CELL 3A (SC3A) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Manganese (Mn)-Dissolved	3.73		0.0010	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	0.183		0.00050	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	0.292		0.0050	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	<0.50	DLDS	0.50	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	37.8		0.50	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.0329		0.0020	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	0.00076		0.00050	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	7.90		0.50	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	2430		1.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	4.43		0.0020	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	2090		5.0	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	0.0045		0.0010	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	0.0035		0.0030	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	0.0365		0.0010	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.0489		0.00010	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	<0.0050	DLDS	0.0050	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	0.042		0.010	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	0.0063		0.0020	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	0.72	DLDS	0.40	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	89.6	BL:INT		%		04-OCT-21	
TDS (Calculated)	10300			mg/L		04-OCT-21	
Hardness (as CaCO3)	1910			mg/L		04-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	6160	DLDS	6.0	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	8.02		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	12000		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	1300		5.0	mg/L		28-SEP-21	R5604420
Carbonate (CO3)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Hydroxide (OH)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Alkalinity, Total (as CaCO3)	1070		2.0	mg/L		28-SEP-21	R5604420
L2644364-3 SECONDARY LEACHATE CELL 3B (SC3B) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-3 SECONDARY LEACHATE CELL 3B (SC3B)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
m+p-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	<0.00071		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	102.5		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	73.4		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	118.2		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	0.24		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	97.3		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0171		0.0020	mg/L		03-OCT-21	R5607158
Miscellaneous Parameters							
Ammonia, Total (as N)	46.3	RRV	5.0	mg/L		09-OCT-21	R5615177
Chemical Oxygen Demand	417	DLM	20	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		01-OCT-21	R5607091
Dissolved Organic Carbon	<100		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	<0.010	DLM	0.010	mg/L		30-SEP-21	R5605685
Phosphorus (P)-Total Dissolved	7.31	DLHC	0.40	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	13500	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	41		20	mg/L		28-OCT-21	R5608657
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		29-SEP-21	R5604602
Phosphorus (P)-Total	7.48	DLHC	0.40	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	12.1		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	721	DLDS	10	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606935
Aluminum (Al)-Dissolved	<0.020	DLDS	0.020	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.0082		0.0020	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.106		0.0020	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	8.51		0.20	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	0.00015		0.00010	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	342		1.0	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	0.00320		0.00020	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	0.0135		0.0020	mg/L		03-OCT-21	R5607158
Cobalt (Co)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	0.46		0.20	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	0.619		0.020	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	278		0.10	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	1.61		0.0020	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	0.435		0.0010	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-3 SECONDARY LEACHATE CELL 3B (SC3B) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Nickel (Ni)-Dissolved	0.066		0.010	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	8.6		1.0	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	152		1.0	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.227		0.0040	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	0.0019		0.0010	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	9.7		1.0	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	3170		1.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	4.02		0.0040	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	2270		10	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	0.0038		0.0020	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	<0.0060	DLDS	0.0060	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	0.487		0.0020	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.0105		0.00020	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	0.015		0.010	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	<0.020	DLDS	0.020	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	0.0063		0.0040	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	1.11	DLDS	0.40	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	97.0			%		09-OCT-21	
TDS (Calculated)	12200			mg/L		09-OCT-21	
Hardness (as CaCO3)	2000			mg/L		09-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	6570	DLDS	6.0	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	8.21		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	14500		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	2050		5.0	mg/L		28-SEP-21	R5604420
Carbonate (CO3)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Hydroxide (OH)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Alkalinity, Total (as CaCO3)	1680		2.0	mg/L		28-SEP-21	R5604420
L2644364-4 SECONDARY LEACHATE CELL 3C (SC3C) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-4 SECONDARY LEACHATE CELL 3C (SC3C)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	<0.00071		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	101.2		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	81.9		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	101.6		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	92.5		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0021		0.0010	mg/L		03-OCT-21	R5607158
Miscellaneous Parameters							
Ammonia, Total (as N)	1.41	DLHC	0.25	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	274	DLM	20	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		01-OCT-21	R5607091
Dissolved Organic Carbon	<100		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	<0.0010		0.0010	mg/L		30-SEP-21	R5605685
Phosphorus (P)-Total Dissolved	0.028		0.020	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	10200	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	5.05		0.20	mg/L		01-OCT-21	R5608657
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		29-SEP-21	R5604602
Phosphorus (P)-Total	0.060		0.020	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	7.7		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	230	DLDS	10	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606935
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.0023		0.0010	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.0314		0.0010	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	1.17		0.10	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	<0.000050	DLDS	0.000050	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	289		0.50	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Cobalt (Co)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	0.0035		0.0020	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	<0.10	DLDS	0.10	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	0.202		0.010	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	235		0.10	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	1.18		0.0010	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	0.0498		0.00050	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	0.0234		0.0050	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	<0.50	DLDS	0.50	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-4 SECONDARY LEACHATE CELL 3C (SC3C) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Potassium (K)-Dissolved	18.7		0.50	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.0065		0.0020	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	0.00092		0.00050	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	7.10		0.50	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	2250		1.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	2.76		0.0020	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	1880		5.0	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.0257		0.00010	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	0.147		0.0050	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	0.046		0.010	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	0.0036		0.0020	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	0.50	DLDS	0.40	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	88.1	BL:INT		%		04-OCT-21	
TDS (Calculated)	9540			mg/L		04-OCT-21	
Hardness (as CaCO3)	1690			mg/L		04-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	3.82	DLDS	0.40	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	3.82		0.45	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	5860	DLDS	6.0	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	8.30		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	10800		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	1300		5.0	mg/L		28-SEP-21	R5604420
Carbonate (CO3)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Hydroxide (OH)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Alkalinity, Total (as CaCO3)	1070		2.0	mg/L		28-SEP-21	R5604420
L2644364-5 SECONDARY LEACHATE CELL 3D (SC3D) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-5 SECONDARY LEACHATE CELL 3D (SC3D)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
F1-BTEX	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	<0.00071		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	103.0		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	74.9		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	100.2		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	94.5		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0029		0.0010	mg/L		03-OCT-21	R5607158
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	164	DLM	20	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		04-OCT-21	R5608797
Dissolved Organic Carbon	<100		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	<0.0010		0.0010	mg/L		30-SEP-21	R5605685
Phosphorus (P)-Total Dissolved	0.428		0.020	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	8720	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	0.42		0.20	mg/L		01-OCT-21	R5608657
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		29-SEP-21	R5604602
Phosphorus (P)-Total	0.465		0.020	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	7.7		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2230	DLDS	10	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606935
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.0119		0.0010	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.163		0.0010	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	10.4		0.10	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	0.00139		0.000050	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	592		0.50	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Cobalt (Co)-Dissolved	0.0052		0.0010	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	0.0189		0.0020	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	<0.10	DLDS	0.10	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	0.584		0.010	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	353		0.10	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	2.88		0.0010	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	4.39		0.00050	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	0.937		0.0050	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	0.50		0.50	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	183		0.50	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.0448		0.0020	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-5 SECONDARY LEACHATE CELL 3D (SC3D) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Selenium (Se)-Dissolved	0.00507		0.00050	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	11.5		0.50	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	1450		1.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	2.92		0.0020	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	622		5.0	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	0.0052		0.0030	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	0.0018		0.0010	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.00711		0.00010	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	27.0		0.0050	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	0.112		0.010	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	1.60	DLDS	0.40	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	94.4			%		04-OCT-21	
TDS (Calculated)	8430			mg/L		04-OCT-21	
Hardness (as CaCO3)	2930			mg/L		04-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	356	DLDS	0.40	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	356		0.45	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	1810	DLDS	6.0	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	7.90		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	11600		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	471		5.0	mg/L		28-SEP-21	R5604420
Carbonate (CO3)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Hydroxide (OH)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Alkalinity, Total (as CaCO3)	386		2.0	mg/L		28-SEP-21	R5604420
L2644364-6 SECONDARY LEACHATE CELL 3E (SC3E) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	<0.10		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	<0.00071		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-6 SECONDARY LEACHATE CELL 3E (SC3E)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Surrogate: 1,4-Difluorobenzene (SS)	104.2		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	73.8		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 3,4-Dichlorotoluene (SS)	108.1		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	84.6		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.00183		0.00050	mg/L		03-OCT-21	R5607158
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	139	DLM	20	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	0.00059		0.00050	mg/L		01-OCT-21	R5607091
Dissolved Organic Carbon	<100		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	<0.0010		0.0010	mg/L		30-SEP-21	R5605685
Phosphorus (P)-Total Dissolved	0.148		0.020	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	5690	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	2.29		0.20	mg/L		01-OCT-21	R5608657
Mercury (Hg)-Total	0.0000081		0.0000050	mg/L		29-SEP-21	R5604602
Phosphorus (P)-Total	0.220		0.020	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	118		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	556	DLDS	10	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606935
Aluminum (Al)-Dissolved	0.0116		0.0050	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	0.00081		0.00050	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.00220		0.00050	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.0965		0.00050	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.00025	DLDS	0.00025	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	1.36		0.050	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	0.000138		0.000025	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	113		0.50	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	0.000085		0.000050	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	0.00054		0.00050	mg/L		03-OCT-21	R5607158
Cobalt (Co)-Dissolved	0.00079		0.00050	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	0.0349		0.0010	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	<0.050	DLDS	0.050	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	0.334		0.0050	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	141		0.10	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	0.00269		0.00050	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	0.406		0.00025	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	0.117		0.0025	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	<0.25	DLDS	0.25	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	27.0		0.50	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.0054		0.0010	mg/L		03-OCT-21	R5607158
Selenium (Se)-Dissolved	0.00129		0.00025	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	5.06		0.25	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-6 SECONDARY LEACHATE CELL 3E (SC3E) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	1500		1.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	1.84		0.0010	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	993		2.5	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.000050	DLDS	0.000050	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	<0.0015	DLDS	0.0015	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	<0.00050	DLDS	0.00050	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.0403		0.000050	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	0.0196		0.0025	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	0.0769		0.0050	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	0.54	DLDS	0.40	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	96.9			%		04-OCT-21	
TDS (Calculated)	5520			mg/L		04-OCT-21	
Hardness (as CaCO3)	863			mg/L		04-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	13.8	DLDS	0.40	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	13.8		0.45	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	2790	DLDS	6.0	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	8.40		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	7330		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	654		5.0	mg/L		28-SEP-21	R5604420
Carbonate (CO3)	9.2		5.0	mg/L		28-SEP-21	R5604420
Hydroxide (OH)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Alkalinity, Total (as CaCO3)	551		2.0	mg/L		28-SEP-21	R5604420
L2644364-7 SECONDARY LEACHATE CELL 4 (SC4) Sampled By: MURRAY on 27-SEP-21 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Toluene	0.00088		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
EthylBenzene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
m+p-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
o-Xylene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
Styrene	<0.00050		0.00050	mg/L	30-SEP-21	01-OCT-21	R5604025
F1(C6-C10)	0.21		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
F1-BTEX	0.21		0.10	mg/L	30-SEP-21	01-OCT-21	R5604025
Xylenes	<0.00071		0.00071	mg/L	30-SEP-21	01-OCT-21	R5604025
Surrogate: 1,4-Difluorobenzene (SS)	102.8		70-130	%	30-SEP-21	01-OCT-21	R5604025
Surrogate: 4-Bromofluorobenzene (SS)	80.7		70-130	%	30-SEP-21	01-OCT-21	R5604025

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-7 SECONDARY LEACHATE CELL 4 (SC4)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Surrogate: 3,4-Dichlorotoluene (SS)	100.7		70-130	%	30-SEP-21	01-OCT-21	R5604025
F2 (>C10-C16)							
F2 (C10-C16)	2.19		0.10	mg/L	29-SEP-21	30-SEP-21	R5605732
Surrogate: 2-Bromobenzotrifluoride	97.4		60-140	%	29-SEP-21	30-SEP-21	R5605732
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0076		0.0020	mg/L		03-OCT-21	R5607158
Miscellaneous Parameters							
Ammonia, Total (as N)	174	DLHC	50	mg/L		03-OCT-21	R5607183
Chemical Oxygen Demand	2680	DLHC	20	mg/L		05-OCT-21	R5610833
Chromium (VI)-Dissolved	<0.0025	DLM	0.0025	mg/L		04-OCT-21	R5608797
Dissolved Organic Carbon	590		100	mg/L		08-OCT-21	R5615040
Phenols (4AAP)	0.651	RRR	0.010	mg/L		30-SEP-21	R5605685
Note: DLHC Detection Limit Raised: Dilution required due to high concentration of test analyte(s)., SP Sample was Preserved at the laboratory							
Phosphorus (P)-Total Dissolved	13.7	DLHC	0.40	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Dissolved Solids	13000	DLDS	20	mg/L		30-SEP-21	R5605083
Total Kjeldahl Nitrogen	179		20	mg/L		21-OCT-21	R5608657
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		29-SEP-21	R5604602
Phosphorus (P)-Total	13.5	DLHC	0.40	mg/L	29-SEP-21	01-OCT-21	R5606664
Total Suspended Solids	23.1		3.0	mg/L		28-SEP-21	R5604322
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2310	DLDS	10	mg/L		28-SEP-21	R5604723
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					03-OCT-21	R5606935
Aluminum (Al)-Dissolved	0.044		0.020	mg/L		03-OCT-21	R5607158
Antimony (Sb)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Arsenic (As)-Dissolved	0.0559		0.0020	mg/L		03-OCT-21	R5607158
Barium (Ba)-Dissolved	0.171		0.0020	mg/L		03-OCT-21	R5607158
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Boron (B)-Dissolved	25.4		0.20	mg/L		03-OCT-21	R5607158
Cadmium (Cd)-Dissolved	0.00079		0.00010	mg/L		03-OCT-21	R5607158
Calcium (Ca)-Dissolved	558		1.0	mg/L		03-OCT-21	R5607158
Cesium (Cs)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Chromium (Cr)-Dissolved	0.0060		0.0020	mg/L		03-OCT-21	R5607158
Cobalt (Co)-Dissolved	0.0029		0.0020	mg/L		03-OCT-21	R5607158
Copper (Cu)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-OCT-21	R5607158
Iron (Fe)-Dissolved	1.45		0.20	mg/L		03-OCT-21	R5607158
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		03-OCT-21	R5607158
Lithium (Li)-Dissolved	0.278		0.020	mg/L		03-OCT-21	R5607158
Magnesium (Mg)-Dissolved	314		0.10	mg/L		03-OCT-21	R5607158
Manganese (Mn)-Dissolved	5.85		0.0020	mg/L		03-OCT-21	R5607158
Molybdenum (Mo)-Dissolved	3.34		0.0010	mg/L		03-OCT-21	R5607158
Nickel (Ni)-Dissolved	0.265		0.010	mg/L		03-OCT-21	R5607158
Phosphorus (P)-Dissolved	17.2		1.0	mg/L		03-OCT-21	R5607158
Potassium (K)-Dissolved	45.2		1.0	mg/L		03-OCT-21	R5607158
Rubidium (Rb)-Dissolved	0.0133		0.0040	mg/L		03-OCT-21	R5607158

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2644364-7 SECONDARY LEACHATE CELL 4 (SC4)							
Sampled By: MURRAY on 27-SEP-21							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Selenium (Se)-Dissolved	0.0052		0.0010	mg/L		03-OCT-21	R5607158
Silicon (Si)-Dissolved	15.4		1.0	mg/L		03-OCT-21	R5607158
Silver (Ag)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Sodium (Na)-Dissolved	2990		1.0	mg/L		03-OCT-21	R5607158
Strontium (Sr)-Dissolved	5.69		0.0040	mg/L		03-OCT-21	R5607158
Sulfur (S)-Dissolved	1400		10	mg/L		03-OCT-21	R5607158
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		03-OCT-21	R5607158
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		03-OCT-21	R5607158
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		03-OCT-21	R5607158
Titanium (Ti)-Dissolved	0.0257		0.0060	mg/L		03-OCT-21	R5607158
Tungsten (W)-Dissolved	0.0094		0.0020	mg/L		03-OCT-21	R5607158
Uranium (U)-Dissolved	0.0243		0.00020	mg/L		03-OCT-21	R5607158
Vanadium (V)-Dissolved	2.38		0.010	mg/L		03-OCT-21	R5607158
Zinc (Zn)-Dissolved	<0.020	DLDS	0.020	mg/L		03-OCT-21	R5607158
Zirconium (Zr)-Dissolved	0.0411		0.0040	mg/L		03-OCT-21	R5607158
Fluoride in Water by IC							
Fluoride (F)	0.44	DLDS	0.40	mg/L		28-SEP-21	R5604723
Ion Balance Calculation							
Ion Balance	96.5			%		04-OCT-21	
TDS (Calculated)	11900			mg/L		04-OCT-21	
Hardness (as CaCO3)	2690			mg/L		04-OCT-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		28-SEP-21	R5604723
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		29-SEP-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		28-SEP-21	R5604723
Sulfate in Water by IC							
Sulfate (SO4)	4120	DLDS	6.0	mg/L		28-SEP-21	R5604723
pH, Conductivity and Total Alkalinity							
pH	8.03		0.10	pH		28-SEP-21	R5604420
Conductivity (EC)	15800		2.0	uS/cm		28-SEP-21	R5604420
Bicarbonate (HCO3)	3270		5.0	mg/L		28-SEP-21	R5604420
Carbonate (CO3)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Hydroxide (OH)	<5.0		5.0	mg/L		28-SEP-21	R5604420
Alkalinity, Total (as CaCO3)	2680		2.0	mg/L		28-SEP-21	R5604420

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
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).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRR	Refer to Report Remarks for issues regarding this analysis
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method.			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-T-COL-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
CR-CR6-DIS-WT	Water	Dissolved Hexavalent Chromium in Water	EPA 7199
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Chromium (III) is calculated as the difference between the total chromium and the chromium (VI) results.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.			
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
P-TD-COL-ED	Water	Total Dissolved P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H2SO4 is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-ED	Water	Total Dissolved Solids	APHA 2540 C
Gravimetric determination of solids in waters by filtration and evaporating filtrate to dryness at 180 degrees Celsius.			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-CL	Water	Total Kjeldahl Nitrogen by Fluorescence	APHA 4500-NORG (TKN)
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-790953

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

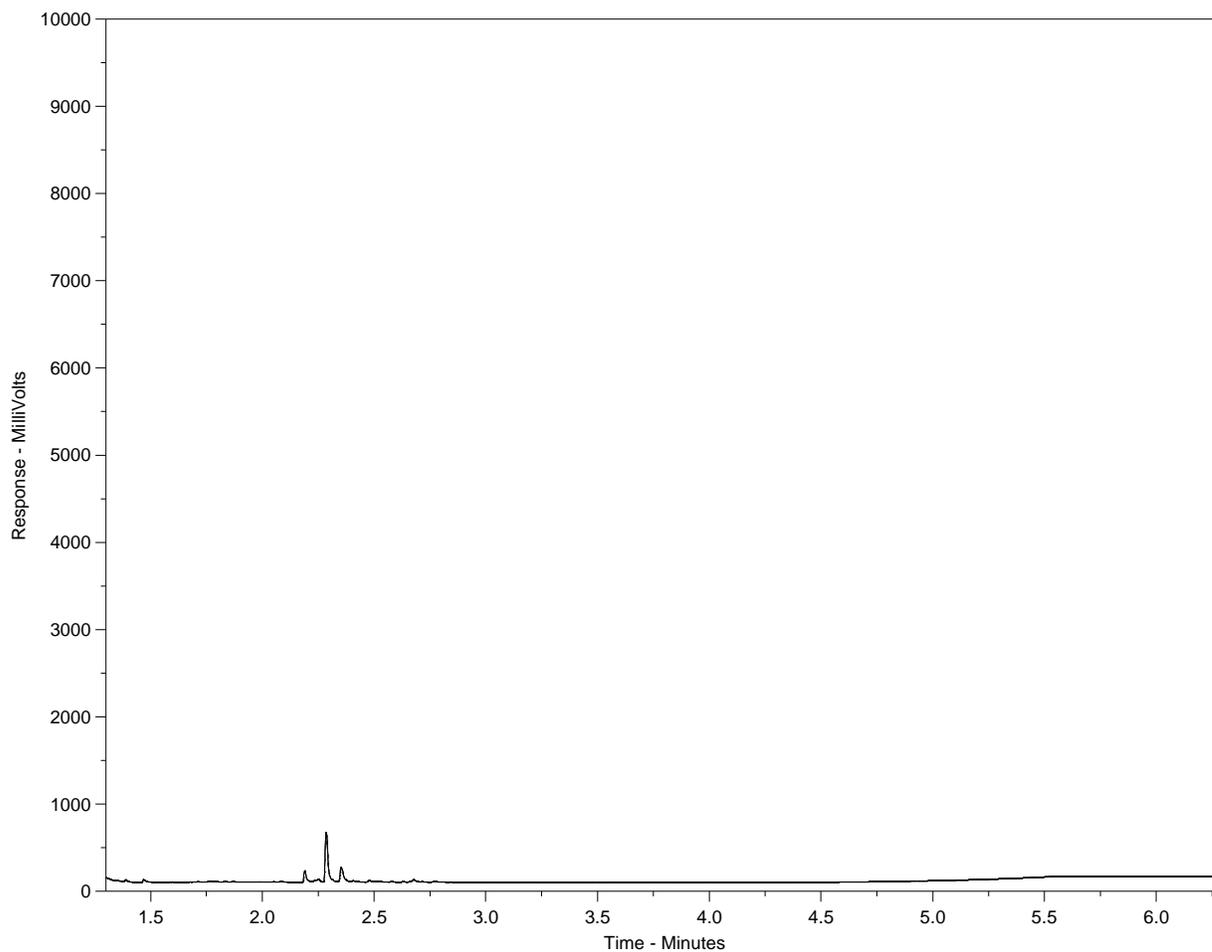
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Hydrocarbon Distribution Report



ALS Sample ID: L2644364-1
 Client ID: SECONDARY LEACHATE CELL 2 (SC2)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

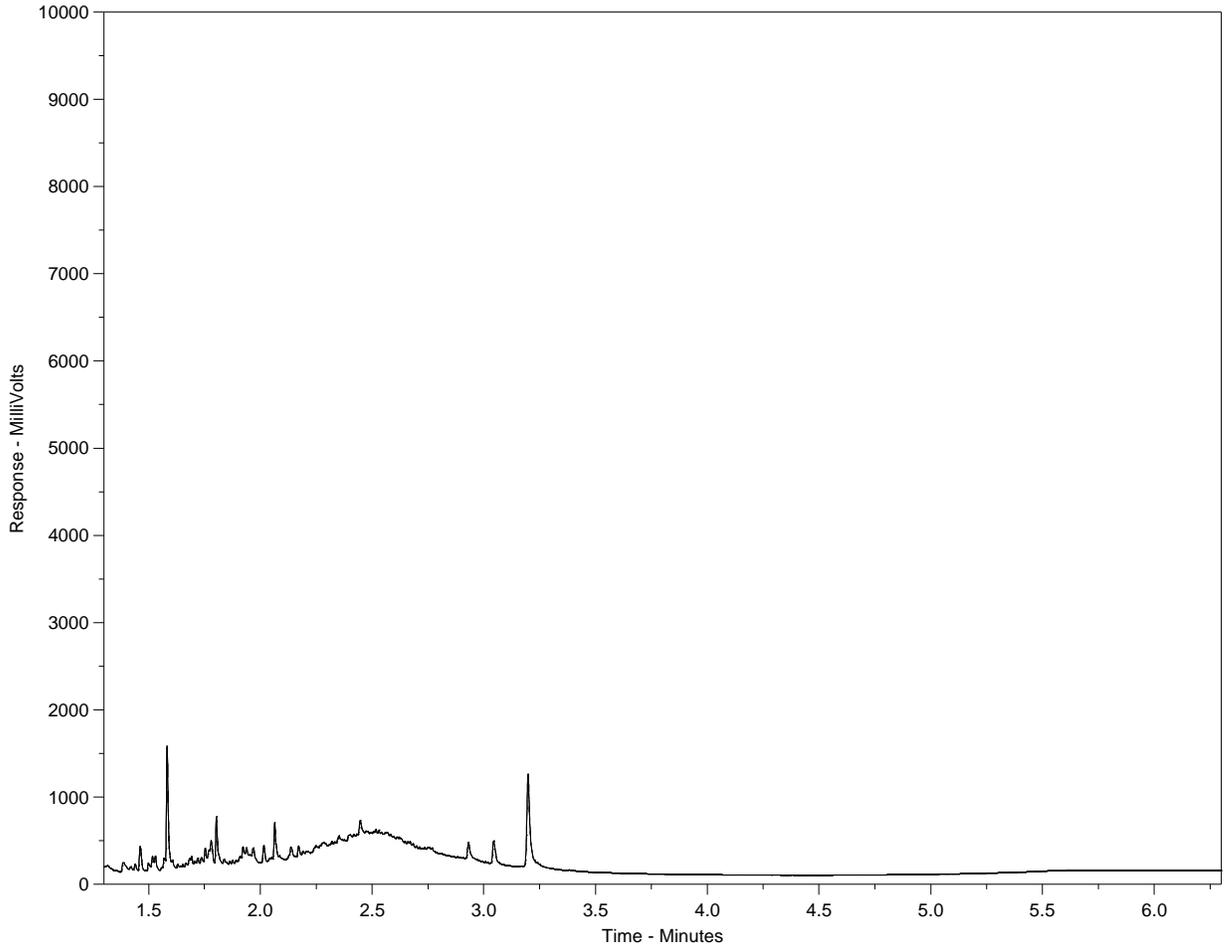
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644364-2
 Client ID: SECONDARY LEACHATE CELL 3A (SC3A)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

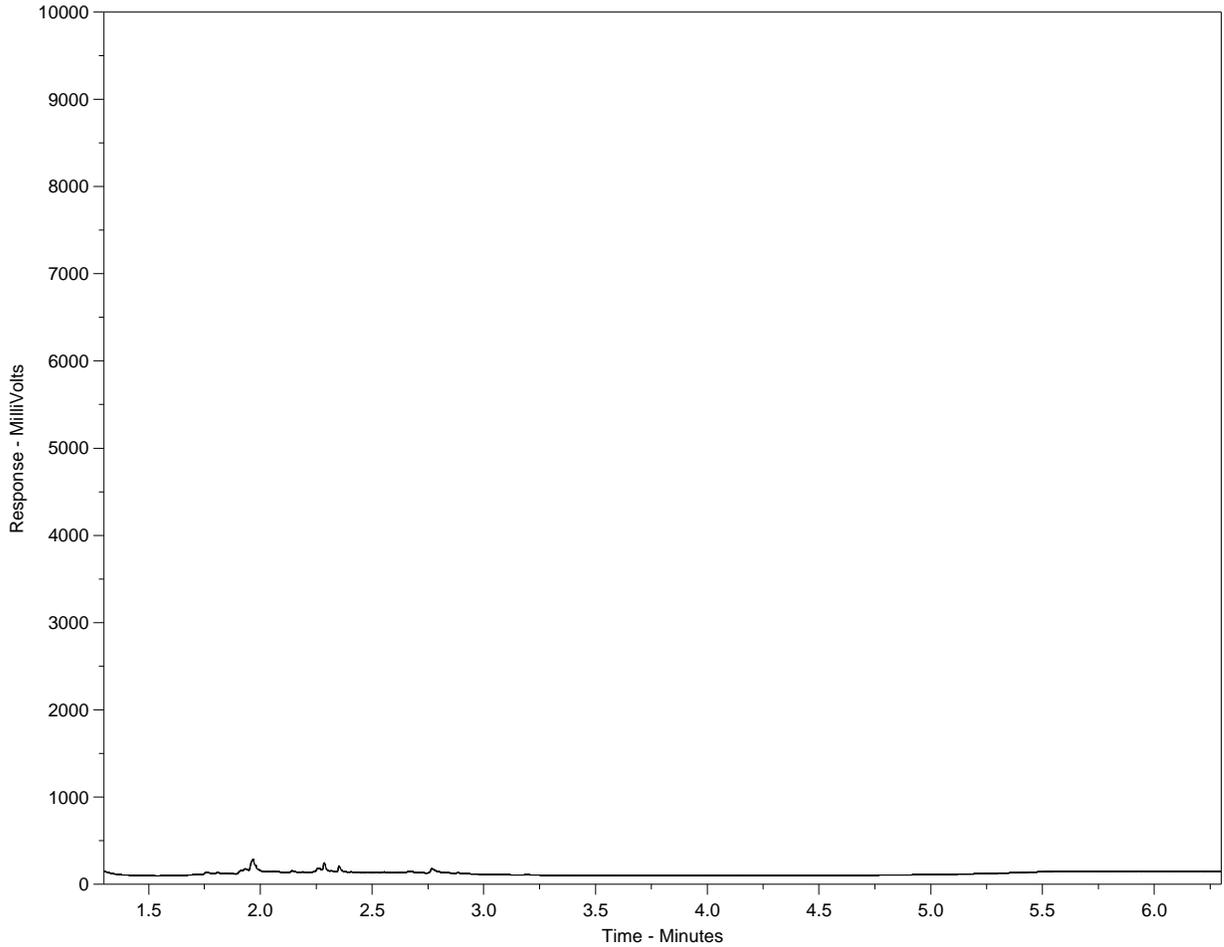
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644364-3
 Client ID: SECONDARY LEACHATE CELL 3B (SC3B)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

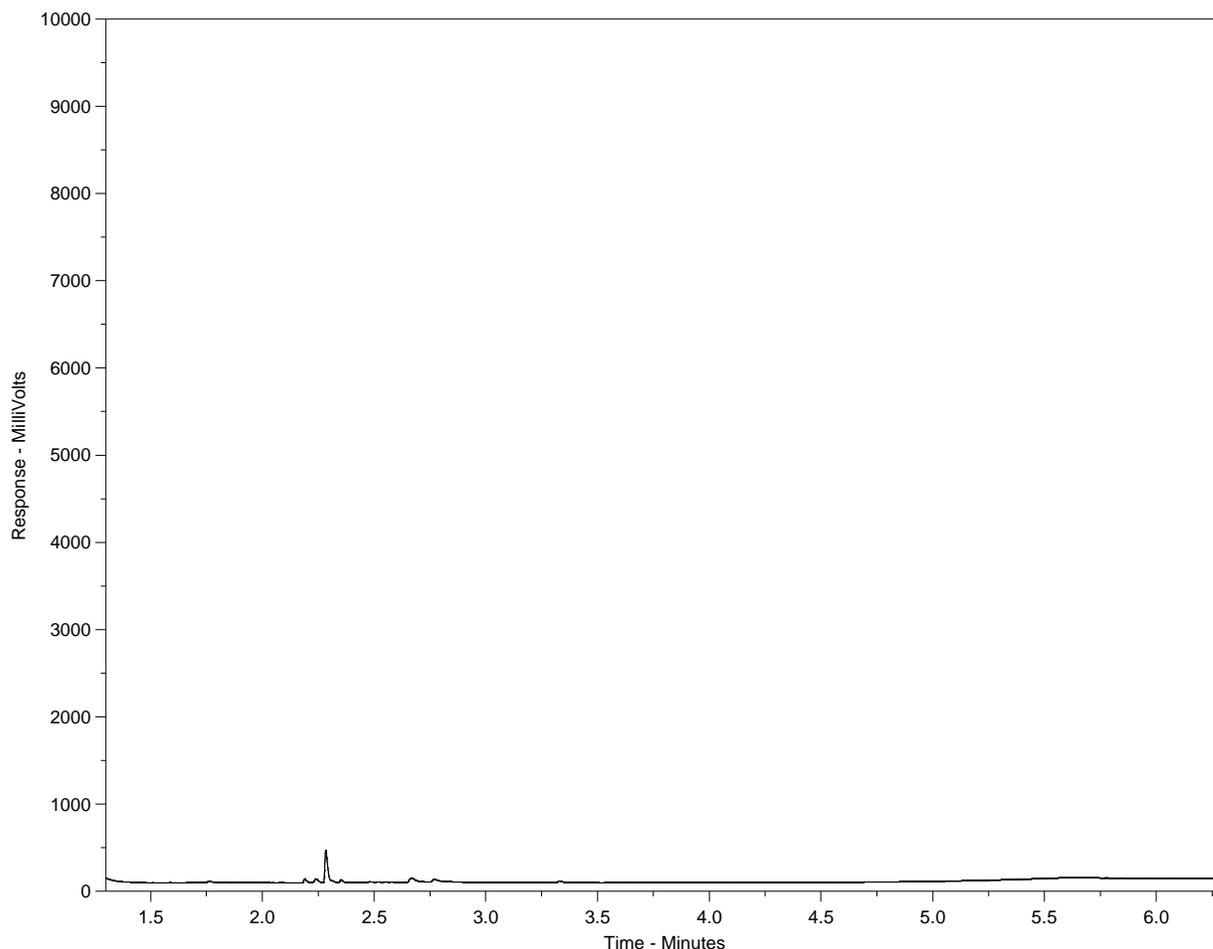
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644364-4
 Client ID: SECONDARY LEACHATE CELL 3A (SC3C)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

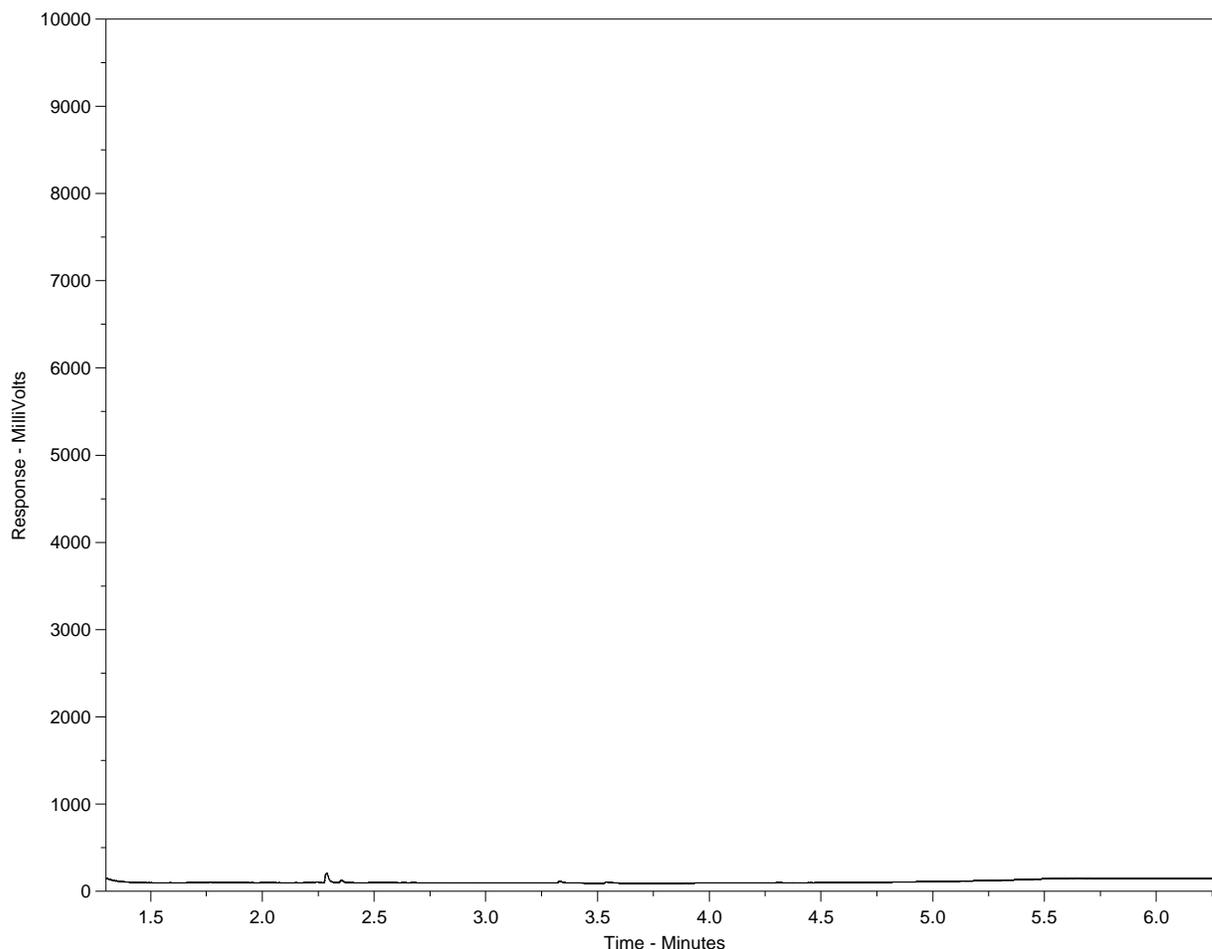
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644364-5
 Client ID: SECONDARY LEACHATE CELL 3D (SC3D)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

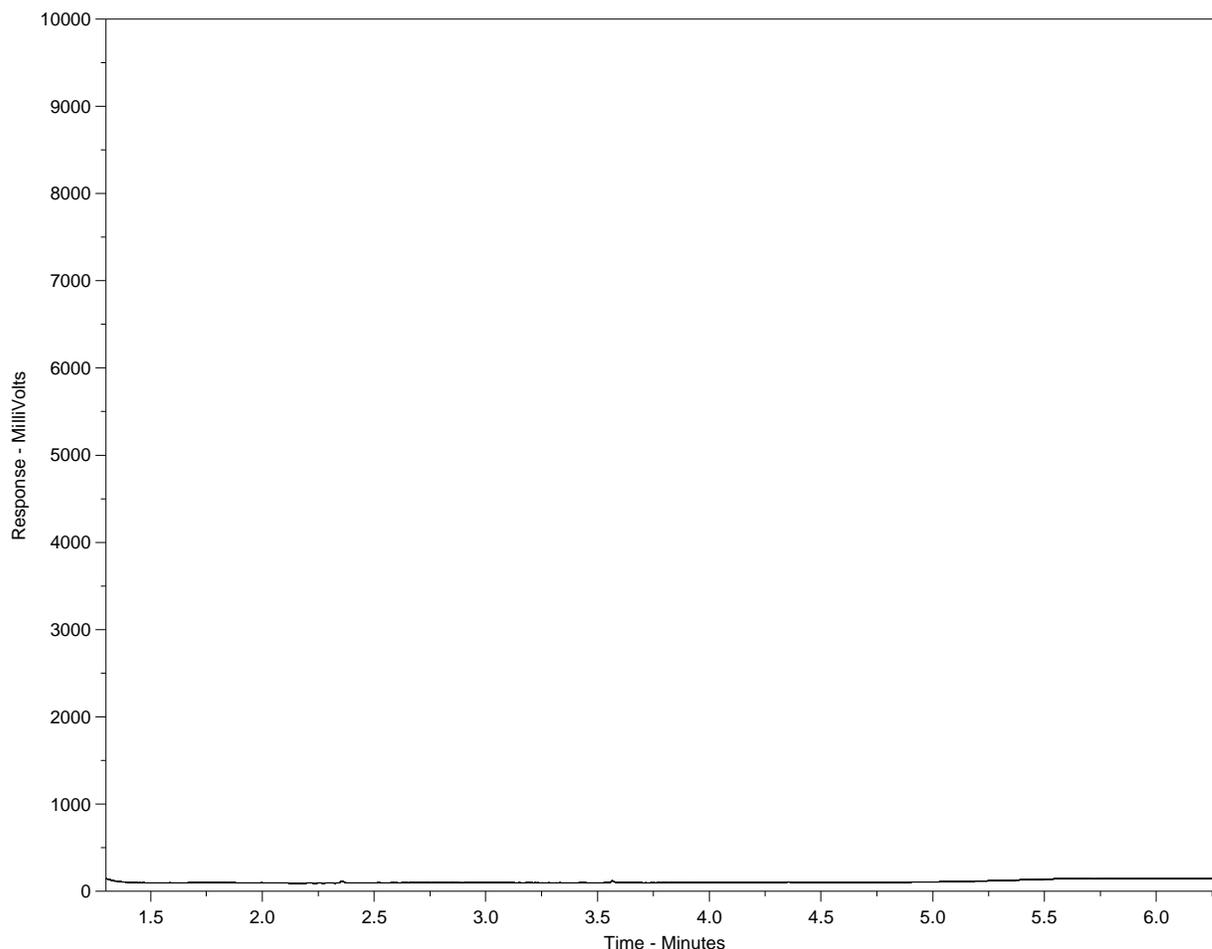
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644364-6
 Client ID: SECONDARY LEACHATE CELL 3E (SC3E)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

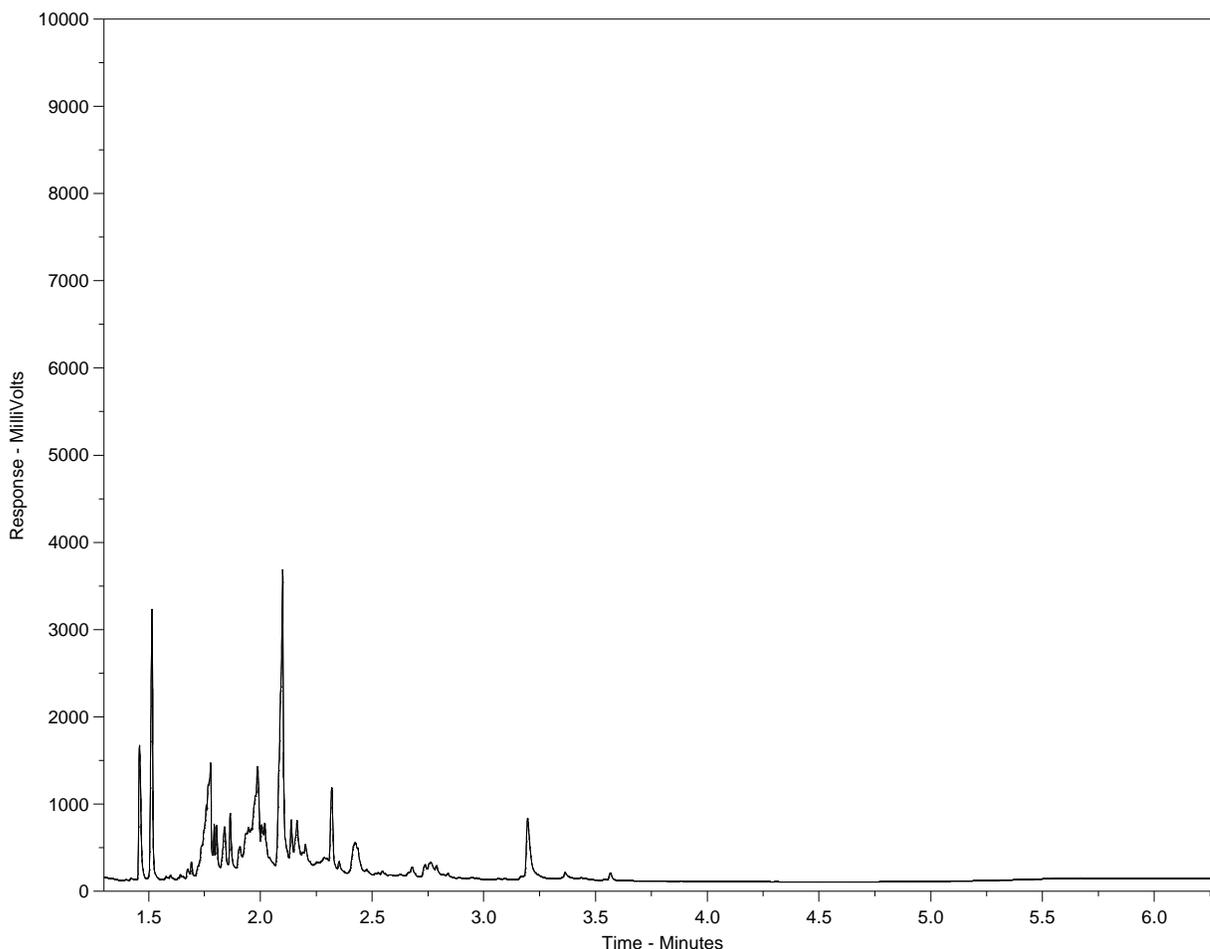
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2644364-7
 Client ID: SECONDARY LEACHATE CELL 4 (SC4)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34	nC50		
174°C	287°C			481°C	575°C		
346°F	549°F			898°F	1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.



L2644364-COFC

COC Number: 17 - 790953

Page () of ()

Canada Toll Free: 1 800 668 9878

Report To Contact and company name below will appear on the final report		Report Format / Distribution			Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply									
Company: <u>Clean Harbors Canada</u>		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			Emergency <input type="checkbox"/> 1 Business day [E - 100%]									
Contact: <u>Todd Webb, Stan Yuha</u>		Quality Control (QC) Report with Report <input type="checkbox"/> YES <input type="checkbox"/> NO			Same Day, Weekend or Statutory holiday [E2 - 200% (Laboratory opening fees may apply)] <input type="checkbox"/>									
Phone: <u>(781) 663-2513</u>		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked			2 day [P2-50%] <input type="checkbox"/>									
Company address below will appear on the final report		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm									
Street: <u>PO Box 390, 50114 Range Road 173</u>		Email 1 or Fax: <u>Webb.todd@cleanharbors.com</u>			For tests that can not be performed according to the service level selected, you will be contacted.									
City/Province: <u>Riverview, AB</u>		Email 2: <u>Yuha.Stan@cleanharbors.com</u>			Analysis Request Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below									
Postal Code: <u>T0B 4A0</u>		Email 3:												
Invoice To: Same as Report To <input type="checkbox"/> YES <input type="checkbox"/> NO		Invoice Distribution			NUMBER OF CONTAINERS <u>Table 4.4A: Leachate + Leach Detection Monitoring</u>									
Copy of Invoice with Report <input type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX							SAMPLES ON HOLD SUSPECTED HAZARD (see Special Instructions)					
Company: <u>Clean Harbors Canada</u>		Email 1 or Fax: <u>Gooding.Robbi@cleanharbors.com</u>												
Contact: <u>Robbi Gooding</u>		Email 2:												
Project Information		Oil and Gas Required Fields (client use)												
ALS Account # / Quote #:		AFE/Cost Center:	PO#											
Job #: <u>Secondary Leachate Qtr 3</u>		Major/Minor Code:	Routing Code:											
PO / AFE:		Requisitioner:												
LSD:		Location:												
ALS Lab Work Order # (lab use only): <u>L2644364</u>		ALS Contact:	Sampler: <u>Murray</u>											
ALS Sample # (lab 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 <u>Table 4.4A: Leachate + Leach Detection Monitoring</u>								
	<u>Secondary Leachate Cell 2 (SC2)</u>		<u>27-Sep-21</u>						SAMPLES ON HOLD SUSPECTED HAZARD (see Special Instructions)					
	<u>Secondary Leachate Cell 3A (SC 3A)</u>		<u>27-Sep-21</u>											
	<u>Secondary Leachate Cell 3B (SC 3B)</u>		<u>27-Sep-21</u>											
	<u>Secondary Leachate Cell 3C (SC 3C)</u>		<u>27-Sep-21</u>											
	<u>Secondary Leachate Cell 3D (SC 3D)</u>		<u>27-Sep-21</u>											
	<u>Secondary Leachate Cell 3E (SC 3E)</u>		<u>27-Sep-21</u>											
	<u>Secondary Leachate Cell 4 (SC 4)</u>		<u>27-Sep-21</u>											
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)			SAMPLE CONDITION AS RECEIVED (lab use only)									
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO		<u>Analyze as per Quote Q82438</u> <u>Table 4.4A package (attached)</u>			Frozen <input type="checkbox"/> SIF Observations: Yes <input type="checkbox"/> No <input type="checkbox"/>									
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO					Ice Packs <input checked="" type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact: Yes <input type="checkbox"/> No <input type="checkbox"/>									
					Cooling Initiated <input type="checkbox"/>		INITIAL COOLER TEMPERATURES °C							
					<u>14.1</u> <u>15.2</u> <u>13.9</u>		FINAL COOLER TEMPERATURES °C							
SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)								
Released by: <u>Todd Webb</u>	Date: <u>September 27th 2021</u>	Time: <u>15:00</u>	Received by: <u>[Signature]</u>	Date: <u>27 Sep 21</u>	Time: <u>6:10</u>	Received by:	Date:	Time:						

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

APPENDIX F

Leak Detection Liquid Analysis

Quarter 4



Clean Harbors Canada Inc.
ATTN: Todd Webb/Stan Yuha
PO BOX 390
RYLEY AB TOB 4A0

Date Received: 30-NOV-21
Report Date: 09-DEC-21 16:04 (MT)
Version: FINAL

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2667959
Project P.O. #: 221434
Job Reference: SECONDARY LEACHATE QTR 4
C of C Numbers: 20-973263
Legal Site Desc:


Kieran Tordoff
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9450 17 Avenue NW, Edmonton, AB T6N 1M9 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667959-1 SECONDARY LEACHATE CELL 2 (SC2)							
Sampled By: MU on 29-NOV-21 @ 11:00							
Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
Toluene	0.00062		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
EthylBenzene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
m+p-Xylene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
o-Xylene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
Styrene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
F1(C6-C10)	<0.10		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
F1-BTEX	<0.10		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
Xylenes	<0.00071		0.00071	mg/L	03-DEC-21	03-DEC-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	101.7		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	80.9		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	119.2		70-130	%	03-DEC-21	03-DEC-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	0.12		0.10	mg/L	01-DEC-21	01-DEC-21	R5664282
Surrogate: 2-Bromobenzotrifluoride	95.2		60-140	%	01-DEC-21	01-DEC-21	R5664282
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0026		0.0020	mg/L		02-DEC-21	R5662176
Miscellaneous Parameters							
Ammonia, Total (as N)	14.6		2.5	mg/L		02-DEC-21	R5663578
Chemical Oxygen Demand	25500	DLHC	200	mg/L		07-DEC-21	R5669320
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		03-DEC-21	R5665804
Dissolved Organic Carbon	68		20	mg/L		02-DEC-21	R5663856
Phenols (4AAP)	<0.0010		0.0010	mg/L		01-DEC-21	R5661817
Phosphorus (P)-Total Dissolved	0.159		0.020	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Dissolved Solids	12100	DLHC	80	mg/L		03-DEC-21	R5664636
Total Kjeldahl Nitrogen	17.2		2.0	mg/L		04-DEC-21	R5664865
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		01-DEC-21	R5660207
Phosphorus (P)-Total	0.923		0.020	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Suspended Solids	11.2		3.0	mg/L		03-DEC-21	R5664956
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	376	DLDS	10	mg/L		01-DEC-21	R5661417
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-DEC-21	R5660853
Aluminum (Al)-Dissolved	0.859		0.020	mg/L		02-DEC-21	R5662176
Antimony (Sb)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Arsenic (As)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Barium (Ba)-Dissolved	0.0293		0.0020	mg/L		02-DEC-21	R5662176
Beryllium (Be)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Bismuth (Bi)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Boron (B)-Dissolved	0.87		0.20	mg/L		03-DEC-21	R5664221
Cadmium (Cd)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Calcium (Ca)-Dissolved	399		1.0	mg/L		02-DEC-21	R5662176
Cesium (Cs)-Dissolved	0.00092		0.00020	mg/L		02-DEC-21	R5662176
Chromium (Cr)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Cobalt (Co)-Dissolved	0.0209		0.0020	mg/L		02-DEC-21	R5662176
Copper (Cu)-Dissolved	0.0125		0.0040	mg/L		02-DEC-21	R5662176
Iron (Fe)-Dissolved	0.22		0.20	mg/L		02-DEC-21	R5662176
Lead (Pb)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667959-1 SECONDARY LEACHATE CELL 2 (SC2) Sampled By: MU on 29-NOV-21 @ 11:00 Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.658		0.020	mg/L		02-DEC-21	R5662176
Magnesium (Mg)-Dissolved	243		0.10	mg/L		02-DEC-21	R5662176
Manganese (Mn)-Dissolved	16.2		0.0020	mg/L		02-DEC-21	R5662176
Molybdenum (Mo)-Dissolved	0.239		0.0010	mg/L		02-DEC-21	R5662176
Nickel (Ni)-Dissolved	0.064		0.010	mg/L		02-DEC-21	R5662176
Phosphorus (P)-Dissolved	<1.0	DLM	1.0	mg/L		02-DEC-21	R5662176
Potassium (K)-Dissolved	41.6		1.0	mg/L		02-DEC-21	R5662176
Rubidium (Rb)-Dissolved	0.0340		0.0040	mg/L		02-DEC-21	R5662176
Selenium (Se)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Silicon (Si)-Dissolved	17.9		1.0	mg/L		02-DEC-21	R5662176
Silver (Ag)-Dissolved	<0.00020	DLM	0.00020	mg/L		02-DEC-21	R5662176
Sodium (Na)-Dissolved	3480		1.0	mg/L		02-DEC-21	R5662176
Strontium (Sr)-Dissolved	7.77		0.0040	mg/L		02-DEC-21	R5662176
Sulfur (S)-Dissolved	3120		10	mg/L		02-DEC-21	R5662176
Tellurium (Te)-Dissolved	<0.0040	DLM	0.0040	mg/L		02-DEC-21	R5662176
Thallium (Tl)-Dissolved	<0.00020	DLM	0.00020	mg/L		02-DEC-21	R5662176
Thorium (Th)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Tin (Sn)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Titanium (Ti)-Dissolved	<0.0060	DLM	0.0060	mg/L		02-DEC-21	R5662176
Tungsten (W)-Dissolved	0.0569		0.0020	mg/L		02-DEC-21	R5662176
Uranium (U)-Dissolved	0.00167		0.00020	mg/L		02-DEC-21	R5662176
Vanadium (V)-Dissolved	<0.010	DLM	0.010	mg/L		02-DEC-21	R5662176
Zinc (Zn)-Dissolved	0.114		0.020	mg/L		02-DEC-21	R5662176
Zirconium (Zr)-Dissolved	<0.0040	DLM	0.0040	mg/L		02-DEC-21	R5662176
Fluoride in Water by IC							
Fluoride (F)	2.75	DLDS	0.40	mg/L		01-DEC-21	R5661417
Ion Balance Calculation							
Ion Balance	87.3	BL:INT		%		04-DEC-21	
TDS (Calculated)	14600			mg/L		04-DEC-21	
Hardness (as CaCO3)	2000			mg/L		04-DEC-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-21	R5661417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-DEC-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-21	R5661417
Sulfate in Water by IC							
Sulfate (SO4)	10000	DLDS	6.0	mg/L		01-DEC-21	R5661417
pH, Conductivity and Total Alkalinity							
pH	6.50		0.10	pH		01-DEC-21	R5660860
Conductivity (EC)	14100		2.0	uS/cm		01-DEC-21	R5660860
Bicarbonate (HCO3)	149		5.0	mg/L		01-DEC-21	R5660860
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Alkalinity, Total (as CaCO3)	122		2.0	mg/L		01-DEC-21	R5660860
L2667959-2 SECONDARY LEACHATE CELL 3A (SC3A) Sampled By: MU on 29-NOV-21 @ 11:00 Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00075	DLM	0.00075	mg/L	03-DEC-21	03-DEC-21	R5653949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667959-2 SECONDARY LEACHATE CELL 3A (SC3A)							
Sampled By: MU on 29-NOV-21 @ 11:00							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
Toluene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
EthylBenzene	<0.00065	DLM	0.00065	mg/L	03-DEC-21	03-DEC-21	R5653949
m+p-Xylene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
o-Xylene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
Styrene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
F1(C6-C10)	<0.10		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
F1-BTEX	<0.10		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
Xylenes	<0.00071		0.00071	mg/L	03-DEC-21	03-DEC-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	99.6		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	76.8		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	122.0		70-130	%	03-DEC-21	03-DEC-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	01-DEC-21	01-DEC-21	R5664282
Surrogate: 2-Bromobenzotrifluoride	95.5		60-140	%	01-DEC-21	01-DEC-21	R5664282
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0092		0.0010	mg/L		02-DEC-21	R5662176
Miscellaneous Parameters							
Ammonia, Total (as N)	16.7		2.5	mg/L		02-DEC-21	R5663578
Chemical Oxygen Demand	400	DLM	200	mg/L		07-DEC-21	R5669320
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		03-DEC-21	R5665804
Dissolved Organic Carbon	96		20	mg/L		02-DEC-21	R5663856
Phenols (4AAP)	<0.0010		0.0010	mg/L		01-DEC-21	R5661817
Phosphorus (P)-Total Dissolved	0.096		0.020	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Dissolved Solids	10800	DLHC	80	mg/L		06-DEC-21	R5666737
Total Kjeldahl Nitrogen	23.2		2.0	mg/L		04-DEC-21	R5664865
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		01-DEC-21	R5660207
Phosphorus (P)-Total	0.247		0.020	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Suspended Solids	83.8		3.0	mg/L		03-DEC-21	R5664956
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	483	DLDS	10	mg/L		01-DEC-21	R5661417
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-DEC-21	R5660853
Aluminum (Al)-Dissolved	0.034		0.010	mg/L		02-DEC-21	R5662176
Antimony (Sb)-Dissolved	0.0025		0.0010	mg/L		02-DEC-21	R5662176
Arsenic (As)-Dissolved	0.0033		0.0010	mg/L		02-DEC-21	R5662176
Barium (Ba)-Dissolved	0.0647		0.0010	mg/L		02-DEC-21	R5662176
Beryllium (Be)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Bismuth (Bi)-Dissolved	<0.00050	DLM	0.00050	mg/L		02-DEC-21	R5662176
Boron (B)-Dissolved	0.27		0.10	mg/L		03-DEC-21	R5664221
Cadmium (Cd)-Dissolved	<0.000050	DLM	0.000050	mg/L		02-DEC-21	R5662176
Calcium (Ca)-Dissolved	324		0.50	mg/L		02-DEC-21	R5662176
Cesium (Cs)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Chromium (Cr)-Dissolved	0.0058		0.0010	mg/L		02-DEC-21	R5662176
Cobalt (Co)-Dissolved	0.0067		0.0010	mg/L		02-DEC-21	R5662176
Copper (Cu)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Iron (Fe)-Dissolved	2.36		0.10	mg/L		02-DEC-21	R5662176
Lead (Pb)-Dissolved	<0.00050	DLM	0.00050	mg/L		02-DEC-21	R5662176
Lithium (Li)-Dissolved	0.454		0.010	mg/L		02-DEC-21	R5662176
Magnesium (Mg)-Dissolved	228		0.10	mg/L		02-DEC-21	R5662176

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667959-2 SECONDARY LEACHATE CELL 3A (SC3A) Sampled By: MU on 29-NOV-21 @ 11:00 Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Manganese (Mn)-Dissolved	2.61		0.0010	mg/L		02-DEC-21	R5662176
Molybdenum (Mo)-Dissolved	0.157		0.00050	mg/L		02-DEC-21	R5662176
Nickel (Ni)-Dissolved	0.287		0.0050	mg/L		02-DEC-21	R5662176
Phosphorus (P)-Dissolved	<0.50	DLM	0.50	mg/L		02-DEC-21	R5662176
Potassium (K)-Dissolved	36.4		0.50	mg/L		02-DEC-21	R5662176
Rubidium (Rb)-Dissolved	0.0294		0.0020	mg/L		02-DEC-21	R5662176
Selenium (Se)-Dissolved	0.00058		0.00050	mg/L		02-DEC-21	R5662176
Silicon (Si)-Dissolved	6.78		0.50	mg/L		02-DEC-21	R5662176
Silver (Ag)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Sodium (Na)-Dissolved	2480		1.0	mg/L		02-DEC-21	R5662176
Strontium (Sr)-Dissolved	4.27		0.0020	mg/L		02-DEC-21	R5662176
Sulfur (S)-Dissolved	1950		5.0	mg/L		02-DEC-21	R5662176
Tellurium (Te)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Thallium (Tl)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Thorium (Th)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Tin (Sn)-Dissolved	0.0064		0.0010	mg/L		02-DEC-21	R5662176
Titanium (Ti)-Dissolved	<0.0030	DLM	0.0030	mg/L		02-DEC-21	R5662176
Tungsten (W)-Dissolved	0.0260		0.0010	mg/L		02-DEC-21	R5662176
Uranium (U)-Dissolved	0.0419		0.00010	mg/L		02-DEC-21	R5662176
Vanadium (V)-Dissolved	<0.0050	DLM	0.0050	mg/L		02-DEC-21	R5662176
Zinc (Zn)-Dissolved	0.059		0.010	mg/L		02-DEC-21	R5662176
Zirconium (Zr)-Dissolved	0.0044		0.0020	mg/L		02-DEC-21	R5662176
Fluoride in Water by IC							
Fluoride (F)	0.68	DLDS	0.40	mg/L		01-DEC-21	R5661417
Ion Balance Calculation							
Ion Balance	87.9	BL:INT		%		06-DEC-21	
TDS (Calculated)	10500			mg/L		06-DEC-21	
Hardness (as CaCO3)	1750			mg/L		06-DEC-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-21	R5661417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-DEC-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-21	R5661417
Sulfate in Water by IC							
Sulfate (SO4)	6370	DLDS	6.0	mg/L		01-DEC-21	R5661417
pH, Conductivity and Total Alkalinity							
pH	7.52		0.10	pH		01-DEC-21	R5660860
Conductivity (EC)	10700		2.0	uS/cm		01-DEC-21	R5660860
Bicarbonate (HCO3)	1140		5.0	mg/L		01-DEC-21	R5660860
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Alkalinity, Total (as CaCO3)	937	DLHC	20	mg/L		01-DEC-21	R5660860
L2667959-3 SECONDARY LEACHATE CELL 3B (SC3B) Sampled By: MU on 29-NOV-21 @ 11:00 Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
Toluene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
EthylBenzene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667959-3 SECONDARY LEACHATE CELL 3B (SC3B)							
Sampled By: MU on 29-NOV-21 @ 11:00							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
m+p-Xylene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
o-Xylene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
Styrene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
F1(C6-C10)	<0.10		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
F1-BTEX	<0.10		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
Xylenes	<0.00071		0.00071	mg/L	03-DEC-21	03-DEC-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	99.4		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	79.1		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	124.5		70-130	%	03-DEC-21	03-DEC-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	0.46		0.10	mg/L	01-DEC-21	01-DEC-21	R5664282
Surrogate: 2-Bromobenzotrifluoride	93.4		60-140	%	01-DEC-21	01-DEC-21	R5664282
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0337		0.0010	mg/L		02-DEC-21	R5662176
Miscellaneous Parameters							
Ammonia, Total (as N)	105		25	mg/L		02-DEC-21	R5663578
Chemical Oxygen Demand	680	DLM	200	mg/L		07-DEC-21	R5669320
Chromium (VI)-Dissolved	0.00071		0.00050	mg/L		03-DEC-21	R5665804
Dissolved Organic Carbon	194		20	mg/L		02-DEC-21	R5663856
Phenols (4AAP)	0.322	DLHC	0.010	mg/L		01-DEC-21	R5661817
Phosphorus (P)-Total Dissolved	6.63	DLHC	0.10	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Dissolved Solids	10800	DLHC	20	mg/L		03-DEC-21	R5664636
Total Kjeldahl Nitrogen	119		10	mg/L		04-DEC-21	R5664865
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		01-DEC-21	R5660207
Phosphorus (P)-Total	6.80	DLHC	0.10	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Suspended Solids	10.6		3.0	mg/L		03-DEC-21	R5664956
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	1030	DLDS	10	mg/L		01-DEC-21	R5661417
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-DEC-21	R5660853
Aluminum (Al)-Dissolved	0.011		0.010	mg/L		02-DEC-21	R5662176
Antimony (Sb)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Arsenic (As)-Dissolved	0.0105		0.0010	mg/L		02-DEC-21	R5662176
Barium (Ba)-Dissolved	0.0943		0.0010	mg/L		02-DEC-21	R5662176
Beryllium (Be)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Bismuth (Bi)-Dissolved	<0.00050	DLM	0.00050	mg/L		02-DEC-21	R5662176
Boron (B)-Dissolved	12.0		0.10	mg/L		02-DEC-21	R5662176
Cadmium (Cd)-Dissolved	0.000204		0.000050	mg/L		02-DEC-21	R5662176
Calcium (Ca)-Dissolved	282		0.50	mg/L		02-DEC-21	R5662176
Cesium (Cs)-Dissolved	0.00586		0.00010	mg/L		02-DEC-21	R5662176
Chromium (Cr)-Dissolved	0.0290		0.0010	mg/L		02-DEC-21	R5662176
Cobalt (Co)-Dissolved	0.0024		0.0010	mg/L		02-DEC-21	R5662176
Copper (Cu)-Dissolved	0.0034		0.0020	mg/L		02-DEC-21	R5662176
Iron (Fe)-Dissolved	0.46		0.10	mg/L		02-DEC-21	R5662176
Lead (Pb)-Dissolved	<0.00050	DLM	0.00050	mg/L		02-DEC-21	R5662176
Lithium (Li)-Dissolved	0.907		0.010	mg/L		02-DEC-21	R5662176
Magnesium (Mg)-Dissolved	263		0.10	mg/L		02-DEC-21	R5662176
Manganese (Mn)-Dissolved	1.49		0.0010	mg/L		02-DEC-21	R5662176
Molybdenum (Mo)-Dissolved	0.864		0.00050	mg/L		02-DEC-21	R5662176

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667959-3 SECONDARY LEACHATE CELL 3B (SC3B) Sampled By: MU on 29-NOV-21 @ 11:00 Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Nickel (Ni)-Dissolved	0.0983		0.0050	mg/L		02-DEC-21	R5662176
Phosphorus (P)-Dissolved	6.77		0.50	mg/L		02-DEC-21	R5662176
Potassium (K)-Dissolved	255		0.50	mg/L		02-DEC-21	R5662176
Rubidium (Rb)-Dissolved	0.358		0.0020	mg/L		02-DEC-21	R5662176
Selenium (Se)-Dissolved	0.00300		0.00050	mg/L		02-DEC-21	R5662176
Silicon (Si)-Dissolved	10.5		0.50	mg/L		02-DEC-21	R5662176
Silver (Ag)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Sodium (Na)-Dissolved	3340		1.0	mg/L		02-DEC-21	R5662176
Strontium (Sr)-Dissolved	3.69		0.0020	mg/L		02-DEC-21	R5662176
Sulfur (S)-Dissolved	2210		5.0	mg/L		02-DEC-21	R5662176
Tellurium (Te)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Thallium (Tl)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Thorium (Th)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Tin (Sn)-Dissolved	0.0013		0.0010	mg/L		02-DEC-21	R5662176
Titanium (Ti)-Dissolved	0.0123		0.0030	mg/L		02-DEC-21	R5662176
Tungsten (W)-Dissolved	0.739		0.0010	mg/L		02-DEC-21	R5662176
Uranium (U)-Dissolved	0.0137		0.00010	mg/L		02-DEC-21	R5662176
Vanadium (V)-Dissolved	0.0233		0.0050	mg/L		02-DEC-21	R5662176
Zinc (Zn)-Dissolved	<0.010	DLM	0.010	mg/L		02-DEC-21	R5662176
Zirconium (Zr)-Dissolved	0.0089		0.0020	mg/L		02-DEC-21	R5662176
Fluoride in Water by IC							
Fluoride (F)	<0.40	DLDS	0.40	mg/L		01-DEC-21	R5661417
Ion Balance Calculation							
Ion Balance	91.6			%		04-DEC-21	
TDS (Calculated)	13200			mg/L		04-DEC-21	
Hardness (as CaCO3)	1790			mg/L		04-DEC-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-21	R5661417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-DEC-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-21	R5661417
Sulfate in Water by IC							
Sulfate (SO4)	6750	DLDS	6.0	mg/L		01-DEC-21	R5661417
pH, Conductivity and Total Alkalinity							
pH	8.15		0.10	pH		01-DEC-21	R5660860
Conductivity (EC)	14200		2.0	uS/cm		01-DEC-21	R5660860
Bicarbonate (HCO3)	2600		5.0	mg/L		01-DEC-21	R5660860
Carbonate (CO3)	22.8		5.0	mg/L		01-DEC-21	R5660860
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Alkalinity, Total (as CaCO3)	2170	DLHC	20	mg/L		01-DEC-21	R5660860
L2667959-4 SECONDARY LEACHATE CELL 4 (SC4) Sampled By: MU on 29-NOV-21 @ 11:00 Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
Toluene	<0.00055	DLM	0.00055	mg/L	03-DEC-21	03-DEC-21	R5653949
EthylBenzene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
m+p-Xylene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
o-Xylene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667959-4 SECONDARY LEACHATE CELL 4 (SC4)							
Sampled By: MU on 29-NOV-21 @ 11:00							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
Styrene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
F1(C6-C10)	<0.45	DLM	0.45	mg/L	03-DEC-21	03-DEC-21	R5653949
F1-BTEX	0.44		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
Xylenes	<0.00071		0.00071	mg/L	03-DEC-21	03-DEC-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	101.8		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	88.3		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	117.1		70-130	%	03-DEC-21	03-DEC-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	1.78		0.10	mg/L	01-DEC-21	01-DEC-21	R5664282
Surrogate: 2-Bromobenzotrifluoride	95.1		60-140	%	01-DEC-21	01-DEC-21	R5664282
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0081		0.0010	mg/L		02-DEC-21	R5662176
Miscellaneous Parameters							
Ammonia, Total (as N)	326		50	mg/L		02-DEC-21	R5663578
Chemical Oxygen Demand	2060	DLHC	200	mg/L		07-DEC-21	R5669320
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		03-DEC-21	R5665804
Dissolved Organic Carbon	435		20	mg/L		02-DEC-21	R5663856
Phenols (4AAP)	0.323	DLHC	0.010	mg/L		01-DEC-21	R5661817
Phosphorus (P)-Total Dissolved	3.31	DLHC	0.050	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Dissolved Solids	7580	DLHC	20	mg/L		03-DEC-21	R5664636
Total Kjeldahl Nitrogen	430		100	mg/L		03-DEC-21	R5664865
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		01-DEC-21	R5660207
Phosphorus (P)-Total	2.85	DLHC	0.050	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Suspended Solids	111	DLHC	8.0	mg/L		03-DEC-21	R5664956
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	1730	DLDS	10	mg/L		01-DEC-21	R5661417
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-DEC-21	R5660853
Aluminum (Al)-Dissolved	0.023		0.010	mg/L		02-DEC-21	R5662176
Antimony (Sb)-Dissolved	0.0054		0.0010	mg/L		02-DEC-21	R5662176
Arsenic (As)-Dissolved	0.0590		0.0010	mg/L		02-DEC-21	R5662176
Barium (Ba)-Dissolved	0.0670		0.0010	mg/L		02-DEC-21	R5662176
Beryllium (Be)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Bismuth (Bi)-Dissolved	<0.00050	DLM	0.00050	mg/L		02-DEC-21	R5662176
Boron (B)-Dissolved	36.7		0.10	mg/L		02-DEC-21	R5662176
Cadmium (Cd)-Dissolved	0.000398		0.000050	mg/L		02-DEC-21	R5662176
Calcium (Ca)-Dissolved	122		0.50	mg/L		02-DEC-21	R5662176
Cesium (Cs)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Chromium (Cr)-Dissolved	0.0075		0.0010	mg/L		02-DEC-21	R5662176
Cobalt (Co)-Dissolved	0.0047		0.0010	mg/L		02-DEC-21	R5662176
Copper (Cu)-Dissolved	0.0059		0.0020	mg/L		02-DEC-21	R5662176
Iron (Fe)-Dissolved	1.98		0.10	mg/L		02-DEC-21	R5662176
Lead (Pb)-Dissolved	<0.00050	DLM	0.00050	mg/L		02-DEC-21	R5662176
Lithium (Li)-Dissolved	0.267		0.010	mg/L		02-DEC-21	R5662176
Magnesium (Mg)-Dissolved	212		0.10	mg/L		02-DEC-21	R5662176
Manganese (Mn)-Dissolved	1.27		0.0010	mg/L		02-DEC-21	R5662176
Molybdenum (Mo)-Dissolved	1.64		0.00050	mg/L		02-DEC-21	R5662176
Nickel (Ni)-Dissolved	0.430		0.0050	mg/L		02-DEC-21	R5662176
Phosphorus (P)-Dissolved	4.22		0.50	mg/L		02-DEC-21	R5662176

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667959-4 SECONDARY LEACHATE CELL 4 (SC4) Sampled By: MU on 29-NOV-21 @ 11:00 Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Potassium (K)-Dissolved	65.7		0.50	mg/L		02-DEC-21	R5662176
Rubidium (Rb)-Dissolved	0.0144		0.0020	mg/L		02-DEC-21	R5662176
Selenium (Se)-Dissolved	0.00390		0.00050	mg/L		02-DEC-21	R5662176
Silicon (Si)-Dissolved	7.70		0.50	mg/L		02-DEC-21	R5662176
Silver (Ag)-Dissolved	0.00020		0.00010	mg/L		02-DEC-21	R5662176
Sodium (Na)-Dissolved	2980		1.0	mg/L		02-DEC-21	R5662176
Strontium (Sr)-Dissolved	2.39		0.0020	mg/L		02-DEC-21	R5662176
Sulfur (S)-Dissolved	960		5.0	mg/L		02-DEC-21	R5662176
Tellurium (Te)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Thallium (Tl)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Thorium (Th)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Tin (Sn)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Titanium (Ti)-Dissolved	0.0415		0.0030	mg/L		02-DEC-21	R5662176
Tungsten (W)-Dissolved	0.0078		0.0010	mg/L		02-DEC-21	R5662176
Uranium (U)-Dissolved	0.00894		0.00010	mg/L		02-DEC-21	R5662176
Vanadium (V)-Dissolved	0.869		0.0050	mg/L		02-DEC-21	R5662176
Zinc (Zn)-Dissolved	0.052		0.010	mg/L		02-DEC-21	R5662176
Zirconium (Zr)-Dissolved	0.122		0.0020	mg/L		02-DEC-21	R5662176
Fluoride in Water by IC							
Fluoride (F)	<0.40	DLDS	0.40	mg/L		01-DEC-21	R5661417
Ion Balance Calculation							
Ion Balance	91.4			%		04-DEC-21	
TDS (Calculated)	10500			mg/L		04-DEC-21	
Hardness (as CaCO3)	1180			mg/L		04-DEC-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-21	R5661417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-DEC-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-21	R5661417
Sulfate in Water by IC							
Sulfate (SO4)	2690	DLDS	6.0	mg/L		01-DEC-21	R5661417
pH, Conductivity and Total Alkalinity							
pH	8.00		0.10	pH		01-DEC-21	R5660860
Conductivity (EC)	14100		2.0	uS/cm		01-DEC-21	R5660860
Bicarbonate (HCO3)	5330		5.0	mg/L		01-DEC-21	R5660860
Carbonate (CO3)	84.0		5.0	mg/L		01-DEC-21	R5660860
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Alkalinity, Total (as CaCO3)	4510	DLHC	20	mg/L		01-DEC-21	R5660860
L2667959-5 SECONDARY LEACHATE CELL 1 (SC1) Sampled By: MU on 30-NOV-21 @ 11:00 Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00125	DLM	0.0013	mg/L	03-DEC-21	03-DEC-21	R5653949
Toluene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
EthylBenzene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
m+p-Xylene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
o-Xylene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
Styrene	<0.00050		0.00050	mg/L	03-DEC-21	03-DEC-21	R5653949
F1(C6-C10)	<0.10		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667959-5 SECONDARY LEACHATE CELL 1 (SC1)							
Sampled By: MU on 30-NOV-21 @ 11:00							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
F1-BTEX	<0.10		0.10	mg/L	03-DEC-21	03-DEC-21	R5653949
Xylenes	<0.00071		0.00071	mg/L	03-DEC-21	03-DEC-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	100.0		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	84.5		70-130	%	03-DEC-21	03-DEC-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	116.9		70-130	%	03-DEC-21	03-DEC-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	0.47		0.10	mg/L	01-DEC-21	01-DEC-21	R5664282
Surrogate: 2-Bromobenzotrifluoride	93.4		60-140	%	01-DEC-21	01-DEC-21	R5664282
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0722		0.0010	mg/L		02-DEC-21	R5662176
Miscellaneous Parameters							
Ammonia, Total (as N)	5.6		2.5	mg/L		02-DEC-21	R5663578
Chemical Oxygen Demand	750	DLM	200	mg/L		07-DEC-21	R5669320
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		03-DEC-21	R5665804
Dissolved Organic Carbon	282		1.0	mg/L		02-DEC-21	R5663856
Phenols (4AAP)	0.0051		0.0010	mg/L		01-DEC-21	R5661817
Phosphorus (P)-Total Dissolved	0.288		0.020	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Dissolved Solids	6360	DLHC	20	mg/L		03-DEC-21	R5664636
Total Kjeldahl Nitrogen	68.1		4.0	mg/L		07-DEC-21	R5664865
Mercury (Hg)-Total	<0.000050	DLM	0.000050	mg/L		01-DEC-21	R5660207
Phosphorus (P)-Total	0.466		0.020	mg/L	01-DEC-21	04-DEC-21	R5669288
Total Suspended Solids	94.6		3.0	mg/L		03-DEC-21	R5664956
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	1350	DLDS	10	mg/L		01-DEC-21	R5661417
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					02-DEC-21	R5660853
Aluminum (Al)-Dissolved	0.015		0.010	mg/L		02-DEC-21	R5662176
Antimony (Sb)-Dissolved	0.0011		0.0010	mg/L		02-DEC-21	R5662176
Arsenic (As)-Dissolved	0.0155		0.0010	mg/L		02-DEC-21	R5662176
Barium (Ba)-Dissolved	0.153		0.0010	mg/L		02-DEC-21	R5662176
Beryllium (Be)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Bismuth (Bi)-Dissolved	<0.00050	DLM	0.00050	mg/L		02-DEC-21	R5662176
Boron (B)-Dissolved	6.42		0.10	mg/L		02-DEC-21	R5662176
Cadmium (Cd)-Dissolved	0.00590		0.000050	mg/L		02-DEC-21	R5662176
Calcium (Ca)-Dissolved	551		0.50	mg/L		02-DEC-21	R5662176
Cesium (Cs)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Chromium (Cr)-Dissolved	0.0713		0.0010	mg/L		02-DEC-21	R5662176
Cobalt (Co)-Dissolved	1.42		0.0010	mg/L		02-DEC-21	R5662176
Copper (Cu)-Dissolved	0.0167		0.0020	mg/L		02-DEC-21	R5662176
Iron (Fe)-Dissolved	23.1		0.10	mg/L		02-DEC-21	R5662176
Lead (Pb)-Dissolved	0.149		0.00050	mg/L		02-DEC-21	R5662176
Lithium (Li)-Dissolved	0.368		0.010	mg/L		02-DEC-21	R5662176
Magnesium (Mg)-Dissolved	192		0.10	mg/L		02-DEC-21	R5662176
Manganese (Mn)-Dissolved	8.00		0.0010	mg/L		02-DEC-21	R5662176
Molybdenum (Mo)-Dissolved	0.0356		0.00050	mg/L		02-DEC-21	R5662176
Nickel (Ni)-Dissolved	9.20		0.0050	mg/L		02-DEC-21	R5662176
Phosphorus (P)-Dissolved	<0.50	DLM	0.50	mg/L		02-DEC-21	R5662176
Potassium (K)-Dissolved	19.2		0.50	mg/L		02-DEC-21	R5662176
Rubidium (Rb)-Dissolved	0.0032		0.0020	mg/L		02-DEC-21	R5662176

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2667959-5 SECONDARY LEACHATE CELL 1 (SC1)							
Sampled By: MU on 30-NOV-21 @ 11:00							
Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Selenium (Se)-Dissolved	0.00113		0.00050	mg/L		02-DEC-21	R5662176
Silicon (Si)-Dissolved	8.78		0.50	mg/L		02-DEC-21	R5662176
Silver (Ag)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Sodium (Na)-Dissolved	1690		1.0	mg/L		02-DEC-21	R5662176
Strontium (Sr)-Dissolved	2.76		0.0020	mg/L		02-DEC-21	R5662176
Sulfur (S)-Dissolved	1030		5.0	mg/L		02-DEC-21	R5662176
Tellurium (Te)-Dissolved	<0.0020	DLM	0.0020	mg/L		02-DEC-21	R5662176
Thallium (Tl)-Dissolved	<0.00010	DLM	0.00010	mg/L		02-DEC-21	R5662176
Thorium (Th)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Tin (Sn)-Dissolved	<0.0010	DLM	0.0010	mg/L		02-DEC-21	R5662176
Titanium (Ti)-Dissolved	<0.0030	DLM	0.0030	mg/L		02-DEC-21	R5662176
Tungsten (W)-Dissolved	0.0013		0.0010	mg/L		02-DEC-21	R5662176
Uranium (U)-Dissolved	0.0625		0.00010	mg/L		02-DEC-21	R5662176
Vanadium (V)-Dissolved	0.0383		0.0050	mg/L		02-DEC-21	R5662176
Zinc (Zn)-Dissolved	4.68		0.010	mg/L		02-DEC-21	R5662176
Zirconium (Zr)-Dissolved	0.0093		0.0020	mg/L		02-DEC-21	R5662176
Fluoride in Water by IC							
Fluoride (F)	<0.40	DLDS	0.40	mg/L		01-DEC-21	R5661417
Ion Balance Calculation							
Ion Balance	99.2			%		04-DEC-21	
TDS (Calculated)	7280			mg/L		04-DEC-21	
Hardness (as CaCO3)	2170			mg/L		04-DEC-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-21	R5661417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		02-DEC-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-21	R5661417
Sulfate in Water by IC							
Sulfate (SO4)	2840	DLDS	6.0	mg/L		01-DEC-21	R5661417
pH, Conductivity and Total Alkalinity							
pH	7.61		0.10	pH		01-DEC-21	R5660860
Conductivity (EC)	9280		2.0	uS/cm		01-DEC-21	R5660860
Bicarbonate (HCO3)	1310		5.0	mg/L		01-DEC-21	R5660860
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-21	R5660860
Alkalinity, Total (as CaCO3)	1070	DLHC	20	mg/L		01-DEC-21	R5660860

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
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).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method.			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-T-COL-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
CR-CR6-DIS-WT	Water	Dissolved Hexavalent Chromium in Water	EPA 7199
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Chromium (III) is calculated as the difference between the total chromium and the chromium (VI) results.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
P-TD-COL-ED	Water	Total Dissolved P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H ₂ SO ₄ is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-ED	Water	Phenols (4AAP)	EPA 9066 AUTO-DISTILL-COLORIMETRIC
This automated method is based on the distillation of phenol and subsequent reaction of the distillate with an oxidizing agent (alkaline potassium ferricyanide), and 4-aminoantipyrine to form a red complex which is measured at 505 nm. The method will include ortho and meta-substituted phenols, and is collectively named 4AAP phenols.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-ED	Water	Total Dissolved Solids	APHA 2540 C
Gravimetric determination of solids in waters by filtration and evaporating filtrate to dryness at 180 degrees Celsius.			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-CL	Water	Total Kjeldahl Nitrogen by Fluorescence	APHA 4500-NORG (TKN)
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

20-973263

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

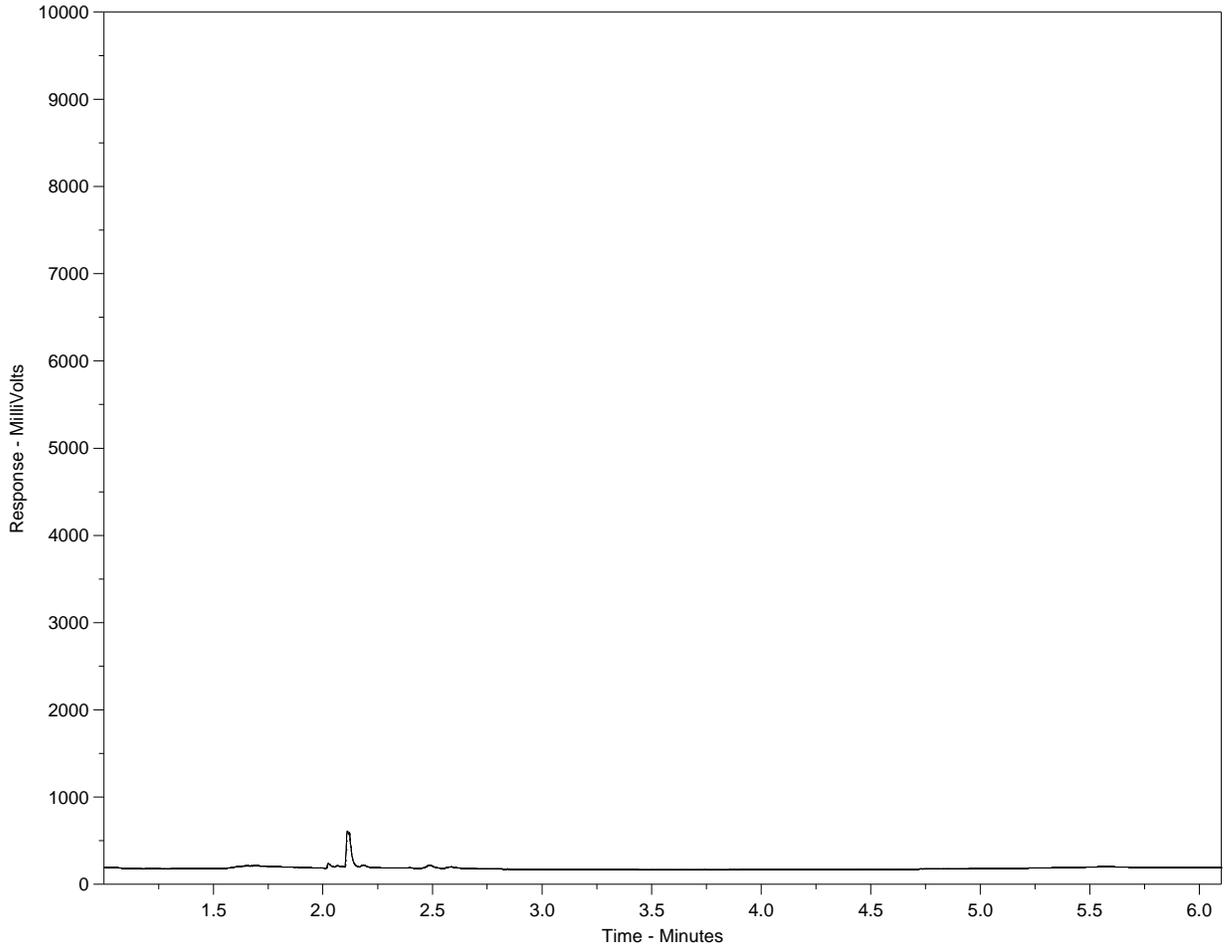
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Hydrocarbon Distribution Report



ALS Sample ID: L2667959-1
 Client ID: SECONDARY LEACHATE CELL 2 (SC2)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

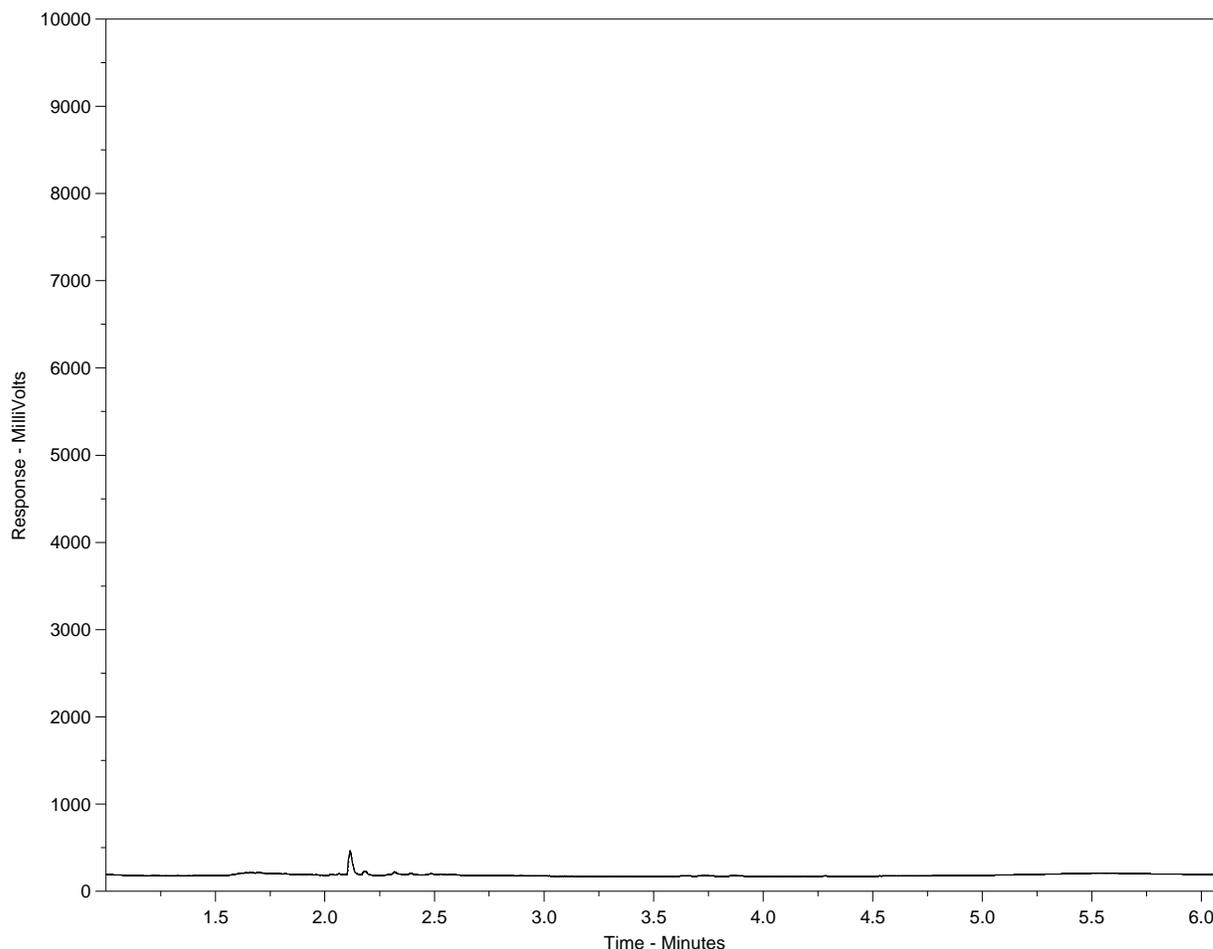
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2667959-2
 Client ID: SECONDARY LEACHATE CELL 3A (SC3A)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

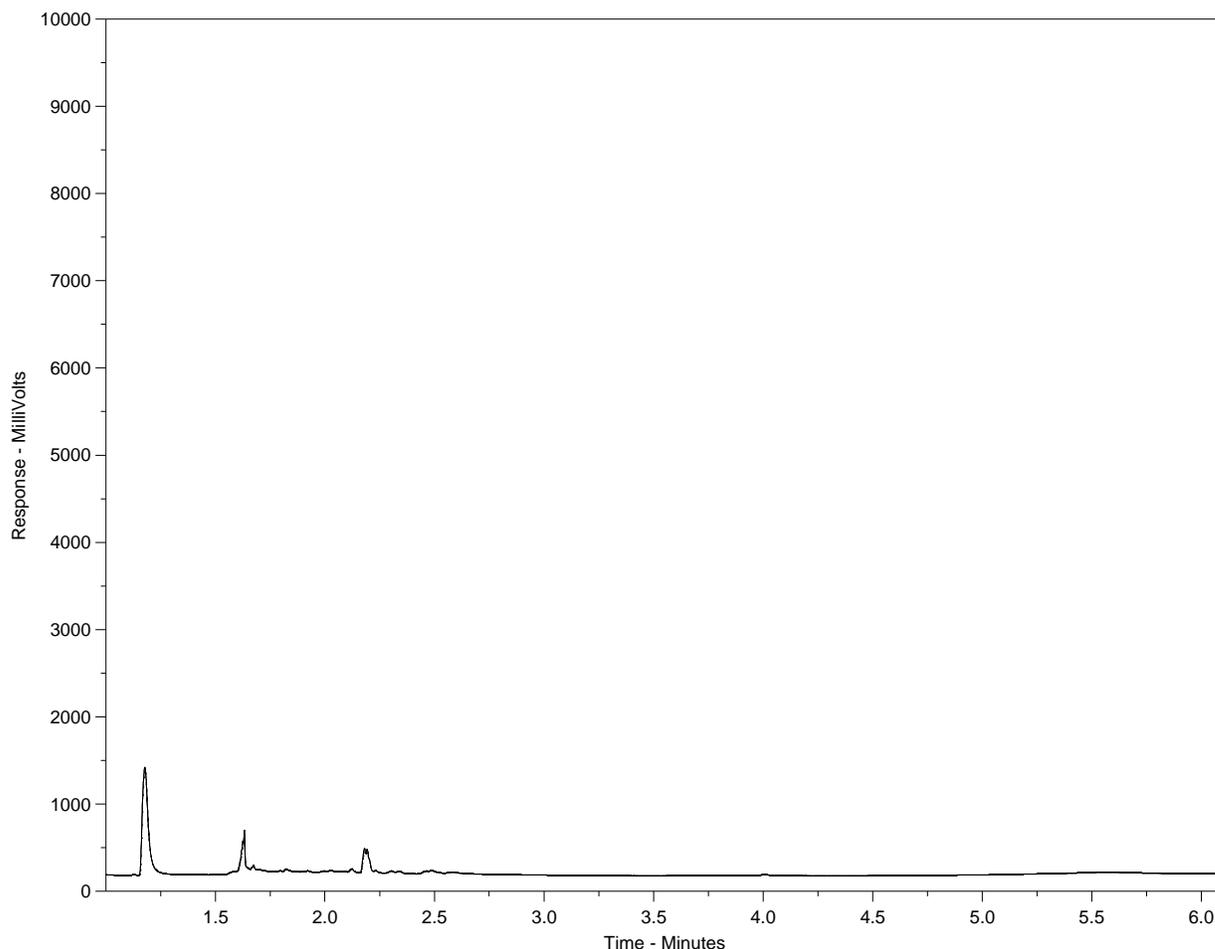
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2667959-3
 Client ID: SECONDARY LEACHATE CELL 3B (SC3B)



← F2 →		← F3 →		← F4 →		← F4 →
nC10	nC16	nC34	nC50			
174°C	287°C	481°C	575°C			
346°F	549°F	898°F	1067°F			
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →						

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

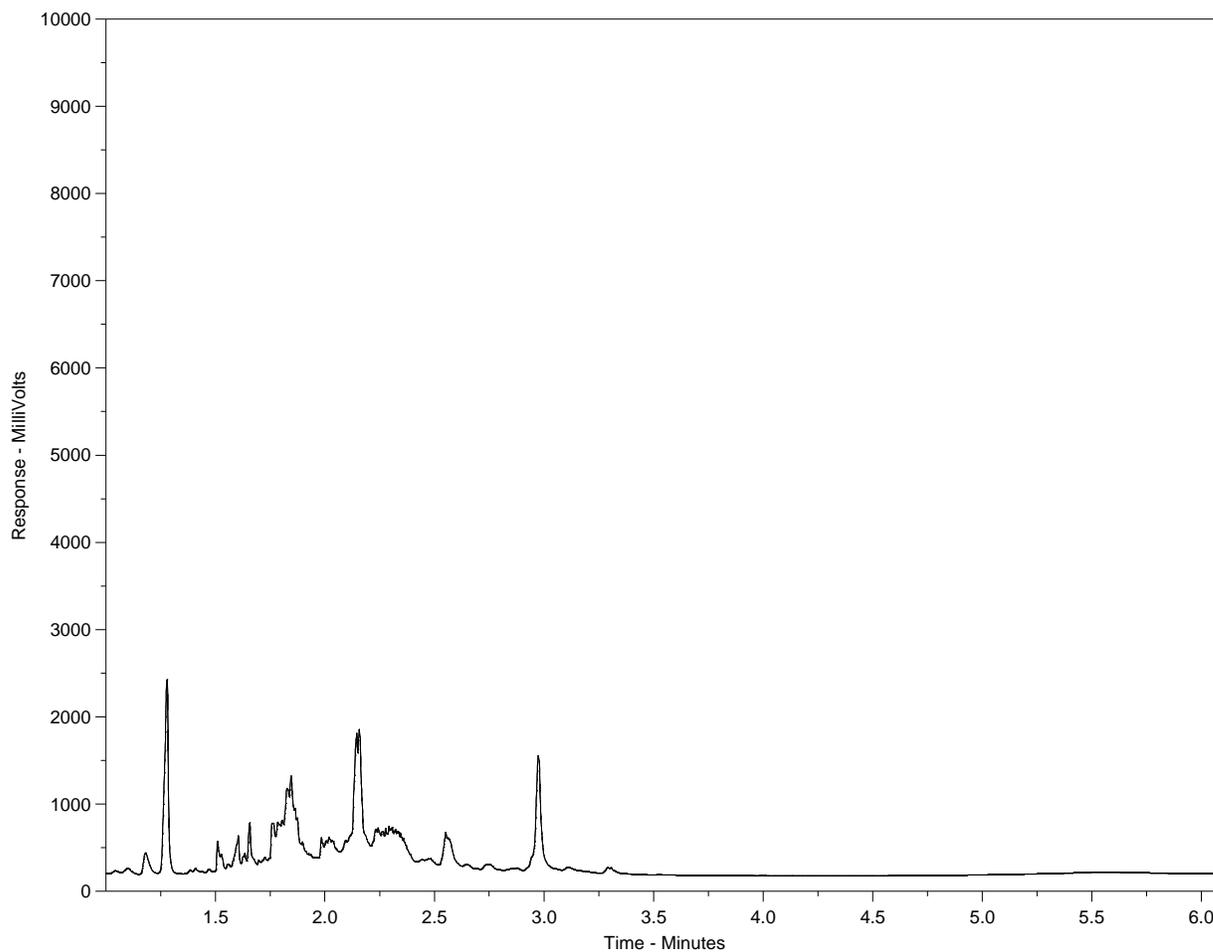
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2667959-4
 Client ID: SECONDARY LEACHATE CELL 4 (SC4)



F2		F3		F4		->F4->	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

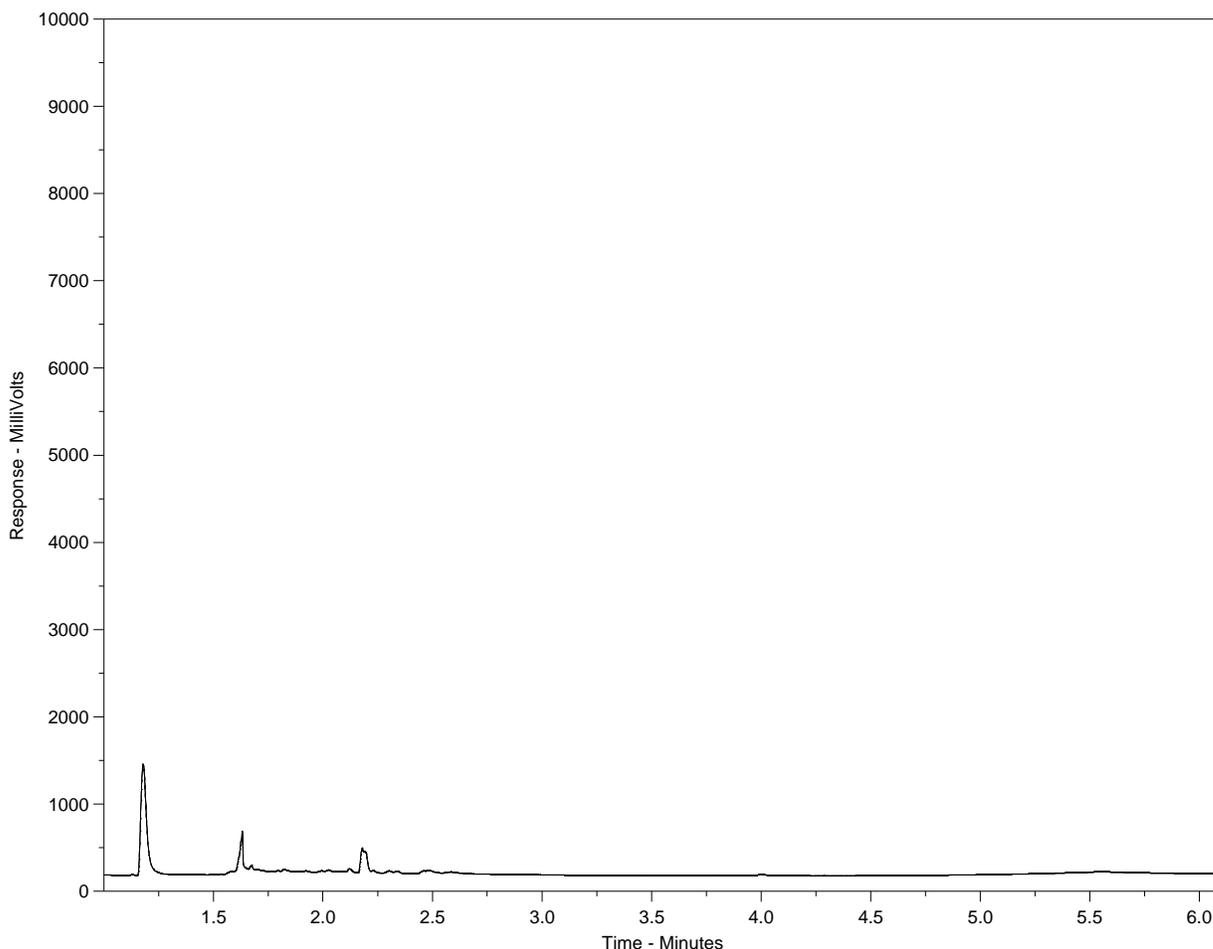
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2667959-5
 Client ID: SECONDARY LEACHATE CELL 1 (SC1)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.



L2667959-COFC

m

COC Number: 20 - 973263

Page 1 of 1

Report To Contact and company name below will appear on the final report		Reports / Recipients			Turnaround Time (TAT) Requested				AFFIX ALS BARCODE LABEL HERE (ALS use only)																																																																																																																																																
Company:	Clean Harbors Canada	Select Report Format:	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)	<input checked="" type="checkbox"/> Routine [R] if received by 3pm M-F - no surcharges apply <input type="checkbox"/> 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum <input type="checkbox"/> 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum <input type="checkbox"/> 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum <input type="checkbox"/> 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum <input type="checkbox"/> Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests																																																																																																																																																					
Contact:	Todd Webb, Stan Yuba	Merge QC/QCI Reports with COA	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm																																																																																																																																																					
Phone:	(781) 663-2513	Compare Results to Criteria on Report - provide details below if box checked	<input type="checkbox"/>	For all tests with rush TATs requested, please contact your AM to confirm availability.																																																																																																																																																					
Company address below will appear on the final report		Select Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX	Analysis Request				<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">NUMBER OF CONTAINERS</td> <td colspan="10" style="text-align: center;">Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">SAMPLES ON HOLD</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">EXTENDED STORAGE REQUIRED</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">SUSPECTED HAZARD (see notes)</td> </tr> <tr> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">Table 4.4A Leachate +</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">Leak Detection Monitoring</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>		NUMBER OF CONTAINERS	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below										SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)	Table 4.4A Leachate +													Leak Detection Monitoring																																																																																																																				
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Street:	Po Box 390, 5014 Rye Road 173	Email 1 or Fax:	webb.todd@cleanharbors.com																																																																																																																																																						
City/Province:	Ryley AB	Email 2:	yuba.stan@cleanharbors.com																																																																																																																																																						
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Company:	Clean Harbors Canada	Email 1 or Fax:	Gooding.Robbi@cleanharbors.com																																																																																																																																																						
Contact:	Robbi Gooding	Email 2:																																																																																																																																																							
Project Information		Oil and Gas Required Fields (client use)																																																																																																																																																							
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ALS Lab Work Order # (ALS use only): L2667959		ALS Contact:		Sampler:	Murray																																																																																																																																																				
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																																																																																																																																																			
	Secondary Leachate Cell 2 (SC2)			29-Nov-21	11:00																																																																																																																																																				
	Secondary Leachate Cell 3A (SC3A)			29-Nov-21	11:00																																																																																																																																																				
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	Secondary Leachate Cell 4 (SC4)			29-Nov-21	11:00																																																																																																																																																				
	Secondary Leachate Cell 1 (SC1)			30-Nov-21	11:00																																																																																																																																																				
Drinking Water (DW) Samples¹ (client use)		Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)			SAMPLE RECEIPT DETAILS (ALS use only)																																																																																																																																																				
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO		Analyze as per Quote Q 82438 Table 4.4 package (attached). Separate report than COC 973262.			Cooling Method: <input type="checkbox"/> NONE <input type="checkbox"/> ICE <input checked="" type="checkbox"/> ICE PACKS <input type="checkbox"/> FROZEN <input checked="" type="checkbox"/> COOLING INITIATED																																																																																																																																																				
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO					Submission Comments Identified on Sample Receipt Notification: <input type="checkbox"/> YES <input type="checkbox"/> NO																																																																																																																																																				
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SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)																																																																																																																																																				
Released by:	Todd Webb	Date:	Nov 30, 2021	Time:	8:00	Received by:	AZ	Date:	Nov 30, 2021	Time:	2:33	Received by:		Date:		Time:																																																																																																																																									



Clean Harbors Canada Inc.
ATTN: Todd Webb
PO BOX 390
RYLEY AB TOB 4A0

Date Received: 16-NOV-21
Report Date: 29-NOV-21 09:26 (MT)
Version: FINAL

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2663225
Project P.O. #: 221434
Job Reference: SECONDARY LEACHATE QTR 4
C of C Numbers: 17-790954
Legal Site Desc:

Kieran Tordoff
Account Manager

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ADDRESS: 9450 17 Avenue NW, Edmonton, AB T6N 1M9 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2663225-1 SECONDARY LEACHATE CELL 3C (SC3C)							
Sampled By: CLIENT on 15-NOV-21 @ 10:00							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
Toluene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
EthylBenzene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
m+p-Xylene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
o-Xylene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
Styrene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
F1(C6-C10)	<0.10		0.10	mg/L	23-NOV-21	23-NOV-21	R5653949
F1-BTEX	<0.10		0.10	mg/L	23-NOV-21	23-NOV-21	R5653949
Xylenes	<0.00071		0.00071	mg/L	23-NOV-21	23-NOV-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	99.6		70-130	%	23-NOV-21	23-NOV-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	91.0		70-130	%	23-NOV-21	23-NOV-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	111.9		70-130	%	23-NOV-21	23-NOV-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	21-NOV-21	23-NOV-21	R5656137
Surrogate: 2-Bromobenzotrifluoride	95.7		60-140	%	21-NOV-21	23-NOV-21	R5656137
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0061		0.0010	mg/L		18-NOV-21	R5653935
Miscellaneous Parameters							
Ammonia, Total (as N)	27.8		5.0	mg/L		24-NOV-21	R5656585
Chemical Oxygen Demand	280		10	mg/L		18-NOV-21	R5654248
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		19-NOV-21	R5655035
Dissolved Organic Carbon	109		5.0	mg/L		22-NOV-21	R5655947
Phenols (4AAP)	0.0050		0.0010	mg/L		18-NOV-21	R5653973
Phosphorus (P)-Total Dissolved	0.053		0.020	mg/L	18-NOV-21	21-NOV-21	R5655767
Total Dissolved Solids	7890		10	mg/L		25-NOV-21	R5657462
Total Kjeldahl Nitrogen	31		10	mg/L		24-NOV-21	R5654859
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		19-NOV-21	R5654494
Phosphorus (P)-Total	0.097		0.020	mg/L	18-NOV-21	21-NOV-21	R5655767
Total Suspended Solids	13.7		3.0	mg/L		19-NOV-21	R5654835
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	247	DLDS	5.0	mg/L		17-NOV-21	R5653641
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					17-NOV-21	R5652360
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		18-NOV-21	R5650541
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Arsenic (As)-Dissolved	0.0024		0.0010	mg/L		18-NOV-21	R5650541
Barium (Ba)-Dissolved	0.0274		0.0010	mg/L		18-NOV-21	R5650541
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		18-NOV-21	R5650541
Boron (B)-Dissolved	1.22		0.10	mg/L		18-NOV-21	R5650541
Cadmium (Cd)-Dissolved	<0.000050	DLDS	0.000050	mg/L		18-NOV-21	R5650541
Calcium (Ca)-Dissolved	228		0.50	mg/L		18-NOV-21	R5650541
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		18-NOV-21	R5650541
Chromium (Cr)-Dissolved	0.0014		0.0010	mg/L		18-NOV-21	R5650541
Cobalt (Co)-Dissolved	0.0019		0.0010	mg/L		18-NOV-21	R5650541
Copper (Cu)-Dissolved	0.0029		0.0020	mg/L		18-NOV-21	R5650541
Iron (Fe)-Dissolved	<0.10	DLDS	0.10	mg/L		18-NOV-21	R5650541
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		18-NOV-21	R5650541

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2663225-1 SECONDARY LEACHATE CELL 3C (SC3C) Sampled By: CLIENT on 15-NOV-21 @ 10:00 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.208		0.010	mg/L		18-NOV-21	R5650541
Magnesium (Mg)-Dissolved	231		0.10	mg/L		18-NOV-21	R5650541
Manganese (Mn)-Dissolved	0.660		0.0010	mg/L		18-NOV-21	R5650541
Molybdenum (Mo)-Dissolved	0.0364		0.00050	mg/L		18-NOV-21	R5650541
Nickel (Ni)-Dissolved	0.0347		0.0050	mg/L		18-NOV-21	R5650541
Phosphorus (P)-Dissolved	<0.50	DLDS	0.50	mg/L		18-NOV-21	R5650541
Potassium (K)-Dissolved	21.6		0.50	mg/L		18-NOV-21	R5650541
Rubidium (Rb)-Dissolved	0.0075		0.0020	mg/L		18-NOV-21	R5650541
Selenium (Se)-Dissolved	0.00073		0.00050	mg/L		18-NOV-21	R5650541
Silicon (Si)-Dissolved	5.42		0.50	mg/L		18-NOV-21	R5650541
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		18-NOV-21	R5650541
Sodium (Na)-Dissolved	2410		1.0	mg/L		18-NOV-21	R5650541
Strontium (Sr)-Dissolved	2.51		0.0020	mg/L		18-NOV-21	R5650541
Sulfur (S)-Dissolved	1890		5.0	mg/L		18-NOV-21	R5650541
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		18-NOV-21	R5650541
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		18-NOV-21	R5650541
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		18-NOV-21	R5650541
Tungsten (W)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Uranium (U)-Dissolved	0.0237		0.00010	mg/L		18-NOV-21	R5650541
Vanadium (V)-Dissolved	0.0124		0.0050	mg/L		18-NOV-21	R5650541
Zinc (Zn)-Dissolved	0.124		0.010	mg/L		18-NOV-21	R5650541
Zirconium (Zr)-Dissolved	0.0028		0.0020	mg/L		18-NOV-21	R5650541
Fluoride in Water by IC							
Fluoride (F)	0.48	DLDS	0.20	mg/L		17-NOV-21	R5653641
Ion Balance Calculation							
Ion Balance	91.6			%		25-NOV-21	
TDS (Calculated)	9690			mg/L		25-NOV-21	
Hardness (as CaCO3)	1520			mg/L		25-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	15.0	DLDS	0.20	mg/L		17-NOV-21	R5653641
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	16.5		0.22	mg/L		18-NOV-21	
Nitrite in Water by IC							
Nitrite (as N)	1.51	DLDS	0.10	mg/L		17-NOV-21	R5653641
Sulfate in Water by IC							
Sulfate (SO4)	5900	DLDS	3.0	mg/L		17-NOV-21	R5653641
pH, Conductivity and Total Alkalinity							
pH	8.07		0.10	pH		17-NOV-21	R5653816
Conductivity (EC)	10600		2.0	uS/cm		17-NOV-21	R5653816
Bicarbonate (HCO3)	1180		5.0	mg/L		17-NOV-21	R5653816
Carbonate (CO3)	<5.0		5.0	mg/L		17-NOV-21	R5653816
Hydroxide (OH)	<5.0		5.0	mg/L		17-NOV-21	R5653816
Alkalinity, Total (as CaCO3)	969		2.0	mg/L		17-NOV-21	R5653816
L2663225-2 SECONDARY LEACHATE CELL 3D (SC3D) Sampled By: CLIENT on 15-NOV-21 @ 10:00 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2663225-2 SECONDARY LEACHATE CELL 3D (SC3D)							
Sampled By: CLIENT on 15-NOV-21 @ 10:00							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Toluene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
EthylBenzene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
m+p-Xylene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
o-Xylene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
Styrene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
F1(C6-C10)	<0.10		0.10	mg/L	23-NOV-21	23-NOV-21	R5653949
F1-BTEX	<0.10		0.10	mg/L	23-NOV-21	23-NOV-21	R5653949
Xylenes	<0.00071		0.00071	mg/L	23-NOV-21	23-NOV-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	99.9		70-130	%	23-NOV-21	23-NOV-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	84.8		70-130	%	23-NOV-21	23-NOV-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	112.2		70-130	%	23-NOV-21	23-NOV-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	21-NOV-21	23-NOV-21	R5656137
Surrogate: 2-Bromobenzotrifluoride	100.6		60-140	%	21-NOV-21	23-NOV-21	R5656137
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	<0.0010	DLM	0.0010	mg/L		18-NOV-21	R5653935
Miscellaneous Parameters							
Ammonia, Total (as N)	1.48		0.50	mg/L		23-NOV-21	R5656585
Chemical Oxygen Demand	163		10	mg/L		18-NOV-21	R5654248
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		19-NOV-21	R5655035
Dissolved Organic Carbon	40.6		5.0	mg/L		22-NOV-21	R5655947
Phenols (4AAP)	0.0037		0.0010	mg/L		27-NOV-21	R5658534
Phosphorus (P)-Total Dissolved	0.571		0.020	mg/L	18-NOV-21	21-NOV-21	R5655767
Total Dissolved Solids	8190		10	mg/L		25-NOV-21	R5657462
Total Kjeldahl Nitrogen	<0.20		0.20	mg/L		24-NOV-21	R5654859
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		19-NOV-21	R5654494
Phosphorus (P)-Total	0.509		0.020	mg/L	18-NOV-21	21-NOV-21	R5655767
Total Suspended Solids	9.1		3.0	mg/L		19-NOV-21	R5654835
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2200	DLDS	10	mg/L		17-NOV-21	R5653641
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					17-NOV-21	R5652360
Aluminum (Al)-Dissolved	0.013		0.010	mg/L		18-NOV-21	R5650541
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Arsenic (As)-Dissolved	0.0114		0.0010	mg/L		18-NOV-21	R5650541
Barium (Ba)-Dissolved	0.168		0.0010	mg/L		18-NOV-21	R5650541
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		18-NOV-21	R5650541
Boron (B)-Dissolved	10.5		0.10	mg/L		18-NOV-21	R5650541
Cadmium (Cd)-Dissolved	0.00119		0.000050	mg/L		18-NOV-21	R5650541
Calcium (Ca)-Dissolved	551		0.50	mg/L		18-NOV-21	R5650541
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		18-NOV-21	R5650541
Chromium (Cr)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Cobalt (Co)-Dissolved	0.0052		0.0010	mg/L		18-NOV-21	R5650541
Copper (Cu)-Dissolved	0.0183		0.0020	mg/L		18-NOV-21	R5650541
Iron (Fe)-Dissolved	<0.10	DLDS	0.10	mg/L		18-NOV-21	R5650541
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		18-NOV-21	R5650541
Lithium (Li)-Dissolved	0.596		0.010	mg/L		18-NOV-21	R5650541
Magnesium (Mg)-Dissolved	354		0.10	mg/L		18-NOV-21	R5650541

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2663225-2 SECONDARY LEACHATE CELL 3D (SC3D) Sampled By: CLIENT on 15-NOV-21 @ 10:00 Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Manganese (Mn)-Dissolved	2.85		0.0010	mg/L		18-NOV-21	R5650541
Molybdenum (Mo)-Dissolved	4.64		0.00050	mg/L		18-NOV-21	R5650541
Nickel (Ni)-Dissolved	0.970		0.0050	mg/L		18-NOV-21	R5650541
Phosphorus (P)-Dissolved	<0.50		0.50	mg/L		18-NOV-21	R5650541
Potassium (K)-Dissolved	171		0.50	mg/L		18-NOV-21	R5650541
Rubidium (Rb)-Dissolved	0.0359		0.0020	mg/L		18-NOV-21	R5650541
Selenium (Se)-Dissolved	0.00452		0.00050	mg/L		18-NOV-21	R5650541
Silicon (Si)-Dissolved	11.3		0.50	mg/L		18-NOV-21	R5650541
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		18-NOV-21	R5650541
Sodium (Na)-Dissolved	1490		1.0	mg/L		18-NOV-21	R5650541
Strontium (Sr)-Dissolved	2.92		0.0020	mg/L		18-NOV-21	R5650541
Sulfur (S)-Dissolved	608		5.0	mg/L		18-NOV-21	R5650541
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		18-NOV-21	R5650541
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		18-NOV-21	R5650541
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Titanium (Ti)-Dissolved	0.0039		0.0030	mg/L		18-NOV-21	R5650541
Tungsten (W)-Dissolved	0.0016		0.0010	mg/L		18-NOV-21	R5650541
Uranium (U)-Dissolved	0.00623		0.00010	mg/L		18-NOV-21	R5650541
Vanadium (V)-Dissolved	25.0		0.0050	mg/L		18-NOV-21	R5650541
Zinc (Zn)-Dissolved	0.096		0.010	mg/L		18-NOV-21	R5650541
Zirconium (Zr)-Dissolved	0.0021		0.0020	mg/L		18-NOV-21	R5650541
Fluoride in Water by IC							
Fluoride (F)	1.23	DLDS	0.40	mg/L		17-NOV-21	R5653641
Ion Balance Calculation							
Ion Balance	96.4			%		25-NOV-21	
TDS (Calculated)	8270			mg/L		25-NOV-21	
Hardness (as CaCO3)	2830			mg/L		25-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	345	DLDS	0.40	mg/L		17-NOV-21	R5653641
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	345		0.45	mg/L		18-NOV-21	
Nitrite in Water by IC							
Nitrite (as N)	0.39	DLDS	0.20	mg/L		17-NOV-21	R5653641
Sulfate in Water by IC							
Sulfate (SO4)	1750	DLDS	6.0	mg/L		17-NOV-21	R5653641
pH, Conductivity and Total Alkalinity							
pH	7.55		0.10	pH		17-NOV-21	R5653816
Conductivity (EC)	11000		2.0	uS/cm		17-NOV-21	R5653816
Bicarbonate (HCO3)	450		5.0	mg/L		17-NOV-21	R5653816
Carbonate (CO3)	<5.0		5.0	mg/L		17-NOV-21	R5653816
Hydroxide (OH)	<5.0		5.0	mg/L		17-NOV-21	R5653816
Alkalinity, Total (as CaCO3)	369		2.0	mg/L		17-NOV-21	R5653816
L2663225-3 SECONDARY LEACHATE CELL 3E (SC3E) Sampled By: CLIENT on 15-NOV-21 @ 10:00 Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
Toluene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
EthylBenzene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2663225-3 SECONDARY LEACHATE CELL 3E (SC3E)							
Sampled By: CLIENT on 15-NOV-21 @ 10:00							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
m+p-Xylene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
o-Xylene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
Styrene	<0.00050		0.00050	mg/L	23-NOV-21	23-NOV-21	R5653949
F1(C6-C10)	<0.10		0.10	mg/L	23-NOV-21	23-NOV-21	R5653949
F1-BTEX	<0.10		0.10	mg/L	23-NOV-21	23-NOV-21	R5653949
Xylenes	<0.00071		0.00071	mg/L	23-NOV-21	23-NOV-21	R5653949
Surrogate: 1,4-Difluorobenzene (SS)	98.3		70-130	%	23-NOV-21	23-NOV-21	R5653949
Surrogate: 4-Bromofluorobenzene (SS)	82.1		70-130	%	23-NOV-21	23-NOV-21	R5653949
Surrogate: 3,4-Dichlorotoluene (SS)	120.2		70-130	%	23-NOV-21	23-NOV-21	R5653949
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	21-NOV-21	23-NOV-21	R5656137
Surrogate: 2-Bromobenzotrifluoride	100.6		60-140	%	21-NOV-21	23-NOV-21	R5656137
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0012		0.0010	mg/L		18-NOV-21	R5653935
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		24-NOV-21	R5656585
Chemical Oxygen Demand	99		10	mg/L		18-NOV-21	R5654248
Chromium (VI)-Dissolved	0.00062		0.00050	mg/L		19-NOV-21	R5655035
Dissolved Organic Carbon	41.1		5.0	mg/L		22-NOV-21	R5655947
Phenols (4AAP)	0.0019		0.0010	mg/L		27-NOV-21	R5658534
Phosphorus (P)-Total Dissolved	0.373		0.020	mg/L	18-NOV-21	21-NOV-21	R5655767
Total Dissolved Solids	5370		10	mg/L		25-NOV-21	R5657462
Total Kjeldahl Nitrogen	2.08		0.40	mg/L		19-NOV-21	R5654859
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		19-NOV-21	R5654494
Phosphorus (P)-Total	0.442		0.020	mg/L	18-NOV-21	21-NOV-21	R5655767
Total Suspended Solids	116		3.0	mg/L		19-NOV-21	R5654835
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	576	DLDS	5.0	mg/L		17-NOV-21	R5653641
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					17-NOV-21	R5652360
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		18-NOV-21	R5650541
Antimony (Sb)-Dissolved	0.0021		0.0010	mg/L		18-NOV-21	R5650541
Arsenic (As)-Dissolved	0.0026		0.0010	mg/L		18-NOV-21	R5650541
Barium (Ba)-Dissolved	0.0523		0.0010	mg/L		18-NOV-21	R5650541
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		18-NOV-21	R5650541
Boron (B)-Dissolved	1.30		0.10	mg/L		18-NOV-21	R5650541
Cadmium (Cd)-Dissolved	0.000118		0.000050	mg/L		18-NOV-21	R5650541
Calcium (Ca)-Dissolved	97.6		0.50	mg/L		18-NOV-21	R5650541
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		18-NOV-21	R5650541
Chromium (Cr)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Cobalt (Co)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Copper (Cu)-Dissolved	0.0212		0.0020	mg/L		18-NOV-21	R5650541
Iron (Fe)-Dissolved	<0.10	DLDS	0.10	mg/L		18-NOV-21	R5650541
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		18-NOV-21	R5650541
Lithium (Li)-Dissolved	0.318		0.010	mg/L		18-NOV-21	R5650541
Magnesium (Mg)-Dissolved	129		0.10	mg/L		18-NOV-21	R5650541
Manganese (Mn)-Dissolved	0.0160		0.0010	mg/L		18-NOV-21	R5650541
Molybdenum (Mo)-Dissolved	0.387		0.00050	mg/L		18-NOV-21	R5650541

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2663225-3 SECONDARY LEACHATE CELL 3E (SC3E)							
Sampled By: CLIENT on 15-NOV-21 @ 10:00							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Nickel (Ni)-Dissolved	0.111		0.0050	mg/L		18-NOV-21	R5650541
Phosphorus (P)-Dissolved	<0.50	DLDS	0.50	mg/L		18-NOV-21	R5650541
Potassium (K)-Dissolved	26.2		0.50	mg/L		18-NOV-21	R5650541
Rubidium (Rb)-Dissolved	0.0049		0.0020	mg/L		18-NOV-21	R5650541
Selenium (Se)-Dissolved	0.00101		0.00050	mg/L		18-NOV-21	R5650541
Silicon (Si)-Dissolved	4.65		0.50	mg/L		18-NOV-21	R5650541
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		18-NOV-21	R5650541
Sodium (Na)-Dissolved	1370		1.0	mg/L		18-NOV-21	R5650541
Strontium (Sr)-Dissolved	1.69		0.0020	mg/L		18-NOV-21	R5650541
Sulfur (S)-Dissolved	869		5.0	mg/L		18-NOV-21	R5650541
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		18-NOV-21	R5650541
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		18-NOV-21	R5650541
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		18-NOV-21	R5650541
Tungsten (W)-Dissolved	<0.0010	DLDS	0.0010	mg/L		18-NOV-21	R5650541
Uranium (U)-Dissolved	0.0352		0.00010	mg/L		18-NOV-21	R5650541
Vanadium (V)-Dissolved	0.123		0.0050	mg/L		18-NOV-21	R5650541
Zinc (Zn)-Dissolved	0.047		0.010	mg/L		18-NOV-21	R5650541
Zirconium (Zr)-Dissolved	<0.0020	DLDS	0.0020	mg/L		18-NOV-21	R5650541
Fluoride in Water by IC							
Fluoride (F)	0.49	DLDS	0.20	mg/L		17-NOV-21	R5653641
Ion Balance Calculation							
Ion Balance	91.3			%		25-NOV-21	
TDS (Calculated)	5240			mg/L		25-NOV-21	
Hardness (as CaCO3)	775			mg/L		25-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	16.6	DLDS	0.20	mg/L		17-NOV-21	R5653641
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	16.6		0.22	mg/L		18-NOV-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		17-NOV-21	R5653641
Sulfate in Water by IC							
Sulfate (SO4)	2680	DLDS	3.0	mg/L		17-NOV-21	R5653641
pH, Conductivity and Total Alkalinity							
pH	8.16		0.10	pH		17-NOV-21	R5653816
Conductivity (EC)	6670		2.0	uS/cm		17-NOV-21	R5653816
Bicarbonate (HCO3)	592		5.0	mg/L		17-NOV-21	R5653816
Carbonate (CO3)	<5.0		5.0	mg/L		17-NOV-21	R5653816
Hydroxide (OH)	<5.0		5.0	mg/L		17-NOV-21	R5653816
Alkalinity, Total (as CaCO3)	485		2.0	mg/L		17-NOV-21	R5653816

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method.			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry
Samples are analyzed using the closed reflux colourimetric method			
CR-CR6-DIS-WT	Water	Dissolved Hexavalent Chromium in Water	EPA 7199
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Chromium (III) is calculated as the difference between the total chromium and the chromium (VI) results.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
P-TD-COL-ED	Water	Total Dissolved P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H2SO4 is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-ED	Water	Phenols (4AAP)	EPA 9066 AUTO-DISTILL-COLORIMETRIC
This automated method is based on the distillation of phenol and subsequent reaction of the distillate with an oxidizing agent (alkaline potassium ferricyanide), and 4-aminoantipyrine to form a red complex which is measured at 505 nm. The method will include ortho and meta-substituted phenols, and is collectively named 4AAP phenols.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-ED	Water	Total Dissolved Solids	APHA 2540 C
Gravimetric determination of solids in waters by filtration and evaporating filtrate to dryness at 180 degrees Celsius.			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-CL	Water	Total Kjeldahl Nitrogen by Fluorescence	APHA 4500-NORG (TKN)
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-790954

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

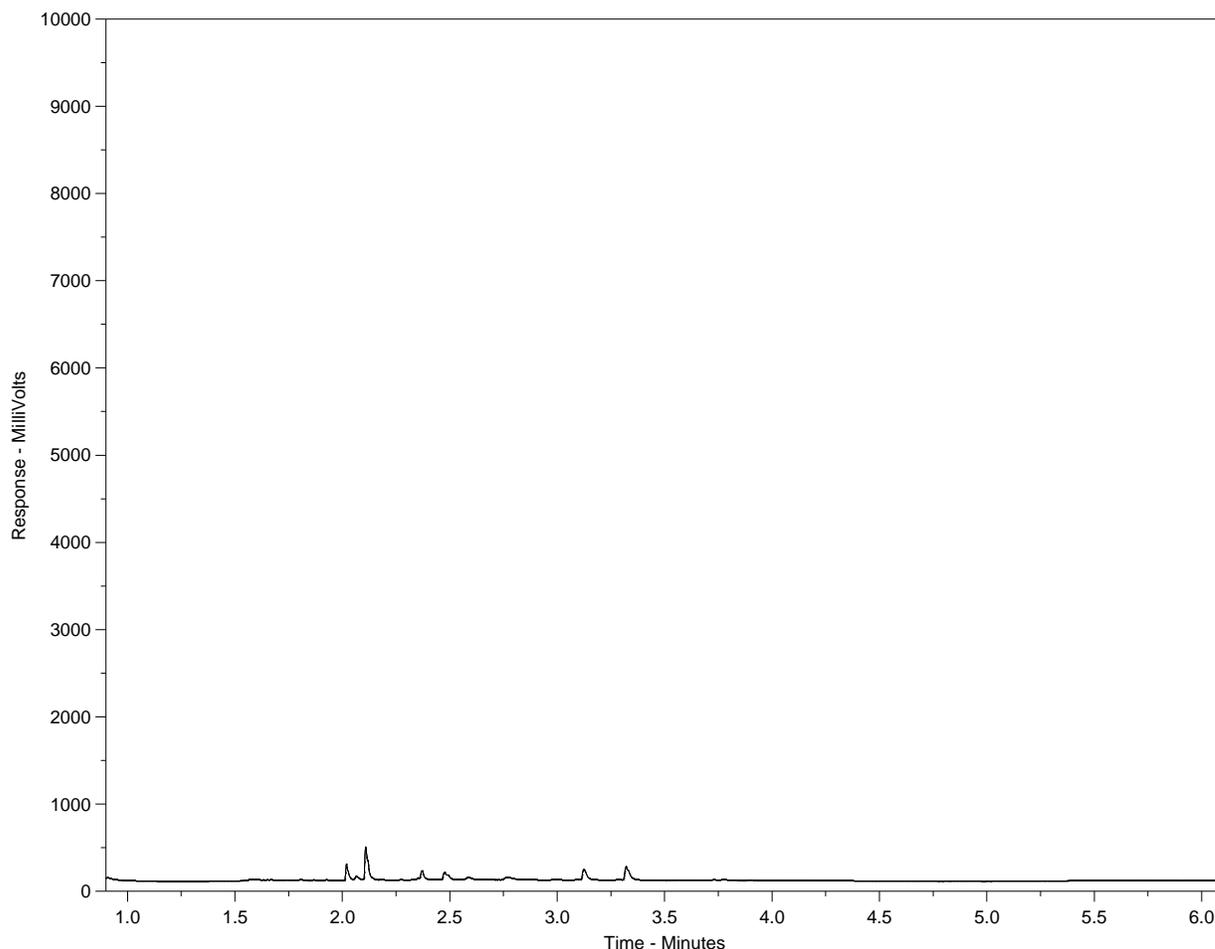
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Hydrocarbon Distribution Report



ALS Sample ID: L2663225-1
 Client ID: SECONDARY LEACHATE CELL 3C (SC3C)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

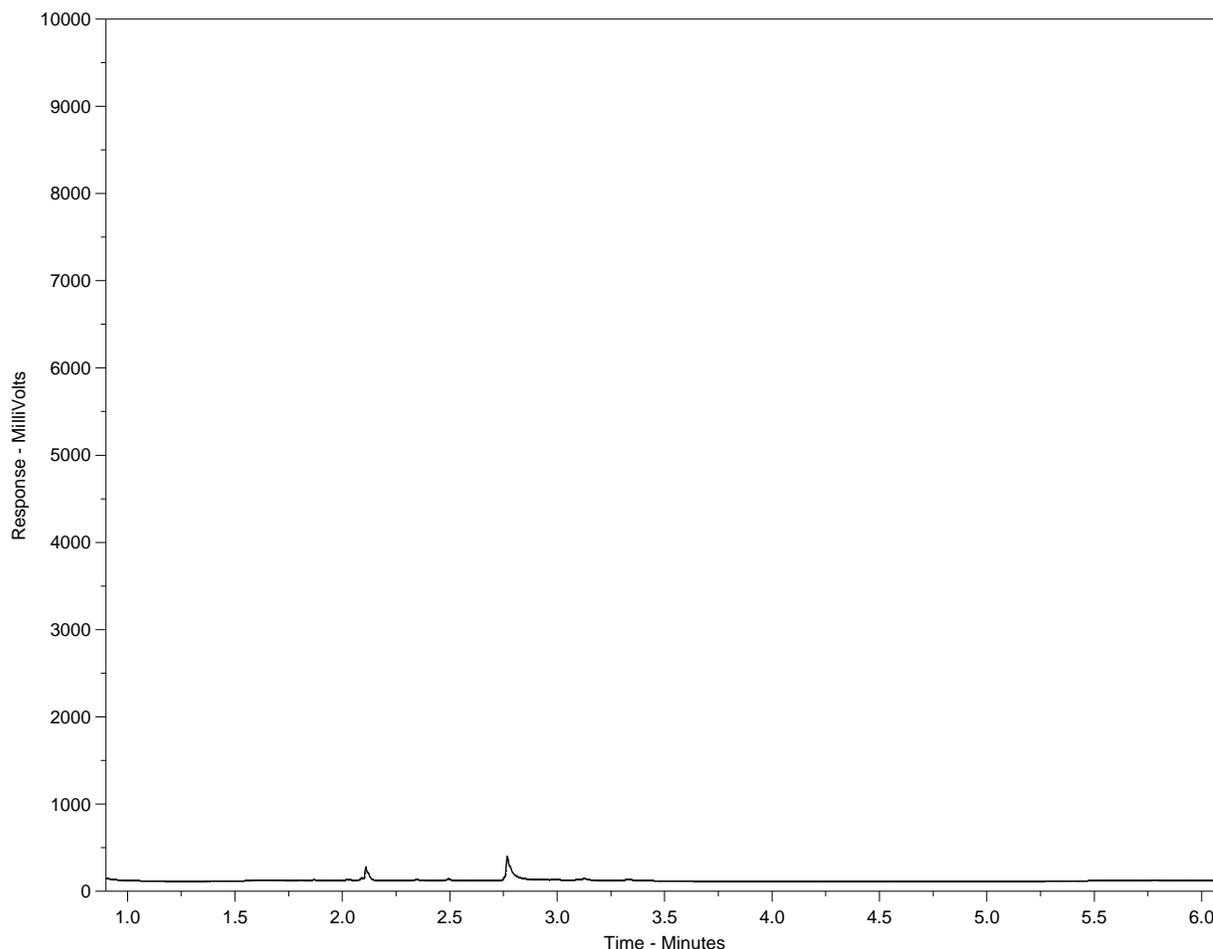
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2663225-2
 Client ID: SECONDARY LEACHATE CELL 3D (SC3D)



F2		F3		F4		F4	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

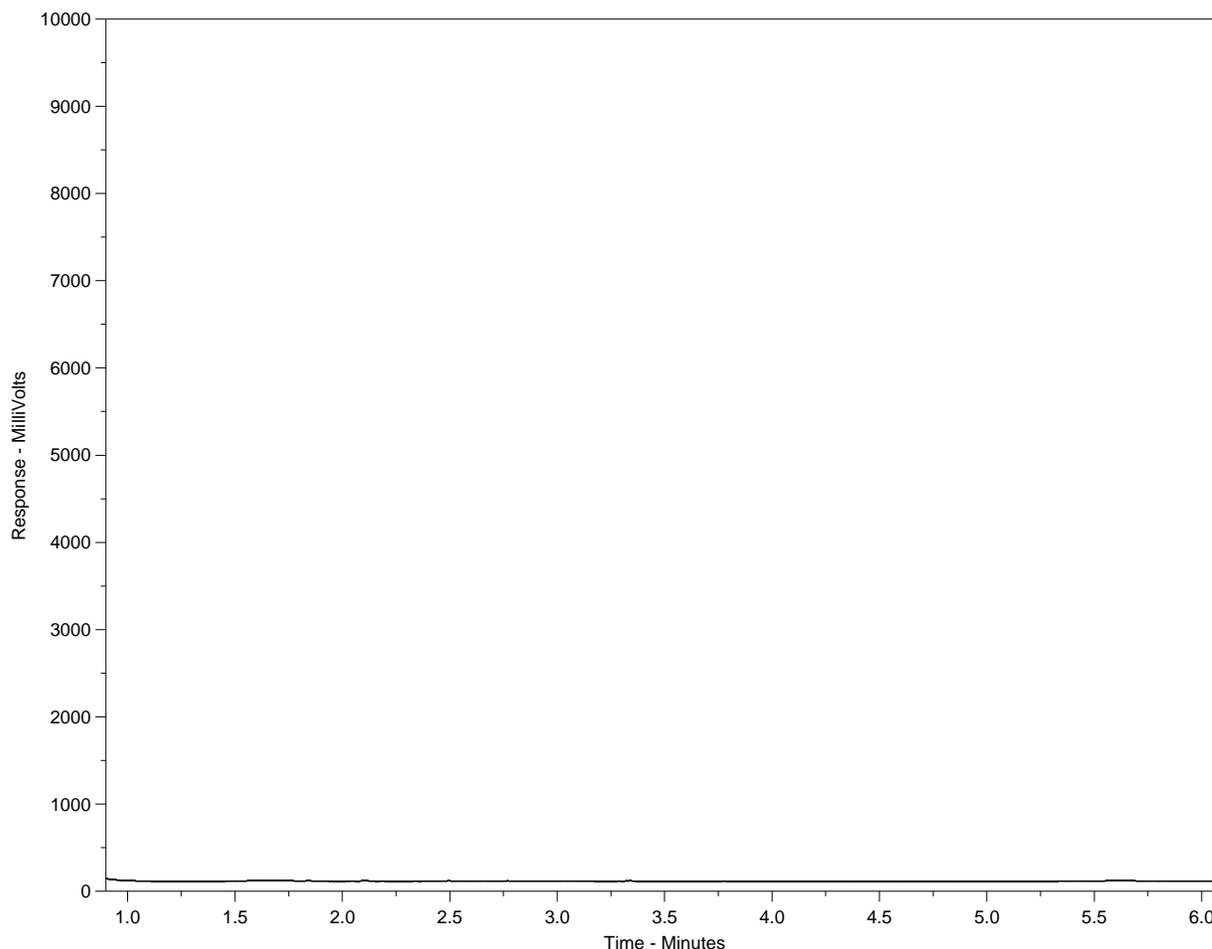
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2663225-3
 Client ID: SECONDARY LEACHATE CELL 3E (SC3E)



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

APPENDIX G

Volume of Leak Detection Liquid Removed

CLEAN HARBORS CANADA, INC.
Liquid Removed from Leak Detection Systems 2021

CELL 1			CELL 2			CELL 3A (3)			CELL 3B (4)			Cell 3C (5)			Cell 3D (6)			Cell 3E (7)			Cell 4						
# of hectares		0.688	# of hectares		1.353	# of hectares		2.125	# of hectares		2.125	# of hectares		2.546	# of hectares		2.535	# of hectares		3.08	# of hectares		2.43				
DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)				
1-1-21			1-1-21			1-1-21			1-1-21			1-1-21			1-1-21			1-1-21			1-1-21						
1-2-21			1-2-21			1-2-21			1-2-21			1-2-21			1-2-21			1-2-21			1-2-21						
1-3-21			1-3-21			1-3-21			1-3-21			1-3-21			1-3-21			1-3-21			1-3-21						
1-4-21			1-4-21	36.0	26.6	1-4-21	100.0	47.1	1-4-21	10.0	4.7	1-4-21	0.0	0.0	1-4-21	0.0	0.0	1-4-21	0.0	0.0	****	1-4-21	182.0	74.9			
1-5-21			1-5-21	21.0	15.5	1-5-21	41.0	19.3	1-5-21	5.0	2.4	1-5-21	0.0	0.0	1-5-21	0.0	0.0	1-5-21	0.0	0.0	****	1-5-21	5.0	2.1			
1-6-21			1-6-21	19.0	14.0	1-6-21	45.0	21.2	1-6-21	0.0	0.0	1-6-21	0.0	0.0	1-6-21	0.0	0.0	1-6-21	0.0	0.0	****	1-6-21	0.0	0.0			
1-7-21			1-7-21	20.0	14.8	1-7-21	31.0	14.6	1-7-21	0.0	0.0	1-7-21	0.0	0.0	1-7-21	0.0	0.0	1-7-21	0.0	0.0	****	1-7-21	0.0	0.0			
1-8-21			1-8-21	15.0	11.1	1-8-21	12.0	5.6	1-8-21	10.0	4.7	1-8-21	0.0	0.0	1-8-21	0.0	0.0	1-8-21	0.0	0.0	****	1-8-21	210.0	86.4			
1-9-21			1-9-21			1-9-21			1-9-21			1-9-21			1-9-21			1-9-21									
1-10-21			1-10-21			1-10-21			1-10-21			1-10-21			1-10-21			1-10-21									
1-11-21			1-11-21	33.0	24.4	1-11-21	44.0	20.7	1-11-21	0.0	0.0	1-11-21	60.0	23.6	1-11-21	0.0	0.0	1-11-21	0.0	0.0	****	1-11-21	91.0	37.4			
1-12-21			1-12-21	19.0	14.0	1-12-21	0.0	0.0	1-12-21	30.0	14.1	1-12-21	25.0	9.8	1-12-21	5.0	2.0	1-12-21	0.0	0.0	****	1-12-21	50.0	20.6			
1-13-21			1-13-21	16.0	11.8	1-13-21	15.0	7.1	1-13-21	30.0	14.1	1-13-21	55.0	21.6	1-13-21	25.0	9.9	1-13-21	0.0	0.0	****	1-13-21	60.0	24.7			
1-14-21			1-14-21	15.0	11.1	1-14-21	15.0	7.1	1-14-21	10.0	4.7	1-14-21	0.0	0.0	1-14-21	0.0	0.0	1-14-21	0.0	0.0	****	1-14-21	30.0	12.3			
1-15-21			1-15-21	15.0	11.1	1-15-21	10.0	4.7	1-15-21	10.0	4.7	1-15-21	0.0	0.0	1-15-21	0.0	0.0	1-15-21	0.0	0.0	****	1-15-21	25.0	10.3			
1-16-21			1-16-21			1-16-21			1-16-21			1-16-21			1-16-21			1-16-21									
1-17-21			1-17-21			1-17-21			1-17-21			1-17-21			1-17-21			1-17-21									
1-18-21			1-18-21	26.0	19.2	1-18-21	110.0	51.8	1-18-21	10.0	4.7	1-18-21	5.0	2.0	1-18-21	0.0	0.0	1-18-21	408.0	132.5		1-18-21	50.0	20.6			
1-19-21			1-19-21	21.0	15.5	1-19-21	42.0	19.8	1-19-21	0.0	0.0	1-19-21	0.0	0.0	1-19-21	0.0	0.0	1-19-21	0.0	0.0		1-19-21	20.0	8.2			
1-20-21			1-20-21	19.0	14.0	1-20-21	30.0	14.1	1-20-21	5.0	2.4	1-20-21	0.0	0.0	1-20-21	0.0	0.0	1-20-21	0.0	0.0		1-20-21	0.0	0.0			
1-21-21			1-21-21	16.0	11.8	1-21-21	33.0	15.5	1-21-21	0.0	0.0	1-21-21	0.0	0.0	1-21-21	0.0	0.0	1-21-21	0.0	0.0		1-21-21	35.0	14.4			
1-22-21			1-22-21	15.0	11.1	1-22-21	36.0	16.9	1-22-21	15.0	7.1	1-22-21	0.0	0.0	1-22-21	0.0	0.0	1-22-21	0.0	0.0		1-22-21	40.0	16.5			
1-23-21			1-23-21			1-23-21			1-23-21			1-23-21			1-23-21			1-23-21									
1-24-21			1-24-21			1-24-21			1-24-21			1-24-21			1-24-21			1-24-21									
1-25-21			1-25-21	23.0	17.0	1-25-21	0.0	0.0	1-25-21	0.0	0.0	1-25-21	0.0	0.0	1-25-21	0.0	0.0	1-25-21	0.0	0.0		1-25-21	50.0	20.6			
1-26-21			1-26-21	20.0	14.8	1-26-21	0.0	0.0	1-26-21	0.0	0.0	1-26-21	0.0	0.0	1-26-21	50.0	19.7	1-26-21	0.0	0.0		1-26-21	40.0	16.5			
1-27-21			1-27-21	18.0	13.3	1-27-21	167.0	78.6	1-27-21	0.0	0.0	1-27-21	0.0	0.0	1-27-21	0.0	0.0	1-27-21	0.0	0.0		1-27-21	40.0	16.5			
1-28-21			1-28-21	15.0	11.1	1-28-21	42.0	19.8	1-28-21	0.0	0.0	1-28-21	0.0	0.0	1-28-21	0.0	0.0	**	1-28-21	0.0	0.0		1-28-21	28.0	11.5		
1-29-21			1-29-21	17.0	12.6	1-29-21	30.0	14.1	1-29-21	0.0	0.0	1-29-21	0.0	0.0	1-29-21	0.0	0.0	**	1-29-21	0.0	0.0		1-29-21	14.0	5.8		
1-30-21			1-30-21			1-30-21			1-30-21			1-30-21			1-30-21			1-30-21									
1-31-21			1-31-21			1-31-21			1-31-21			1-31-21			1-31-21			1-31-21									
2-1-21			2-1-21	25.0	18.5	2-1-21	77.0	36.2	2-1-21	0.0	0.0	2-1-21	0.0	0.0	2-1-21	0.0	0.0	**	2-1-21	0.0	0.0		2-1-21	121.0	49.8		
2-2-21			2-2-21	22.0	16.3	2-2-21	33.0	15.5	2-2-21	0.0	0.0	2-2-21	15.0	5.9	2-2-21	0.0	0.0	**	2-2-21	0.0	0.0		2-2-21	0.0	0.0		
2-3-21			2-3-21	18.0	13.3	2-3-21	25.0	11.8	2-3-21	0.0	0.0	2-3-21	0.0	0.0	2-3-21	0.0	0.0	**	2-3-21	0.0	0.0		2-3-21	0.0	0.0		
2-4-21			2-4-21	16.0	11.8	2-4-21	13.0	6.1	2-4-21	0.0	0.0	2-4-21	0.0	0.0	2-4-21	0.0	0.0	**	2-4-21	0.0	0.0		2-4-21	0.0	0.0		
2-5-21			2-5-21	14.0	10.3	2-5-21	27.0	12.7	2-5-21	0.0	0.0	**	2-5-21	0.0	0.0	**	2-5-21	0.0	0.0	**	2-5-21	0.0	0.0	**	2-5-21	0.0	0.0
2-6-21			2-6-21			2-6-21			2-6-21			2-6-21			2-6-21			2-6-21									
2-7-21			2-7-21			2-7-21			2-7-21			2-7-21			2-7-21			2-7-21									
2-8-21			2-8-21	22.0	16.3	2-8-21	74.0	34.8	2-8-21	0.0	0.0	2-8-21	0.0	0.0	2-8-21	0.0	0.0	**	2-8-21	0.0	0.0	**	2-8-21	0.0	0.0		
2-9-21			2-9-21	19.0	14.0	2-9-21	46.0	21.6	2-9-21	0.0	0.0	2-9-21	0.0	0.0	2-9-21	0.0	0.0	**	2-9-21	105.0	34.1		2-9-21	770.0	316.9		
2-10-21			2-10-21	16.0	11.8	2-10-21	13.0	6.1	2-10-21	0.0	0.0	2-10-21	0.0	0.0	2-10-21	0.0	0.0	**	2-10-21	10.0	3.2		2-10-21	10.0	4.1		
2-11-21			2-11-21	14.0	10.3	2-11-21	21.0	9.9	2-11-21	0.0	0.0	2-11-21	0.0	0.0	2-11-21	0.0	0.0	**	2-11-21	5.0	1.6		2-11-21	10.0	4.1		
2-12-21			2-12-21	13.0	9.6	2-12-21	8.0	3.8	2-12-21	0.0	0.0	2-12-21	0.0	0.0	2-12-21	0.0	0.0	**	2-12-21	0.0	0.0		2-12-21	0.0	0.0		
2-13-21			2-13-21			2-13-21			2-13-21			2-13-21			2-13-21			2-13-21									
2-14-21			2-14-21			2-14-21			2-14-21			2-14-21			2-14-21			2-14-21									
2-15-21			2-15-21			2-15-21			2-15-21			2-15-21			2-15-21			2-15-21									
2-16-21			2-16-21	24.0	17.7	2-16-21	122.0	57.4	2-16-21	0.0	0.0	2-16-21	0.0	0.0	2-16-21	0.0	0.0	**	2-16-21	10.0	3.2		2-16-21	964.0	396.7		
2-17-21			2-17-21	18.0	13.3	2-17-21	29.0	13.6	2-17-21	0.0	0.0	2-17-21	0.0	0.0	2-17-21	0.0	0.0	**	2-17-21	10.0	3.2		2-17-21	5.0	2.1		
2-18-21			2-18-21	16.0	11.8	2-18-21	27.0	12.7	2-18-21	0.0	0.0	2-18-21	0.0	0.0	2-18-21	0.0	0.0	**	2-18-21	0.0	0.0		2-18-21	10.0	4.1		
2-19-21			2-19-21	14.0	10.3	2-19-21	40.0	18.8	2-19-21	0.0	0.0	2-19-21	25.0	9.8	2-19-21	0.0	0.0	**	2-19-21	50.0	16.2		2-19-21	30.0	12.3		
2-20-21			2-20-21			2-20-21			2-20-21			2-20-21			2-20-21			2-20-21									
2-21-21			2-21-21			2-21-21			2-21-21			2-21-21			2-21-21			2-21-21									
2-22-21			2-22-21	19.0	14.0	2-22-21	21.0	9.9	2-22-21	0.0	0.0	**	2-22-21	0.0	0.0	**	2-22-21	0.0	0.0	**	2-22-21	0.0	0.0	**	2-22-21	0.0	0.0
2-23-21			2-23-21	16.0	11.8	2-23-21	24.0	11.3	2-23-21	5.0	2.4	2-23-21	0.0	0.0	2-23-21	0.0	0.0	2-23-21	0.0	0.0		2-23-21	212.0	87.2			
2-24-21			2-24-21	13.0	9.6	2-24-21	20.0	9.4	2-24-21	10.0	4.7	2-24-21	0.0	0.0	2-24-21	0.0	0.0	2-24-21	0.0	0.0		2-24-21	20.0	8.2			
2-25-21			2-25-21	12.0	8.9	2-25-21	22.0	10.4	2-25-21	20.0	9.4	2-25-21	5.0	2.0	2-25-21	0.0	0.0	2-25-21	0.0	0.0		2-25-21	40.0	16.5			
2-26-21			2-26-21	24.0	17.7	2-26-21	5.0	2.4	2-26-21	5.0	2.4	2															

CLEAN HARBORS CANADA, INC.
Liquid Removed from Leak Detection Systems 2021

CELL 1			CELL 2			CELL 3A (3)			CELL 3B (4)			Cell 3C (5)			Cell 3D (6)			Cell 3E (7)			Cell 4			
# of hectares		0.688	# of hectares		1.353	# of hectares		2.125	# of hectares		2.125	# of hectares		2.546	# of hectares		2.535	# of hectares		3.08	# of hectares		2.43	
DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	
3-1-21	0.0		3-1-21	21.0	15.5	3-1-21	72.0	33.9	3-1-21	0.0	0.0	3-1-21	15.0	5.9	3-1-21	35.0	13.8	3-1-21	20.0	6.5	3-1-21	125.0	51.4	
3-2-21			3-2-21	17.0	12.6	3-2-21	12.0	5.6	3-2-21	0.0	0.0	3-2-21	0.0	0.0	3-2-21	0.0	0.0	3-2-21	0.0	0.0	3-2-21	10.0	4.1	
3-3-21			3-3-21	12.0	8.9	3-3-21	23.0	10.8	3-3-21	0.0	0.0	3-3-21	0.0	0.0	3-3-21	0.0	0.0	3-3-21	40.0	13.0	3-3-21	30.0	12.3	
3-4-21			3-4-21	7.0	5.2	3-4-21	22.0	10.4	3-4-21	0.0	0.0	3-4-21	0.0	0.0	3-4-21	0.0	0.0	3-4-21	0.0	0.0	3-4-21	0.0	0.0	
3-5-21			3-5-21	4.0	3.0	3-5-21	0.0	0.0	3-5-21	0.0	0.0	3-5-21	0.0	0.0	3-5-21	0.0	0.0	3-5-21	0.0	0.0	3-5-21	0.0	0.0	
3-6-21			3-6-21			3-6-21			3-6-21			3-6-21			3-6-21			3-6-21			3-6-21			
3-7-21			3-7-21			3-7-21			3-7-21			3-7-21			3-7-21			3-7-21			3-7-21			
3-8-21			3-8-21	0.0	0.0	3-8-21	95.0	44.7	3-8-21	0.0	0.0	3-8-21	0.0	0.0	3-8-21	0.0	0.0	3-8-21	0.0	0.0	3-8-21	0.0	0.0	
3-9-21			3-9-21	0.0	0.0	3-9-21	33.0	15.5	3-9-21	0.0	0.0	3-9-21	0.0	0.0	3-9-21	0.0	0.0	3-9-21	0.0	0.0	3-9-21	384.0	158.0	
3-10-21			3-10-21	0.0	0.0	3-10-21	30.0	14.1	3-10-21	0.0	0.0	3-10-21	0.0	0.0	3-10-21	0.0	0.0	3-10-21	0.0	0.0	3-10-21	0.0	0.0	
3-11-21			3-11-21	0.0	0.0	3-11-21	26.0	12.2	3-11-21	0.0	0.0	3-11-21	0.0	0.0	3-11-21	0.0	0.0	3-11-21	0.0	0.0	3-11-21	0.0	0.0	
3-12-21			3-12-21	15.0	11.1	3-12-21	23.0	10.8	3-12-21	0.0	0.0	3-12-21	0.0	0.0	3-12-21	0.0	0.0	3-12-21	0.0	0.0	3-12-21	294.0	121.0	
3-13-21			3-13-21			3-13-21			3-13-21			3-13-21			3-13-21			3-13-21			3-13-21			
3-14-21			3-14-21			3-14-21			3-14-21			3-14-21			3-14-21			3-14-21			3-14-21			
3-15-21			3-15-21	11.0	8.1	3-15-21	57.0	26.8	3-15-21	0.0	0.0	3-15-21	0.0	0.0	3-15-21	0.0	0.0	3-15-21	0.0	0.0	3-15-21	248.0	102.1	
3-16-21			3-16-21	15.0	11.1	3-16-21	30.0	14.1	3-16-21	15.0	7.1	3-16-21	0.0	0.0	3-16-21	0.0	0.0	3-16-21	0.0	0.0	3-16-21	0.0	0.0	
3-17-21			3-17-21	4.0	3.0	3-17-21	21.0	9.9	3-17-21	0.0	0.0	3-17-21	0.0	0.0	3-17-21	0.0	0.0	3-17-21	0.0	0.0	3-17-21	0.0	0.0	
3-18-21			3-18-21	0.0	0.0	3-18-21	19.0	8.9	3-18-21	0.0	0.0	3-18-21	0.0	0.0	3-18-21	0.0	0.0	3-18-21	0.0	0.0	3-18-21	0.0	0.0	
3-19-21			3-19-21	12.0	8.9	3-19-21	19.0	8.9	3-19-21	0.0	0.0	3-19-21	22.0	8.6	3-19-21	0.0	0.0	3-19-21	0.0	0.0	3-19-21	330.0	135.8	
3-20-21			3-20-21			3-20-21			3-20-21			3-20-21			3-20-21			3-20-21			3-20-21			
3-21-21			3-21-21			3-21-21			3-21-21			3-21-21			3-21-21			3-21-21			3-21-21			
3-22-21			3-22-21	13.0	9.6	3-22-21	56.0	26.4	3-22-21	0.0	0.0	3-22-21	2.0	0.8	3-22-21	0.0	0.0	3-22-21	0.0	0.0	3-22-21	0.0	0.0	
3-23-21			3-23-21	9.0	6.7	3-23-21	21.0	9.9	3-23-21	0.0	0.0	3-23-21	0.0	0.0	3-23-21	0.0	0.0	3-23-21	0.0	0.0	3-23-21	361.0	148.6	
3-24-21			3-24-21	7.0	5.2	3-24-21	35.0	16.5	3-24-21	0.0	0.0	3-24-21	24.0	9.4	3-24-21	0.0	0.0	3-24-21	0.0	0.0	3-24-21	0.0	0.0	
3-25-21			3-25-21	6.0	4.4	3-25-21	5.0	2.4	3-25-21	0.0	0.0	3-25-21	0.0	0.0	3-25-21	0.0	0.0	3-25-21	0.0	0.0	3-25-21	0.0	0.0	
3-26-21			3-26-21	5.0	3.7	3-26-21	17.0	8.0	3-26-21	0.0	0.0	3-26-21	0.0	0.0	3-26-21	0.0	0.0	3-26-21	0.0	0.0	3-26-21	5.0	2.1	
3-27-21			3-27-21			3-27-21			3-27-21			3-27-21			3-27-21			3-27-21			3-27-21			
3-28-21			3-28-21			3-28-21			3-28-21			3-28-21			3-28-21			3-28-21			3-28-21			
3-29-21			3-29-21	9.0	6.7	3-29-21	58.0	27.3	3-29-21	0.0	0.0	3-29-21	0.0	0.0	3-29-21	0.0	0.0	3-29-21	0.0	0.0	*	3-29-21	760.0	312.8
3-30-21			3-30-21	9.0	6.7	3-30-21	27.0	12.7	3-30-21	0.0	0.0	3-30-21	0.0	0.0	3-30-21	0.0	0.0	3-30-21	0.0	0.0	*	3-30-21	0.0	0.0
3-31-21			3-31-21	8.0	5.9	3-31-21	22.0	10.4	3-31-21	0.0	0.0	3-31-21	0.0	0.0	3-31-21	0.0	0.0	3-31-21	50.0	16.2	3-31-21	0.0	0.0	
4-1-21			4-1-21	7.0	5.2	4-1-21	22.0	10.4	4-1-21	0.0	0.0	4-1-21	6.0	2.4	4-1-21	0.0	0.0	4-1-21	0.0	0.0	4-1-21	0.0	0.0	
4-2-21			4-2-21			4-2-21			4-2-21			4-2-21			4-2-21			4-2-21			4-2-21			
4-3-21			4-3-21			4-3-21			4-3-21			4-3-21			4-3-21			4-3-21			4-3-21			
4-4-21			4-4-21			4-4-21			4-4-21			4-4-21			4-4-21			4-4-21			4-4-21			
4-5-21			4-5-21	14.0	10.3	4-5-21	82.0	38.6	4-5-21	0.0	0.0	4-5-21	0.0	0.0	4-5-21	0.0	0.0	4-5-21	0.0	0.0	4-5-21	647.0	266.3	
4-6-21			4-6-21	7.0	5.2	4-6-21	29.0	13.6	4-6-21	0.0	0.0	4-6-21	0.0	0.0	4-6-21	0.0	0.0	4-6-21	0.0	0.0	4-6-21	0.0	0.0	
4-7-21			4-7-21	7.0	5.2	4-7-21	21.0	9.9	4-7-21	20.0	9.4	4-7-21	25.0	9.8	4-7-21	0.0	0.0	4-7-21	0.0	0.0	4-7-21	0.0	0.0	
4-8-21			4-8-21	5.0	3.7	4-8-21	4.0	1.9	4-8-21	0.0	0.0	4-8-21	0.0	0.0	4-8-21	0.0	0.0	4-8-21	0.0	0.0	4-8-21	365.0	150.2	
4-9-21			4-9-21	5.0	3.7	4-9-21	13.0	6.1	4-9-21	0.0	0.0	4-9-21	0.0	0.0	4-9-21	0.0	0.0	4-9-21	0.0	0.0	4-9-21	0.0	0.0	
4-10-21			4-10-21			4-10-21			4-10-21			4-10-21			4-10-21			4-10-21			4-10-21			
4-11-21			4-11-21			4-11-21			4-11-21			4-11-21			4-11-21			4-11-21			4-11-21			
4-12-21			4-12-21	9.0	6.7	4-12-21	44.0	20.7	4-12-21	0.0	0.0	4-12-21	0.0	0.0	4-12-21	0.0	0.0	4-12-21	0.0	0.0	4-12-21	354.0	145.7	
4-13-21			4-13-21	7.0	5.2	4-13-21	23.0	10.8	4-13-21	0.0	0.0	4-13-21	0.0	0.0	4-13-21	0.0	0.0	4-13-21	0.0	0.0	4-13-21	0.0	0.0	
4-14-21			4-14-21	4.0	3.0	4-14-21	16.0	7.5	4-14-21	0.0	0.0	4-14-21	0.0	0.0	4-14-21	0.0	0.0	4-14-21	0.0	0.0	4-14-21	0.0	0.0	
4-15-21			4-15-21	4.0	3.0	4-15-21	21.0	9.9	4-15-21	0.0	0.0	4-15-21	0.0	0.0	4-15-21	0.0	0.0	4-15-21	0.0	0.0	4-15-21	0.0	0.0	
4-16-21			4-16-21	4.0	3.0	4-16-21	3.0	1.4	4-16-21	0.0	0.0	4-16-21	0.0	0.0	4-16-21	0.0	0.0	4-16-21	0.0	0.0	4-16-21	0.0	0.0	
4-17-21			4-17-21			4-17-21			4-17-21			4-17-21			4-17-21			4-17-21			4-17-21			
4-18-21			4-18-21			4-18-21			4-18-21			4-18-21			4-18-21			4-18-21			4-18-21			
4-19-21			4-19-21	9.0	6.7	4-19-21	52.0	24.5	4-19-21	0.0	0.0	4-19-21	0.0	0.0	4-19-21	0.0	0.0	4-19-21	8.0	2.6	4-19-21	770.0	316.9	
4-20-21			4-20-21	3.0	2.2	4-20-21	21.0	9.9	4-20-21	8.0	3.8	4-20-21	0.0	0.0	4-20-21	0.0	0.0	4-20-21	0.0	0.0	4-20-21	0.0	0.0	
4-21-21			4-21-21	7.0	5.2	4-21-21	21.0	9.9	4-21-21	0.0	0.0	4-21-21	10.0	3.9	4-21-21	0.0	0.0	4-21-21	0.0	0.0	4-21-21	0.0	0.0	
4-22-21			4-22-21	4.0	3.0	4-22-21	13.0	6.1	4-22-21	0.0	0.0	4-22-21	0.0	0.0	4-22-21	0.0	0.0	4-22-21	0.0	0.0	4-22-21	389.0	160.1	
4-23-21			4-23-21	7.0	5.2	4-23-21	14.0	6.6	4-23-21	0.0	0.0	4-23-21	0.0	0.0	4-23-21	0.0	0.0	4-23-21	0.0	0.0	4-23-21	0.0	0.0	
4-24-21			4-24-21			4-24-21			4-24-21			4-24-21			4-24-21			4-24-21			4-24-21			
4-25-21			4-25-21			4-25-21			4-25-21			4-25-21			4-25-21			4-25-21			4-25-21			
4-26-21			4-26-21	0.0	0.0	4-26-21	36.0	16.9	4-26-21	0.0	0.0	4-26-21	8.0	3.1	4-26-21	0.0	0.0	4-26-21	15.0	4.9	4-26-21	447.0	184.0	
4-27-21			4-27-21	0.0	0.0	4-27-21	20.0																	

CLEAN HARBORS CANADA, INC.
Liquid Removed from Leak Detection Systems 2021

CELL 1			CELL 2			CELL 3A (3)			CELL 3B (4)			Cell 3C (5)			Cell 3D (6)			Cell 3E (7)			Cell 4			
# of hectares		0.688	# of hectares		1.353	# of hectares		2.125	# of hectares		2.125	# of hectares		2.546	# of hectares		2.535	# of hectares		3.08	# of hectares		2.43	
DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	
4-29-21			4-29-21	4.0	3.0	4-29-21	11.0	5.2	4-29-21	0.0	0.0	4-29-21	0.0	0.0	4-29-21	0.0	0.0	4-29-21	0.0	0.0	4-29-21	317.0	130.5	
4-30-21			4-30-21	0.0	0.0	4-30-21	14.0	6.6	4-30-21	0.0	0.0	4-30-21	0.0	0.0	4-30-21	0.0	0.0	4-30-21	0.0	0.0	4-30-21	0.0	0.0	
5-1-21			5-1-21			5-1-21			5-1-21			5-1-21			5-1-21			5-1-21			5-1-21			
5-2-21			5-2-21			5-2-21			5-2-21			5-2-21			5-2-21			5-2-21			5-2-21			
5-3-21			5-3-21	14.0	10.3	5-3-21	40.0	18.8	5-3-21	0.0	0.0	5-3-21	0.0	0.0	5-3-21	0.0	0.0	5-3-21	0.0	0.0	5-3-21	439.0	180.7	
5-4-21			5-4-21	11.0	8.1	5-4-21	22.0	10.4	5-4-21	0.0	0.0	5-4-21	0.0	0.0	5-4-21	0.0	0.0	5-4-21	0.0	0.0	5-4-21	0.0	0.0	
5-5-21			5-5-21	9.0	6.7	5-5-21	18.0	8.5	5-5-21	0.0	0.0	5-5-21	0.0	0.0	5-5-21	0.0	0.0	5-5-21	0.0	0.0	5-5-21	0.0	0.0	
5-6-21			5-6-21	6.0	4.4	5-6-21	16.0	7.5	5-6-21	0.0	0.0	5-6-21	0.0	0.0	5-6-21	0.0	0.0	5-6-21	0.0	0.0	5-6-21	320.0	131.7	
5-7-21			5-7-21	3.0	2.2	5-7-21	16.0	7.5	5-7-21	5.0	2.4	5-7-21	0.0	0.0	5-7-21	0.0	0.0	5-7-21	0.0	0.0	5-7-21	0.0	0.0	
5-8-21			5-8-21			5-8-21			5-8-21			5-8-21			5-8-21			5-8-21			5-8-21			
5-9-21			5-9-21			5-9-21			5-9-21			5-9-21			5-9-21			5-9-21			5-9-21			
5-10-21			5-10-21	0.0	0.0	5-10-21	38.0	17.9	5-10-21	0.0	0.0	5-10-21	0.0	0.0	5-10-21	0.0	0.0	5-10-21	0.0	0.0	5-10-21	506.0	208.2	
5-11-21			5-11-21	5.0	3.7	5-11-21	19.0	8.9	5-11-21	0.0	0.0	5-11-21	0.0	0.0	5-11-21	0.0	0.0	5-11-21	0.0	0.0	5-11-21	0.0	0.0	
5-12-21			5-12-21	0.0	0.0	5-12-21	18.0	8.5	5-12-21	0.0	0.0	5-12-21	0.0	0.0	5-12-21	0.0	0.0	5-12-21	0.0	0.0	5-12-21	0.0	0.0	
5-13-21			5-13-21	16.0	11.8	5-13-21	16.0	7.5	5-13-21	0.0	0.0	5-13-21	0.0	0.0	5-13-21	0.0	0.0	5-13-21	7.0	2.3	5-13-21	0.0	0.0	
5-14-21			5-14-21	14.0	10.3	5-14-21	13.0	6.1	5-14-21	0.0	0.0	5-14-21	0.0	0.0	5-14-21	0.0	0.0	5-14-21	0.0	0.0	5-14-21	0.0	0.0	
5-15-21			5-15-21			5-15-21			5-15-21			5-15-21			5-15-21			5-15-21			5-15-21			
5-16-21			5-16-21			5-16-21			5-16-21			5-16-21			5-16-21			5-16-21			5-16-21			
5-17-21			5-17-21	8.0	5.9	5-17-21	34.0	16.0	5-17-21	5.0	2.4	5-17-21	10.0	3.9	5-17-21	0.0	0.0	5-17-21	0.0	0.0	5-17-21	262.0	107.8	
5-18-21			5-18-21	14.0	10.3	5-18-21	13.0	6.1	5-18-21	0.0	0.0	5-18-21	1.0	0.4	5-18-21	0.0	0.0	5-18-21	0.0	0.0	5-18-21	0.0	0.0	
5-19-21			5-19-21	9.0	6.7	5-19-21	8.0	3.8	5-19-21	0.0	0.0	5-19-21	0.0	0.0	5-19-21	0.0	0.0	5-19-21	200.0	64.9	5-19-21	0.0	0.0	
5-20-21			5-20-21	0.0	0.0	5-20-21	2.0	0.9	5-20-21	0.0	0.0	5-20-21	0.0	0.0	5-20-21	0.0	0.0	5-20-21	0.0	0.0	5-20-21	0.0	0.0	
5-21-21			5-21-21	4.0	3.0	5-21-21	0.0	0.0	5-21-21	0.0	0.0	5-21-21	0.0	0.0	5-21-21	0.0	0.0	5-21-21	0.0	0.0	5-21-21	0.0	0.0	
5-22-21			5-22-21			5-22-21			5-22-21			5-22-21			5-22-21			5-22-21			5-22-21			
5-23-21			5-23-21			5-23-21			5-23-21			5-23-21			5-23-21			5-23-21			5-23-21			
5-24-21			5-24-21			5-24-21			5-24-21			5-24-21			5-24-21			5-24-21			5-24-21			
5-25-21			5-25-21	15.0	11.1	5-25-21	45.0	21.2	5-25-21	0.0	0.0	5-25-21	0.0	0.0	5-25-21	0.0	0.0	5-25-21	27.0	8.8	5-25-21	683.0	281.1	
5-26-21			5-26-21	8.0	5.9	5-26-21	0.0	0.0	5-26-21	0.0	0.0	5-26-21	0.0	0.0	5-26-21	0.0	0.0	5-26-21	0.0	0.0	5-26-21	0.0	0.0	
5-27-21			5-27-21	10.0	7.4	5-27-21	14.0	6.6	5-27-21	0.0	0.0	5-27-21	0.0	0.0	5-27-21	0.0	0.0	5-27-21	53.0	17.2	5-27-21	85.0	35.0	
5-28-21			5-28-21	10.0	7.4	5-28-21	53.0	24.9	5-28-21	0.0	0.0	5-28-21	0.0	0.0	5-28-21	0.0	0.0	5-28-21	37.0	12.0	5-28-21	70.0	28.8	
5-29-21			5-29-21			5-29-21			5-29-21			5-29-21			5-29-21			5-29-21			5-29-21			
5-30-21			5-30-21			5-30-21			5-30-21			5-30-21			5-30-21			5-30-21			5-30-21			
5-31-21			5-31-21	15.0	11.1	5-31-21	190.0	89.4	5-31-21	0.0	0.0	5-31-21	0.0	0.0	5-31-21	0.0	0.0	5-31-21	6.0	1.9	5-31-21	116.0	47.7	
6-1-21			6-1-21	12.0	8.9	6-1-21	260.0	122.4	6-1-21	0.0	0.0	6-1-21	0.0	0.0	6-1-21	5.0	2.0	6-1-21	10.0	3.2	6-1-21	21.0	8.6	
6-2-21			6-2-21	10.0	7.4	6-2-21	308.0	144.9	6-2-21	0.0	0.0	6-2-21	0.0	0.0	6-2-21	5.0	2.0	6-2-21	5.0	1.6	6-2-21	17.0	7.0	
6-3-21			6-3-21	10.0	7.4	**	6-3-21	271.0	127.5	6-3-21	0.0	0.0	6-3-21	15.0	5.9	6-3-21	0.0	0.0	6-3-21	0.0	0.0	6-3-21	0.0	0.0
6-4-21			6-4-21	7.0	5.2	6-4-21	247.0	116.2	6-4-21	0.0	0.0	6-4-21	0.0	0.0	6-4-21	0.0	0.0	6-4-21	10.0	3.2	6-4-21	148.0	60.9	
6-5-21			6-5-21			6-5-21			6-5-21			6-5-21			6-5-21			6-5-21			6-5-21			
6-6-21			6-6-21			6-6-21			6-6-21			6-6-21			6-6-21			6-6-21			6-6-21			
6-7-21			6-7-21	15.0	11.1	6-7-21	570.0	268.2	6-7-21	0.0	0.0	6-7-21	12.0	4.7	6-7-21	6.0	2.4	6-7-21	30.0	9.7	6-7-21	111.0	45.7	
6-8-21			6-8-21	10.0	7.4	6-8-21	131.0	61.6	6-8-21	0.0	0.0	6-8-21	0.0	0.0	6-8-21	5.0	2.0	6-8-21	20.0	6.5	6-8-21	131.0	53.9	
6-9-21			6-9-21	10.0	7.4	6-9-21	126.0	59.3	6-9-21	0.0	0.0	6-9-21	0.0	0.0	6-9-21	10.0	3.9	6-9-21	9.0	2.9	6-9-21	153.0	63.0	
6-10-21	0.0		6-10-21	5.0	3.7	6-10-21	108.0	50.8	6-10-21	0.0	0.0	6-10-21	0.0	0.0	6-10-21	5.0	2.0	6-10-21	15.0	4.9	6-10-21	96.0	39.5	
6-11-21			6-11-21	0.0	0.0	6-11-21	78.0	36.7	6-11-21	0.0	0.0	6-11-21	0.0	0.0	6-11-21	5.0	2.0	6-11-21	15.0	4.9	6-11-21	50.0	20.6	
6-12-21			6-12-21			6-12-21			6-12-21			6-12-21			6-12-21			6-12-21			6-12-21			
6-13-21			6-13-21			6-13-21			6-13-21			6-13-21			6-13-21			6-13-21			6-13-21			
6-14-21			6-14-21	21.0	15.5	6-14-21	275.0	129.4	6-14-21	0.0	0.0	6-14-21	0.0	0.0	6-14-21	6.0	2.4	6-14-21	6.0	1.9	6-14-21	345.0	142.0	
6-15-21			6-15-21	5.0	3.7	6-15-21	81.0	38.1	6-15-21	0.0	0.0	6-15-21	5.0	2.0	6-15-21	0.0	0.0	6-15-21	10.0	3.2	6-15-21	80.0	32.9	
6-16-21			6-16-21	5.0	3.7	6-16-21	70.0	32.9	6-16-21	0.0	0.0	6-16-21	0.0	0.0	6-16-21	5.0	2.0	6-16-21	5.0	1.6	6-16-21	60.0	24.7	
6-17-21			6-17-21	15.0	11.1	6-17-21	50.0	23.5	6-17-21	0.0	0.0	6-17-21	0.0	0.0	6-17-21	5.0	2.0	6-17-21	3.0	1.0	6-17-21	30.0	12.3	
6-18-21			6-18-21	10.0	7.4	6-18-21	60.0	28.2	6-18-21	0.0	0.0	6-18-21	0.0	0.0	6-18-21	10.0	3.9	6-18-21	3.0	1.0	6-18-21	20.0	8.2	
6-19-21			6-19-21			6-19-21			6-19-21			6-19-21			6-19-21			6-19-21			6-19-21			
6-20-21			6-20-21			6-20-21			6-20-21			6-20-21			6-20-21			6-20-21			6-20-21			
6-21-21			6-21-21	30.0	22.2	6-21-21	210.0	98.8	6-21-21	0.0	0.0	6-21-21	0.0	0.0	6-21-21	6.0	2.4	6-21-21	15.0	4.9	6-21-21	438.0	180.2	
6-22-21			6-22-21	10.0	7.4	6-22-21	85.0	40.0	6-22-21	0.0	0.0	6-22-21	30.0	11.8	6-22-21	5.0	2.0	6-22-21	5.0	1.6	6-22-21	33.0	13.6	
6-23-21			6-23-21	5.0	3.7	6-23-21	57.0	26.8	6-23-21	0.0	0.0	6-23-21	0.0	0.0	6-23-21	0.0	0.0	6-23-21	10.0	3.2	6-23-21	20.0	8.2	
6-24-21			6-24-21	5.0	3.7	6-24-21	64.0	30.1	6-24-21	0.0	0.0	6-24-21	0.0	0.0	6-24-21	5.0	2.0	6-24-21	10.0	3.2	6-24-21	24.0	9.9	
6-25-21																								

CLEAN HARBORS CANADA, INC.
Liquid Removed from Leak Detection Systems 2021

CELL 1			CELL 2			CELL 3A (3)			CELL 3B (4)			Cell 3C (5)			Cell 3D (6)			Cell 3E (7)			Cell 4			
# of hectares		0.688	# of hectares		1.353	# of hectares		2.125	# of hectares		2.125	# of hectares		2.546	# of hectares		2.535	# of hectares		3.08	# of hectares		2.43	
DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	
6-27-21			6-27-21			6-27-21			6-27-21			6-27-21			6-27-21			6-27-21			6-27-21			
6-28-21	0.0		6-28-21	30.0	22.2	6-28-21	153.0	72.0	6-28-21	15.0	7.1	6-28-21	10.0	3.9	6-28-21	15.0	5.9	6-28-21	15.0	4.9	6-28-21	30.0	12.3	
6-29-21			6-29-21	5.0	3.7	6-29-21	62.0	29.2	6-29-21	0.0	0.0	6-29-21	0.0	0.0	6-29-21	47.0	18.5	6-29-21	5.0	1.6	6-29-21	382.0	157.2	
6-30-21			6-30-21	5.0	3.7	6-30-21	64.0	30.1	6-30-21	0.0	0.0	6-30-21	0.0	0.0	6-30-21	17.0	6.7	6-30-21	5.0	1.6	6-30-21	197.0	81.1	
7-1-21			7-1-21			7-1-21			7-1-21			7-1-21			7-1-21			7-1-21			7-1-21			
7-2-21			7-2-21	0.0	0.0	***	7-2-21	92.0	43.3	7-2-21	0.0	0.0	7-2-21	0.0	0.0	7-2-21	15.0	5.9	7-2-21	10.0	3.2	7-2-21	318.0	130.9
7-3-21			7-3-21			7-3-21			7-3-21			7-3-21			7-3-21			7-3-21			7-3-21			
7-4-21			7-4-21			7-4-21			7-4-21			7-4-21			7-4-21			7-4-21			7-4-21			
7-5-21			7-5-21	0.0	0.0	7-5-21	177.0	83.3	7-5-21	20.0	9.4	7-5-21	0.0	0.0	7-5-21	27.0	10.7	7-5-21	30.0	9.7	7-5-21	539.0	221.8	
7-6-21			7-6-21	0.0	0.0	7-6-21	62.0	29.2	7-6-21	0.0	0.0	7-6-21	5.0	2.0	7-6-21	16.0	6.3	7-6-21	10.0	3.2	7-6-21	17.0	7.0	
7-7-21			7-7-21	0.0	0.0	7-7-21	54.0	25.4	7-7-21	0.0	0.0	7-7-21	0.0	0.0	7-7-21	10.0	3.9	7-7-21	10.0	3.2	7-7-21	10.0	4.1	
7-8-21			7-8-21	10.0	7.4	7-8-21	60.0	28.2	7-8-21	0.0	0.0	7-8-21	0.0	0.0	7-8-21	5.0	2.0	7-8-21	10.0	3.2	7-8-21	10.0	4.1	
7-9-21			7-9-21	9.0	6.7	7-9-21	104.0	48.9	7-9-21	0.0	0.0	7-9-21	0.0	0.0	7-9-21	5.0	2.0	7-9-21	15.0	4.9	7-9-21	87.0	35.8	
7-10-21			7-10-21			7-10-21			7-10-21			7-10-21			7-10-21			7-10-21			7-10-21			
7-11-21			7-11-21			7-11-21			7-11-21			7-11-21			7-11-21			7-11-21			7-11-21			
7-12-21			7-12-21	16.0	11.8	7-12-21	154.0	72.5	7-12-21	15.0	7.1	7-12-21	0.0	0.0	7-12-21	6.0	2.4	7-12-21	30.0	9.7	7-12-21	344.0	141.6	
7-13-21			7-13-21	5.0	3.7	7-13-21	53.0	24.9	7-13-21	0.0	0.0	7-13-21	0.0	0.0	7-13-21	5.0	2.0	7-13-21	10.0	3.2	7-13-21	30.0	12.3	
7-14-21			7-14-21	5.0	3.7	7-14-21	39.0	18.4	7-14-21	0.0	0.0	7-14-21	0.0	0.0	7-14-21	5.0	2.0	7-14-21	15.0	4.9	7-14-21	20.0	8.2	
7-15-21			7-15-21	5.0	3.7	7-15-21	57.0	26.8	7-15-21	0.0	0.0	7-15-21	5.0	2.0	7-15-21	5.0	2.0	7-15-21	10.0	3.2	7-15-21	122.0	50.2	
7-16-21			7-16-21	7.0	5.2	7-16-21	52.0	24.5	7-16-21	0.0	0.0	7-16-21	5.0	2.0	7-16-21	5.0	2.0	7-16-21	10.0	3.2	7-16-21	30.0	12.3	
7-17-21			7-17-21			7-17-21			7-17-21			7-17-21			7-17-21			7-17-21			7-17-21			
7-18-21			7-18-21			7-18-21			7-18-21			7-18-21			7-18-21			7-18-21			7-18-21			
7-19-21			7-19-21	9.0	6.7	7-19-21	135.0	63.5	7-19-21	5.0	2.4	7-19-21	8.0	3.1	7-19-21	10.0	3.9	7-19-21	30.0	9.7	7-19-21	94.0	38.7	
7-20-21			7-20-21	14.0	10.3	7-20-21	17.0	8.0	7-20-21	0.0	0.0	7-20-21	0.0	0.0	7-20-21	5.0	2.0	7-20-21	10.0	3.2	7-20-21	561.0	230.9	
7-21-21			7-21-21	4.0	3.0	7-21-21	43.0	20.2	7-21-21	0.0	0.0	7-21-21	0.0	0.0	7-21-21	4.0	1.6	7-21-21	7.0	2.3	7-21-21	165.0	67.9	
7-22-21			7-22-21	2.0	1.5	7-22-21	51.0	24.0	7-22-21	0.0	0.0	7-22-21	0.0	0.0	7-22-21	5.0	2.0	7-22-21	5.0	1.6	7-22-21	60.0	24.7	
7-23-21			7-23-21	3.0	2.2	7-23-21	8.0	3.8	7-23-21	0.0	0.0	7-23-21	0.0	0.0	7-23-21	5.0	2.0	7-23-21	5.0	1.6	7-23-21	0.0	0.0	
7-24-21			7-24-21			7-24-21			7-24-21			7-24-21			7-24-21			7-24-21			7-24-21			
7-25-21			7-25-21			7-25-21			7-25-21			7-25-21			7-25-21			7-25-21			7-25-21			
7-26-21			7-26-21	12.0	8.9	7-26-21	101.0	47.5	7-26-21	10.0	4.7	7-26-21	0.0	0.0	7-26-21	12.0	4.7	7-26-21	15.0	4.9	7-26-21	416.0	171.2	
7-27-21			7-27-21	2.0	1.5	7-27-21	25.0	11.8	7-27-21	0.0	0.0	7-27-21	0.0	0.0	7-27-21	8.0	3.2	7-27-21	5.0	1.6	7-27-21	21.0	8.6	
7-28-21			7-28-21	2.0	1.5	7-28-21	31.0	14.6	7-28-21	0.0	0.0	7-28-21	0.0	0.0	7-28-21	0.0	0.0	7-28-21	0.0	0.0	7-28-21	0.0	0.0	
7-29-21			7-29-21	2.0	1.5	7-29-21	40.0	18.8	7-29-21	0.0	0.0	7-29-21	0.0	0.0	7-29-21	0.0	0.0	7-29-21	0.0	0.0	7-29-21	213.0	87.7	
7-30-21			7-30-21	3.0	2.2	7-30-21	33.0	15.5	7-30-21	0.0	0.0	7-30-21	0.0	0.0	7-30-21	0.0	0.0	7-30-21	5.0	1.6	7-30-21	24.0	9.9	
7-31-21			7-31-21		0.0	7-31-21			7-31-21			7-31-21			7-31-21			7-31-21			7-31-21			
8-1-21			8-1-21			8-1-21			8-1-21			8-1-21			8-1-21			8-1-21			8-1-21			
8-2-21			8-2-21			8-2-21			8-2-21			8-2-21			8-2-21			8-2-21			8-2-21			
8-3-21			8-3-21	11.0	8.1	8-3-21	161.0	75.8	8-3-21	0.0	0.0	8-3-21	0.0	0.0	8-3-21	5.0	2.0	8-3-21	10.0	3.2	8-3-21	731.0	300.8	
8-4-21			8-4-21	4.0	3.0	8-4-21	48.0	22.6	8-4-21	0.0	0.0	8-4-21	5.0	2.0	8-4-21	5.0	2.0	8-4-21	10.0	3.2	8-4-21	28.0	11.5	
8-5-21			8-5-21	3.0	2.2	8-5-21	34.0	16.0	8-5-21	0.0	0.0	8-5-21	15.0	5.9	8-5-21	0.0	0.0	8-5-21	0.0	0.0	8-5-21	0.0	0.0	
8-6-21			8-6-21	2.0	1.5	8-6-21	36.0	16.9	8-6-21	0.0	0.0	8-6-21	5.0	2.0	8-6-21	0.0	0.0	8-6-21	0.0	0.0	8-6-21	0.0	0.0	
8-7-21			8-7-21			8-7-21			8-7-21			8-7-21			8-7-21			8-7-21			8-7-21			
8-8-21			8-8-21			8-8-21			8-8-21			8-8-21			8-8-21			8-8-21			8-8-21			
8-9-21			8-9-21	6.0	4.4	8-9-21	88.0	41.4	8-9-21	0.0	0.0	8-9-21	0.0	0.0	8-9-21	0.0	0.0	8-9-21	12.0	3.9	8-9-21	642.0	264.2	
8-10-21			8-10-21	3.0	2.2	8-10-21	53.0	24.9	8-10-21	0.0	0.0	8-10-21	5.0	2.0	8-10-21	5.0	2.0	8-10-21	5.0	1.6	8-10-21	384.0	158.0	
8-11-21			8-11-21	2.0	1.5	8-11-21	10.0	4.7	8-11-21	0.0	0.0	8-11-21	0.0	0.0	8-11-21	12.0	4.7	8-11-21	5.0	1.6	8-11-21	131.0	53.9	
8-12-21			8-12-21	2.0	1.5	8-12-21	17.0	8.0	8-12-21	0.0	0.0	8-12-21	0.0	0.0	8-12-21	4.0	1.6	8-12-21	5.0	1.6	8-12-21	39.0	16.0	
8-13-21			8-13-21	3.0	2.2	8-13-21	19.0	8.9	8-13-21	0.0	0.0	8-13-21	0.0	0.0	8-13-21	2.0	0.8	8-13-21	5.0	1.6	8-13-21	114.0	46.9	
8-14-21			8-14-21			8-14-21			8-14-21			8-14-21			8-14-21			8-14-21			8-14-21			
8-15-21			8-15-21			8-15-21			8-15-21			8-15-21			8-15-21			8-15-21			8-15-21			
8-16-21			8-16-21	4.0	3.0	8-16-21	99.0	46.6	8-16-21	10.0	4.7	8-16-21	6.0	2.4	8-16-21	8.0	3.2	8-16-21	12.0	3.9	8-16-21	468.0	192.6	
8-17-21			8-17-21	3.0	2.2	8-17-21	25.0	11.8	8-17-21	0.0	0.0	8-17-21	0.0	0.0	8-17-21	2.0	0.8	8-17-21	10.0	3.2	8-17-21	62.0	25.5	
8-18-21			8-18-21	4.0	3.0	8-18-21	14.0	6.6	8-18-21	0.0	0.0	8-18-21	0.0	0.0	8-18-21	3.0	1.2	8-18-21	5.0	1.6	8-18-21	108.0	44.4	
8-19-21			8-19-21	2.0	1.5	8-19-21	24.0	11.3	8-19-21	0.0	0.0	8-19-21	0.0	0.0	8-19-21	0.0	0.0	8-19-21	5.0	1.6	8-19-21	151.0	62.1	
8-20-21			8-20-21	3.0	2.2	8-20-21	27.0	12.7	8-20-21	0.0	0.0	8-20-21	0.0	0.0	8-20-21	5.0	2.0	8-20-21	10.0	3.2	8-20-21	68.0	28.0	
8-21-21			8-21-21			8-21-21			8-21-21			8-21-21			8-21-21			8-21-21			8-21-21			
8-22-21			8-22-21			8-22-21			8-22-21			8-22-21			8-22-21			8-22-21			8-22-21			
8-23-21			8-23-21	7.0	5.2	8-23-21	76.0	35.8	8-23-21	0.0	0.													

CLEAN HARBORS CANADA, INC.
Liquid Removed from Leak Detection Systems 2021

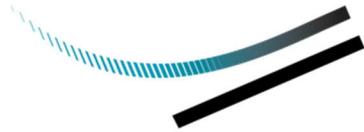
CELL 1			CELL 2			CELL 3A (3)			CELL 3B (4)			Cell 3C (5)			Cell 3D (6)			Cell 3E (7)			Cell 4		
# of hectares		0.688	# of hectares		1.353	# of hectares		2.125	# of hectares		2.125	# of hectares		2.546	# of hectares		2.535	# of hectares		3.08	# of hectares		2.43
DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)
8-25-21			8-25-21	2.0	1.5	8-25-21	38.0	17.9	8-25-21	0.0	0.0	8-25-21	3.0	1.2	8-25-21	5.0	2.0	8-25-21	0.0	0.0	8-25-21	179.0	73.7
8-26-21			8-26-21	0.0	0.0	8-26-21	59.0	27.8	8-26-21	0.0	0.0	8-26-21	0.0	0.0	8-26-21	2.0	0.8	8-26-21	0.0	0.0	8-26-21	32.0	13.2
8-27-21			8-27-21	0.0	0.0	8-27-21	24.0	11.3	8-27-21	0.0	0.0	8-27-21	20.0	7.9	8-27-21	0.0	0.0	8-27-21	0.0	0.0	8-27-21	0.0	0.0
8-28-21			8-28-21			8-28-21			8-28-21			8-28-21			8-28-21			8-28-21			8-28-21		
8-29-21			8-29-21			8-29-21			8-29-21			8-29-21			8-29-21			8-29-21			8-29-21		
8-30-21			8-30-21	4.0	3.0	8-30-21	71.0	33.4	8-30-21	6.0	2.8	8-30-21	0.0	0.0	8-30-21	0.0	0.0	8-30-21	15.0	4.9	8-30-21	594.0	244.4
8-31-21			8-31-21	5.0	3.7	8-31-21	87.0	40.9	8-31-21	0.0	0.0	8-31-21	5.0	2.0	8-31-21	2.0	0.8	8-31-21	3.0	1.0	8-31-21	40.0	16.5
9-1-21			9-1-21	2.0	1.5	9-1-21	10.0	4.7	9-1-21	0.0	0.0	9-1-21	0.0	0.0	9-1-21	2.0	0.8	9-1-21	0.0	0.0	9-1-21	73.0	30.0
9-2-21			9-2-21	3.0	2.2	9-2-21	22.0	10.4	9-2-21	2.0	0.9	9-2-21	0.0	0.0	9-2-21	0.0	0.0	9-2-21	3.0	1.0	9-2-21	36.0	14.8
9-3-21			9-3-21	2.0	1.5	9-3-21	15.0	7.1	9-3-21	15.0	7.1	9-3-21	0.0	0.0	9-3-21	11.0	4.3	9-3-21	0.0	0.0	9-3-21	333.0	137.0
9-4-21			9-4-21			9-4-21			9-4-21			9-4-21			9-4-21			9-4-21			9-4-21		
9-5-21			9-5-21			9-5-21			9-5-21			9-5-21			9-5-21			9-5-21			9-5-21		
9-6-21			9-6-21			9-6-21			9-6-21			9-6-21			9-6-21			9-6-21			9-6-21		
9-7-21			9-7-21	5.0	3.7	9-7-21	94.0	44.2	9-7-21	10.0	4.7	9-7-21	0.0	0.0	9-7-21	8.0	3.2	9-7-21	10.0	3.2	9-7-21	1045.0	430.0
9-8-21			9-8-21	3.0	2.2	9-8-21	33.0	15.5	9-8-21	5.0	2.4	9-8-21	0.0	0.0	9-8-21	2.0	0.8	9-8-21	16.0	5.2	9-8-21	135.0	55.6
9-9-21			9-9-21	2.0	1.5	9-9-21	52.0	24.5	9-9-21	0.0	0.0	9-9-21	5.0	2.0	9-9-21	2.0	0.8	9-9-21	2.0	1.6	9-9-21	88.0	36.2
9-10-21			9-10-21	3.0	2.2	9-10-21	68.0	32.0	9-10-21	0.0	0.0	9-10-21	0.0	0.0	9-10-21	5.0	2.0	9-10-21	0.0	0.0	9-10-21	40.0	16.5
9-11-21			9-11-21			9-11-21			9-11-21			9-11-21			9-11-21			9-11-21			9-11-21		
9-12-21			9-12-21			9-12-21			9-12-21			9-12-21			9-12-21			9-12-21			9-12-21		
9-13-21			9-13-21	7.0	5.2	9-13-21	72.0	33.9	9-13-21	0.0	0.0	9-13-21	0.0	0.0	9-13-21	12.0	4.7	9-13-21	9.0	2.9	9-13-21	752.0	309.5
9-14-21			9-14-21	2.0	1.5	9-14-21	30.0	14.1	9-14-21	0.0	0.0	9-14-21	0.0	0.0	9-14-21	3.0	1.2	9-14-21	3.0	1.0	9-14-21	51.0	21.0
9-15-21			9-15-21	2.0	1.5	9-15-21	12.0	5.6	9-15-21	0.0	0.0	9-15-21	1.0	0.4	9-15-21	1.0	0.4	9-15-21	5.0	1.6	9-15-21	61.0	25.1
9-16-21			9-16-21	2.0	1.5	9-16-21	25.0	11.8	9-16-21	0.0	0.0	9-16-21	5.0	2.0	9-16-21	4.0	1.6	9-16-21	0.0	0.0	9-16-21	69.0	28.4
9-17-21			9-17-21	3.0	2.2	9-17-21	7.0	3.3	9-17-21	0.0	0.0	9-17-21	0.0	0.0	9-17-21	2.0	0.8	9-17-21	0.0	0.0	9-17-21	31.0	12.8
9-18-21			9-18-21			9-18-21			9-18-21			9-18-21			9-18-21			9-18-21			9-18-21		
9-19-21			9-19-21			9-19-21			9-19-21			9-19-21			9-19-21			9-19-21			9-19-21		
9-20-21			9-20-21	7.0	5.2	9-20-21	90.0	42.4	9-20-21	0.0	0.0	9-20-21	0.0	0.0	9-20-21	6.0	2.4	9-20-21	12.0	3.9	9-20-21	100.0	41.2
9-21-21			9-21-21	3.0	2.2	9-21-21	21.0	9.9	9-21-21	0.0	0.0	9-21-21	0.0	0.0	9-21-21	2.0	0.8	9-21-21	3.0	1.0	9-21-21	40.0	16.5
9-22-21			9-22-21	2.0	1.5	9-22-21	17.0	8.0	9-22-21	0.0	0.0	9-22-21	4.0	1.6	9-22-21	5.0	2.0	9-22-21	3.0	1.0	9-22-21	69.0	28.4
9-23-21			9-23-21	2.0	1.5	9-23-21	18.0	8.5	9-23-21	0.0	0.0	9-23-21	0.0	0.0	9-23-21	3.0	1.2	9-23-21	5.0	1.6	9-23-21	52.0	21.4
9-24-21			9-24-21	0.0	0.0	9-24-21	44.0	20.7	9-24-21	0.0	0.0	9-24-21	5.0	2.0	9-24-21	3.0	1.2	9-24-21	5.0	1.6	9-24-21	89.0	36.6
9-25-21			9-25-21			9-25-21			9-25-21			9-25-21			9-25-21			9-25-21			9-25-21		
9-26-21			9-26-21			9-26-21			9-26-21			9-26-21			9-26-21			9-26-21			9-26-21		
9-27-21	0.0		9-27-21	5.0	3.7	9-27-21	15.0	7.1	9-27-21	4.0	1.9	9-27-21	10.0	3.9	9-27-21	5.0	2.0	9-27-21	6.0	1.9	9-27-21	208.0	85.6
9-28-21			9-28-21	2.0	1.5	9-28-21	33.0	15.5	9-28-21	0.0	0.0	9-28-21	2.0	0.8	9-28-21	6.0	2.4	9-28-21	5.0	1.6	9-28-21	180.0	74.1
9-29-21			9-29-21	3.0	2.2	9-29-21	17.0	8.0	9-29-21	0.0	0.0	9-29-21	0.0	0.0	9-29-21	0.0	0.0	9-29-21	0.0	0.0	9-29-21	134.0	55.1
9-30-21			9-30-21			9-30-21			9-30-21			9-30-21			9-30-21			9-30-21			9-30-21		
10-1-21			10-1-21	5.0	3.7	10-1-21	70.0	32.9	10-1-21	0.0	0.0	10-1-21	0.0	0.0	10-1-21	0.0	0.0	10-1-21	6.0	1.9	10-1-21	230.0	94.7
10-2-21			10-2-21			10-2-21			10-2-21			10-2-21			10-2-21			10-2-21			10-2-21		
10-3-21			10-3-21			10-3-21			10-3-21			10-3-21			10-3-21			10-3-21			10-3-21		
10-4-21			10-4-21	5.0	3.7	10-4-21	70.0	32.9	10-4-21	0.0	0.0	10-4-21	0.0	0.0	10-4-21	6.0	2.4	10-4-21	10.0	3.2	10-4-21	325.0	133.7
10-5-21			10-5-21	4.0	3.0	10-5-21	19.0	8.9	10-5-21	0.0	0.0	10-5-21	0.0	0.0	10-5-21	5.0	2.0	10-5-21	10.0	3.2	10-5-21	111.0	45.7
10-6-21			10-6-21	3.0	2.2	10-6-21	16.0	7.5	10-6-21	0.0	0.0	10-6-21	0.0	0.0	10-6-21	4.0	1.6	10-6-21	7.0	2.3	10-6-21	155.0	63.8
10-7-21			10-7-21	2.0	1.5	10-7-21	22.0	10.4	10-7-21	0.0	0.0	10-7-21	0.0	0.0	10-7-21	0.0	0.0	10-7-21	0.0	0.0	10-7-21	0.0	0.0
10-8-21			10-8-21	2.0	1.5	10-8-21	3.0	1.4	10-8-21	0.0	0.0	10-8-21	0.0	0.0	10-8-21	0.0	0.0	10-8-21	2.0	0.6	10-8-21	278.0	114.4
10-9-21			10-9-21			10-9-21			10-9-21			10-9-21			10-9-21			10-9-21			10-9-21		
10-10-21			10-10-21			10-10-21			10-10-21			10-10-21			10-10-21			10-10-21			10-10-21		
10-11-21			10-11-21			10-11-21			10-11-21			10-11-21			10-11-21			10-11-21			10-11-21		
10-12-21			10-12-21	3.0	2.2	10-12-21	57.0	26.8	10-12-21	0.0	0.0	10-12-21	0.0	0.0	10-12-21	0.0	0.0	10-12-21	0.0	0.0	10-12-21	1092.0	449.4
10-13-21			10-13-21	25.0	18.5	10-13-21	20.0	9.4	10-13-21	0.0	0.0	10-13-21	0.0	0.0	10-13-21	0.0	0.0	10-13-21	0.0	0.0	10-13-21	0.0	0.0
10-14-21			10-14-21	5.0	3.7	10-14-21	10.0	4.7	10-14-21	30.0	14.1	10-14-21	25.0	9.8	10-14-21	0.0	0.0	10-14-21	0.0	0.0	10-14-21	0.0	0.0
10-15-21			10-15-21	0.0	0.0	10-15-21	5.0	2.4	10-15-21	0.0	0.0	10-15-21	0.0	0.0	10-15-21	0.0	0.0	10-15-21	5.0	1.6	10-15-21	655.0	269.5
10-16-21			10-16-21			10-16-21			10-16-21			10-16-21			10-16-21			10-16-21			10-16-21		
10-17-21			10-17-21			10-17-21			10-17-21			10-17-21			10-17-21			10-17-21			10-17-21		
10-18-21			10-18-21	3.0	2.2	10-18-21	29.0	13.6	10-18-21	0.0	0.0	10-18-21	0.0	0.0	10-18-21	17.0	6.7	10-18-21	8.0	2.6	10-18-21	276.0	113.6
10-19-21			10-19-21	2.0	1.5	10-19-21	38.0	17.9	10-19-21	0.0	0.0	10-19-21	0.0	0.0	10-19-21	0.0	0.0	10-19-21	0.0	0.0	10-19-21	0.0	0.0
10-20-21			10-20-21	2.0	1.5	10-20-21	5.0	2.4	10-20-21	0.0	0.0	10-20-21	0.0	0.0	10-20-21	0.0	0.0	10-20-21	0.0	0.0	10-20-21	536.0	220.6

CLEAN HARBORS CANADA, INC.
Liquid Removed from Leak Detection Systems 2021

CELL 1			CELL 2			CELL 3A (3)			CELL 3B (4)			Cell 3C (5)			Cell 3D (6)			Cell 3E (7)			Cell 4		
# of hectares		0.688	# of hectares		1.353	# of hectares		2.125	# of hectares		2.125	# of hectares		2.546	# of hectares		2.535	# of hectares		3.08	# of hectares		2.43
DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)	DATE	VOLUME (litres)	Volume (litres/H a/day)
10-23-21			10-23-21			10-23-21			10-23-21			10-23-21			10-23-21			10-23-21			10-23-21		
10-24-21			10-24-21			10-24-21			10-24-21			10-24-21			10-24-21			10-24-21			10-24-21		
10-25-21			10-25-21	5.0	3.7	10-25-21	50.0	23.5	10-25-21	0.0	0.0	10-25-21	35.0	13.7	10-25-21	0.0	0.0	10-25-21	0.0	0.0	10-25-21	217.0	89.3
10-26-21			10-26-21	0.0	0.0	10-26-21	0.0	0.0	10-26-21	0.0	0.0	10-26-21	0.0	0.0	10-26-21	10.0	3.9	10-26-21	0.0	0.0	10-26-21	0.0	0.0
10-27-21			10-27-21	0.0	0.0	10-27-21	31.0	14.6	10-27-21	0.0	0.0	10-27-21	0.0	0.0	10-27-21	5.0	2.0	10-27-21	0.0	0.0	10-27-21	50.0	20.6
10-28-21			10-28-21	3.0	2.2	10-28-21	0.0	0.0	10-28-21	0.0	0.0	10-28-21	0.0	0.0	10-28-21	10.0	3.9	10-28-21	5.0	1.6	10-28-21	110.0	45.3
10-29-21			10-29-21	0.0	0.0	10-29-21	0.0	0.0	10-29-21	0.0	0.0	10-29-21	0.0	0.0	10-29-21	2.0	0.8	10-29-21	0.0	0.0	10-29-21	13.0	5.3
10-30-21			10-30-21			10-30-21			10-30-21			10-30-21			10-30-21			10-30-21			10-30-21		
10-31-21			10-31-21			10-31-21			10-31-21			10-31-21			10-31-21			10-31-21			10-31-21		
11-1-21			11-1-21	0.0	0.0	11-1-21	17.0	8.0	11-1-21	0.0	0.0	11-1-21	5.0	2.0	11-1-21	4.0	1.6	11-1-21	12.0	3.9	11-1-21	162.0	66.7
11-2-21			11-2-21	2.0	1.5	11-2-21	5.0	2.4	11-2-21	0.0	0.0	11-2-21	0.0	0.0	11-2-21	0.0	0.0	11-2-21	0.0	0.0	11-2-21	50.0	20.6
11-3-21			11-3-21	2.0	1.5	11-3-21	5.0	2.4	11-3-21	0.0	0.0	11-3-21	0.0	0.0	11-3-21	0.0	0.0	11-3-21	0.0	0.0	11-3-21	0.0	0.0
11-4-21			11-4-21	0.0	0.0	11-4-21	0.0	0.0	11-4-21	0.0	0.0	11-4-21	0.0	0.0	11-4-21	0.0	0.0	11-4-21	0.0	0.0	11-4-21	118.0	48.6
11-5-21			11-5-21	0.0	0.0	11-5-21	6.0	2.8	11-5-21	0.0	0.0	11-5-21	0.0	0.0	11-5-21	0.0	0.0	11-5-21	2.0	0.6	11-5-21	106.0	43.6
11-6-21			11-6-21			11-6-21			11-6-21			11-6-21			11-6-21			11-6-21			11-6-21		
11-7-21			11-7-21			11-7-21			11-7-21			11-7-21			11-7-21			11-7-21			11-7-21		
11-8-21			11-8-21	10.0	7.4	11-8-21	45.0	21.2	11-8-21	0.0	0.0	11-8-21	0.0	0.0	11-8-21	5.0	2.0	11-8-21	10.0	3.2	11-8-21	328.0	135.0
11-9-21			11-9-21	2.0	1.5	11-9-21	10.0	4.7	11-9-21	0.0	0.0	11-9-21	0.0	0.0	11-9-21	12.0	4.7	11-9-21	0.0	0.0	11-9-21	158.0	65.0
11-10-21			11-10-21	2.0	1.5	11-10-21	0.0	0.0	11-10-21	0.0	0.0	11-10-21	0.0	0.0	11-10-21	9.0	3.6	11-10-21	0.0	0.0	11-10-21	30.0	12.3
11-11-21			11-11-21	3.0	2.2	11-11-21	0.0	0.0	11-11-21	0.0	0.0	11-11-21	4.0	1.6	11-11-21	10.0	3.9	11-11-21	2.0	0.6	11-11-21	72.0	29.6
11-12-21			11-12-21	3.0	2.2	11-12-21	0.0	0.0	11-12-21	0.0	0.0	11-12-21	0.0	0.0	11-12-21	6.0	2.4	11-12-21	0.0	0.0	11-12-21	49.0	20.2
11-13-21			11-13-21			11-13-21			11-13-21			11-13-21			11-13-21			11-13-21			11-13-21		
11-14-21			11-14-21			11-14-21			11-14-21			11-14-21			11-14-21			11-14-21			11-14-21		
11-15-21			11-15-21	2.0	1.5	11-15-21	5.0	2.4	11-15-21	30.0	14.1	11-15-21	15.0	5.9	11-15-21	45.0	17.8	11-15-21	30.0	9.7	11-15-21	0.0	0.0
11-16-21			11-16-21	0.0	0.0	11-16-21	0.0	0.0	11-16-21	0.0	0.0	11-16-21	0.0	0.0	11-16-21	5.0	2.0	11-16-21	0.0	0.0	11-16-21	19.0	7.8
11-17-21			11-17-21	4.0	3.0	11-17-21	0.0	0.0	11-17-21	0.0	0.0	11-17-21	5.0	2.0	11-17-21	3.0	1.2	11-17-21	0.0	0.0	11-17-21	358.0	147.3
11-18-21			11-18-21	3.0	2.2	11-18-21	5.0	2.4	11-18-21	0.0	0.0	11-18-21	0.0	0.0	11-18-21	0.0	0.0	11-18-21	0.0	0.0	11-18-21	22.0	9.1
11-19-21			11-19-21	0.0	0.0	11-19-21	5.0	2.4	11-19-21	0.0	0.0	11-19-21	0.0	0.0	11-19-21	2.0	0.8	11-19-21	0.0	0.0	11-19-21	63.0	25.9
11-20-21			11-20-21			11-20-21			11-20-21			11-20-21			11-20-21			11-20-21			11-20-21		
11-21-21			11-21-21			11-21-21			11-21-21			11-21-21			11-21-21			11-21-21			11-21-21		
11-22-21			11-22-21	5.0	3.7	11-22-21	10.0	4.7	11-22-21	0.0	0.0	11-22-21	0.0	0.0	11-22-21	20.0	7.9	11-22-21	10.0	3.2	11-22-21	673.0	277.0
11-23-21			11-23-21	0.0	0.0	11-23-21	0.0	0.0	11-23-21	0.0	0.0	11-23-21	0.0	0.0	11-23-21	5.0	2.0	11-23-21	0.0	0.0	11-23-21	435.0	179.0
11-24-21			11-24-21	0.0	0.0	11-24-21	0.0	0.0	11-24-21	0.0	0.0	11-24-21	0.0	0.0	11-24-21	3.0	1.2	11-24-21	0.0	0.0	11-24-21	42.0	17.3
11-25-21			11-25-21	0.0	0.0	11-25-21	25.0	11.8	11-25-21	0.0	0.0	11-25-21	0.0	0.0	11-25-21	3.0	1.2	11-25-21	5.0	1.6	11-25-21	308.0	126.7
11-26-21			11-26-21	0.0	0.0	11-26-21	10.0	4.7	11-26-21	0.0	0.0	11-26-21	0.0	0.0	11-26-21	5.0	2.0	11-26-21	0.0	0.0	11-26-21	30.0	12.3
11-27-21			11-27-21			11-27-21			11-27-21			11-27-21			11-27-21			11-27-21			11-27-21		
11-28-21			11-28-21			11-28-21			11-28-21			11-28-21			11-28-21			11-28-21			11-28-21		
11-29-21			11-29-21	15.0	11.1	11-29-21	30.0	14.1	11-29-21	20.0	9.4	11-29-21	0.0	0.0	11-29-21	0.0	0.0	11-29-21	0.0	0.0	11-29-21	215.0	88.5
11-30-21	15.0		11-30-21	5.0	3.7	11-30-21	10.0	4.7	11-30-21	0.0	0.0	11-30-21	0.0	0.0	11-30-21	0.0	0.0	11-30-21	0.0	0.0	11-30-21	22.0	9.1
12-1-21			12-1-21	3.0	2.2	12-1-21	5.0	2.4	12-1-21	0.0	0.0	12-1-21	0.0	0.0	12-1-21	5.0	2.0	12-1-21	5.0	1.6	12-1-21	37.0	15.2
12-2-21			12-2-21	0.0	0.0	12-2-21	5.0	2.4	12-2-21	0.0	0.0	12-2-21	0.0	0.0	12-2-21	5.0	2.0	12-2-21	3.0	1.0	12-2-21	20.0	8.2
12-3-21			12-3-21	0.0	0.0	12-3-21	0.0	0.0	12-3-21	0.0	0.0	12-3-21	0.0	0.0	12-3-21	5.0	2.0	12-3-21	0.0	0.0	12-3-21	202.0	83.1
12-4-21			12-4-21			12-4-21			12-4-21			12-4-21			12-4-21			12-4-21			12-4-21		
12-5-21			12-5-21			12-5-21			12-5-21			12-5-21			12-5-21			12-5-21			12-5-21		
12-6-21			12-6-21	15.0	11.1	12-6-21	10.0	4.7	12-6-21	0.0	0.0	12-6-21	0.0	0.0	12-6-21	0.0	0.0	12-6-21	15.0	4.9	12-6-21	532.0	218.9
12-7-21			12-7-21	5.0	3.7	12-7-21	10.0	4.7	12-7-21	0.0	0.0	12-7-21	15.0	5.9	12-7-21	0.0	0.0	12-7-21	0.0	0.0	12-7-21	0.0	0.0
12-8-21			12-8-21	3.0	2.2	12-8-21	5.0	2.4	12-8-21	0.0	0.0	12-8-21	10.0	3.9	12-8-21	0.0	0.0	12-8-21	0.0	0.0	12-8-21	0.0	0.0
12-9-21			12-9-21	0.0	0.0	12-9-21	5.0	2.4	12-9-21	0.0	0.0	12-9-21	0.0	0.0	12-9-21	0.0	0.0	12-9-21	0.0	0.0	12-9-21	0.0	0.0
12-10-21			12-10-21	0.0	0.0	12-10-21	2.0	0.9	12-10-21	0.0	0.0	12-10-21	0.0	0.0	12-10-21	0.0	0.0	12-10-21	0.0	0.0	12-10-21	28.0	11.5
12-11-21			12-11-21			12-11-21			12-11-21			12-11-21			12-11-21			12-11-21			12-11-21		
12-12-21			12-12-21			12-12-21			12-12-21			12-12-21			12-12-21			12-12-21			12-12-21		
12-13-21			12-13-21	10.0	7.4	12-13-21	5.0	2.4	12-13-21	0.0	0.0	12-13-21	0.0	0.0	12-13-21	0.0	0.0	12-13-21	0.0	0.0	12-13-21	927.0	381.5
12-14-21			12-14-21	2.0	1.5	12-14-21	5.0	2.4	12-14-21	0.0	0.0	12-14-21	0.0	0.0	12-14-21	1.0	0.4	12-14-21	0.0	0.0	12-14-21	89.0	36.6
12-15-21			12-15-21	0.0	0.0	12-15-21	10.0	4.7	12-15-21	0.0	0.0	12-15-21	0.0	0.0	12-15-21	10.0	3.9	12-15-21	0.0	0.0	12-15-21	124.0	51.0
12-16-21			12-16-21	0.0	0.0	12-16-21	7.0	3.3	12-16-21	0.0	0.0	12-16-21	0.0	0.0	12-16-21	0.0	0.0	12-16-21	5.0	1.6	12-16-21	51.0	21.0
12-17-21			12-17-21																				

APPENDIX H

Third-party Compliance Audit Report



DILLON
CONSULTING

CLEAN HARBORS CANADA INC

2021 Compliance Audit Summary Report – Ryley Hazardous Waste Storage Facility and Landfill, Ryley, Alberta

Alberta Environment and Parks Approval Number 10348-03-00



December 17, 2021

Clean Harbors Canada, Inc.
P.O. Box 390
Ryley, Alberta
T0B 4A0

Attention: Mr. Stan Yuha
Facility Manager

2021 Compliance Audit Summary Report – Ryley Hazardous Waste Storage Facility
and Landfill

Dear Mr. Yuha:

Dillon Consulting Limited is pleased to submit the enclosed Final 2021 Compliance Audit Summary Report for the Ryley Facility (Facility or Site) to Clean Harbors Canada, Inc. This report describes the methodological approach used and highlights key findings resulting from the 2021 Triennial Compliance Audit completed at the Facility through a site visit conducted over September 1 to 2, 2021.

We hope you see this as a valuable tool to gain insight into current operations and Approval requirements, and discover the findings and recommendations described herein useful in informing continued operations at the Facility.

Sincerely,

DILLON CONSULTING LIMITED

A handwritten signature in blue ink, appearing to read "Jack Wallace".

Jack Wallace, P. Eng.
Lead Auditor

END:sls

cc: Mr. Mike Parker

Our file: 21-2502

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Table of Contents

1.0	Introduction	1
	1.1 Scope and Objectives	1
2.0	Discussion	3
	2.1 Resolution of 2018 Audit Findings	3
	2.2 2021 Audit Summary of Findings	3
3.0	Conclusions	5
4.0	Audit Limitations	6
5.0	Closure	7

Appendices

A	Ryley Audit Checklist	
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1.0 Introduction

Clean Harbors Canada, Inc. (Clean Harbors) is required to undergo a third-party compliance audit (compliance audit or audit) of construction, operations, and closure/post-closure care of its Ryley Facility (Facility or Site), located in Ryley, Alberta, as a requirement of the Site's Alberta Environment and Parks (AEP) Approval number 10348-03-00 (Approval), at a minimum of once every three years. The audit, as part of section 4.1.7 of the Approval (valid 2017-2027), is required to be performed at least once every three years, commencing on or before October 1, 2018. Dillon Consulting Limited (Dillon) was retained to perform the 2021 Triennial Compliance Audit (2021 Audit), for which the compliance audit kick-off was held on September 1, 2021, representing the commencement of the audit activities, followed by the formal site visit, conducted on September 1 and 2, 2021.

To prepare for this exercise, an audit checklist (Appendix A following this report) was established to account for every actionable item contained within the operating Approval. During the site visit, the auditors reviewed relevant documentation, interviewed facility staff members, and took part in the site visit and associated visual inspection of the facility in order to assess the compliance level of each item contained within the audit checklist. This report summarizes the findings and results of this audit.

1.1 Scope and Objectives

The objective of this audit was to determine if the Facility was in compliance with all requirements included in the Approval from the period of September 20, 2018 (2018 compliance audit completion) to September 1, 2021 (2021 Compliance Audit commenced). This is the second audit completed at the Facility since the new Approval came into effect in 2017.

Each of the 573 line items in the audit checklist were assessed and assigned one of the following statuses:

- Compliant;
- Non-compliant;
- Opportunity for Improvement; and
- Not Applicable/Information.

Each line item consists of a clear statement identifying an obligation of the Facility to the Approval. Line items are phrased in such a way where it is easy to assign one of the above statuses without cause for confusion. Approval requirements, which state numerous conditions under one larger, enveloping condition, have been separated and added as individual line items in the audit checklist to provide further clarity. A "Not Applicable/Information" status was assigned to items which were not applicable at the time of the audit, or were for information purposes only and do not represent compliance requirements. "Opportunity for Improvement" was assigned to items for which the Facility was clearly implementing compliance measures, but where Dillon identified room to improve.

In addition to assessing compliance with each item of the audit checklist, the auditors also recorded the supporting documentation (where available), which the auditors had reviewed prior to assigning a status to each line item. Documentation is generally the strongest evidence to support interviewee statements, and was revisited, as needed, to confirm statements. Documents reviewed included, but were not limited to:

- Site Approval;
- Annual Landfill Operations Report(s);
- Annual Landfill Operations Plan(s);
- Groundwater Monitoring Report(s);
- Calibration records;
- Sample analytical results;
- Regulatory documents and guidelines;
- Regulatory correspondence;
- Design drawings; and
- Emails.

To supplement documentation review, or in cases where documentation was not available or did not exist, a Facility tour was conducted by both auditors and three senior staff members of Clean Harbors. Visual observations and inspections were performed during the tour to verify compliance with certain items in the audit checklist.

Verbal confirmation provided by Clean Harbors' personnel was accepted in cases where assigning a status based on documentation or visual inspection was not feasible. Oftentimes, more than one staff member confirmed claims by the other, increasing the confidence of the auditors in assigning a status.

Clarification from AEP on Approval terms was not sought for this audit. Dillon's Auditors used professional judgement when evaluating the Approval terms and the Facility's compliance to them.

Requirements not explicitly identified in the Approval were outside the scope of this audit.

2.0 Discussion

The completed audit checklist, identifying the status of all Approval clauses, is provided as Appendix A, following the report text.

2.1 Resolution of 2018 Audit Findings

The 2018 audit completed at the Facility has identified two non-conformant items. Specifically, it was discovered that a groundwater monitoring well (MW-10) was found to have been damaged, resulting in well cap exposure, contravening Sections 4.1.4(vi) and Sections 4.9.10 (a) and (b) of the Approval. The 2021 audit observed that the monitoring well MW-10 had been repaired and locked. The second contravention found was relating to Section 4.6.16 (b) of the Approval, which states “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: (b) A written operating procedure to prevent tank overfill”. Although the “Bulk Flammable Liquid Transfer Safe Operating Procedure (SOP) Document and Checklist” is available, it is not posted next to the tanks in question. During the field observations of the 2021 audit, the Bulk Flammable Liquid Transfer SOP had not been stored next to the flammable tanks. This resulted in the non-compliance of Section 4.6.16(b) of the Approval during the 2021 Audit.

The requirements of Section 7.1 – Landfill Cell Closure and Maintenance of the Approval, which states in Section 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” and Section 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” were found to not necessarily portray the operating practices which are actually utilized by the Facility. It was observed in the 2018 audit that Sections 7.1.1 through Sections 7.1.2 required clarification from AEP to ensure compliance to the Approval is maintained. The latest landfill cell closure would be Cell 3B. Based on further discussion with Clean Harbors, the Landfill Cell Closure Plan was formed by the stamped design work completed as part of the issued for construction and final record drawing packages, and associated documents; as such, this item appears to be not applicable to ongoing operations. Further monitoring of this requirement is recommended for future landfill cell closure activities.

2.2 2021 Audit Summary of Findings

Appendix A includes the full checklist used during the audit. Table 1 below summarizes the statuses assigned to each line item in the audit checklist.

Table 1: Statuses Assigned to Line Items in the Audit Checklist

Status	Number Assigned
Compliant	391
Non-Compliant	2
Opportunity for Improvement	17
Not Applicable/Information	163
TOTAL	573

Two line items were assigned the status “non-compliant”. They are as follows:

1. Section 4.4.5 of the Approval states “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”. Action leakage rate exceedances were noted and reported June 9, June 10, July 2, and July 9, 2020, and reported to AEP within acceptable time frames with no adverse impacts from the exceedances. Several action leakage rate exceedances were also determined to have not been reported. Notification to AEP was made as soon as this information was discovered (AEP 376183), with actions taken to ensure this is not repeated. No adverse impacts resulted due to the exceedances.
2. Section 4.6.16 (b) of the Approval states “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: (b) A written operating procedure to prevent tank overfill”. Although the “Bulk Flammable Liquid Transfer SOP Document and Checklist” is available, it is not posted next to the tanks in question.

Several requirements of the Approval were identified as “informational” or “non-applicable” in nature by audit and the Facility’s personnel, and were assigned these identifiers accordingly. For example, Section 4.6.41 of the Approval states “The approval holder shall not dispose of hazardous waste in any Class II landfill cell”. No Class II landfill cells exist at the Facility, and no plans or permits are in place to allow a Class II landfill cell to be constructed in the future.

For continued Approval compliance in construction and operations, Dillon recommends that the Facility’s staff regularly review the Approval in depth, and engage the AEP Director as needed during approval amendment periods to modify clauses, which may no longer be applicable to site conditions.

Conclusions

The 2021 Compliance Audit of AEP Approval number 10348-03-00 revealed two non-compliances to Approval terms and conditions between the time of the last audit completion and commencement of this audit. These non-compliances relate to the following Approval clauses and consisted of the following:

- Clause 4.4.5: Action leakage rate exceedances were noted and reported June 9, June 10, July 2, , and July 9, 2020, and reported to AEP within acceptable time frames with no adverse impacts from the exceedances. Several action leakage rate exceedances were also determined to have not been reported. Notification to AEP was made as soon as this information was discovered (AEP 376183), with actions taken to ensure this is not repeated. No adverse impacts resulted due to the exceedances.
- Clause 4.6.16 (b): The SOP for tank filling and responding to overflows was available to staff on-site, but was not posted next to the bulk liquid storage tanks at the time of the audit.

Several opportunities for improvement were identified in the course of the audit, as identified in Appendix A. They include the following:

- Clause 2.3.1 (ii); 2.3.1(iii, A); and 2.3.1(iii, B): Although it appears that the Facility is adhering to the standards referenced for the collection, preservation, storage, and analysis of effluent or runoff water, a written SOP referencing the standards is recommended to be procured and included in the Operations Plan;
- Clause 4.1.4: A 24 hour "Hotline" is maintained at the Facility. Opportunity for improvement would be to post this number at the Facility's gate and office entrance;
- Clause 4.1.5(ii): Ponding was observed in roadways near potable water tanks, which can be managed on an ongoing basis;
- Clause 4.3.9 and 4.3.13(b): Results for the runoff control system testing of 48 hour static acute lethality test using daphnia magna could be included in the Summary of Batch Analysis presented in the 2020 Annual Landfill Operations Report, along with the lethality of effluents to rainbow trout testing;
- 4.6.29(a)-(e): The Facility is adhering to the information required in the Monthly Waste Management Report, viewed for July 2021. However, the reports are currently referencing the 10348-02-00 Approval. Dillon would recommended that the referenced Approval be updated to 10348-03-00;
- Clauses 4.6.24 (i); 4.6.30 (b); and 4.6.39 (b): Although it appears that the Facility is adhering to the document in question; "Industrial Waste Identification and Management Options, Alberta Environment, May 1996", it could be explicitly referred to in the Facility's Operations Plan; and
- Clause 7.1.1 and 7.1.2: It is understood that the Landfill Cell Closure Plan is formed by the stamped design work completed as part of the issued for construction and final record drawing packages, and associated documents. Assess the requirement for future Closure Plan submissions for future landfill cell closure activities.

Audit Limitations

This limited scope regulatory compliance audit relied upon information provided by representatives of Clean Harbors, and gathered during the site visit and document review conducted by Dillon during the course of the audit works undertaken. All information was verified to the extent possible through independent observations. However, Dillon cannot warrant that all information provided by Clean Harbors or other parties is completely accurate, transparent, or correct.

5.0

Closure

This audit and report have been completed in accordance with industry best practices subject to limitations outlined herein. If you should have any questions or concerns regarding the contents of this report or findings of the audit, please direct them to Jack Wallace at jwallace@dillon.ca or by calling 403.215.8880 ext. 4364.

Appendix A

Ryley Audit Checklist

Section 2 - General

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 2 - General							
2.1.1	The approval holder must immediately report to the Director by telephone any contravention of the terms and conditions of this approval at 1-780-422-4505.	X				<ul style="list-style-type: none"> Notification to AEP regarding odour complaint (ref. #380842), dated July 12, 2021. Report to AEP regarding landfill fire (ref. #375305), dated January 25, 2021. 	<ul style="list-style-type: none"> All complaints are called into the AEP number, which then assigns a reference number. The facility aims to call in within the hour. Contraventions are mostly odour complaints, which are called in to site then reported to AEP. There was a landfill fire early in 2021 due to a non-conforming waste stream, which was reported.
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.	X					Confirmed through review of records and discussion that all odour complaints are investigated and findings are submitted to the AEP within the reports.
2.1.3	The approval holder shall immediately notify the director if any of the following events occurs:				X	Not applicable.	Confirmed through discussion that the facility has not had any of these events occur.
2.1.3 (a)	The approval holder is served with a petition into bankruptcy.				X		
2.1.3 (b)	The approval holder files an assignment in bankruptcy or Notice of Intent to make a proposal.				X		
2.1.3 (c)	A receiver or receiver-manager is appointed.				X		
2.1.3 (d)	An application for protection from creditors is filed for the benefit of the approval holder under any creditor protection legislation.				X		
2.1.3 (e)	Any of the assets which are the subject matter of this approval are seized for any reason.				X		
2.1.4	The approval holder shall report any monitoring of substances or parameters which are the subject of operational limits as set out in the approval if they are monitored more frequently than specified by the approval. The additional results of such monitoring are to be included as an addendum in the reports required by the approval.				X	Not applicable.	Confirmed through discussion that the monitoring frequency as specified in Approval is followed.
2.1.5	The approval holder shall submit all monthly reports required by the approval to be compiled or submitted on or before the end of the month following the month in which the information was collected.	X				<ul style="list-style-type: none"> 2020 Annual Landfill Operations Report, dated March 31, 2021. 2020 Annual Air Monitoring Report, dated March 30, 2021. 	<ul style="list-style-type: none"> Air monitoring reporting is done monthly by GHD. Reporting requirements and data were viewed in the 2020 Annual Landfill Operations Report. No late submissions noted.
2.1.6	The approval holder shall submit all annual reports require by the 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.	X				<ul style="list-style-type: none"> 2020 Annual Landfill Operations Report, dated March 31, 2021. 2020 Annual Air Monitoring Report, dated March 30, 2021. 	Confirmed through discussion that all reporting has been on time to date.

Section 2 - General

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 2 - General							
2.2.1 (b)	The approval holder shall record and retain all the following information in respect of any sampling conducted or analyses performed in accordance with this approval for a minimum of 10 years:	X				<ul style="list-style-type: none"> Record Retention Schedule dated November 14, 2014. WIN Web records. 	Compliance confirmed through a review of multiple files and windows in the Clean Harbors Facility Compliance View system (WIN Web).
2.2.1 (b, i)	The place, date and time of sampling.	X				<ul style="list-style-type: none"> pH at scrubber daily inspection for August 31, 2021. Leachate level quarterly sampling certificate of analysis dated March 17, 2020. 	Facility Compliance View system (WIN Web) is the electronic database and data is accessible for all records of daily scrubber pH data; leachate level log data; and surface water and leachate monitoring results.
2.2.1 (b, ii)	Sample type.	X					
2.2.1 (b, iii)	The dates the analyses were performed.	X					
2.2.1 (b, iv)	The analytical techniques, methods or procedures used in the analysis.	X					
2.2.1 (b, v)	The names of the persons who collected and analysed each sample.	X					
2.2.1 (b, vi)	The number of analyses.	X					
2.2.2	The approval holder shall keep and maintain an Operating Record as per 4.6.34(a) until the end of the landfill post-closure.	X				<ul style="list-style-type: none"> Landfill annual operations reports (submissions to AEP). Landfill Operations Plan and Ryley HWRSP Facility Plan, dated February 2021. (Operations Plan). HWRSP Standard Operating Procedures. 	<ul style="list-style-type: none"> Landfill and Facility Operations Plan is updated annually per Approval as required. Latest version is dated February 22, 2021. Updates for 2021: personnel listing, procedures for sampling of new or changed landfill cells, what cells are capped Operations Report available publicly or viewing any time on the Clean Harbors website.
2.2.3	The Operating Record shall include, at minimum, all of the following information:				X		
2.2.3 (a)	The information required in section 7.3(c) of the Standards for Landfills in Alberta .	X					
2.2.3 (b)	The name and contact information of all persons who discover any contravention	X					
2.2.3 (c)	The names and contact information of all persons who take any remedial actions arising from the contravention of the Act, the regulations, or the approval.	X					
2.2.3 (d)	A description of remedial measures taken in respect of a contravention of the Act, the regulations, or the Approval.	X					
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 by the Director.	X					
2.3.1 (i, A)	Air monitoring analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Alberta Stack Sampling Code" (AEP, 1995).	X				GHD 2016 Quality Assurance Plan - Air Monitoring Program.	Exhaust stack sampling done once per week as per Section 4.2.9.
2.3.1 (i, B)	Air monitoring analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Methods Manual for Chemical Analysis of Atmospheric Pollutants" (AEP, 1993).	X				GHD 2016 Quality Assurance Plan - Air Monitoring Program.	Referred to in Air Monitoring Program.
2.3.1 (i, C)	Air monitoring analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Air Monitoring Directive" (AEP 1989).	X				GHD 2020 AEP annual Ambient Air Monitoring Report, dated March 30, 2021.	Standard referenced in the 2020 Annual Ambient Air Monitoring Report

Section 2 - General

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 2 - General							
2.3.1 (ii)	Industrial Wastewater, Industrial runoff, groundwater and domestic wastewater analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association, American Water Works Association, Water Environment Federation, 1998).			X		Industrial run-off report for July 2020 to AEP.	<ul style="list-style-type: none"> Clean Harbors staff collects samples then send them to the lab in Edmonton. Staff are trained in proper sampling techniques consistent with the methods indicated in the Approval. There is no formal written SOP for sampling industrial wastewater which makes reference to the Approval line test method.
2.3.1 (iii, A)	Whole effluent toxicity analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Biological Test Method: Reference Method for Determining the Acute Lethality of Effluents to Rainbow Trout" (Environment and Climate Change Canada, 2000).			X			
2.3.1 (iii, B)	Whole effluent toxicity analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Biological Test Method: Reference Method for Determining the Acute Lethality of Effluents to Daphnia Magna" (Environment and Climate Change Canada, 2000).			X			
2.3.1 (iii, C)	Whole effluent toxicity analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Biological Test Method: Growth Inhibition Test Using the Freshwater Alga <i>Selenastrum capricornutum</i> " (Environment and Climate Change Canada, 1992).				X	Review of Approval requirements (Table 4.3-B, 4.3-C, 4.3-D).	Not applicable. Whole effluent control system limits analysed as outlined by the Approval in Sections 4.6.8 are for: pH, COD, TDS, TSS, ammonia, chloride, sodium, sulphate, oil and other substances, 96-hour acute lethality test using rainbow trout, 48-hour acute lethality test using daphnia magna.
2.3.1 (iii, D)	Whole effluent toxicity analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Biological Test Method: Test of Reproduction and Survival Using the Cladoceran <i>Ceriodaphnia dubia</i> " (Environment and Climate Change Canada, 1992).				X		
2.3.1 (iii, E)	Whole effluent toxicity analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows" (Environment and Climate Change Canada, 1992).				X		
2.3.1 (iii, F)	Whole effluent toxicity analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Biological Test Method: Toxicity Test Using Luminescent Bacteria (<i>Photobacterium phosphoreum</i>)" (Environment and Climate Change Canada, 1992).				X		
2.3.1 (iv, A)	Soil analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the Soil Monitoring Directive (AEP, 2009).	X				2019 Soil Monitoring Program Report dated January 31, 2020.	Tetra Tech performs the soil sampling. Confirmed that the Soil Monitoring Directive was followed
2.3.1 (iv, B)	Soil analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: The Soil Quality Criteria Relative to Disturbance and Reclamation (Alberta Agriculture, 1987)				X	2019 Soil Monitoring Program Report dated January 31, 2020.	Not applicable. Information only as this pertains to reclamation. The site is still operating.

Section 2 - General

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	O/I	Info, N/A		
Part 2 - General							
2.3.1 (v, A)	Waste analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (USEPA, 1986).	X				Operations Plan.	All wastes are subject to a pre-acceptance review prior to receipt. Each waste stream will have a waste profile completed prior to the receipt of the waste which includes a third party Class II Landfill analysis Package - pH, BTEX, metals, delta T and flash point. Sampling of incoming loads is performed to verify characteristics of the shipment.
2.3.1 (v, B)	Waste analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Methods Manual for Chemical Analysis of Water and Wastes" (Alberta Environmental Centre, 1996).	X					
2.3.1 (v, C)	Waste analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Toxicity Characteristic Leaching Procedure (TCLP)" (USEPA Regulation 40 CFR261, Appendix II, Method No. 1311).	X					
2.3.1 (v, D)	Waste analytical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association, American Water Works Association, Water Environment Federation, 2010).	X					
2.3.2	Labs retained for analysis of parameters required by the approval are accredited pursuant to ISO/IEC 17025.	X				Certificate of Analysis for Bureau Veritas and ALS Environmental in various reports.	<ul style="list-style-type: none"> Bureau Veritas and ALS Environmental are used for all water/leachate parameters (switched to ALS from BV in Q4 2020). Alberta Innovates is used for all air parameters. Confirmed accreditations for all labs.
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.				X	Not applicable.	Not applicable. Information only.
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.				X	Not applicable.	Not applicable. Information only.
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.				X	Not applicable.	Not applicable. Information only.
2.4.3	Environmental Protection and Enhancement Act Approval No. 10348-02-00, as amended, is cancelled.				X	Not applicable.	Not applicable. Information only.
2.4.4	All tanks shall conform to the "Guidelines for Secondary Containment for Above Ground Storage Tanks" (Alberta Environmental Protection, 1997).	X				Field observations.	<ul style="list-style-type: none"> Three get annually inspected by Petroleum Tank Industry (diesel tank and 2 liquid waste tanks). Safety Codes Council invoice viewed. PTMAA certificate no longer required after Aug. 31, 2020. Safety Codes Council is now the regulating body. Secondary containment observed in field.
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, 1995).	X				<ul style="list-style-type: none"> Safety Codes Council invoice dated June 10, 2021. Field observations. 	<ul style="list-style-type: none"> Waste tanks were connected to the vapour capture and scrubbing system. Leachate tank had a newly installed vapour capture and scrubbing system installed. Inspected the three waste tanks on site and the leachate tank.

Section 3 - Construction

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	O/I	Info. N/A		
Part 3 - Construction							
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.	X				<ul style="list-style-type: none"> Letter to AEP regarding Cell 4 QA/QC Submission, dated February 19, 2019. Bond for financial security from Chubb dated August 16, 2021. AEP acceptance letter for bond, dated October 22, 2019. 	Compliance confirmed through a review of correspondence regarding changes to financial security for this period related to construction. AEP accepted the financial security bond for the construction period.
3.1.2	The approval holder shall construct each new Class 1 industrial landfill which has the following components, at a minimum:				X	Not applicable.	Not applicable. Information only.
3.1.2 (a)	A minimum of 0.45 metre thick cover of clean sand or soil placed over top of the uppermost drainage layer.	X				Tetra Tech Issued for Construction Drawings, dated March 2018.	Compliance confirmed; minimum of 450 mm is specified in drawing details.
3.1.2 (b, i)	GCL liner placed in direct contact with an underlying 80 mil HDPE geomembrane liner as a primary liner.	X				<ul style="list-style-type: none"> Tetra Tech Issued for Construction Drawings. AEP Letter amending GCL to Geosynthetic. 	Compliance confirmed; Detail 3 on Drawing C-04 shows GCL in direct contact with underlying geomembrane.
3.1.2 (b, ii)	GCL liner placed in direct contact with an underlying 80 mil HDPE geomembrane liner as a secondary liner.	X				<ul style="list-style-type: none"> Tetra Tech Issued for Construction Drawings. AEP Letter amending GCL to Geosynthetic. 	Compliance confirmed; Detail 3 on Drawing C-04 shows GCL in direct contact with underlying geomembrane as a secondary liner.
3.1.2 (b, iii, A)	GCL liner placed in direct contact with an underlying clay liner that has a minimum thickness of 1.0 metre at all points.	X				Tetra Tech Issued for Construction Drawings.	Compliance confirmed; 1000 mm indicated as a minimum thickness of the underlying clay liner, GCL indicated above in Detail 3 on Drawing C-04.
3.1.2 (b, iii, B)	GCL liner placed in direct contact with an underlying clay liner that has been compacted to achieve an in-place hydraulic conductivity of 1×10^{-9} m/s or less.	X				Clean Harbors Cell 4 Request for Quotation.	Compliance confirmed; GCL is required to have a conductivity of 5×10^{-9} cm/s at most (which is lower than the AEP requirements).
3.1.2 (c, i)	Leachate collection system that is placed over the primary liner.	X				Tetra Tech Issued for Construction Drawings.	Compliance confirmed; Detail 11 on Drawing C-06 shows LCS above primary layer.
3.1.2 (c, ii)	Leachate collection system that is capable of maintaining the acceptable leachate head.	X				Tetra Tech Issued for Construction Drawings.	Compliance confirmed; leachate collection system for most cells on timers, one cell has automatic pumping based on leachate level.
3.1.2 (c, iii, a)	Leachate collection system that consists of a geo-composite drainage layer with a transmissivity of at least 1×10^{-4} m ² /s placed over top of the primary layer.	X				Tetra Tech Issued for Construction Drawings.	Compliance confirmed; transmissivity is required to be 1×10^{-4} m ² /s at a minimum.
3.1.2 (c, iii, b)	Leachate collection system that consists of a network of perforated leachate collection pipes.	X				Tetra Tech Issued for Construction Drawings.	Compliance confirmed; Drawing C-05 shows perforation details for the leachate collection system.
3.1.2 (c, iii, c)	Leachate collection system that consists of a leachate collection sump placed over the primary layer.	X				Tetra Tech Issued for Construction Drawings.	Compliance confirmed; Drawing C-05 shows sump in both primary and secondary layer acting as one.
3.1.2 (d, i)	Leak detection system that is placed over the secondary layer.	X				Tetra Tech Issued for Construction Drawings.	Compliance confirmed; Detail 3 on Drawing C-04 shows leak detection system over the secondary layer.
3.1.2 (d, ii)	Leak detection system that is capable of detecting the leakage through the primary layer.	X				Tetra Tech Issued for Construction Drawings.	Compliance confirmed; Detail 3 on Drawing C-04 shows leak detection system under the primary layer.

Section 3 - Construction

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	O/I	Info. N/A		
Part 3 - Construction							
3.1.2 (d, iii, a)	Leak detection system that consists of a geo-composite drainage layer with a transmissivity of at least $1 \times 10^{-4} \text{m}^2/\text{s}$ placed over the top of the secondary layer.	X				Tetra Tech Issued for Construction Drawings.	Compliance confirmed; Detail 3 on Drawing C-04 shows geocomposite leak detection system over the secondary layer. Transmissivity of geocomposite satisfies requirements.
3.1.2 (d, iii, b)	Leak detection system that consists of a network of perforated leak detection liquid collection pipes.	X				Tetra Tech Issued for Construction Drawings.	Compliance confirmed; Detail 10 on Drawing C-05 shows perforated leachate monitoring pipes.
3.1.2 (d, iii, c)	Leak collection system that consists of a leak detection liquid collection sump placed over the secondary layer.	X				Tetra Tech Issued for Construction Drawings.	Compliance confirmed; Drawing C-05 shows sump in both primary and secondary layer acting as one.
3.1.2 (e, i)	A final cover that meets the requirements in Section 6.1(c) of the "Standards for Landfills in Alberta" or as specified in the Landfill Cell Closure Plan submitted by the approval holder and authorized by the Director pursuant to 7.1.1 and 7.1.4 of the approval.	X				Dillon Annual Landfill Cell Closure Report (Cell 3B), dated March 2021.	Compliance confirmed; design and installation of the Cell 3B final cover system was completed in 2020.
3.1.2 (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.	X				Tetra Tech Issued for Construction Drawings.	Compliance confirmed; perimeter berm is evident in Drawing C-03.
3.1.2 (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.	X				Tetra Tech Issued for Construction Drawings.	Leachate collections system will handle all stormwater that falls in the landfill footprint.
3.1.3	The composite liner is constructed on a foundation or base that prevents failure of the liners due to settlement, compression or uplift.	X				Tetra Tech Issued for Construction Drawings.	1000 mm minimum of compacted clay liner specified on top of compacted backfill of an unknown thickness.
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 3 months prior to construction:				X	Not applicable.	Not applicable. Information only.
3.1.4 (a)	Detailed Construction Plan and Specifications	X				Tetra Tech Construction Quality Assurance Report - Cell 4 and Laydown Pond - Earthworks, dated February 2019.	Construction started 3 months after submission of the referenced plans per the Approval.
3.1.4 (b)	Construction Quality Assurance Plan	X					
3.1.4 (c)	Construction Quality Control Plan	X					
3.1.5	The approval holder shall correct all deficiencies as outlined in the Detailed Construction Plan and Specifications outlined by the Director in the timeline specified by the Director.	X				Letter from AEP: Authorization of Cell 4 Construction, dated August 21, 2018.	Deficiencies were corrected on a per item basis until final issuance of approval to proceed on August 21, 2018.
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.	X				Tetra Tech Construction Quality Assurance Report - Cell 4 and Laydown Pond - Earthworks, dated February 2019.	Report details the construction activities and identifies compliance with the Detailed Construction Plan.
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 unless the following conditions are met:				X	Not applicable.	Not applicable. Information only.

Section 3 - Construction

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	O/I	Info. N/A		
Part 3 - Construction							
3.1.7 (a)	The deviation results in a minor adjustment in order to suite field conditions encountered.	X				Dillon Annual Landfill Cell Closure Report (Cell 3B), dated March 2021.	Deviation results to be communicated to AEP following construction in the summary report, per Line Item 3.1.9.
3.1.7 (b)	The deviation will result in an equivalent or better design performance of the landfill.	X				Dillon Annual Landfill Cell Closure Report (Cell 3B), dated March 2021.	Deviation results to be communicated to AEP following construction in the summary report, per Line Item 3.1.9.
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.	X				<ul style="list-style-type: none"> • Tetra Tech Construction Quality Assurance Report - Cell 4 and Laydown Pond - Earthworks, dated February 2019. • Tetra Tech Construction Quality Assurance Report - Cell 4 and Laydown Pond Geosynthetics Installation, dated February 2019. • Dillon Annual Landfill Cell Closure Report (Cell 3B), dated March 2021. 	Confirmed through a review of the reports indicated.
3.1.9	The summary report in 3.1.9 shall contain the following information, at minimum:				X		Not applicable. Information only.
3.1.9 (a)	Confirmation that the landfill has been constructed according to the Construction Quality Assurance Plan, Construction Quality Control Plan, and the Detailed Construction Plan and Specifications.	X					Confirmed through a review of the reports indicated.
3.1.9 (b)	Description of any minor deviations as per 3.1.7	X					Confirmed that no deviations occurred.
3.1.9 (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.	X					Confirmed that no deviations occurred and that that design met or exceeded specifications.
3.1.9 (d)	"As-built" plans.	X					Confirmed, dated February 2019.
3.1.9 (e)	Photo-documentation of important stages of construction including any repair work or remediation activities to establish or maintain liner integrity.	X					Confirmed through a review of the reports indicated.
3.1.9 (f)	Any other information not listed or implied in 3.1.9 as required in writing by the Director.	X				Confirmed through a review of the reports indicated.	
3.1.10	The approval holder shall notify the Director in writing at least fourteen days prior to construction of commencing operations of any new landfill cell.	X				Letter to AEP, dated February 19, 2021.	Notifying that construction approval requirements fulfilled and that operations will commence in 14 days.
3.1.11	The approval holder shall construct the off-loading area as described in the application.				X	Not applicable.	Construction hasn't started on the off-loading area.
3.1.12	The approval holder shall manage landfill progression in a manner that has limited off-site visual impacts of the landfill, as described in the Landfill Cell Closure Plan.	X				<ul style="list-style-type: none"> • Dillon Annual Landfill Cell Closure Report (Cell 3B), dated March 2021. • Clean Harbors Closure and Post Closure Plan. 	Report details the construction activities and identifies compliance with the Closure and Post Closure Plan.
3.2.1 (a)	The waste stabilization area has been constructed in accordance with application No. 008-10348.	X				Correspondence between AEP and Clean Harbors.	<ul style="list-style-type: none"> • This has been completed within the constructed portions of Cell 3D to avoid tracking waste off-site. • Clean Harbors submitted specifications for stabilization area and did not receive any amendment requests from AEP.
3.2.1 (b)	The waste stabilization area has been constructed in accordance within a Class I landfill cell.	X					

Section 3 - Construction

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info. N/A		
Part 3 - Construction							
3.3.1	The approval holder shall salvage and conserve all topsoil for land reclamation of the landfill.	X				<ul style="list-style-type: none"> Field Observations Operations Plan. Annual Landfill Cell Closure Reports. 	<ul style="list-style-type: none"> Vegetated mounds for final Cell 3 closure at southern edge. Non-vegetated active stockpiles for Cell 4 construction at north end.
3.3.2	The approval holder shall salvage and conserve all upper subsoil for land reclamation of the landfill.	X					
3.3.3	The approval holder shall conserve and stockpile all topsoil separately from the upper subsoil.	X					Stockpiles are separated for topsoil and upper subsoil.
3.3.4 (a)	The approval holder shall place all top soil stockpiles at the landfill.	X					Stockpiles placed within the landfill boundary.
3.3.4 (b)	The approval holder shall place all upper subsoil stockpiles at the landfill.	X					
3.3.5 (a)	The approval holder shall stockpile all topsoil on stable foundations.	X					Topsoil stockpiles are placed on undisturbed topsoil and stable ground.
3.3.5 (b)	The approval holder shall stockpile all topsoil on undisturbed topsoil.	X					
3.3.6 (a)	The approval holder shall stockpile all upper subsoil on stable foundations.	X					Upper subsoil stockpiles are placed on areas with topsoil removed and stable ground.
3.3.6 (b)	The approval holder shall stockpile all upper subsoil on areas where the topsoil has been removed.	X					
3.3.7	The approval holder shall take all steps necessary to prevent any erosion due to wind or water.	X					Vegetation for closed stockpiles used for final closure of Cell 3. No other erosion measures required from AEP.
3.3.7 (a)	The approval holder shall revegetate stockpiles in order to prevent erosion.	X					Stockpiles appear to be vegetated from field observation.
3.3.7 (b)	The approval holder shall take all steps authorized in writing by the director in order to prevent erosion.	X					Erosion controls observed in place.
3.3.8 (a, i)	The approval holder shall suspend conservation of topsoil when wet or frozen condition would result in mixing, loss, degradation or compaction of topsoil.	X					Stockpiling of topsoil and upper subsoil is suspended during periods of adverse weather conditions, in accordance with facility operational practices.
3.3.8 (a, ii)	The approval holder shall suspend conservation of topsoil when high wind velocities or other field conditions would result in mixing, loss, or degradation of topsoil.	X					
3.3.8 (b, i)	The approval holder shall suspend conservation of upper subsoil when wet or frozen condition would result in mixing, loss, degradation or compaction of upper subsoil.	X					
3.3.8 (b, ii)	The approval holder shall suspend conservation of upper subsoil when wet or frozen condition would result in mixing, loss, degradation or compaction of upper subsoil.	X					

Section 3 - Construction

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	O/I	Info. N/A		
Part 3 - Construction							
3.3.9 (a)	The approval holder shall recommend conservation of topsoil when conditions in 3.3.8 no longer existed.				X	Not applicable.	Not applicable. Information only.
3.3.9 (b)	The approval holder shall recommend conservation of upper subsoil when conditions in 3.3.8 no longer existed.				X	Not applicable.	Not applicable. Information only.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.1.1	The geographic boundaries of the landfill has been maintained to that located within SE ¼ of Section 9, Township 50, Range 17, West of the 4 th Meridian.	X				<ul style="list-style-type: none"> 2020 Annual Report Field observations. 	Confirmed that landfill is within the approved boundary.
4.1.2	The waste elevation of the landfill has not exceeded the maximum designated waste elevation.	X				Cell 3B Landfill Capping Top of Final Cover Elevations, Figure No. 3 in Dillon Annual Landfill Cell Closure Report (Cell 3B), dated March 2021.	<ul style="list-style-type: none"> Maximum elevation, per Part 1 (ggg) (definitions) is 714 masl. Most recent closure was Cell 3B, which is also the highest. Maximum elevation observed in final cover was 713.15 masl.
4.1.3	Access to the facility has been restricted to only authorized personnel.	X				Field observations.	<ul style="list-style-type: none"> Visitor sign in sheet at front desk. Scale house reporting for all vehicles. Security cameras on-site. Gated access.
4.1.4	A 24 hour "HOTLINE" number has been maintained for prompt response during an emergency.			X		Field observations.	A hotline is maintained but not posted at gate or office entrance. Hotline is 780-690-0614.
4.1.5	The approval owner shall operate and maintain the integrity of the following waste management facilities at the facility:				X		Not applicable. Information only.
4.1.5 (i)	HWRSP Facility	X					Confirmed during field inspection.
4.1.5 (ii)	Class I and II landfill, including Class I and II cells and waste stabilization areas.			X			Observed ponding in roadways near potable water tanks, which can be managed on an ongoing basis.
4.1.5 (iii)	Waste storage areas.	X					Confirmed during field inspection.
4.1.6	The approval holder shall operate and maintain the integrity of the following infrastructure components at the facility:				X		Not applicable. Information only.
4.1.6 (i)	Composite liner	X				<ul style="list-style-type: none"> 2020 Annual Report. Field observations. 	Confirmed during field inspection.
4.1.6 (ii)	Leachate collection system	X					Confirmed during field inspection.
4.1.6 (iii)	Leak detection system	X					Confirmed during field inspection.
4.1.6 (iv)	Run-on control system	X					Confirmed during field inspection.
4.1.6 (v)	Run-off control system	X					Confirmed during field inspection.
4.1.6 (vi)	Groundwater monitoring wells	X					<ul style="list-style-type: none"> Confirmed well MW-10 (near waste storage and HWRSP Facility) has been repaired and locked. All other wells were observed to be protected and locked.
4.1.6 (vii)	Weigh scale	X					Weigh scale is operational.
4.1.6 (viii)	Site access control	X				Field observations.	Confirmed that sign-in procedures in place, doors locked, etc.
Facility Audit							
4.1.7	The approval holder shall cause the facility to be audited by an independent third-party environmental consultant to assess compliance with the terms and conditions of this approval, commencing on or before October 1, 2018.	X				<ul style="list-style-type: none"> 2018 Compliance Audit Report. 2021 Compliance Audit Report. 	Compliance confirmed.
4.1.8	The approval holder shall submit the audit report required in 4.1.7 in the Annual Landfill Operations Report.	X				2020 Annual Report.	Reviewed the 2020 Annual Landfill Operations Report and confirmed previous Audit was included.
4.1.9	The requirements in 4.1.7 and 4.1.8 do not relieve the approval holder of any duty under the Act, or its associated regulations, or this approval.				X	Not applicable.	Not applicable. Information only.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
Operations							
4.2.1	The approval holder shall not release any air effluent streams to the atmosphere except as authorized by this approval.				X	Not applicable.	Not applicable. Information only.
4.2.2	The approval holder shall only release air effluent streams to the atmosphere from the following sources: - Scrubber exhaust stack - Drum Processing Building exhaust vent - Staging Building exhaust vent - Administrative Building exhaust vents - Laboratory fume hood and exhaust vents - Maintenance Shop equipment and exhaust vents - Leachate Collection Tanks exhaust vents - Leachate transfer lines passive gas vents - Any other source authorized in writing by the Director	X				Field observations.	<ul style="list-style-type: none"> No other sources not listed in the approval. Requested in Approval Amendment (pending) to do quenching emulsions, only if non-toxic gases are emitted.
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 operational and operating.	X				<ul style="list-style-type: none"> Field observations. Verbal confirmation. Sept. 1, 2021 Transfer Station Daily Inspection (including scrubber inspection). 	All pollution abatement equipment is continuously operated.
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: - Hazardous wastes/recyclables are being processed. - Hazardous wastes/recyclables are being transferred. - Containers of hazardous wastes/recyclables are open in the Drum Processing and/or Staging Buildings.	X				<ul style="list-style-type: none"> Field observations. Discussion with site staff. 	Monitored weekly and documented as per section below. All building air is treated through the pollution abatement equipment (scrubber and filter), including drum and tank vents.
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.	X				Field observations.	A carbon filter was added to the leachate tank.
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:				X	<ul style="list-style-type: none"> Operations Plan, Appendix C (Fugitive Dust and Odour Best Management Plan). Odour Complaint notification to Village and County, dated July 30, 2021. 	<ul style="list-style-type: none"> No fugitive emissions outside of what's permitted. Odour complaints are received and managed per BMPs (report reviewed and contained in Operations Plan). As part of the Amendment Application, AEP identified concerns regarding communications to the Village of Ryley and Beaver County. Clean Harbors now notifies the Village and County of all complaints and contraventions submitted to AEP.
4.2.6 (a)	Impairment, degradation or alteration of the quality of natural resources.	X					
4.2.6 (b)	Material discomfort, harm or adverse effect to the well being or health of a person.	X					
4.2.6 (c)	Harm to property or to vegetative or animal life.	X					
4.2.7	The approval holder shall not burn any debris by means of an open fire unless authorized in writing by the Director.	X				Correspondence with AEP	A fire occurred on property in January 2021, for which AEP was notified. No burning is conducted on site.
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:				X		
4.2.8 (a)	Conduct the following to reduce the release of those odours, or fugitive dust, or both by:	X				<ul style="list-style-type: none"> Operations Plan, Appendix C (Fugitive Dust and Odour Best Management Plan). Environmental Management Program SOP #90RY-410-00. Field observations. Discussion with site staff. 	<ul style="list-style-type: none"> Response is based on the type of complaint. Recently added a carbon filter on the leachate tank vent. Material receipt may be suspended during high wind days. Cover can be immediately placed for dust suppression and dispersion prevention. Receive typically 2-3 odour complaints per year.
4.2.8 (a, 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.	X					
4.2.8 (a, ii)	Increasing the frequency of cover placement, or modifying waste handling activities, or performing both, at the landfill.	X					
4.2.8 (a, iii)	Modifying waste handling activities at the HWRSP Facility.	X					
4.2.8 (a, iv)	Performing any combination of the above.	X					
4.2.8 (b)	Activate the Odour and Fugitive Dust Response Program as specified in the Landfill Operations Plan 4.6.34U).	X					

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
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.	X				<ul style="list-style-type: none"> Field observations. Recorded daily (viewed Aug. 22, 2021 and Nov. 5, 2020 examples) and maintained in the WIN Web system. 	<ul style="list-style-type: none"> pH data logger contains daily readings. Available to AEP upon request, confirmed in report that recordings are compliant. "Keep pH above 8.0" sign posted.
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.	X				<ul style="list-style-type: none"> Field observations. WIN Web records. 	<ul style="list-style-type: none"> Weekly total petroleum hydrocarbon readings are taken and recorded in log book next to the scrubber and in WINWEB. Carbon is typically replaced every 4-5 years or less frequent. Last replacement occurred July 2015. No exceedances or replacement of media in the last three year period (2019-2021).
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.	X				<ul style="list-style-type: none"> Monitoring records for Aug. 22, 2021 and Nov. 5, 2020 in WIN Web. Field observations. 	<ul style="list-style-type: none"> Data logger contains daily readings. Available to AEP upon request, confirmed in report that recordings are compliant. If pH readings are close to 8.0 limit, a secondary laboratory reading is performed to verify in-line pH meter accuracy. Aug. 22, 2021 and Nov. 5, 2020 dates sampled.
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: <ul style="list-style-type: none"> - Hazardous wastes/recyclables are being processed. - Hazardous wastes/recyclables are being transferred. - Containers of hazardous wastes/recyclables are open in the Drum Processing and/or Staging Buildings. 	X				<ul style="list-style-type: none"> Field observations. WIN Web records. 	<ul style="list-style-type: none"> Weekly readings are taken and recorded in log book next to the scrubber. Carbon is replaced every 4-5 years or less frequency.
4.2.13	The portable total petroleum hydrocarbon analyzer referred to in 4.2.12 shall:				X	Not applicable.	Not applicable. Information only.
4.2.13 (a)	Have a detection limit of 1 ppm or lower for total petroleum hydrocarbons.	X				Field observations.	Confirmed that accuracy is to 0.1 ppm, as observed on calibration certificate.
4.2.13 (b)	Be located in a straight section of the scrubber exhaust stack, a minimum of one (1) metre downstream from the last flow disturbance.	X				Field observations.	Sampling location is on second story scaffolding within building, 1 m downstream from the last flow disturbance.
4.2.13 (c)	Be calibrated regularly in accordance with the analyzer manufacturer's specifications.	X				Calibration certificate from 2020.	Confirmed calibrated in 2020; expires in 2022.
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.	X					
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: <ul style="list-style-type: none"> - Monthly Ambient Air Monitoring Report - 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.	X				<ul style="list-style-type: none"> 2020 Operations Report. GHD Quality Assurance Plan - Air Monitoring Program Report, dated Dec. 31, 2016. "Ambient Air Monitoring Station Audit" letter from AEP, dated August 31, 2016. "Ambient Air Monitoring Station Audit" letter from AEP, dated Jan. 13, 2017 (closing out the audit findings). 	<ul style="list-style-type: none"> Clean Harbors was audited by AEP for adherence to the new Air Monitoring Directive released in 2016. Clean Harbors proposed dates and actions to address findings of the audit, which were accepted by AEP in letter December 2, 2016. Dec. 31, 2016 GHD report contains new Air Monitoring Program. AEP letter closing out the audit indicates that all findings addressed.
4.2.16	The approval holder shall submit a revised Ambient Air Monitoring Program, revised reporting requirements, or both, to the Director upon written request from the Director within the timeline specified in writing by the Director.	X					
4.2.17	If the revised Ambient Air Monitoring Program, reporting requirements, or both, 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.	X					

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.2.18	The approval holder shall implement the revised Ambient Air Monitoring Program, reporting requirements, or both, submitted pursuant to 4.2.16 as authorized in writing by the Director within the timeline specified in writing by the Director.	X					
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.	X				Field observations.	Compliance confirmed. 100% of the leachate is disposed of via deep well injection. Runon/runoff control systems in place and inspected during field observations.
4.3.2	The approval holder shall operate and maintain the integrity of:				X	Not applicable.	Not applicable. Information only.
4.3.2 (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.	X				Field observations.	Compliance confirmed. Run on/run off control systems were completed during Cell 4 construction. As built drawings reviewed.
4.3.2 (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.	X				Field observations.	Compliance confirmed. Run on/run off control systems were completed during Cell 4 construction. As built drawings reviewed.
4.3.3	All runoff from the facility developed area shall be directed to the runoff control system as described in:				X	Not applicable.	Not applicable. Information only.
4.3.3 (a)	Application No. 012-10348, prior to decommissioning and reclamation of the old surface water detention pond.	X				Not applicable.	Confirmed. The old surface water detention pond was decommissioned in August 2018 prior to this audit.
4.3.3 (b)	The application, after decommissioning and reclamation of the old surface water detention pond.	X					
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:				X	Not applicable.	Not applicable. Information only.
4.3.4 (a)	At the release point as designated in application No. 012-10348, which is: • Located in the south east corner of the old surface water detention pond. • Referred to as sampling location A 1 in 4.3.11.	X				<ul style="list-style-type: none"> • 2020 Annual Report. • Field observations. • Operations Plan. • Discussions with site staff. 	Decommissioning of the old surface water detention pond was completed in August 2018. Observations were made of the new surface water detention pond, drainage ditch, and discharge point.
4.3.4 (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.	X					
4.3.4 (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.	X					
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:	X					
4.3.5 (a)	At the release point as designated in application No. 012-10348, which is: • Located in the north east corner of the new surface water detention pond. • Referred to as sampling location 81 in 4.3.11.	X					<ul style="list-style-type: none"> • Observed the discharge point at the new surface water detention pond. • Composite sampling is performed prior to any discharge consistent with the approval.
4.3.5 (b)	Through a pump and a release hose over the east berm into the culvert under Highway 854.	X					
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:				X	<ul style="list-style-type: none"> • 2020 Annual Report. • Field observations. • Operations Plan. • Discussions with site staff. 	<ul style="list-style-type: none"> • All stormwaters are discharged through pond with testing prior to discharge. • No non-compliant discharges have occurred. • When TSS exceeds limits, further settling time is done prior to re-testing and discharge, or flocculant is added. • No change to discharge.
4.3.6 (a)	To facilities holding a current Act authorization to accept such waste.	X					
4.3.6 (b)	To facilities approved by a local environmental authority outside of Alberta to accept such waste.	X					
4.3.6 (c)	To a disposal well approved by AER.	X					
4.3.6 (d)	As per 4.6.51.	X					
4.3.6 (e)	As otherwise authorized in writing by the Director.	X					

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
Limits							
4.3.7	Releases of runoff from the following to the surrounding watershed shall comply with the limits specified in Table 4.3-B: - The old surface water detention pond. - The new surface water detention pond. - Or, both ponds.	X				<ul style="list-style-type: none"> 2020 Annual Report. Operations Plan. 	Compliance confirmed through a review of release analytical records.
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.				X	Not applicable.	Not applicable: <ul style="list-style-type: none"> Tank farm bermed area water goes into landfill. This volume is pumped and solidified for disposal in the landfill.
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.			X		Surface Water Detention Pond B Summary of Batch Analysis, 2020 Annual Report.	Results for the runoff control system testing of 48 hour static acute lethality test using daphnia magna could be included in the Summary of Batch Analysis presented in the 2020 Annual Landfill Operations Report; along with the lethality of effluents to rainbow trout testing.
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.	X				2020 Annual Report.	Monitoring findings reported to AEP.
4.3.11	For the purpose of Table 4.3-D:				X	Not applicable	Not applicable. Information only.
4.3.11 (a)	Sampling location A 1 is defined as the old surface water detention pond release point.				X	Field observations.	Not applicable. Old surface water detention pond has been decommissioned.
4.3.11 (b)	Sampling location A2 is defined as the old surface water detention pond.				X	Field observations.	Facility actively monitors releases.
4.3.11 (c)	Sampling location B1 is defined as the new surface water detention pond release point.	X				Field observations.	Facility actively monitors detention pond.
4.3.11 (d)	Sampling location B2 is defined as the new surface water detention pond.	X				Field observations.	Water collected in bermed area of tank farm is solidified for disposal in landfill as per 4.3.8
4.3.11 (e)	Sampling location C is defined as the tank farm bermed area.	X				Field observations.	Not applicable. The old surface water detention pond was decommissioned in August, 2018 prior to this audit.
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.				X	Not applicable.	Not applicable. Information only.
4.3.13	The monitoring and reporting required in Table 4.3-D for the acute lethality tests shall comply with:				X	Not applicable.	Summary of results all pass for the Surface Water Detention Pond B Summary of Batch Analyses.
4.3.13 (a)	The Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, Environment Canada, Environment Protection Series 1/RM/13, December 2000, as amended.	X				Surface Water Detention Pond B Summary of Batch Analysis - 2020 Annual Landfill Operations Report	<ul style="list-style-type: none"> Monthly Runoff and Industrial Wastewater Report. Surface Water Detention Pond B Summary of Batch Analysis - 2020 Annual Report. Results for the runoff control system testing of 48 hour static acute lethality test using daphnia magna could be included in the Summary of Batch Analysis presented in the 2020 Annual Landfill Operations Report; along with the lethality of effluents to rainbow trout testing.
4.3.13 (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.			X		Not applicable.	Not applicable. No deviation from corresponding test method has occurred.
4.3.14	The approval holder shall: - Treat any acute lethality test that deviates from the corresponding test method referred to in 4.3.13 as invalid. - Repeat the test as soon as logistically possible.				X	Not applicable.	Not applicable. All testing passed the criteria.
4.3.15	In the event that less than 50% of the rainbow trout survived in the 100% concentration sample, the approval holder shall: - Implement a program immediately to identify the source of the toxicity. - Submit to the Director within 90 days after the test result is available, a proposed program to reduce the toxicity of the runoff.				X	Not applicable.	Verbal confirmation from multiple parties confirming the reports are forwarded to AEP.
4.3.16	The approval holder shall submit the Monthly Runoff and Industrial Wastewater Report in Table 4.3-D to the Director.	X				Monthly Runoff and Industrial Wastewater Report.	Not applicable. Monthly reports contained in annual report, but only need to be submitted with discharges.
4.3.17	The Monthly Runoff and Industrial Wastewater Report shall include, at a minimum, all of the following information:				X	Not applicable.	

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.3.17 (a)	A monthly assessment of the monitoring results relative to the limits in Table 4.3-B.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.17 (b)	A monthly assessment of the monitoring results relative to the limits in Table 4.3-C.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.17 (c)	A monthly assessment of the performance of the: - Runoff control system. - Pollution abatement equipment. - Monitoring equipment.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.17 (d)	A monthly summary of management and disposal of the industrial wastewaters and specified runoff, as per 4.3.6.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.17 (e)	A monthly summary of management and disposal of runoff in general.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.17 (f)	A monthly summary of runoff contraventions reported pursuant to 2. 1. 1.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.17 (g)	Any other information as required in writing by the Director.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.18	The approval holder shall submit the Annual Runoff and Industrial Wastewater Report in Table 4.3-D to the Director.	X				Annual Runoff and Industrial Wastewater Report.	Verbal confirmation and included with annual report.
4.3.19	The Annual Runoff and Industrial Wastewater Report shall include, at a minimum, all of the following information:			X		Not applicable.	Not applicable. Information only.
4.3.19 (a)	An annual summary assessment of the monitoring results relative to the limits in Table 4.3-B.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.19 (b)	An annual summary assessment of the monitoring results relative to the limits in Table 4.3-C.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.19 (c)	An annual summary assessment of the performance of the: - Runoff control system. - Pollution abatement equipment. - Monitoring equipment.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.19 (d)	An annual summary of management and disposal of the industrial wastewaters and specified runoff, as per 4.3.6.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.19 (e)	An annual summary and evaluation of management and disposal of runoff in general.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.19 (f)	An annual summary of the results pursuant to 4.3.21.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.3.19 (g)	An annual summary of runoff contraventions reported pursuant to 2. 1. 1.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.19 (h)	Any other information as required in writing by the Director.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.20	The approval holder shall:				X	Not applicable.	Not applicable. Information only.
4.3.20 (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.				X	Not applicable.	Not applicable. Old surface water detention pond has been decommissioned.
4.3.20 (b)	Collect a representative grab sample from the new surface water detention pond at least once per year.	X				Annual Runoff and Industrial Wastewater Report	Details included in Report.
4.3.20 (c)	Analyze the sample(s) for all of the parameters specified in Table 4.3-E.	X				Annual Runoff and Industrial Wastewater Report	Details included in Report.
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.	X				Annual Runoff and Industrial Wastewater Report	Details included in Report.
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:				X	Not applicable.	Not applicable. Information only.
4.4.1 (a)	To facilities holding a current Act authorization to accept such waste.				X	Not applicable.	Not applicable. Option not used by the facility.
4.4.1 (b)	To facilities approved by a local environmental authority outside of Alberta to accept such waste.				X	Not applicable.	Not applicable. Option not used by the facility.
4.4.1 (c)	To a disposal well approved by AER.	X				<ul style="list-style-type: none"> • Alberta Energy Regulator (AER) approval for deep well. • Appendix E of 2020 Annual Report. 	Leachate is hauled to Class I deep well in Calmar. Volume summary included in annual report.
4.4.1 (d)	As per 4.6.51.				X	Not applicable.	Not applicable. Information only.
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:				X	Not applicable.	Not applicable. Information only.
4.4.2 (a)	To facilities holding a current Act authorization to accept such waste.				X	Not applicable.	Not applicable. Option not used by the facility.
4.4.2 (b)	To facilities approved by a local environmental authority outside of Alberta to accept such waste.				X	Not applicable.	Not applicable. Option not used by the facility.
4.4.2 (c)	To a disposal well approved by AER.	X				<ul style="list-style-type: none"> • AER approval for deep well. • Appendix E of 2020 Annual Landfill Operations Report. 	Leachate is hauled to Class I deep well in Calmar. Volume summary included in annual report.
4.4.2 (d)	As per 4.6.51.				X	Not applicable.	Option not used by the facility.
Limits							
4.4.3	Subject to 4.4.4, the approval holder shall not exceed the maximum acceptable leachate head in any landfill cell.	X				Leachate Head Level Table.	Leachate levels recorded daily. Field logs for 2020 observed, contain following parameters: - Date, time, condition, level status, personnel initial
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.	X				Leachate Head Level Table.	Leachate pumping infrastructure on timers in most cells, (all but Cell 1). A fire January 12, 2020 caused a fire (AEP Reference No. 362650) which destroyed the Cell 2 Leachate building until pumping capacity was restored June 30, 2020. Infrastructure is capable of removing leachate generated from a storm event in fewer than 14 days.
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.		X			2020 Annual Report.	Action Leakage Rate (ALR) Exceedances were noted June 9, 2020, June 10, 2020, July 2, 2020, July 9, 2020. Section 14.6 of the Annual Landfill Operations Report detail several ALR exceedances that were not reported. No negative impacts were observed and clarification of the reporting requirements were made with the Facility Manager to ensure this is not repeated in the future. (AEP 376183)

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
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.	X				Primary Leachate Analysis Results Appendix D of 2020 Annual Report.	Leachate levels recorded daily. Field logs for 2020 observed, contain following parameters: • Date, time, condition, level status, personnel initial.
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.	X				Primary Leachate Analysis Results Appendix D of 2020 Annual Report.	Submitted to AEP.
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.				X	Not applicable.	Not applicable. Information only.
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.				X	Not applicable.	Not applicable. Information only.
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.	X				2020 Annual Report.	(AEP 376183) links exceedances to excessive rainfall and details steps taken to solve infiltration.
Monitoring and Reporting							
4.5.1	The approval holder shall, unless the approval holder is not granted access by the landowner:				X	Not applicable.	Not applicable. Information only.
4.5.1 (a)	Collect a representative sample from each of the dugouts and each of the water wells, within an approximate 1.6 kilometre radius around the facility.	X				Tetra Tech 2020 Dugout Sampling Program Report, dated March 2, 2021.	Details included in Report.
4.5.1 (b)	Analyze the sample for the parameters listed in Table 4.5-A.	X					Details included in Report.
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.	X					Details included in Report.
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.	X					Details included in 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).	X					Details included in Report.
General							
4.6.1	The approval holder shall not receive, process, dispose of, or perform any combination of the above for any of the following wastes, individually or in any combination, at the places specified below respectively: - Explosives (Class 1 TDGR wastes), at the facility. - Radioactive wastes (Class 7 TDGR wastes), at the facility. - Radioactive wastes regulated under the Nuclear Safety and Control Act (Canada), at the facility. - Biomedical waste, at the facility. - Waste containing free liquids, at the landfill, excluding the waste stabilization area. - Material containing ozone depleting substances, at the landfill. - Municipal solid waste, at the facility. - NORM waste, at the facility.	X				• Field observations. • Discussions with site staff.	Site field observations and verbal confirmation were received regarding materials receipt. Cross checked against Facility Operations Plan and SOPs for individual waste materials. WINWEB system also performs checks on waste compatibility and will issue warnings of any non-conforming waste
4.6.2	Incompatible wastes and incompatible hazardous recyclables shall be prevented from mixing.	X				• Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Landfill Operations (SOPL001). • WIN Web (compatibility workbench).	Relevant Facility SOPs confirm procedures are appropriate to prevent incompatible wastes and recyclables from mixing.
4.6.3	The approval holder shall dispose of wastes generated at the facility only:				X	Not applicable	Information only.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.6.3 (a)	To facilities holding a current Act authorization.	X				Discussions with site staff.	Confirmed that regulations are being followed.
4.6.3 (b)	To facilities approved by a local environmental authority outside of Alberta.	X				Discussions with site staff.	Confirmed that regulations are being followed.
4.6.3 (c)	As otherwise authorized in writing by the Director.	X				Discussions with site staff.	Confirmed that regulations are being followed.
HWRSP Facility							
Operations Plan							
4.6.4	The approval holder shall develop, keep up-to-date, and implement an HWRSP Facility Operations Plan.	X				<ul style="list-style-type: none"> Facility Standard Operating Procedures (SOPs) Operations Plan. 	Most recently dated as February 2021, with annual updates required. In 2020, procedures for Cell 4 added.
4.6.5	The approval holder shall:				X	Not applicable.	Not applicable. Information only.
4.6.5 (a)	Review the HWRSP Facility Operations Plan annually, at a minimum.	X				<ul style="list-style-type: none"> 2020 Annual Report. Operations Plan. 	This is performed in line with the annual reporting required under the Approval.
4.6.5 (b)	Update the HWRSP Facility Operations Plan if any of the following circumstances apply: - There are facility expansions or changes in site operations or equipment. - There is an applicable change to an applicable regulation. - An update is required in writing by the Director.	X				<ul style="list-style-type: none"> 2020 Annual Report. Operations Plan. 	Section 14 added to 2017 Annual Report, addressing HWRSP facility operations.
4.6.6	The approval holder shall retain a copy of the most recent HWRSP Facility Operations Plan at the facility.	X				<ul style="list-style-type: none"> 2020 Annual Report. Operations Plan. 	Held on-site electronically and in hard copy.
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.	X				<ul style="list-style-type: none"> 2020 Annual Report. Operations Plan. 	Submitted in the 2020 Annual Report.
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.				X	Not applicable.	Not applicable. No response received from AEP on 2020 Annual Report.
4.6.9	The approval holder shall implement the latest HWRSP Facility Operations Plan, unless otherwise authorized in writing by the Director.	X				Operations Plan.	Up to date plan available and utilized.
Operations							
4.6.10	The approval holder shall only transfer wastes and hazardous recyclables at designated transfer areas designed to contain spills and leaks.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Relevant Facility SOPs confirm procedures for transferring wastes in the HWRSP.
4.6.11	The approval holder shall use the following when transferring substances to, from, and between containers, tanks, and trucks:				X	Not applicable.	Not applicable. Information only.
4.6.11 (a)	Couplings equipped with seals that are compatible with the substance transferred.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.
4.6.11 (b)	The necessary precautions to prevent spills when the couplings are disconnected.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.
4.6.11 (c)	Emergency shut-off valves.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.6.11 (d)	Established transfer areas and associated curbing, paving and catchment areas.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.
4.6.11 (e)	Drip trays to capture potential losses under coupling devices and other connections.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.
4.6.11 (f)	Manual inspections of the transfer area for leaks and spills during and after waste transfer.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.
4.6.12	All wastes and all hazardous recyclables that are unloaded shall be immediately transferred to the waste storage area.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.
4.6.13	All containers and unrinsed empty containers shall be stored in the waste storage area.	X				Field observations.	Confirmed during Site visit.
4.6.14	The approval holder shall:				X	Not applicable.	Not applicable. Information only.
4.6.14 (a)	Provide and maintain an adequate aisle space between containers in the waste storage area to allow inspection and unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment to any area of the waste storage area.	X				Field observations.	Site field operations consistent with fire code for spacing between containers.
4.6.14 (b)	Arrange inspection aisles in the waste storage area such that the identification label on each container is readable.	X				Field observations.	Identification labels clear for all containers.
4.6.15	All tanks within the tank farm area shall be equipped, at a minimum, with all of the following:				X	Not applicable.	Not applicable. Information only.
4.6.15 (a)	Sensors for detecting the level in each tank.	X				Field observations.	Sensors, alarms, and shut-off devices observed and active for each tank. The aqueous tank within the building does not contain a high level alarm but is not considered part of the tank farm.
4.6.15 (b)	High level alarms that activate when a tank overflow is imminent.	X					
4.6.15 (c)	Automatic shut-off devices or sufficient free board space above the high level sensor to allow operators time to prevent overflow from occurring.	X					
4.6.15 (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.	X				Field observations.	Entire waste storage area is the building floor, which is drained to holding tank in central manhole and can be pumped.
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:				X	Not applicable.	Not applicable. Information only.
4.6.16 (a)	Sensors or gauges for detecting the level in each tank.	X				Field observations.	Sensors observed and active for tanks.
4.6.16 (b)	A written operating procedure to prevent tank overflow.		X			<ul style="list-style-type: none"> Field observation Bulk Flammable Liquid Transfer SOP 	Bulk Flammable Liquid Transfer SOP Document and Checklist is available (part of Facility SOPs) in office area but is not stored next to tanks.
4.6.16 (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.	X				Field observations.	Secondary containment structures observed in the field.
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.	X				<ul style="list-style-type: none"> Field observations. Bulk Flammable Liquid Transfer SOP. 	Facility observed to be following governing regulations.
4.6.18	The approval holder shall only carry out the following activities, individually or in any combination, at the HWRSF Facility in relation to hazardous waste or hazardous recyclables or both:	X				<ul style="list-style-type: none"> Field observations. 	Field observations reviewed the activities that occur on site; which was confirmed through review of the Facility and Landfill
4.6.18 (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.	X					
4.6.18 (b)	Phase separation by gravity settling, only without the addition of any chemicals designed to accelerate settling.	X					
4.6.18 (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.	X					

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.6.18 (d)	Physical segregation of hazardous from non-hazardous articles or components from the same container, only if no process equipment is used.	X				<ul style="list-style-type: none"> Operations Plan. Facility SOPs. 	Operations Plan and Facility SOPs.
4.6.18 (e)	Washing of drums or other objects, only for the purpose of removing hazardous residue.	X					
4.6.18 (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.	X					
4.6.18 (g)	Treatment of hazardous waste, only as authorized in writing by the Director.	X					
4.6.19	Notwithstanding 4.6.1 B(g), the approval holder shall not incinerate waste at the facility.	X					
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.	X				WIN Web inventory management software.	Maximum capacity not exceeded as of September 2, 2021, per the below volumes.
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.	X				WIN Web inventory management software.	Observations of inventory software made on September 2, 2021: <ul style="list-style-type: none"> 254,681 L of all wastes (hazardous and non-hazardous) 64,856 L of hazardous waste in containers (drums) 15,340 L of bulk liquids
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.	X				WIN Web inventory management software.	Software automatically calculates drum equivalents.
4.6.23	The limits referred to in 4.6.20 and 4.6.21 shall be calculated based on the:				X	Not applicable.	Not applicable. Information only.
4.6.23 (a)	Total nominal volumes of all containers, treating all partially filled containers as if they were full.				X	Not applicable.	Not applicable. Information only.
4.6.23 (b)	Total filled capacities of all tanks.				X	Not applicable.	Not applicable. Information only.
Monitoring and Reporting							
4.6.24	The approval holder shall identify, characterize, and 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:				X	Not applicable.	Not applicable. Information only.
4.6.24 (i)	Industrial Waste Identification and Management Options, Alberta Environment, May 1996, as amended.			X		Facility and Landfill Operations Report, Section B	The document is not referenced specifically in Landfill Operations Plan, although review of documentation indicates adherence to this standard. Recommended that this be included in the Operations Plan as a specific reference.
4.6.24 (ii)	Alberta User Guide for Waste Managers, Alberta Environment, August 1996, as amended.	X				Facility and Landfill Operations Report, Section B	Referenced in Landfill Operations Plan.
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.	X				Facility and Landfill Operations Report	Addressed in Appendix A of Operations Report.
4.6.26	The approval holder shall keep a daily total and inventory of all materials being stored at the HWRSP Facility.	X				<ul style="list-style-type: none"> Field observations. Various inventory logs (WIN Web). 	Observed documentation in the field.
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.	X				<ul style="list-style-type: none"> Field observations. Various inventory logs (WIN Web). 	Available at the time of the audit.
4.6.28	The approval holder shall submit a Monthly Waste Management Report to the Director.	X				<ul style="list-style-type: none"> July 2021 Waste Inventory Report. Discussion with site staff. 	Verbal confirmation that the monthly reports are submitted to AEP. Different documents for internal use and submission confirms submission.
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:				X	Not applicable.	Not applicable. Information only.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.6.29 (a)	An opening waste and hazardous recyclables inventory balance in kilograms or litres by waste class or material type.			X		<ul style="list-style-type: none"> July 2021 Waste Inventory Report. Discussion with site staff. 	Compliance confirmed; included in report. The Facility is adhering to the information required in the Monthly Waste Management Report, viewed for July 2021. However the reports are currently referencing the 10348-02-00 Approval. Dillon would recommend that the referenced Approval be updated to 10348-03-00.
4.6.29 (b)	The amount and type of waste and hazardous recyclables received: - Within the province. - From outside of the province.			X			
4.6.29 (c)	The amount and type of waste and hazardous recyclables: - Shipped for recycling or product. - Shipped off-site for disposal. - Disposed on-site.			X			
4.6.29 (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.			X			
4.6.29 (e)	Closing balance in kilograms or litres.			X			
4.6.29 (f)	A summary of contraventions reported pursuant to 2. 1. 1 related to waste and hazardous recyclables.	X				<ul style="list-style-type: none"> July 2021 Waste Inventory Report. Discussion with site staff. 	No contraventions identified in monthly report.
4.6.29 (g)	Any other information as required in writing by the Director.	X				<ul style="list-style-type: none"> July 2021 Waste Inventory Report. Discussion with site staff. 	No additional requirements by AEP.
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:				X	Not applicable.	Not applicable. Information only.
4.6.30 (a)	As specified in Table 4.6-C.	X				2020 Annual Waste Management Summary - Table 4.6-D, Hazardous Waste Landfilled, included in the 2020 Annual Report.	In Appendix A of Operations Report.
4.6.30 (b)	In accordance with the: - Industrial Waste Identification and Management Options, Alberta Environment, May 1996, as amended. - Alberta User Guide for Waste Managers, Alberta Environment, August 1996, as amended.			X		2020 Annual Waste Management Summary - Table 4.6-D, Hazardous Waste Landfilled, included in the 2020 Annual Report.	The first document is not referenced specifically in Landfill Operations Plan, although review of documentation indicates adherence to this standard. Recommended that this be included in the Operations Plan as a specific reference.
4.6.31	The approval holder shall submit the Annual Waste Management Summary Report to the Director.	X				2020 Annual Waste Management Summary - Table 4.6-D, Hazardous Waste Landfilled, included in the 2020 Annual Report.	Submitted as part of the Annual Report for the Facility.
Landfill							
Operations Plan							
4.6.32	The approval holder shall develop, keep up-to-date, and implement a Landfill Operations Plan that does not contravene with the requirements of this approval.	X				Operations Plan.	Approval requirements are being examined in this checklist.
4.6.33	The approval holder shall:				X	Not applicable.	Not applicable. Information only.
4.6.33 (a)	Review the Landfill Operations Plan annually, at a minimum.	X				Operations Plan.	Revision date on the 2021 Facility and Landfill Operations Plan is February, 2021.
4.6.33 (b)	Update the Landfill Operations Plan if any of the following circumstances apply: - There are facility expansions or changes in site operations or equipment. - There is an applicable change to the Standards for Landfills in Alberta, as amended. - An update is required in writing by the Director. - There is an update to an applicable regulation.	X				Operations Plan.	Updates to the operations plan reflect Cell 4 and Cell 3B changes.
4.6.34	The Landfill Operations Plan shall include, at a minimum, all of the following:				X	Not applicable.	Not applicable. Information only.
4.6.34 (a)	SOP for keeping and maintaining an Operating Record.	X				Operations Plan.	Addressed in section A of Operations Plan.
4.6.34 (b)	SOP for waste control, run-on and runoff controls, and nuisance controls.	X				Operations Plan.	Addressed in section B of Operations Plan.
4.6.34 (c)	SOP for the waste stabilization area operations.	X				Operations Plan.	Addressed in section C of Operations Plan.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.6.34 (d)	SOP for the acceptance, handling and disposal of wastes, including: - Waste characterization and classification at source. - Waste manifesting and tracking. - QA/QC waste acceptance procedures. - Waste sampling.	X				Operations Plan.	Addressed in Sections D of Operations Plan.
4.6.34 (e)	SOP for detecting, preventing and disposal of unauthorized wastes.	X				Operations Plan.	Addressed in Sections E of Operations Plan.
4.6.34 (f)	SOP for placing waste in a landfill cell including: - Working face width. - Lift depth. - Compaction. - Waste placement location using a grid system	X				Operations Plan.	Addressed in Sections F of Operations Plan.
4.6.34 (g)	SOP for managing contaminated sulphur and sulphur containing wastes.	X				Operations Plan.	Addressed in Sections G of Operations Plan.
4.6.34 (h)	SOP for managing asbestos wastes.	X				Operations Plan.	Addressed in Sections H of Operations Plan.
4.6.34 (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.	X				Operations Plan.	Addressed in Sections I of Operations Plan.
4.6.34 (j)	An Odour and Fugitive Dust Response Program.	X				Operations Plan.	Addressed in Sections J of Operations Plan, referencing the Fugitive Dust and Odour Best Management Plan in Appendix C.
4.6.34 (k)	A Fugitive Dust and Odour Best Management Plan.	X				Operations Plan.	Addressed in Sections K of Operations Plan, referencing the Fugitive Dust and Odour Best Management Plan in Appendix C.
4.6.34 (l)	A runoff and industrial wastewater monitoring and management program.	X				Operations Plan.	Addressed in Sections L of Operations Plan.
4.6.34 (m)	A leachate monitoring and management program.	X				• Operations Plan. • SOPL002-003 Landfill Leachate System.	Addressed in Sections M of Operations Plan.
4.6.34 (n)	A leak detection liquid monitoring and management program.	X				• Operations Plan. • SOPL002-003 Landfill Leachate System.	Addressed in Sections M/N of Operations Plan.
4.6.34 (o)	A groundwater monitoring program.	X				Operations Plan.	Addressed in Sections O of Operations Plan.
4.6.34 (p)	A Remediation Plan to deal with groundwater quality deterioration.	X				Groundwater Remediation Plan.	Addressed in Sections P of Operations Plan.
4.6.34 (q)	A soil monitoring program.	X				Operations Plan.	Addressed in Sections Q of Operations Plan. Submitted in late 2019 and the first soil monitoring program report was submitted to AEP on January 31, 2020.
4.6.34 (r)	A soil management program.	X				Operations Plan.	Addressed in Sections R of Operations Plan. Confirmation of acceptance from AEP September 18, 2020.
4.6.34 (s)	A landfill cell cover system.	X				Operations Plan.	Addressed in Sections S of Operations Plan. Cell cover system is prepared by consultants and conforms to provincial regulations.
4.6.34 (t)	A monitoring and maintenance program for the scale house and heavy operational equipment.	X				• Operations Plan. • Maintenance Dashboard. • Scale maintenance records	Addressed in Sections T of Operations Plan. Scales calibrated twice per year, maintenance program in place.
4.6.34 (u)	A health and safety program.	X				Health and Safety Program.	Addressed in Sections U of Operations Plan. Health and Safety program in place, training records are kept accounted for, and notifications when training comes due. Employees sign-off on Health and Safety program.
4.6.34 (v)	An emergency response program, including SOP for handling fires, substance releases to the environment, and health concerns.	X				Contingency Plan in Appendix A of the Operations Plan.	Addressed in Sections V of Operations Plan, referencing the facility's Contingency Plan in Appendix A. A system exists to track each employees training and provides management with information such as: training expiring, which training each employee requires, etc.
4.6.34 (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.	X				Operations Plan.	Addressed in Section W of Operations Plan, referencing Appendix D.
4.6.35	The approval holder shall retain a copy of the most recent Landfill Operations Plan at the facility.	X				Operations Plan.	Hard copy of 2021 Operations Plan viewed
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.	X				Discussions with site staff.	Compliance confirmed; submitted annually.
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.				X	Not applicable.	Not applicable. Information only.
4.6.38	The approval holder shall implement the latest Landfill Operations Plan, unless otherwise authorized in writing by the Director.	X				Operations Plan.	2021 Operations Plan observed.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
Operations							
4.6.39	The approval holder shall classify all materials entering the landfill in accordance with the:				X	Not applicable.	Not applicable. Information only.
4.6.39 (a)	Waste Control Regulation (AR 192196).	X				Operations Plan, Section B.	Referenced in Landfill Operations Plan.
4.6.39 (b)	Industrial Waste Identification and Management Options, Alberta Environment, May 1996, as amended.			X		Operations Plan.	The document is not referenced specifically in Landfill Operations Plan, although review of documentation indicates adherence to this standard. Recommended that this be included in the Operations Plan as a specific reference.
4.6.39 (c)	Alberta User Guide for Waste Managers, May 1995, as amended.	X				Operations Plan, Section B.	Referenced in Landfill Operations Plan.
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:				X	Not applicable.	Not applicable. Information only.
4.6.40 (a)	The first time a waste is received from a new generator.	X				• Operations Plan, Sections B-D • Waste Profile from WIN Web viewed.	Compliance confirmed: • Procedures and acceptance criteria in the Landfill Operations Plan are compliant with Approval. • All waste profiles renewed annually, either by customers or Clean Harbors on-site.
4.6.40 (b)	The first time a delivery is received from a different process associated with a known waste generator.	X					
4.6.40 (c)	The first time a waste is received from a different location associated with a known waste generator.	X					
4.6.40 (d)	When the nature or composition of the waste that was previously characterized by the generator changes.	X					
4.6.41	The approval holder shall not dispose of hazardous waste in any Class II landfill cell.				X	Not applicable.	Not applicable. The site is not a Class II landfill.
4.6.42	The approval holder shall:				X	Not applicable.	Not applicable. Information only.
4.6.42 (a)	Only carry out waste stabilization or solidification or both within the waste stabilization area.	X				Site field observations.	Solidification and waste stabilization activities consistent with Approval requirements during field observations.
4.6.42 (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.	X					
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:				X	Not applicable.	Not applicable. Information only.
4.6.43 (a)	To facilities holding a current Act authorization to accept such waste.				X	Not applicable.	Not applicable. This option not used by the facility.
4.6.43 (b)	To facilities approved by a local environmental authority outside of Alberta to accept such waste.				X	Not applicable.	Not applicable. This option not used by the facility.
4.6.43 (c)	To a disposal well approved by AER.or	X				AER approval for deep well.	• Liquid waste is hauled to Class I deep well in Calmar. • AER approval for deep well (leased from Seller's Oilfield Services to CH) observed. Approval No. WM 077 A, dated July 25, 2011.
4.6.43 (d)	As otherwise authorized in writing by the Director.				X	Not applicable.	Option not used by the Facility.
4.6.44	The approval holder shall conduct:				X	Not applicable.	Not applicable. Information only.
4.6.44 (a)	Annually, in-house visual inspections for corrosion.	X				Discussion with site staff.	Confirmed that annual visual inspections performed.
4.6.44 (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.	X				Inspection report from Integrity Testing Services Inc., dated August 2021.	Performed yearly, tracked by compliance calendar.
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.	X				Operations Plan, Section H.	Referenced in Landfill Operations Plan.
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.	X				Operations Plan, Section G.	Referenced in Landfill Operations Plan.
4.6.47	The approval holder shall only dispose of wastes that the landfill is not authorized to dispose of:				X	Not applicable.	Not applicable. Information only.
4.6.47 (a)	To facilities holding a current Act authorization.	X				Discussion with site staff.	Compliance confirmed. All waste receipts are screened at the site entry scale and any non-authorized loads, as determined through manifest, are rejected.
4.6.47 (b)	To facilities approved by a local environmental authority outside of Alberta. Or:	X					
4.6.47 (c)	As otherwise authorized in writing by the Director.	X					
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.				X	Not applicable.	Not applicable. Not observed during the audit. Non authorized waste not received in the landfill.
4.6.49	The approval holder shall restrict the working face of each landfill cell to the smallest practical area.				X		
4.6.50	For any waste disposed of at the landfill that is subject to wind dispersal, the approval holder shall:				X		
4.6.50 (a)	Wet the waste to prevent dispersal of particulate matter.or	X				Operations Plan, Appendix C (Fugitive Dust and Odour Best Management Plan).	Documents reviewed have procedures for managing dust and particulate matter through waste placement in landfill and in waste stabilization.
4.6.50 (b)	Immediately apply cover on top of the waste to minimize entrainment of particulate matter.	X					

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
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, provided that placement of such wastes will not cause offensive odours:	X				Discussion with site staff.	Compliance confirmed. Pond water for dust suppression. Leachate is never used due to odour.
4.6.51 (a)	Specified runoff.				X		
4.6.51 (b)	Leachate.				X		
4.6.51 (c)	Leak detection liquid.				X		
4.6.51 (d)	Sump waste of car wash bays or similar operations.				X	Not applicable.	Not applicable. Pond water is used for dust suppression only.
4.6.51 (e)	Waste from hydrovac excavation operations.				X		
4.6.51 (f)	Any other waste authorized by the Alberta User Guide for Waste Managers, May 1995, as amended.				X		
4.6.52	The approval holder shall inspect the landfill, at a minimum:				X	Not applicable.	Not applicable. Information only.
4.6.52 (a)	Weekly.	X					
4.6.52 (b)	Immediately after each storm event to: - Detect evidence of deterioration of any infrastructure components, including the composite liner. - Detect any malfunction or improper operation of the run-on and runoff control systems, leachate collection system, or leak detection system. - Take corrective measures to repair any damage to infrastructure components, including the composite liner.	X				<ul style="list-style-type: none"> Discussion with site staff. September 1, 2021 daily inspection record. 	Compliance confirmed through review of inspection record.
4.6.53	The approval holder shall do the following, the Director in writing along with any corrective measures taken or proposed:				X	Not applicable.	Not applicable. Information only.
4.6.53 (a)	Keep a record of inspections conducted pursuant to 4.6.52.	X					
4.6.53 (b)	Have the record of inspections available for review upon written request from the Director.	X				Landfill inspection records.	Compliance confirmed through review of electronic records.
4.6.53 (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	X				Landfill inspection records.	Reported if there is a contravention. If not, a work ticket is created and the issue is fixed.
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.	X				Site survey, dated January 4, 2021.	The site is surveyed twice per year, and no contours exceed the maximum designated waste elevation.
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.	X				Discussion with site staff.	Mud and waste tracking from the haul trucks is addressed as needed.
Monitoring and Reporting							
4.6.56	The approval holder shall monitor the landfill operations as required in Table 4.6-D.	X				2020 Annual Report.	All criteria in Table 4.6-D is included.
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.	X				2020 Annual Report.	Submitted to AEP.
4.6.58	The Annual Landfill Operations Report required in Table 4.6-D shall include, at a minimum, all of the following:				X	Not applicable.	Not applicable. Information only.
4.6.58 (a)	the name and contact information of the person responsible for the facility.	X				2020 Annual Report.	Addressed in Section 2.0 of Annual Report.
4.6.58 (b)	A summary of all information collected as required in Table 4.6-D.	X				2020 Annual Report.	Addressed in Section 3.0 of Annual Report.
4.6.58 (c)	A summary of the results of any audit conducted in accordance with 4.1.7.	X				2020 Annual Report.	2018 Triennial Compliance Audit included in Appendix D of Annual Report.
4.6.58 (d)	A summary of the operations of the waste stabilization area.	X				2020 Annual Report.	Addressed in Section 5.0 and Appendix I of Annual Report.
4.6.58 (e)	A summary of the performance of the run-on and runoff control systems, including a comparison to the limits in Tables 4.3-8 and 4.3-C.	X				2020 Annual Report.	Addressed in Section 6.0 of Annual Report.
4.6.58 (f)	A summary of the performance of the leachate collection system, including a comparison to the maximum acceptable leachate head.	X				2020 Annual Report.	Addressed in Section 7.0 of Annual Report.
4.6.58 (g)	A summary of the performance of the leak detection system, including a comparison to the action leakage rate limit.	X				2020 Annual Report.	Addressed in Section 8.0 of Annual Report.
4.6.58 (h)	The Response Action Plan for the leak detection system pursuant to 4.4.1 O.	X				2020 Annual Report.	Addressed in Section 9.0 and Appendix J of Annual Report.
4.6.58 (i)	The Annual Dugout and Water Well Sampling Program Report pursuant to 4.5.4.	X				2020 Annual Report.	Addressed in Section 10.0 Appendix K of Annual Report.
4.6.58 (j)	A summary of all revisions to the Landfill Operations Plan pursuant to 4.6.33(b).	X				2020 Annual Report.	Addressed in Section 11.0 and Appendix L of Annual Report.
4.6.58 (k)	Any groundwater remedial action taken pursuant to 4.6.34(p).	X				2020 Annual Report.	Addressed in Section 12.0 of Annual Report.
4.6.58 (l)	A summary of records of landfill inspections pursuant to 4.6.53.	X				2020 Annual Report.	Addressed in Section 13.0 and Appendix M of Annual Report.
4.6.58 (m)	A summary of: - Operational issues encountered. - Emergencies occurred. - Measures or actions taken.	X				2020 Annual Report.	Addressed in Section 14.0 of Annual Report.
4.6.58 (n)	A summary of records of: - Public complaints. - The approval holder's responses	X				2020 Annual Report.	Addressed in Section 15.0 and Appendix Q of Annual Report.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.6.58 (o)	An up-to-date financial security estimate pursuant to 5.1.2.	X				2020 Annual Report.	Addressed in Section 16.0 and Appendix N of Annual Report.
4.6.58 (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: - Contour mapping. - The location of active and inactive disposal areas. - Areas where a final cover has been placed. - The location of new landfill cell(s) constructed.	X				2020 Annual Report.	Addressed in Section 17.0 and Appendix O of Annual Report.
4.6.58 (q)	The Annual Landfill Cell Closure Report pursuant to 7.1.7.	X				2020 Annual Report.	Addressed in Section 18.0 Appendix P of Annual Report.
4.6.58 (r)	A summary of contraventions reported pursuant to 2.1.1 related to landfill operations.	X				2020 Annual Report.	Addressed in Section 19.0 Appendix Q of Annual Report.
4.6.58 (s)	Any other information as required in writing by the Director.	X				2020 Annual Report.	Addressed in Section 20 of Annual Report. No additional information was required by the Director.
4.6.59	The approval holder shall submit the Annual Landfill Operations Report to the Director.	X				Discussion with site staff.	Confirmation of submission prior to deadline (March 24, 2021 for last items).
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.	X				Discussion with site staff.	Wastewater is directed to an isolated holding tank.
4.7.2	The approval holder shall direct all domestic wastewater to the domestic wastewater system.	X					
4.7.3	The approval holder shall only dispose of substances from the domestic wastewater system:				X	Not applicable.	Not applicable. Information only.
4.7.3 (a)	To facilities holding a current Act authorization.	X					
4.7.3 (b)	To facilities approved by a local environmental authority outside of Alberta or	X				Discussion with site staff.	Wastewater from holding tank taken across the street to authorized treatment lagoon (Contractor).
4.7.3 (c)	As otherwise authorized in writing by the Director.	X					
Not used at this time.							
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.	X				Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020.	Groundwater reporting is being conducted in conformance with the Groundwater Monitoring Program.
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.	X				Discussion with site staff.	Submitted before the September 30th, 2017 deadline.
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.	X				Discussion with site staff.	AEP did not identify any deficiencies with the program.
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.	X				Discussion with site staff.	Implemented after submittal.
4.9.5	The approval holder shall:				X	Not applicable.	Not applicable. Information only.
4.9.5 (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.	X				Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020.	Compliance confirmed; all wells in monitoring program are sampled.
4.9.5 (b)	Analyze each sample for the parameters listed in Table 4.9-A.	X					Compliance confirmed; all parameters are sampled for.
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:				X	Not applicable.	Not applicable. Information only.
4.9.6 (a)	A minimum of once per year during each of the active landfill life, landfill cell closure, final landfill closure, and post-closure periods.	X				Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020.	Compliance confirmed; groundwater is monitored once per year.
4.9.6 (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.	X				Discussion with site staff.	Compliance confirmed; no leachate constituents have ever been found.
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:				X	Not applicable.	Not applicable. Information only.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.9.7 (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.	X				Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020.	Several exceedances noted in GW report, however these are due to the natural composition of the groundwater in the area.
4.9.7 (b)	Background groundwater chemistry as determined through a statistical analysis, as a derived alternate groundwater performance standard.	X					
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.				X		Remediation Plan has not been required to be implemented. Exceedances are normal for the groundwater in the area.
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.	X				2020 GW Monitoring Report, dated March 2, 2021 from Tetra Tech	Compliance confirmed; acceptable procedures are being followed.
4.9.10	The approval holder shall for all groundwater monitoring wells:				X	Not applicable.	Not applicable. Information only.
4.9.10 (a)	Protect from damage.	X				Field observations.	Compliance confirmed; all wells were observed to be protected and locked.
4.9.10 (b)	Keep locked except when being sampled.	X					
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:				X	Not applicable.	Not applicable. Information only.
4.9.11 (a)	Clean, repair or replace the groundwater monitoring well.				X	Not applicable.	Not applicable. No damaged or non-functional wells.
4.9.11 (b)	Collect and analyse a representative groundwater sample prior to the next scheduled sampling event.	X				Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020.	Compliance confirmed; groundwater monitoring consistent with schedule.
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:				X	Not applicable.	Not applicable. Information only.
4.9.12 (a)	A description of purging and sampling procedures.	X				Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020.	Refer to Section 5.2.
4.9.12 (b)	The static elevations above sea level, and depth below ground surface of fluid phases in the groundwater monitoring well prior to purging.	X					Compliance confirmed; groundwater levels were recorded.
4.9.12 (c)	The temperature of each sample at the time of sampling.	X					Compliance confirmed; temperature was recorded at the time of sampling.
4.9.12 (d)	The pH of each sample at the time of sampling.	X					Compliance confirmed; pH was recorded at the time of sampling.
4.9.12 (e)	The specific conductance of each sample at the time of sampling.	X					Compliance confirmed; recorded as mS at the time of sampling.
4.9.13	The approval holder shall carry out remediation of the groundwater in accordance with the following:				X	Not applicable.	Not applicable. Information only.
4.9.13 (a)	Alberta Tier 1 Soil and Groundwater Remediation Guidelines, Alberta Environment, February 2009, as amended.				X		Not applicable. Groundwater remediation has not been deemed necessary.
4.9.13 (b)	Alberta Tier 2 Soil and Groundwater Remediation Guidelines, Alberta Environment, February 2009, as amended.				X		
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:				X	Not applicable.	Not applicable. Information only.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.9.14 (a)	A completed Record of Site Condition Form, Alberta Environment, 2009, as amended.	X					
4.9.14 (b)	A legal land description of the facility and a map illustrating the facility boundaries.	X					
4.9.14 (c)	A topographic map of the facility.	X					
4.9.14 (d)	A description of the industrial activity and processes.	X					
4.9.14 (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.	X					
4.9.14 (f)	A general hydrogeological characterization of the region within a five kilometre radius of the facility.	X					
4.9.14 (g)	A detailed hydrogeological characterization of the facility, including an interpretation of groundwater flow patterns.	X					
4.9.14 (h)	Cross-sections showing depth to water table, patterns of groundwater movement and hydraulic gradients at the facility.	X					
4.9.14 (i)	Borehole logs and completion details for groundwater monitoring wells.	X					
4.9.14 (j)	A map showing locations of all known buried channels within at least five kilometre of the facility.	X				<ul style="list-style-type: none"> • Tetra Tech 2019 Groundwater Monitoring Program, dated March 10, 2020. • Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020. 	Compliance confirmed through a review of the report. Submission to AEP confirmed through review of correspondence.
4.9.14 (k)	A map of surface drainage within the facility and surrounding area to include nearby water bodies.	X					
4.9.14 (l)	A map of groundwater monitoring well locations and a table summarizing the existing groundwater monitoring program for the facility.	X					
4.9.14 (m)	A summary of any changes to the groundwater monitoring program made since the last groundwater monitoring report.	X					
4.9.14 (n)	Analytical data recorded as required in 4.9.5 and 4.9.11(b).	X					
4.9.14 (o)	A summary of fluid elevations recorded as required in 4.9.12(b) and an interpretation of changes in fluid elevations.	X					
4.9.14 (p)	An interpretation of QA/QC program results.	X					
4.9.14 (q)	An interpretation of all the data in this report, including the following: - Diagrams indicating the location and extent of any contamination. - A description of probable sources of contamination. - A site map showing the location and type of current and historical potential sources of groundwater contamination	X					
4.9.14 (v)	Recommendations for: - Changes to the groundwater monitoring program to make it more effective. - Remediation, risk assessment or risk management of contamination identified.	X					
4.9.15	The approval holder shall submit the Annual Groundwater Monitoring Program Report to the Director.	X					
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.				X	Not applicable.	Not applicable. AEP did not identify any deficiencies.
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:	X				Tetra Tech 2017 Soil Management Program Proposal, including Soil Monitoring Program.	Compliance confirmed: • March 21, 2017 - Soil Management Program Proposal (incl. monitoring program submitted to AEP). • September 11, 2017 - Supplemental Information to Soil Management Program Proposal (revisions), submitted to AEP. • September 13, 2017 - Approval letter from AEP regarding Soil Management Program Proposal.
4.10.1 (a)	Designing and developing proposals for the Soil Monitoring Program.	X					
4.10.1 (b)	Designing and developing proposals for the Soil Management Program.	X					
4.10.1 (c)	All other actions, including sampling, analysing, and reporting, associated with the Soil Monitoring Program.	X				Tetra Tech 2019 Soil Monitoring Program Report, dated January 31, 2020.	Actions in program reflect the 2019 Soil Monitoring Program Proposal and Deficiency Response Letter.
4.10.1 (d)	All other actions, including sampling, analysing and reporting, associated with the Soil Management Program.	X				Tetra Tech 2019 Soil Monitoring Program Report, dated January 31, 2020.	Actions in program reflect the 2019 Soil Monitoring Program Proposal and Deficiency Response Letter.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
Soil Monitoring and Reporting							
4.10.2	The approval holder shall submit the Soil Monitoring Program proposal to the Director according to the following schedule: - For the first soil monitoring event on or before January 31, 2019. - For the second soil monitoring event on or before January 31, 2024.	X				Tetra Tech 2017 Soil Management Program Proposal, including Soil Monitoring Program.	Compliance confirmed: • March 21, 2017 - Soil Management Program Proposal (incl. monitoring program submitted to AEP). • September 11, 2017 - Supplemental Information to Soil Management Program Proposal (revisions), submitted to AEP. • September 13, 2017 - Approval letter from AEP regarding Soil Management Program Proposal.
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.	X					
4.10.4	Subject to 4.10.3, the approval holder shall implement the Soil Monitoring Program as authorized in writing by the Director.	X				Tetra Tech 2019 Soil Monitoring Program.	Confirmed that this was completed in Fall 2019.
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 in accordance with the program as set out in the proposal submitted by the approval holder and within 270 days after the applicable date required by 4.10.2	X				Tetra Tech 2019 Soil Monitoring Program.	Confirmed that this was completed in Fall 2019.
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:	X				Tetra Tech 2019 Soil Monitoring Program.	Confirmed that this was completed in Fall 2019.
4.10.6 (a)	For the first Soil Monitoring Program Report on or before January 31, 2020.	X				Tetra Tech 2019 Soil Monitoring Program Report, dated January 31, 2020.	Submit to the AEP on time, January 31, 2020
4.10.6 (b)	For the second Soil Monitoring Program Report on or before January 31, 2025.				X	Not applicable.	Not applicable. To be completed in the summer of 2024.
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.	X				Tetra Tech 2019 Soil Monitoring Program Report, dated January 31, 2020.	Actions in program reflect the 2019 Soil Monitoring Program Proposal and Deficiency Response Letter.
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.	X				• Tetra Tech 2017 Soil Management Program Proposal, including Soil Monitoring Program. • Tetra Tech Soil Management Program 2017 Cell 4 Soil Sampling, dated March 12, 2018.	Soil Management Program Proposal was developed and compliance was confirmed through a review.
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:				X	Not applicable.	Not applicable. Information only
4.10.9 (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).	X				Soil Management Program - 2017 Cell 4 Soil Sampling	Updated Soil Management Plan and recommendations are being followed by consultant.
4.10.9 (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).	X				Soil Management Program - 2017 Cell 4 Soil Sampling	Updated Soil Management Plan and recommendations are being followed by consultant.
4.10.9 (c)	For any other soil monitoring event not specified in this approval within six months of completion of the soil monitoring event.				X	Not applicable.	Not applicable. Information only
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.	X				Soil Management Program - 2017 Cell 4 Soil Sampling	Updated Soil Management Plan and recommendations are being followed by consultant.
4.10.11	The approval holder shall implement the Soil Management Program as authorized in writing by the Director.	X				Soil Management Program - 2017 Cell 4 Soil Sampling	Updated Soil Management Plan and recommendations are being followed by consultant.
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 Report to the Director on or before March 31 of each year following the year in which the information was collected.	X				Soil Management Program - 2017 Cell 4 Soil Sampling	Updated Soil Management Plan and recommendations are being followed by consultant.
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.				X	Not applicable.	Not applicable. No deficiencies identified by the Director.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.1.1	The geographic boundaries of the landfill has been maintained to that located within SE ¼ of Section 9, Township 50, Range 17, West of the 4 th Meridian.	X				<ul style="list-style-type: none"> 2020 Annual Report Field observations. 	Confirmed that landfill is within the approved boundary.
4.1.2	The waste elevation of the landfill has not exceeded the maximum designated waste elevation.	X				Cell 3B Landfill Capping Top of Final Cover Elevations, Figure No. 3 in Dillon Annual Landfill Cell Closure Report (Cell 3B), dated March 2021.	<ul style="list-style-type: none"> Maximum elevation, per Part 1 (ggg) (definitions) is 714 masl. Most recent closure was Cell 3B, which is also the highest. Maximum elevation observed in final cover was 713.15 masl.
4.1.3	Access to the facility has been restricted to only authorized personnel.	X				Field observations.	<ul style="list-style-type: none"> Visitor sign in sheet at front desk. Scale house reporting for all vehicles. Security cameras on-site. Gated access.
4.1.4	A 24 hour "HOTLINE" number has been maintained for prompt response during an emergency.			X		Field observations.	A hotline is maintained but not posted at gate or office entrance. Hotline is 780-690-0614.
4.1.5	The approval owner shall operate and maintain the integrity of the following waste management facilities at the facility:				X		Not applicable. Information only.
4.1.5 (i)	HWRSP Facility	X					Confirmed during field inspection.
4.1.5 (ii)	Class I and II landfill, including Class I and II cells and waste stabilization areas.			X			Observed ponding in roadways near potable water tanks, which can be managed on an ongoing basis.
4.1.5 (iii)	Waste storage areas.	X					Confirmed during field inspection.
4.1.6	The approval holder shall operate and maintain the integrity of the following infrastructure components at the facility:				X		Not applicable. Information only.
4.1.6 (i)	Composite liner	X				<ul style="list-style-type: none"> 2020 Annual Report. Field observations. 	Confirmed during field inspection.
4.1.6 (ii)	Leachate collection system	X					Confirmed during field inspection.
4.1.6 (iii)	Leak detection system	X					Confirmed during field inspection.
4.1.6 (iv)	Run-on control system	X					Confirmed during field inspection.
4.1.6 (v)	Run-off control system	X					Confirmed during field inspection.
4.1.6 (vi)	Groundwater monitoring wells	X					<ul style="list-style-type: none"> Confirmed well MW-10 (near waste storage and HWRSP Facility) has been repaired and locked. All other wells were observed to be protected and locked.
4.1.6 (vii)	Weigh scale	X					Weigh scale is operational.
4.1.6 (viii)	Site access control	X				Field observations.	Confirmed that sign-in procedures in place, doors locked, etc.
Facility Audit							
4.1.7	The approval holder shall cause the facility to be audited by an independent third-party environmental consultant to assess compliance with the terms and conditions of this approval, commencing on or before October 1, 2018.	X				<ul style="list-style-type: none"> 2018 Compliance Audit Report. 2021 Compliance Audit Report. 	Compliance confirmed.
4.1.8	The approval holder shall submit the audit report required in 4.1.7 in the Annual Landfill Operations Report.	X				2020 Annual Report.	Reviewed the 2020 Annual Landfill Operations Report and confirmed previous Audit was included.
4.1.9	The requirements in 4.1.7 and 4.1.8 do not relieve the approval holder of any duty under the Act, or its associated regulations, or this approval.				X	Not applicable.	Not applicable. Information only.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
Operations							
4.2.1	The approval holder shall not release any air effluent streams to the atmosphere except as authorized by this approval.				X	Not applicable.	Not applicable. Information only.
4.2.2	The approval holder shall only release air effluent streams to the atmosphere from the following sources: - Scrubber exhaust stack - Drum Processing Building exhaust vent - Staging Building exhaust vent - Administrative Building exhaust vents - Laboratory fume hood and exhaust vents - Maintenance Shop equipment and exhaust vents - Leachate Collection Tanks exhaust vents - Leachate transfer lines passive gas vents - Any other source authorized in writing by the Director	X				Field observations.	<ul style="list-style-type: none"> No other sources not listed in the approval. Requested in Approval Amendment (pending) to do quenching emulsions, only if non-toxic gases are emitted.
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 operational and operating.	X				<ul style="list-style-type: none"> Field observations. Verbal confirmation. Sept. 1, 2021 Transfer Station Daily Inspection (including scrubber inspection). 	All pollution abatement equipment is continuously operated.
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: - Hazardous wastes/recyclables are being processed. - Hazardous wastes/recyclables are being transferred. - Containers of hazardous wastes/recyclables are open in the Drum Processing and/or Staging Buildings.	X				<ul style="list-style-type: none"> Field observations. Discussion with site staff. 	Monitored weekly and documented as per section below. All building air is treated through the pollution abatement equipment (scrubber and filter), including drum and tank vents.
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.	X				Field observations.	A carbon filter was added to the leachate tank.
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:				X	<ul style="list-style-type: none"> Operations Plan, Appendix C (Fugitive Dust and Odour Best Management Plan). Odour Complaint notification to Village and County, dated July 30, 2021. 	<ul style="list-style-type: none"> No fugitive emissions outside of what's permitted. Odour complaints are received and managed per BMPs (report reviewed and contained in Operations Plan). As part of the Amendment Application, AEP identified concerns regarding communications to the Village of Ryley and Beaver County. Clean Harbors now notifies the Village and County of all complaints and contraventions submitted to AEP.
4.2.6 (a)	Impairment, degradation or alteration of the quality of natural resources.	X					
4.2.6 (b)	Material discomfort, harm or adverse effect to the well being or health of a person.	X					
4.2.6 (c)	Harm to property or to vegetative or animal life.	X					
4.2.7	The approval holder shall not burn any debris by means of an open fire unless authorized in writing by the Director.	X				Correspondence with AEP	A fire occurred on property in January 2021, for which AEP was notified. No burning is conducted on site.
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:				X		
4.2.8 (a)	Conduct the following to reduce the release of those odours, or fugitive dust, or both by:	X				<ul style="list-style-type: none"> Operations Plan, Appendix C (Fugitive Dust and Odour Best Management Plan). Environmental Management Program SOP #90RY-410-00. Field observations. Discussion with site staff. 	<ul style="list-style-type: none"> Response is based on the type of complaint. Recently added a carbon filter on the leachate tank vent. Material receipt may be suspended during high wind days. Cover can be immediately placed for dust suppression and dispersion prevention. Receive typically 2-3 odour complaints per year.
4.2.8 (a, 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.	X					
4.2.8 (a, ii)	Increasing the frequency of cover placement, or modifying waste handling activities, or performing both, at the landfill.	X					
4.2.8 (a, iii)	Modifying waste handling activities at the HWRSP Facility.	X					
4.2.8 (a, iv)	Performing any combination of the above.	X					
4.2.8 (b)	Activate the Odour and Fugitive Dust Response Program as specified in the Landfill Operations Plan 4.6.34U).	X					

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
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.	X				<ul style="list-style-type: none"> Field observations. Recorded daily (viewed Aug. 22, 2021 and Nov. 5, 2020 examples) and maintained in the WIN Web system. 	<ul style="list-style-type: none"> pH data logger contains daily readings. Available to AEP upon request, confirmed in report that recordings are compliant. "Keep pH above 8.0" sign posted.
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.	X				<ul style="list-style-type: none"> Field observations. WIN Web records. 	<ul style="list-style-type: none"> Weekly total petroleum hydrocarbon readings are taken and recorded in log book next to the scrubber and in WINWEB. Carbon is typically replaced every 4-5 years or less frequent. Last replacement occurred July 2015. No exceedances or replacement of media in the last three year period (2019-2021).
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.	X				<ul style="list-style-type: none"> Monitoring records for Aug. 22, 2021 and Nov. 5, 2020 in WIN Web. Field observations. 	<ul style="list-style-type: none"> Data logger contains daily readings. Available to AEP upon request, confirmed in report that recordings are compliant. If pH readings are close to 8.0 limit, a secondary laboratory reading is performed to verify in-line pH meter accuracy. Aug. 22, 2021 and Nov. 5, 2020 dates sampled.
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: <ul style="list-style-type: none"> - Hazardous wastes/recyclables are being processed. - Hazardous wastes/recyclables are being transferred. - Containers of hazardous wastes/recyclables are open in the Drum Processing and/or Staging Buildings. 	X				<ul style="list-style-type: none"> Field observations. WIN Web records. 	<ul style="list-style-type: none"> Weekly readings are taken and recorded in log book next to the scrubber. Carbon is replaced every 4-5 years or less frequency.
4.2.13	The portable total petroleum hydrocarbon analyzer referred to in 4.2.12 shall:				X	Not applicable.	Not applicable. Information only.
4.2.13 (a)	Have a detection limit of 1 ppm or lower for total petroleum hydrocarbons.	X				Field observations.	Confirmed that accuracy is to 0.1 ppm, as observed on calibration certificate.
4.2.13 (b)	Be located in a straight section of the scrubber exhaust stack, a minimum of one (1) metre downstream from the last flow disturbance.	X				Field observations.	Sampling location is on second story scaffolding within building, 1 m downstream from the last flow disturbance.
4.2.13 (c)	Be calibrated regularly in accordance with the analyzer manufacturer's specifications.	X				Calibration certificate from 2020.	Confirmed calibrated in 2020; expires in 2022.
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.	X					
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: <ul style="list-style-type: none"> - Monthly Ambient Air Monitoring Report - 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.	X				<ul style="list-style-type: none"> 2020 Operations Report. GHD Quality Assurance Plan - Air Monitoring Program Report, dated Dec. 31, 2016. "Ambient Air Monitoring Station Audit" letter from AEP, dated August 31, 2016. "Ambient Air Monitoring Station Audit" letter from AEP, dated Jan. 13, 2017 (closing out the audit findings). 	<ul style="list-style-type: none"> Clean Harbors was audited by AEP for adherence to the new Air Monitoring Directive released in 2016. Clean Harbors proposed dates and actions to address findings of the audit, which were accepted by AEP in letter December 2, 2016. Dec. 31, 2016 GHD report contains new Air Monitoring Program. AEP letter closing out the audit indicates that all findings addressed.
4.2.16	The approval holder shall submit a revised Ambient Air Monitoring Program, revised reporting requirements, or both, to the Director upon written request from the Director within the timeline specified in writing by the Director.	X					
4.2.17	If the revised Ambient Air Monitoring Program, reporting requirements, or both, 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.	X					

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.2.18	The approval holder shall implement the revised Ambient Air Monitoring Program, reporting requirements, or both, submitted pursuant to 4.2.16 as authorized in writing by the Director within the timeline specified in writing by the Director.	X					
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.	X				Field observations.	Compliance confirmed. 100% of the leachate is disposed of via deep well injection. Runon/runoff control systems in place and inspected during field observations.
4.3.2	The approval holder shall operate and maintain the integrity of:				X	Not applicable.	Not applicable. Information only.
4.3.2 (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.	X				Field observations.	Compliance confirmed. Run on/run off control systems were completed during Cell 4 construction. As built drawings reviewed.
4.3.2 (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.	X				Field observations.	Compliance confirmed. Run on/run off control systems were completed during Cell 4 construction. As built drawings reviewed.
4.3.3	All runoff from the facility developed area shall be directed to the runoff control system as described in:				X	Not applicable.	Not applicable. Information only.
4.3.3 (a)	Application No. 012-10348, prior to decommissioning and reclamation of the old surface water detention pond.	X				Not applicable.	Confirmed. The old surface water detention pond was decommissioned in August 2018 prior to this audit.
4.3.3 (b)	The application, after decommissioning and reclamation of the old surface water detention pond.	X					
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:				X	Not applicable.	Not applicable. Information only.
4.3.4 (a)	At the release point as designated in application No. 012-10348, which is: • Located in the south east corner of the old surface water detention pond. • Referred to as sampling location A 1 in 4.3.11.	X				<ul style="list-style-type: none"> • 2020 Annual Report. • Field observations. • Operations Plan. • Discussions with site staff. 	Decommissioning of the old surface water detention pond was completed in August 2018. Observations were made of the new surface water detention pond, drainage ditch, and discharge point.
4.3.4 (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.	X					
4.3.4 (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.	X					
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:	X					
4.3.5 (a)	At the release point as designated in application No. 012-10348, which is: • Located in the north east corner of the new surface water detention pond. • Referred to as sampling location 81 in 4.3.11.	X					<ul style="list-style-type: none"> • Observed the discharge point at the new surface water detention pond. • Composite sampling is performed prior to any discharge consistent with the approval.
4.3.5 (b)	Through a pump and a release hose over the east berm into the culvert under Highway 854.	X					
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:				X	<ul style="list-style-type: none"> • 2020 Annual Report. • Field observations. • Operations Plan. • Discussions with site staff. 	<ul style="list-style-type: none"> • All stormwaters are discharged through pond with testing prior to discharge. • No non-compliant discharges have occurred. • When TSS exceeds limits, further settling time is done prior to re-testing and discharge, or flocculant is added. • No change to discharge.
4.3.6 (a)	To facilities holding a current Act authorization to accept such waste.	X					
4.3.6 (b)	To facilities approved by a local environmental authority outside of Alberta to accept such waste.	X					
4.3.6 (c)	To a disposal well approved by AER.	X					
4.3.6 (d)	As per 4.6.51.	X					
4.3.6 (e)	As otherwise authorized in writing by the Director.	X					

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
Limits							
4.3.7	Releases of runoff from the following to the surrounding watershed shall comply with the limits specified in Table 4.3-B: - The old surface water detention pond. - The new surface water detention pond. - Or, both ponds.	X				<ul style="list-style-type: none"> 2020 Annual Report. Operations Plan. 	Compliance confirmed through a review of release analytical records.
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.				X	Not applicable.	Not applicable: <ul style="list-style-type: none"> Tank farm bermed area water goes into landfill. This volume is pumped and solidified for disposal in the landfill.
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.			X		Surface Water Detention Pond B Summary of Batch Analysis, 2020 Annual Report.	Results for the runoff control system testing of 48 hour static acute lethality test using daphnia magna could be included in the Summary of Batch Analysis presented in the 2020 Annual Landfill Operations Report; along with the lethality of effluents to rainbow trout testing.
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.	X				2020 Annual Report.	Monitoring findings reported to AEP.
4.3.11	For the purpose of Table 4.3-D:				X	Not applicable	Not applicable. Information only.
4.3.11 (a)	Sampling location A 1 is defined as the old surface water detention pond release point.				X	Field observations.	Not applicable. Old surface water detention pond has been decommissioned.
4.3.11 (b)	Sampling location A2 is defined as the old surface water detention pond.				X	Field observations.	Facility actively monitors releases.
4.3.11 (c)	Sampling location B1 is defined as the new surface water detention pond release point.	X				Field observations.	Facility actively monitors detention pond.
4.3.11 (d)	Sampling location B2 is defined as the new surface water detention pond.	X				Field observations.	Water collected in bermed area of tank farm is solidified for disposal in landfill as per 4.3.8
4.3.11 (e)	Sampling location C is defined as the tank farm bermed area.	X				Field observations.	Not applicable. The old surface water detention pond was decommissioned in August, 2018 prior to this audit.
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.				X	Not applicable.	Not applicable. Information only.
4.3.13	The monitoring and reporting required in Table 4.3-D for the acute lethality tests shall comply with:				X	Not applicable.	Summary of results all pass for the Surface Water Detention Pond B Summary of Batch Analyses.
4.3.13 (a)	The Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, Environment Canada, Environment Protection Series 1/RM/13, December 2000, as amended.	X				Surface Water Detention Pond B Summary of Batch Analysis - 2020 Annual Landfill Operations Report	<ul style="list-style-type: none"> Monthly Runoff and Industrial Wastewater Report. Surface Water Detention Pond B Summary of Batch Analysis - 2020 Annual Report. Results for the runoff control system testing of 48 hour static acute lethality test using daphnia magna could be included in the Summary of Batch Analysis presented in the 2020 Annual Landfill Operations Report; along with the lethality of effluents to rainbow trout testing.
4.3.13 (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.			X		Not applicable.	Not applicable. No deviation from corresponding test method has occurred.
4.3.14	The approval holder shall: - Treat any acute lethality test that deviates from the corresponding test method referred to in 4.3.13 as invalid. - Repeat the test as soon as logistically possible.				X	Not applicable.	Not applicable. All testing passed the criteria.
4.3.15	In the event that less than 50% of the rainbow trout survived in the 100% concentration sample, the approval holder shall: - Implement a program immediately to identify the source of the toxicity. - Submit to the Director within 90 days after the test result is available, a proposed program to reduce the toxicity of the runoff.				X	Not applicable.	Verbal confirmation from multiple parties confirming the reports are forwarded to AEP.
4.3.16	The approval holder shall submit the Monthly Runoff and Industrial Wastewater Report in Table 4.3-D to the Director.	X				Monthly Runoff and Industrial Wastewater Report.	Not applicable. Monthly reports contained in annual report, but only need to be submitted with discharges.
4.3.17	The Monthly Runoff and Industrial Wastewater Report shall include, at a minimum, all of the following information:				X	Not applicable.	

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.3.17 (a)	A monthly assessment of the monitoring results relative to the limits in Table 4.3-B.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.17 (b)	A monthly assessment of the monitoring results relative to the limits in Table 4.3-C.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.17 (c)	A monthly assessment of the performance of the: - Runoff control system. - Pollution abatement equipment. - Monitoring equipment.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.17 (d)	A monthly summary of management and disposal of the industrial wastewaters and specified runoff, as per 4.3.6.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.17 (e)	A monthly summary of management and disposal of runoff in general.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.17 (f)	A monthly summary of runoff contraventions reported pursuant to 2. 1. 1.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.17 (g)	Any other information as required in writing by the Director.	X				Monthly Runoff and Industrial Wastewater Report.	Included in Report.
4.3.18	The approval holder shall submit the Annual Runoff and Industrial Wastewater Report in Table 4.3-D to the Director.	X				Annual Runoff and Industrial Wastewater Report.	Verbal confirmation and included with annual report.
4.3.19	The Annual Runoff and Industrial Wastewater Report shall include, at a minimum, all of the following information:			X		Not applicable.	Not applicable. Information only.
4.3.19 (a)	An annual summary assessment of the monitoring results relative to the limits in Table 4.3-B.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.19 (b)	An annual summary assessment of the monitoring results relative to the limits in Table 4.3-C.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.19 (c)	An annual summary assessment of the performance of the: - Runoff control system. - Pollution abatement equipment. - Monitoring equipment.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.19 (d)	An annual summary of management and disposal of the industrial wastewaters and specified runoff, as per 4.3.6.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.19 (e)	An annual summary and evaluation of management and disposal of runoff in general.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.19 (f)	An annual summary of the results pursuant to 4.3.21.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.3.19 (g)	An annual summary of runoff contraventions reported pursuant to 2. 1. 1.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.19 (h)	Any other information as required in writing by the Director.	X				Annual Runoff and Industrial Wastewater Report.	Included in Report.
4.3.20	The approval holder shall:				X	Not applicable.	Not applicable. Information only.
4.3.20 (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.				X	Not applicable.	Not applicable. Old surface water detention pond has been decommissioned.
4.3.20 (b)	Collect a representative grab sample from the new surface water detention pond at least once per year.	X				Annual Runoff and Industrial Wastewater Report	Details included in Report.
4.3.20 (c)	Analyze the sample(s) for all of the parameters specified in Table 4.3-E.	X				Annual Runoff and Industrial Wastewater Report	Details included in Report.
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.	X				Annual Runoff and Industrial Wastewater Report	Details included in Report.
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:				X	Not applicable.	Not applicable. Information only.
4.4.1 (a)	To facilities holding a current Act authorization to accept such waste.				X	Not applicable.	Not applicable. Option not used by the facility.
4.4.1 (b)	To facilities approved by a local environmental authority outside of Alberta to accept such waste.				X	Not applicable.	Not applicable. Option not used by the facility.
4.4.1 (c)	To a disposal well approved by AER.	X				<ul style="list-style-type: none"> • Alberta Energy Regulator (AER) approval for deep well. • Appendix E of 2020 Annual Report. 	Leachate is hauled to Class I deep well in Calmar. Volume summary included in annual report.
4.4.1 (d)	As per 4.6.51.				X	Not applicable.	Not applicable. Information only.
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:				X	Not applicable.	Not applicable. Information only.
4.4.2 (a)	To facilities holding a current Act authorization to accept such waste.				X	Not applicable.	Not applicable. Option not used by the facility.
4.4.2 (b)	To facilities approved by a local environmental authority outside of Alberta to accept such waste.				X	Not applicable.	Not applicable. Option not used by the facility.
4.4.2 (c)	To a disposal well approved by AER.	X				<ul style="list-style-type: none"> • AER approval for deep well. • Appendix E of 2020 Annual Landfill Operations Report. 	Leachate is hauled to Class I deep well in Calmar. Volume summary included in annual report.
4.4.2 (d)	As per 4.6.51.				X	Not applicable.	Option not used by the facility.
Limits							
4.4.3	Subject to 4.4.4, the approval holder shall not exceed the maximum acceptable leachate head in any landfill cell.	X				Leachate Head Level Table.	Leachate levels recorded daily. Field logs for 2020 observed, contain following parameters: - Date, time, condition, level status, personnel initial
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.	X				Leachate Head Level Table.	Leachate pumping infrastructure on timers in most cells, (all but Cell 1). A fire January 12, 2020 caused a fire (AEP Reference No. 362650) which destroyed the Cell 2 Leachate building until pumping capacity was restored June 30, 2020. Infrastructure is capable of removing leachate generated from a storm event in fewer than 14 days.
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.		X			2020 Annual Report.	Action Leakage Rate (ALR) Exceedances were noted June 9, 2020, June 10, 2020, July 2, 2020, July 9, 2020. Section 14.6 of the Annual Landfill Operations Report detail several ALR exceedances that were not reported. No negative impacts were observed and clarification of the reporting requirements were made with the Facility Manager to ensure this is not repeated in the future. (AEP 376183)

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
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.	X				Primary Leachate Analysis Results Appendix D of 2020 Annual Report.	Leachate levels recorded daily. Field logs for 2020 observed, contain following parameters: • Date, time, condition, level status, personnel initial.
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.	X				Primary Leachate Analysis Results Appendix D of 2020 Annual Report.	Submitted to AEP.
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.				X	Not applicable.	Not applicable. Information only.
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.				X	Not applicable.	Not applicable. Information only.
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.	X				2020 Annual Report.	(AEP 376183) links exceedances to excessive rainfall and details steps taken to solve infiltration.
Monitoring and Reporting							
4.5.1	The approval holder shall, unless the approval holder is not granted access by the landowner:				X	Not applicable.	Not applicable. Information only.
4.5.1 (a)	Collect a representative sample from each of the dugouts and each of the water wells, within an approximate 1.6 kilometre radius around the facility.	X				Tetra Tech 2020 Dugout Sampling Program Report, dated March 2, 2021.	Details included in Report.
4.5.1 (b)	Analyze the sample for the parameters listed in Table 4.5-A.	X					Details included in Report.
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.	X					Details included in Report.
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.	X					Details included in 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).	X					Details included in Report.
General							
4.6.1	The approval holder shall not receive, process, dispose of, or perform any combination of the above for any of the following wastes, individually or in any combination, at the places specified below respectively: - Explosives (Class 1 TDGR wastes), at the facility. - Radioactive wastes (Class 7 TDGR wastes), at the facility. - Radioactive wastes regulated under the Nuclear Safety and Control Act (Canada), at the facility. - Biomedical waste, at the facility. - Waste containing free liquids, at the landfill, excluding the waste stabilization area. - Material containing ozone depleting substances, at the landfill. - Municipal solid waste, at the facility. - NORM waste, at the facility.	X				• Field observations. • Discussions with site staff.	Site field observations and verbal confirmation were received regarding materials receipt. Cross checked against Facility Operations Plan and SOPs for individual waste materials. WINWEB system also performs checks on waste compatibility and will issue warnings of any non-conforming waste
4.6.2	Incompatible wastes and incompatible hazardous recyclables shall be prevented from mixing.	X				• Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Landfill Operations (SOPL001). • WIN Web (compatibility workbench).	Relevant Facility SOPs confirm procedures are appropriate to prevent incompatible wastes and recyclables from mixing.
4.6.3	The approval holder shall dispose of wastes generated at the facility only:				X	Not applicable	Information only.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.6.3 (a)	To facilities holding a current Act authorization.	X				Discussions with site staff.	Confirmed that regulations are being followed.
4.6.3 (b)	To facilities approved by a local environmental authority outside of Alberta.	X				Discussions with site staff.	Confirmed that regulations are being followed.
4.6.3 (c)	As otherwise authorized in writing by the Director.	X				Discussions with site staff.	Confirmed that regulations are being followed.
HWRSP Facility							
Operations Plan							
4.6.4	The approval holder shall develop, keep up-to-date, and implement an HWRSP Facility Operations Plan.	X				<ul style="list-style-type: none"> Facility Standard Operating Procedures (SOPs) Operations Plan. 	Most recently dated as February 2021, with annual updates required. In 2020, procedures for Cell 4 added.
4.6.5	The approval holder shall:				X	Not applicable.	Not applicable. Information only.
4.6.5 (a)	Review the HWRSP Facility Operations Plan annually, at a minimum.	X				<ul style="list-style-type: none"> 2020 Annual Report. Operations Plan. 	This is performed in line with the annual reporting required under the Approval.
4.6.5 (b)	Update the HWRSP Facility Operations Plan if any of the following circumstances apply: - There are facility expansions or changes in site operations or equipment. - There is an applicable change to an applicable regulation. - An update is required in writing by the Director.	X				<ul style="list-style-type: none"> 2020 Annual Report. Operations Plan. 	Section 14 added to 2017 Annual Report, addressing HWRSP facility operations.
4.6.6	The approval holder shall retain a copy of the most recent HWRSP Facility Operations Plan at the facility.	X				<ul style="list-style-type: none"> 2020 Annual Report. Operations Plan. 	Held on-site electronically and in hard copy.
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.	X				<ul style="list-style-type: none"> 2020 Annual Report. Operations Plan. 	Submitted in the 2020 Annual Report.
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.				X	Not applicable.	Not applicable. No response received from AEP on 2020 Annual Report.
4.6.9	The approval holder shall implement the latest HWRSP Facility Operations Plan, unless otherwise authorized in writing by the Director.	X				Operations Plan.	Up to date plan available and utilized.
Operations							
4.6.10	The approval holder shall only transfer wastes and hazardous recyclables at designated transfer areas designed to contain spills and leaks.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Relevant Facility SOPs confirm procedures for transferring wastes in the HWRSP.
4.6.11	The approval holder shall use the following when transferring substances to, from, and between containers, tanks, and trucks:				X	Not applicable.	Not applicable. Information only.
4.6.11 (a)	Couplings equipped with seals that are compatible with the substance transferred.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.
4.6.11 (b)	The necessary precautions to prevent spills when the couplings are disconnected.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.
4.6.11 (c)	Emergency shut-off valves.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.6.11 (d)	Established transfer areas and associated curbing, paving and catchment areas.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.
4.6.11 (e)	Drip trays to capture potential losses under coupling devices and other connections.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.
4.6.11 (f)	Manual inspections of the transfer area for leaks and spills during and after waste transfer.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.
4.6.12	All wastes and all hazardous recyclables that are unloaded shall be immediately transferred to the waste storage area.	X				Facility SOPs: Drum Staging and Storage (SOPOP002), Drum Sampling (SOPOP003), Container Management (SOPOP004), Spills on Site (SOPOP008).	Reviewed and compliance confirmed during site visit.
4.6.13	All containers and unrinsed empty containers shall be stored in the waste storage area.	X				Field observations.	Confirmed during Site visit.
4.6.14	The approval holder shall:				X	Not applicable.	Not applicable. Information only.
4.6.14 (a)	Provide and maintain an adequate aisle space between containers in the waste storage area to allow inspection and unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment to any area of the waste storage area.	X				Field observations.	Site field operations consistent with fire code for spacing between containers.
4.6.14 (b)	Arrange inspection aisles in the waste storage area such that the identification label on each container is readable.	X				Field observations.	Identification labels clear for all containers.
4.6.15	All tanks within the tank farm area shall be equipped, at a minimum, with all of the following:				X	Not applicable.	Not applicable. Information only.
4.6.15 (a)	Sensors for detecting the level in each tank.	X				Field observations.	Sensors, alarms, and shut-off devices observed and active for each tank. The aqueous tank within the building does not contain a high level alarm but is not considered part of the tank farm.
4.6.15 (b)	High level alarms that activate when a tank overflow is imminent.	X					
4.6.15 (c)	Automatic shut-off devices or sufficient free board space above the high level sensor to allow operators time to prevent overflow from occurring.	X					
4.6.15 (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.	X				Field observations.	Entire waste storage area is the building floor, which is drained to holding tank in central manhole and can be pumped.
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:				X	Not applicable.	Not applicable. Information only.
4.6.16 (a)	Sensors or gauges for detecting the level in each tank.	X				Field observations.	Sensors observed and active for tanks.
4.6.16 (b)	A written operating procedure to prevent tank overflow.		X			<ul style="list-style-type: none"> Field observation Bulk Flammable Liquid Transfer SOP 	Bulk Flammable Liquid Transfer SOP Document and Checklist is available (part of Facility SOPs) in office area but is not stored next to tanks.
4.6.16 (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.	X				Field observations.	Secondary containment structures observed in the field.
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.	X				<ul style="list-style-type: none"> Field observations. Bulk Flammable Liquid Transfer SOP. 	Facility observed to be following governing regulations.
4.6.18	The approval holder shall only carry out the following activities, individually or in any combination, at the HWRSF Facility in relation to hazardous waste or hazardous recyclables or both:	X				<ul style="list-style-type: none"> Field observations. 	Field observations reviewed the activities that occur on site; which was confirmed through review of the Facility and Landfill
4.6.18 (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.	X					
4.6.18 (b)	Phase separation by gravity settling, only without the addition of any chemicals designed to accelerate settling.	X					
4.6.18 (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.	X					

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.6.18 (d)	Physical segregation of hazardous from non-hazardous articles or components from the same container, only if no process equipment is used.	X				<ul style="list-style-type: none"> Operations Plan. Facility SOPs. 	Operations Plan and Facility SOPs.
4.6.18 (e)	Washing of drums or other objects, only for the purpose of removing hazardous residue.	X					
4.6.18 (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.	X					
4.6.18 (g)	Treatment of hazardous waste, only as authorized in writing by the Director.	X					
4.6.19	Notwithstanding 4.6.1 B(g), the approval holder shall not incinerate waste at the facility.	X					
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.	X				WIN Web inventory management software.	Maximum capacity not exceeded as of September 2, 2021, per the below volumes.
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.	X				WIN Web inventory management software.	Observations of inventory software made on September 2, 2021: <ul style="list-style-type: none"> 254,681 L of all wastes (hazardous and non-hazardous) 64,856 L of hazardous waste in containers (drums) 15,340 L of bulk liquids
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.	X				WIN Web inventory management software.	Software automatically calculates drum equivalents.
4.6.23	The limits referred to in 4.6.20 and 4.6.21 shall be calculated based on the:				X	Not applicable.	Not applicable. Information only.
4.6.23 (a)	Total nominal volumes of all containers, treating all partially filled containers as if they were full.				X	Not applicable.	Not applicable. Information only.
4.6.23 (b)	Total filled capacities of all tanks.				X	Not applicable.	Not applicable. Information only.
Monitoring and Reporting							
4.6.24	The approval holder shall identify, characterize, and 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:				X	Not applicable.	Not applicable. Information only.
4.6.24 (i)	Industrial Waste Identification and Management Options, Alberta Environment, May 1996, as amended.			X		Facility and Landfill Operations Report, Section B	The document is not referenced specifically in Landfill Operations Plan, although review of documentation indicates adherence to this standard. Recommended that this be included in the Operations Plan as a specific reference.
4.6.24 (ii)	Alberta User Guide for Waste Managers, Alberta Environment, August 1996, as amended.	X				Facility and Landfill Operations Report, Section B	Referenced in Landfill Operations Plan.
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.	X				Facility and Landfill Operations Report	Addressed in Appendix A of Operations Report.
4.6.26	The approval holder shall keep a daily total and inventory of all materials being stored at the HWRSP Facility.	X				<ul style="list-style-type: none"> Field observations. Various inventory logs (WIN Web). 	Observed documentation in the field.
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.	X				<ul style="list-style-type: none"> Field observations. Various inventory logs (WIN Web). 	Available at the time of the audit.
4.6.28	The approval holder shall submit a Monthly Waste Management Report to the Director.	X				<ul style="list-style-type: none"> July 2021 Waste Inventory Report. Discussion with site staff. 	Verbal confirmation that the monthly reports are submitted to AEP. Different documents for internal use and submission confirms submission.
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:				X	Not applicable.	Not applicable. Information only.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OfI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.6.29 (a)	An opening waste and hazardous recyclables inventory balance in kilograms or litres by waste class or material type.			X		<ul style="list-style-type: none"> July 2021 Waste Inventory Report. Discussion with site staff. 	Compliance confirmed; included in report. The Facility is adhering to the information required in the Monthly Waste Management Report, viewed for July 2021. However the reports are currently referencing the 10348-02-00 Approval. Dillon would recommend that the referenced Approval be updated to 10348-03-00.
4.6.29 (b)	The amount and type of waste and hazardous recyclables received: - Within the province. - From outside of the province.			X			
4.6.29 (c)	The amount and type of waste and hazardous recyclables: - Shipped for recycling or product. - Shipped off-site for disposal. - Disposed on-site.			X			
4.6.29 (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.			X			
4.6.29 (e)	Closing balance in kilograms or litres.			X			
4.6.29 (f)	A summary of contraventions reported pursuant to 2. 1. 1 related to waste and hazardous recyclables.	X				<ul style="list-style-type: none"> July 2021 Waste Inventory Report. Discussion with site staff. 	No contraventions identified in monthly report.
4.6.29 (g)	Any other information as required in writing by the Director.	X				<ul style="list-style-type: none"> July 2021 Waste Inventory Report. Discussion with site staff. 	No additional requirements by AEP.
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:				X	Not applicable.	Not applicable. Information only.
4.6.30 (a)	As specified in Table 4.6-C.	X				2020 Annual Waste Management Summary - Table 4.6-D, Hazardous Waste Landfilled, included in the 2020 Annual Report.	In Appendix A of Operations Report.
4.6.30 (b)	In accordance with the: - Industrial Waste Identification and Management Options, Alberta Environment, May 1996, as amended. - Alberta User Guide for Waste Managers, Alberta Environment, August 1996, as amended.			X		2020 Annual Waste Management Summary - Table 4.6-D, Hazardous Waste Landfilled, included in the 2020 Annual Report.	The first document is not referenced specifically in Landfill Operations Plan, although review of documentation indicates adherence to this standard. Recommended that this be included in the Operations Plan as a specific reference.
4.6.31	The approval holder shall submit the Annual Waste Management Summary Report to the Director.	X				2020 Annual Waste Management Summary - Table 4.6-D, Hazardous Waste Landfilled, included in the 2020 Annual Report.	Submitted as part of the Annual Report for the Facility.
Landfill							
Operations Plan							
4.6.32	The approval holder shall develop, keep up-to-date, and implement a Landfill Operations Plan that does not contravene with the requirements of this approval.	X				Operations Plan.	Approval requirements are being examined in this checklist.
4.6.33	The approval holder shall:				X	Not applicable.	Not applicable. Information only.
4.6.33 (a)	Review the Landfill Operations Plan annually, at a minimum.	X				Operations Plan.	Revision date on the 2021 Facility and Landfill Operations Plan is February, 2021.
4.6.33 (b)	Update the Landfill Operations Plan if any of the following circumstances apply: - There are facility expansions or changes in site operations or equipment. - There is an applicable change to the Standards for Landfills in Alberta, as amended. - An update is required in writing by the Director. - There is an update to an applicable regulation.	X				Operations Plan.	Updates to the operations plan reflect Cell 4 and Cell 3B changes.
4.6.34	The Landfill Operations Plan shall include, at a minimum, all of the following:				X	Not applicable.	Not applicable. Information only.
4.6.34 (a)	SOP for keeping and maintaining an Operating Record.	X				Operations Plan.	Addressed in section A of Operations Plan.
4.6.34 (b)	SOP for waste control, run-on and runoff controls, and nuisance controls.	X				Operations Plan.	Addressed in section B of Operations Plan.
4.6.34 (c)	SOP for the waste stabilization area operations.	X				Operations Plan.	Addressed in section C of Operations Plan.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.6.34 (d)	SOP for the acceptance, handling and disposal of wastes, including: - Waste characterization and classification at source. - Waste manifesting and tracking. - QA/QC waste acceptance procedures. - Waste sampling.	X				Operations Plan.	Addressed in Sections D of Operations Plan.
4.6.34 (e)	SOP for detecting, preventing and disposal of unauthorized wastes.	X				Operations Plan.	Addressed in Sections E of Operations Plan.
4.6.34 (f)	SOP for placing waste in a landfill cell including: - Working face width. - Lift depth. - Compaction. - Waste placement location using a grid system	X				Operations Plan.	Addressed in Sections F of Operations Plan.
4.6.34 (g)	SOP for managing contaminated sulphur and sulphur containing wastes.	X				Operations Plan.	Addressed in Sections G of Operations Plan.
4.6.34 (h)	SOP for managing asbestos wastes.	X				Operations Plan.	Addressed in Sections H of Operations Plan.
4.6.34 (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.	X				Operations Plan.	Addressed in Sections I of Operations Plan.
4.6.34 (j)	An Odour and Fugitive Dust Response Program.	X				Operations Plan.	Addressed in Sections J of Operations Plan, referencing the Fugitive Dust and Odour Best Management Plan in Appendix C.
4.6.34 (k)	A Fugitive Dust and Odour Best Management Plan.	X				Operations Plan.	Addressed in Sections K of Operations Plan, referencing the Fugitive Dust and Odour Best Management Plan in Appendix C.
4.6.34 (l)	A runoff and industrial wastewater monitoring and management program.	X				Operations Plan.	Addressed in Sections L of Operations Plan.
4.6.34 (m)	A leachate monitoring and management program.	X				• Operations Plan. • SOPL002-003 Landfill Leachate System.	Addressed in Sections M of Operations Plan.
4.6.34 (n)	A leak detection liquid monitoring and management program.	X				• Operations Plan. • SOPL002-003 Landfill Leachate System.	Addressed in Sections M/N of Operations Plan.
4.6.34 (o)	A groundwater monitoring program.	X				Operations Plan.	Addressed in Sections O of Operations Plan.
4.6.34 (p)	A Remediation Plan to deal with groundwater quality deterioration.	X				Groundwater Remediation Plan.	Addressed in Sections P of Operations Plan.
4.6.34 (q)	A soil monitoring program.	X				Operations Plan.	Addressed in Sections Q of Operations Plan. Submitted in late 2019 and the first soil monitoring program report was submitted to AEP on January 31, 2020.
4.6.34 (r)	A soil management program.	X				Operations Plan.	Addressed in Sections R of Operations Plan. Confirmation of acceptance from AEP September 18, 2020.
4.6.34 (s)	A landfill cell cover system.	X				Operations Plan.	Addressed in Sections S of Operations Plan. Cell cover system is prepared by consultants and conforms to provincial regulations.
4.6.34 (t)	A monitoring and maintenance program for the scale house and heavy operational equipment.	X				• Operations Plan. • Maintenance Dashboard. • Scale maintenance records	Addressed in Sections T of Operations Plan. Scales calibrated twice per year, maintenance program in place.
4.6.34 (u)	A health and safety program.	X				Health and Safety Program.	Addressed in Sections U of Operations Plan. Health and Safety program in place, training records are kept accounted for, and notifications when training comes due. Employees sign-off on Health and Safety program.
4.6.34 (v)	An emergency response program, including SOP for handling fires, substance releases to the environment, and health concerns.	X				Contingency Plan in Appendix A of the Operations Plan.	Addressed in Sections V of Operations Plan, referencing the facility's Contingency Plan in Appendix A. A system exists to track each employees training and provides management with information such as: training expiring, which training each employee requires, etc.
4.6.34 (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.	X				Operations Plan.	Addressed in Section W of Operations Plan, referencing Appendix D.
4.6.35	The approval holder shall retain a copy of the most recent Landfill Operations Plan at the facility.	X				Operations Plan.	Hard copy of 2021 Operations Plan viewed
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.	X				Discussions with site staff.	Compliance confirmed; submitted annually.
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.				X	Not applicable.	Not applicable. Information only.
4.6.38	The approval holder shall implement the latest Landfill Operations Plan, unless otherwise authorized in writing by the Director.	X				Operations Plan.	2021 Operations Plan observed.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
Operations							
4.6.39	The approval holder shall classify all materials entering the landfill in accordance with the:				X	Not applicable.	Not applicable. Information only.
4.6.39 (a)	Waste Control Regulation (AR 192196).	X				Operations Plan, Section B.	Referenced in Landfill Operations Plan.
4.6.39 (b)	Industrial Waste Identification and Management Options, Alberta Environment, May 1996, as amended.			X		Operations Plan.	The document is not referenced specifically in Landfill Operations Plan, although review of documentation indicates adherence to this standard. Recommended that this be included in the Operations Plan as a specific reference.
4.6.39 (c)	Alberta User Guide for Waste Managers, May 1995, as amended.	X				Operations Plan, Section B.	Referenced in Landfill Operations Plan.
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:				X	Not applicable.	Not applicable. Information only.
4.6.40 (a)	The first time a waste is received from a new generator.	X				• Operations Plan, Sections B-D • Waste Profile from WIN Web viewed.	Compliance confirmed: • Procedures and acceptance criteria in the Landfill Operations Plan are compliant with Approval. • All waste profiles renewed annually, either by customers or Clean Harbors on-site.
4.6.40 (b)	The first time a delivery is received from a different process associated with a known waste generator.	X					
4.6.40 (c)	The first time a waste is received from a different location associated with a known waste generator.	X					
4.6.40 (d)	When the nature or composition of the waste that was previously characterized by the generator changes.	X					
4.6.41	The approval holder shall not dispose of hazardous waste in any Class II landfill cell.				X	Not applicable.	Not applicable. The site is not a Class II landfill.
4.6.42	The approval holder shall:				X	Not applicable.	Not applicable. Information only.
4.6.42 (a)	Only carry out waste stabilization or solidification or both within the waste stabilization area.	X				Site field observations.	Solidification and waste stabilization activities consistent with Approval requirements during field observations.
4.6.42 (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.	X					
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:				X	Not applicable.	Not applicable. Information only.
4.6.43 (a)	To facilities holding a current Act authorization to accept such waste.				X	Not applicable.	Not applicable. This option not used by the facility.
4.6.43 (b)	To facilities approved by a local environmental authority outside of Alberta to accept such waste.				X	Not applicable.	Not applicable. This option not used by the facility.
4.6.43 (c)	To a disposal well approved by AER.or	X				AER approval for deep well.	• Liquid waste is hauled to Class I deep well in Calmar. • AER approval for deep well (leased from Seller's Oilfield Services to CH) observed. Approval No. WM 077 A, dated July 25, 2011.
4.6.43 (d)	As otherwise authorized in writing by the Director.				X	Not applicable.	Option not used by the Facility.
4.6.44	The approval holder shall conduct:				X	Not applicable.	Not applicable. Information only.
4.6.44 (a)	Annually, in-house visual inspections for corrosion.	X				Discussion with site staff.	Confirmed that annual visual inspections performed.
4.6.44 (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.	X				Inspection report from Integrity Testing Services Inc., dated August 2021.	Performed yearly, tracked by compliance calendar.
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.	X				Operations Plan, Section H.	Referenced in Landfill Operations Plan.
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.	X				Operations Plan, Section G.	Referenced in Landfill Operations Plan.
4.6.47	The approval holder shall only dispose of wastes that the landfill is not authorized to dispose of:				X	Not applicable.	Not applicable. Information only.
4.6.47 (a)	To facilities holding a current Act authorization.	X				Discussion with site staff.	Compliance confirmed. All waste receipts are screened at the site entry scale and any non-authorized loads, as determined through manifest, are rejected.
4.6.47 (b)	To facilities approved by a local environmental authority outside of Alberta. Or:	X					
4.6.47 (c)	As otherwise authorized in writing by the Director.	X					
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.				X	Not applicable.	Not applicable. Not observed during the audit. Non authorized waste not received in the landfill.
4.6.49	The approval holder shall restrict the working face of each landfill cell to the smallest practical area.				X		
4.6.50	For any waste disposed of at the landfill that is subject to wind dispersal, the approval holder shall:				X		
4.6.50 (a)	Wet the waste to prevent dispersal of particulate matter.or	X				Operations Plan, Appendix C (Fugitive Dust and Odour Best Management Plan).	Documents reviewed have procedures for managing dust and particulate matter through waste placement in landfill and in waste stabilization.
4.6.50 (b)	Immediately apply cover on top of the waste to minimize entrainment of particulate matter.	X					

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
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, provided that placement of such wastes will not cause offensive odours:	X				Discussion with site staff.	Compliance confirmed. Pond water for dust suppression. Leachate is never used due to odour.
4.6.51 (a)	Specified runoff.				X		
4.6.51 (b)	Leachate.				X		
4.6.51 (c)	Leak detection liquid.				X		
4.6.51 (d)	Sump waste of car wash bays or similar operations.				X	Not applicable.	Not applicable. Pond water is used for dust suppression only.
4.6.51 (e)	Waste from hydrovac excavation operations.				X		
4.6.51 (f)	Any other waste authorized by the Alberta User Guide for Waste Managers, May 1995, as amended.				X		
4.6.52	The approval holder shall inspect the landfill, at a minimum:				X	Not applicable.	Not applicable. Information only.
4.6.52 (a)	Weekly.	X					
4.6.52 (b)	Immediately after each storm event to: - Detect evidence of deterioration of any infrastructure components, including the composite liner. - Detect any malfunction or improper operation of the run-on and runoff control systems, leachate collection system, or leak detection system. - Take corrective measures to repair any damage to infrastructure components, including the composite liner.	X				<ul style="list-style-type: none"> Discussion with site staff. September 1, 2021 daily inspection record. 	Compliance confirmed through review of inspection record.
4.6.53	The approval holder shall do the following, the Director in writing along with any corrective measures taken or proposed:				X	Not applicable.	Not applicable. Information only.
4.6.53 (a)	Keep a record of inspections conducted pursuant to 4.6.52.	X					
4.6.53 (b)	Have the record of inspections available for review upon written request from the Director.	X				Landfill inspection records.	Compliance confirmed through review of electronic records.
4.6.53 (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	X				Landfill inspection records.	Reported if there is a contravention. If not, a work ticket is created and the issue is fixed.
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.	X				Site survey, dated January 4, 2021.	The site is surveyed twice per year, and no contours exceed the maximum designated waste elevation.
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.	X				Discussion with site staff.	Mud and waste tracking from the haul trucks is addressed as needed.
Monitoring and Reporting							
4.6.56	The approval holder shall monitor the landfill operations as required in Table 4.6-D.	X				2020 Annual Report.	All criteria in Table 4.6-D is included.
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.	X				2020 Annual Report.	Submitted to AEP.
4.6.58	The Annual Landfill Operations Report required in Table 4.6-D shall include, at a minimum, all of the following:				X	Not applicable.	Not applicable. Information only.
4.6.58 (a)	the name and contact information of the person responsible for the facility.	X				2020 Annual Report.	Addressed in Section 2.0 of Annual Report.
4.6.58 (b)	A summary of all information collected as required in Table 4.6-D.	X				2020 Annual Report.	Addressed in Section 3.0 of Annual Report.
4.6.58 (c)	A summary of the results of any audit conducted in accordance with 4.1.7.	X				2020 Annual Report.	2018 Triennial Compliance Audit included in Appendix D of Annual Report.
4.6.58 (d)	A summary of the operations of the waste stabilization area.	X				2020 Annual Report.	Addressed in Section 5.0 and Appendix I of Annual Report.
4.6.58 (e)	A summary of the performance of the run-on and runoff control systems, including a comparison to the limits in Tables 4.3-8 and 4.3-C.	X				2020 Annual Report.	Addressed in Section 6.0 of Annual Report.
4.6.58 (f)	A summary of the performance of the leachate collection system, including a comparison to the maximum acceptable leachate head.	X				2020 Annual Report.	Addressed in Section 7.0 of Annual Report.
4.6.58 (g)	A summary of the performance of the leak detection system, including a comparison to the action leakage rate limit.	X				2020 Annual Report.	Addressed in Section 8.0 of Annual Report.
4.6.58 (h)	The Response Action Plan for the leak detection system pursuant to 4.4.1 O.	X				2020 Annual Report.	Addressed in Section 9.0 and Appendix J of Annual Report.
4.6.58 (i)	The Annual Dugout and Water Well Sampling Program Report pursuant to 4.5.4.	X				2020 Annual Report.	Addressed in Section 10.0 Appendix K of Annual Report.
4.6.58 (j)	A summary of all revisions to the Landfill Operations Plan pursuant to 4.6.33(b).	X				2020 Annual Report.	Addressed in Section 11.0 and Appendix L of Annual Report.
4.6.58 (k)	Any groundwater remedial action taken pursuant to 4.6.34(p).	X				2020 Annual Report.	Addressed in Section 12.0 of Annual Report.
4.6.58 (l)	A summary of records of landfill inspections pursuant to 4.6.53.	X				2020 Annual Report.	Addressed in Section 13.0 and Appendix M of Annual Report.
4.6.58 (m)	A summary of: - Operational issues encountered. - Emergencies occurred. - Measures or actions taken.	X				2020 Annual Report.	Addressed in Section 14.0 of Annual Report.
4.6.58 (n)	A summary of records of: - Public complaints. - The approval holder's responses	X				2020 Annual Report.	Addressed in Section 15.0 and Appendix Q of Annual Report.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.6.58 (o)	An up-to-date financial security estimate pursuant to 5.1.2.	X				2020 Annual Report.	Addressed in Section 16.0 and Appendix N of Annual Report.
4.6.58 (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: - Contour mapping. - The location of active and inactive disposal areas. - Areas where a final cover has been placed. - The location of new landfill cell(s) constructed.	X				2020 Annual Report.	Addressed in Section 17.0 and Appendix O of Annual Report.
4.6.58 (q)	The Annual Landfill Cell Closure Report pursuant to 7.1.7.	X				2020 Annual Report.	Addressed in Section 18.0 Appendix P of Annual Report.
4.6.58 (r)	A summary of contraventions reported pursuant to 2.1.1 related to landfill operations.	X				2020 Annual Report.	Addressed in Section 19.0 Appendix Q of Annual Report.
4.6.58 (s)	Any other information as required in writing by the Director.	X				2020 Annual Report.	Addressed in Section 20 of Annual Report. No additional information was required by the Director.
4.6.59	The approval holder shall submit the Annual Landfill Operations Report to the Director.	X				Discussion with site staff.	Confirmation of submission prior to deadline (March 24, 2021 for last items).
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.	X				Discussion with site staff.	Wastewater is directed to an isolated holding tank.
4.7.2	The approval holder shall direct all domestic wastewater to the domestic wastewater system.	X					
4.7.3	The approval holder shall only dispose of substances from the domestic wastewater system:				X	Not applicable.	Not applicable. Information only.
4.7.3 (a)	To facilities holding a current Act authorization.	X					
4.7.3 (b)	To facilities approved by a local environmental authority outside of Alberta or	X				Discussion with site staff.	Wastewater from holding tank taken across the street to authorized treatment lagoon (Contractor).
4.7.3 (c)	As otherwise authorized in writing by the Director.	X					
Not used at this time.							
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.	X				Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020.	Groundwater reporting is being conducted in conformance with the Groundwater Monitoring Program.
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.	X				Discussion with site staff.	Submitted before the September 30th, 2017 deadline.
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.	X				Discussion with site staff.	AEP did not identify any deficiencies with the program.
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.	X				Discussion with site staff.	Implemented after submittal.
4.9.5	The approval holder shall:				X	Not applicable.	Not applicable. Information only.
4.9.5 (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.	X				Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020.	Compliance confirmed; all wells in monitoring program are sampled.
4.9.5 (b)	Analyze each sample for the parameters listed in Table 4.9-A.	X					Compliance confirmed; all parameters are sampled for.
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:				X	Not applicable.	Not applicable. Information only.
4.9.6 (a)	A minimum of once per year during each of the active landfill life, landfill cell closure, final landfill closure, and post-closure periods.	X				Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020.	Compliance confirmed; groundwater is monitored once per year.
4.9.6 (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.	X				Discussion with site staff.	Compliance confirmed; no leachate constituents have ever been found.
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:				X	Not applicable.	Not applicable. Information only.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.9.7 (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.	X				Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020.	Several exceedances noted in GW report, however these are due to the natural composition of the groundwater in the area.
4.9.7 (b)	Background groundwater chemistry as determined through a statistical analysis, as a derived alternate groundwater performance standard.	X					
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.				X		Remediation Plan has not been required to be implemented. Exceedances are normal for the groundwater in the area.
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.	X				2020 GW Monitoring Report, dated March 2, 2021 from Tetra Tech	Compliance confirmed; acceptable procedures are being followed.
4.9.10	The approval holder shall for all groundwater monitoring wells:				X	Not applicable.	Not applicable. Information only.
4.9.10 (a)	Protect from damage.	X				Field observations.	Compliance confirmed; all wells were observed to be protected and locked.
4.9.10 (b)	Keep locked except when being sampled.	X					
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:				X	Not applicable.	Not applicable. Information only.
4.9.11 (a)	Clean, repair or replace the groundwater monitoring well.				X	Not applicable.	Not applicable. No damaged or non-functional wells.
4.9.11 (b)	Collect and analyse a representative groundwater sample prior to the next scheduled sampling event.	X				Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020.	Compliance confirmed; groundwater monitoring consistent with schedule.
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:				X	Not applicable.	Not applicable. Information only.
4.9.12 (a)	A description of purging and sampling procedures.	X				Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020.	Refer to Section 5.2.
4.9.12 (b)	The static elevations above sea level, and depth below ground surface of fluid phases in the groundwater monitoring well prior to purging.	X					Compliance confirmed; groundwater levels were recorded.
4.9.12 (c)	The temperature of each sample at the time of sampling.	X					Compliance confirmed; temperature was recorded at the time of sampling.
4.9.12 (d)	The pH of each sample at the time of sampling.	X					Compliance confirmed; pH was recorded at the time of sampling.
4.9.12 (e)	The specific conductance of each sample at the time of sampling.	X					Compliance confirmed; recorded as mS at the time of sampling.
4.9.13	The approval holder shall carry out remediation of the groundwater in accordance with the following:				X	Not applicable.	Not applicable. Information only.
4.9.13 (a)	Alberta Tier 1 Soil and Groundwater Remediation Guidelines, Alberta Environment, February 2009, as amended.				X		Not applicable. Groundwater remediation has not been deemed necessary.
4.9.13 (b)	Alberta Tier 2 Soil and Groundwater Remediation Guidelines, Alberta Environment, February 2009, as amended.				X		
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:				X	Not applicable.	Not applicable. Information only.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
4.9.14 (a)	A completed Record of Site Condition Form, Alberta Environment, 2009, as amended.	X					
4.9.14 (b)	A legal land description of the facility and a map illustrating the facility boundaries.	X					
4.9.14 (c)	A topographic map of the facility.	X					
4.9.14 (d)	A description of the industrial activity and processes.	X					
4.9.14 (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.	X					
4.9.14 (f)	A general hydrogeological characterization of the region within a five kilometre radius of the facility.	X					
4.9.14 (g)	A detailed hydrogeological characterization of the facility, including an interpretation of groundwater flow patterns.	X					
4.9.14 (h)	Cross-sections showing depth to water table, patterns of groundwater movement and hydraulic gradients at the facility.	X					
4.9.14 (i)	Borehole logs and completion details for groundwater monitoring wells.	X					
4.9.14 (j)	A map showing locations of all known buried channels within at least five kilometre of the facility.	X				<ul style="list-style-type: none"> • Tetra Tech 2019 Groundwater Monitoring Program, dated March 10, 2020. • Tetra Tech 2020 Groundwater Monitoring Program, dated March 2, 2020. 	Compliance confirmed through a review of the report. Submission to AEP confirmed through review of correspondence.
4.9.14 (k)	A map of surface drainage within the facility and surrounding area to include nearby water bodies.	X					
4.9.14 (l)	A map of groundwater monitoring well locations and a table summarizing the existing groundwater monitoring program for the facility.	X					
4.9.14 (m)	A summary of any changes to the groundwater monitoring program made since the last groundwater monitoring report.	X					
4.9.14 (n)	Analytical data recorded as required in 4.9.5 and 4.9.11(b).	X					
4.9.14 (o)	A summary of fluid elevations recorded as required in 4.9.12(b) and an interpretation of changes in fluid elevations.	X					
4.9.14 (p)	An interpretation of QA/QC program results.	X					
4.9.14 (q)	An interpretation of all the data in this report, including the following: - Diagrams indicating the location and extent of any contamination. - A description of probable sources of contamination. - A site map showing the location and type of current and historical potential sources of groundwater contamination	X					
4.9.14 (v)	Recommendations for: - Changes to the groundwater monitoring program to make it more effective. - Remediation, risk assessment or risk management of contamination identified.	X					
4.9.15	The approval holder shall submit the Annual Groundwater Monitoring Program Report to the Director.	X					
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.				X	Not applicable.	Not applicable. AEP did not identify any deficiencies.
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:	X				Tetra Tech 2017 Soil Management Program Proposal, including Soil Monitoring Program.	Compliance confirmed: • March 21, 2017 - Soil Management Program Proposal (incl. monitoring program submitted to AEP). • September 11, 2017 - Supplemental Information to Soil Management Program Proposal (revisions), submitted to AEP. • September 13, 2017 - Approval letter from AEP regarding Soil Management Program Proposal.
4.10.1 (a)	Designing and developing proposals for the Soil Monitoring Program.	X					
4.10.1 (b)	Designing and developing proposals for the Soil Management Program.	X					
4.10.1 (c)	All other actions, including sampling, analysing, and reporting, associated with the Soil Monitoring Program.	X				Tetra Tech 2019 Soil Monitoring Program Report, dated January 31, 2020.	Actions in program reflect the 2019 Soil Monitoring Program Proposal and Deficiency Response Letter.
4.10.1 (d)	All other actions, including sampling, analysing and reporting, associated with the Soil Management Program.	X				Tetra Tech 2019 Soil Monitoring Program Report, dated January 31, 2020.	Actions in program reflect the 2019 Soil Monitoring Program Proposal and Deficiency Response Letter.

Section 4 - Operations

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 4 - Operations, Limits, Monitoring, and Reporting							
Soil Monitoring and Reporting							
4.10.2	The approval holder shall submit the Soil Monitoring Program proposal to the Director according to the following schedule: - For the first soil monitoring event on or before January 31, 2019. - For the second soil monitoring event on or before January 31, 2024.	X				Tetra Tech 2017 Soil Management Program Proposal, including Soil Monitoring Program.	Compliance confirmed: • March 21, 2017 - Soil Management Program Proposal (incl. monitoring program submitted to AEP). • September 11, 2017 - Supplemental Information to Soil Management Program Proposal (revisions), submitted to AEP. • September 13, 2017 - Approval letter from AEP regarding Soil Management Program Proposal.
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.	X					
4.10.4	Subject to 4.10.3, the approval holder shall implement the Soil Monitoring Program as authorized in writing by the Director.	X				Tetra Tech 2019 Soil Monitoring Program.	Confirmed that this was completed in Fall 2019.
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 in accordance with the program as set out in the proposal submitted by the approval holder and within 270 days after the applicable date required by 4.10.2	X				Tetra Tech 2019 Soil Monitoring Program.	Confirmed that this was completed in Fall 2019.
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:	X				Tetra Tech 2019 Soil Monitoring Program.	Confirmed that this was completed in Fall 2019.
4.10.6 (a)	For the first Soil Monitoring Program Report on or before January 31, 2020.	X				Tetra Tech 2019 Soil Monitoring Program Report, dated January 31, 2020.	Submit to the AEP on time, January 31, 2020
4.10.6 (b)	For the second Soil Monitoring Program Report on or before January 31, 2025.				X	Not applicable.	Not applicable. To be completed in the summer of 2024.
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.	X				Tetra Tech 2019 Soil Monitoring Program Report, dated January 31, 2020.	Actions in program reflect the 2019 Soil Monitoring Program Proposal and Deficiency Response Letter.
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.	X				• Tetra Tech 2017 Soil Management Program Proposal, including Soil Monitoring Program. • Tetra Tech Soil Management Program 2017 Cell 4 Soil Sampling, dated March 12, 2018.	Soil Management Program Proposal was developed and compliance was confirmed through a review.
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:				X	Not applicable.	Not applicable. Information only
4.10.9 (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).	X				Soil Management Program - 2017 Cell 4 Soil Sampling	Updated Soil Management Plan and recommendations are being followed by consultant.
4.10.9 (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).	X				Soil Management Program - 2017 Cell 4 Soil Sampling	Updated Soil Management Plan and recommendations are being followed by consultant.
4.10.9 (c)	For any other soil monitoring event not specified in this approval within six months of completion of the soil monitoring event.				X	Not applicable.	Not applicable. Information only
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.	X				Soil Management Program - 2017 Cell 4 Soil Sampling	Updated Soil Management Plan and recommendations are being followed by consultant.
4.10.11	The approval holder shall implement the Soil Management Program as authorized in writing by the Director.	X				Soil Management Program - 2017 Cell 4 Soil Sampling	Updated Soil Management Plan and recommendations are being followed by consultant.
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 Report to the Director on or before March 31 of each year following the year in which the information was collected.	X				Soil Management Program - 2017 Cell 4 Soil Sampling	Updated Soil Management Plan and recommendations are being followed by consultant.
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.				X	Not applicable.	Not applicable. No deficiencies identified by the Director.

Section 6 - Decommissioning

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFl	Info, N/A		
Part 6 - Decommissioning and Land Reclamation							
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 Decommissioning Plan. - A Land Reclamation Plan.				X	Not applicable.	Not applicable. Facility is still operational and expanding.
6.1.2	The approval holder shall submit the Decommissioning Plan and 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.				X		
6.2.1	The Decommissioning Plan referred to in 6.1.1 shall include, at a minimum, all of the following:				X	Not applicable.	Not applicable. Facility is still operational and expanding.
6.2.1 (a)	A plan for dismantling the HWRSP Facility.				X		
6.2.1 (b)	A comprehensive study to determine the nature, degree and extent of contamination at the HWRSP Facility and affected lands.				X		
6.2.1 (c)	A plan to manage all wastes at the HWRSP Facility.				X		
6.2.1 (d)	Evaluation of remediation technologies proposed to be used at the HWRSP Facility and affected lands.				X		
6.2.1 (e)	A plan for decontamination of the HWRSP Facility and affected lands in accordance with the following: - For soil or groundwater, Alberta Tier 1 Soil and Groundwater Remediation Guidelines, Alberta Environment, February 2009, as amended. - For soil or groundwater, Alberta Tier 2 Soil and Groundwater Remediation Guidelines, Alberta Environment, February 2009, as amended. - For drinking water, Canadian Environmental Quality Guidelines, Canadian Council of Ministers of the Environment, PN 1299, 1999, as amended. - For surface water, Surface Water Quality Guidelines for Use in Alberta, Alberta Environment, November 1999, as amended.				X		
6.2.1 (f)	Confirmatory testing to indicate compliance with the remediation objectives.				X		
6.2.1 (g)	A plan for maintaining and operating contaminant monitoring systems.				X		
6.2.1 (h)	A schedule for activities (a) through (g) above.				X		
6.2.1 (i)	Any other information as required in writing by the Director.				X		
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.				X		

Section 6 - Decommissioning

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFl	Info, N/A		
6.3.1	The Land Reclamation Plan referred to in 6.1.1 shall include, at a minimum, all of the following:				X	Not applicable.	Not applicable. Facility is still operational and expanding.
6.3.1 (a)	The final use of the reclaimed area and how equivalent land capability will be achieved.				X		
6.3.1 (b)	Removal of infrastructure.				X		
6.3.1 (c)	Restoration of drainage.				X		
6.3.1 (d)	Soil replacement.				X		
6.3.1 (e)	Erosion control.				X		
6.3.1 (f)	Revegetation and conditioning of the HWRSP Facility including: - Species list, seed source and quality, seeding rates and methods. - Fertilization rates and methods. - Reclamation schedule.				X		
6.3.1 (g)	Reclamation schedule.				X		
6.3.1 (h)	Any other information as required in writing by the Director.				X		
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.				X		

Section 7 - Final Closure

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	O/I	Info. N/A		
Part 7 - Final Landfill Closure and Post-Closure							
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.			X		Construction and record drawing packages for Cell 3B.	Based on further discussion with Clean Harbors, the Landfill Cell Closure Plan is formed by the stamped design work completed as part of the issued for construction and final record drawing packages and associated documents, and as such, we have considered this matter closed. Further monitoring of this requirement is recommended for future landfill cell closure activities.
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.			X			
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.				X	Not applicable.	Not applicable. Information only.
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.				X	Not applicable.	Not applicable. Information only.
7.1.5	The approval holder shall maintain the closed landfill cells to:				X	Not applicable.	Not applicable. Information only.
7.1.5 (a)	Protect and maintain the integrity of the final cover and surface water drainage systems.	X				Field observations.	<ul style="list-style-type: none"> • Surface run-off goes to perimeter ditch system. • Vegetated final caps. • Sloping and drainage per approved designs. • Leachate collection system and storage tanks. • No subsidence or settlement observed. Monitoring consistent with Operations Plan.
7.1.5 (b)	Prevent erosion.	X					
7.1.5 (c)	Prevent surface water ponding.	X					
7.1.5 (d)	Remediate areas affected by subsidence and differential settlement.	X					
7.1.5 (e)	Prevent leachate break out.	X					
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:				X	Not applicable.	Not applicable. Information only.
7.1.6 (a)	As-built plans and details on the location of landfill cells that have been closed.	X				Annual Landfill Cell Closure Report - Cell 3B, report from Dillon Consulting dated March 2, 2021.	Confirmed that the Closure Report was submitted in the 2020 Annual Report.
7.1.6 (b)	Certified construction QA/QC procedures employed during cover construction and installation.	X					
7.1.6 (c)	Survey reports showing the final cover depths.	X					
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.	X					

Section 7 - Final Closure

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFl	Info. N/A		
7.2.1	The approval holder shall apply for an amendment to this approval for final landfill closure by submitting to the Director: - A Detailed Final Landfill Closure Plan. - A Landfill Post-Closure Plan.				X	Not applicable.	The landfill is still operational and expanding. Landfill Closure Plan and Post-Closure Plan is to be submitted 180 days prior to implementation.
7.2.2	The approval holder shall submit the Detailed Final Closure Plan and 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.				X	Not applicable.	The landfill is still operational and expanding.
Detailed Final 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.				X	Not applicable.	The landfill is still operational and expanding.
7.2.4	In addition to 7.2.3, the Detailed Final Landfill Closure Plan shall include, at a minimum, all of the following:				X	Not applicable.	The landfill is still operational and expanding.
7.2.4 (a)	A plan for replacement of soil.				X	Not applicable.	The landfill is still operational and expanding.
7.2.4 (b)	A QA/QC Program.				X	Not applicable.	The landfill is still operational and expanding.
7.2.4 (c)	Any deviations from the most recently submitted closure plan.				X	Not applicable.	The landfill is still operational and expanding.
7.2.5	The Detailed Final Landfill Closure Plan shall be signed and stamped by a professional registered with APEGA.				X	Not applicable.	The landfill is still operational and expanding.
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.				X	Not applicable.	The landfill is still operational and expanding.
7.2.7	The approval holder shall implement the Detailed Final Landfill Closure Plan as authorized in writing by the Director.				X	Not applicable.	The landfill is still operational and expanding.
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.				X	Not applicable.	The landfill is still operational and expanding.
7.2.9	In addition to 7.2.8, the Landfill Post-Closure Plan shall include, at a minimum, all of the following:				X	Not applicable.	The landfill is still operational and expanding.
7.2.9 (a)	The groundwater monitoring program including performance standards and points of compliance.				X	Not applicable.	The landfill is still operational and expanding.
7.2.9 (b)	The subsurface landfill gas monitoring program and performance standards at points of compliance.				X	Not applicable.	The landfill is still operational and expanding.
7.2.9 (c)	A plan for erosion control.				X	Not applicable.	The landfill is still operational and expanding.
7.2.9 (d)	A plan for maintaining vegetative cover.				X	Not applicable.	The landfill is still operational and expanding.
7.2.9 (e)	Any other information requested in writing by the Director.				X	Not applicable.	The landfill is still operational and expanding.

Section 7 - Final Closure

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	O/I	Info, N/A		
7.2.10	The Landfill Post-Closure Plan shall be signed and stamped by a professional registered with APEGA.				X	Not applicable.	The landfill is still operational and expanding.
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.				X	Not applicable.	The landfill is still operational and expanding.
7.2.12	The approval holder shall implement the Landfill Post-Closure Plan as authorized in writing by the Director.				X	Not applicable.	The landfill is still operational and expanding.

Section 8 - SWM Pond Closure

Approval Line Item	Action	Finding				Documents Reviewed	Details
		Compliant	Non-Compliant	OFI	Info, N/A		
Part 8 - Decommissioning and Land Reclamation of Old Surface Water Detention Pond							
8.1.1	The approval holder shall decommission and reclaim the old surface water detention pond prior to construction of Cell 4.	X				<ul style="list-style-type: none"> Soil Management Program - 2017 Cell 4 Soil Sampling, report dated March 12, 2018 from Tetra Tech. 	Confirmed that this was done concurrent with earthworks for Cell 4 construction.
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.	X				<ul style="list-style-type: none"> Soil Management Program - 2018 Cell 4 Remediation Report, May 31, 2019 from Tetra Tech. 	<ul style="list-style-type: none"> Soil Management Program (2017 Cell 4 Soil Sampling) submitted to AEP Industrial Reporting email address on March 23, 2018. Soil Management Program (2018 Cell 4 Remediation Report) submitted June 11, 2019. Report details pond draining and soil sampling following remediation to meet guidelines and 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.	X				Not applicable.	AEP did not comment on any deficiencies.

APPENDIX I

Stabilization Facility

UT REPORT SUMMARY

W-001

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	South Sludge Pit		

DWG #: (006)

EQUIPMENT INSPECTION SUMMARY:

NO DATA PLATE
2020/08 - ALL READINGS CONFIRMED.

CML No.	CML Location	Nom. Thick mm	Mill. Tol. mm	CA mm	Min. Nom. mm	Calc. T-Min. mm	Survey Date MM/DD/YY	Last Survey Thick mm	Short Term Rate mm/yr	Long Term Rate mm/yr	Rem. Half Life yr
02	SOUTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	24.90	0	0.0460	100.00
04	SOUTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	24.80	0.2039	0.0809	100.00
06	WEST WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	24.60	0	0.0736	100.00
08	WEST WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	24.60	0	0.1159	100.00
10	WEST WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	24.60	0	0.0855	100.00
12	NORTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	25.10	0.1020	0.0671	100.00
14	NORTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	25.10	0.1020	0.0350	100.00
16	EAST WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	24.40	0	0.0901	100.00
18	EAST WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	24.50	0	0.0901	100.00
20	EAST WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	23.90	0.5098	0.1499	100.00
22	SOUTH FLOOR N-S	N/S	N/S	N/S	N/S	N/S	08/10/21	23.70	0	0.1656	100.00
24	MID FLOOR N-S	N/S	N/S	N/S	N/S	N/S	08/10/21	23.80	0	0.1398	100.00
26	NORTH FLOOR N-S	N/S	N/S	N/S	N/S	N/S	08/10/21	23.90	0.1020	0.1499	100.00

Comments:
2020/08 - PITTING/CORROSION NOTED.

Minimum Thickness is calculated.
 Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.
 Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).
 Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).
BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.
RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.
 CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

UT REPORT SUMMARY

W-001

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	East Sludge Pit		

DWG #: (017)

EQUIPMENT INSPECTION SUMMARY:

NO DATA PLATE

CML No.	CML Location	Nom. Thick mm	Mill. Tol. mm	CA mm	Min. Nom. mm	Calc. T-Min. mm	Survey Date MM/DD/YY	Last Survey Thick mm	Short Term Rate mm/yr	Long Term Rate mm/yr	Rem. Half Life yr
02	EAST WALL (1) T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	18.00	0	0.2214	100.00
04	EAST WALL (2) T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	17.50	0	0.3406	100.00
Comments: 2020/08 - PITTING/CORROSION NOTED.											
06	EAST SOUTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	16.50	0	0.4088	100.00
Comments: 2020/08 - PITTING/CORROSION NOTED.											
08	MID SOUTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	17.80	0	0.1874	100.00
Comments: 2020/08 - PITTING/CORROSION NOTED.											
10	WEST SOUTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	18.10	0	0.1192	100.00
Comments: 2020/08 - PITTING/CORROSION NOTED.											
12	WEST WALL (1) T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	18.50	0	0.1363	100.00
14	WEST WALL (2) T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	18.70	0.1020	0.1703	100.00
16	WEST NORTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	17.30	0.1020	0.2214	100.00
Comments: 2020/08 - PITTING/CORROSION NOTED.											
18	MID NORTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	17.00	0	0.3236	100.00
Comments: 2020/08 - PITTING/CORROSION NOTED.											
20	EAST NORTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/10/21	12.20	1.2235	1.1752	100.00
Comments: 2020/08 - PITTING/CORROSION NOTED.											

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - If Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.

RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

CA - Corrosion Allowance, CR - Corrosion Rate (Highlight and bolded if CR >= 0.500mm or 0.019in/yr.).

UT REPORT SUMMARY

W-001

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	East Sludge Pit		

DWG #: (017)

CML No.	CML Location	Nom. Thick mm	Mill. Tol. mm	CA mm	Min. Nom. mm	Calc. T-Min. mm	Survey Date MM/DD/YY	Last Survey Thick mm	Short Term Rate mm/yr	Long Term Rate mm/yr	Rem. Half Life yr
22	WEST FLOOR E-W	N/S	N/S	N/S	N/S	N/S	08/10/21	17.70	0	0.1533	100.00
Comments: 2020/08 - PITTING/CORROSION NOTED.											
24	MID FLOOR E-W	N/S	N/S	N/S	N/S	N/S	08/10/21	17.60	0	0.2385	100.00
Comments: 2020/08 - PITTING/CORROSION NOTED.											
26	EAST FLOOR E-W	N/S	N/S	N/S	N/S	N/S	08/10/21	17.50	0	0.2044	100.00
Comments: 2020/08 - PITTING/CORROSION NOTED.											

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.

RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

TANK INTERNAL INSPECTION REPORT

Customer:	Clean Harbors	ITS Job No.:	1-4549
District:	Central	Date:	10-Aug-2021
Facility:	Ryley Facility	LSD:	04-09-050-17W4M
Tank Description:	East Sludge Pit	Serial No.:	Not Stated
Equip./OIP No.:	Not Stated		

Remedial Action	Access and Coverage	Internal Coating	Heating Coil
<input checked="" type="checkbox"/> Adequate Cleaning	<input checked="" type="checkbox"/> Internal Inspection	<input checked="" type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Not Applicable
<input type="checkbox"/> No Action Required	<input type="checkbox"/> Part. Internal Inspection	<input type="checkbox"/> Good Condition	<input type="checkbox"/> Good Condition
<input type="checkbox"/> Paint/Coating Repairs	NDE Examination	<input type="checkbox"/> Coated <input type="checkbox"/> Full <input type="checkbox"/> Partial	<input type="checkbox"/> Corrosion
<input type="checkbox"/> Further Assessment Required	<input checked="" type="checkbox"/> UT	<input type="checkbox"/> Holidays/Cracking	<input type="checkbox"/> Pitting: (max depth)
	<input type="checkbox"/> MT	<input type="checkbox"/> Blisters/Bulges	<input type="checkbox"/> Cracked
<input type="checkbox"/> Condition Damage	<input type="checkbox"/> PT	<input type="checkbox"/> Flaking	<input type="checkbox"/> Scaled
<input type="checkbox"/> Does not comply with applicable code/safe operating requirement.	<input type="checkbox"/> RT	<input type="checkbox"/> See Comments	<input type="checkbox"/> Worn
	<input type="checkbox"/> BH	Internal Supports	<input type="checkbox"/> Loose
<input type="checkbox"/> Repairs Required	<input type="checkbox"/> MFL	<input checked="" type="checkbox"/> Not Applicable	<input type="checkbox"/> Poor Installation
<input checked="" type="checkbox"/> See Comments	<input type="checkbox"/> Other	<input type="checkbox"/> Good Condition	<input type="checkbox"/> See Comments
Manway	<input type="checkbox"/> Double Walled	<input type="checkbox"/> Distorted	Bolted Tanks
<input checked="" type="checkbox"/> Not Applicable	<input type="checkbox"/> See Comments	<input type="checkbox"/> Cracked	<input checked="" type="checkbox"/> Not Applicable
<input type="checkbox"/> Good Condition	Internal Components	<input type="checkbox"/> Broken	<input type="checkbox"/> Good Condition
<input type="checkbox"/> Coating Damage	<input type="checkbox"/> Anodes Present	<input type="checkbox"/> Poor Installation	<input type="checkbox"/> Missing Bolts
<input type="checkbox"/> Internal Corrosion	<input type="checkbox"/> Level Gauge Float in Good Condition	<input type="checkbox"/> Bolts Missing/ Loose/ Damage	<input type="checkbox"/> Gasket in Good Condition
<input type="checkbox"/> Mechanical Damage	<input type="checkbox"/> Level Gauge Float or Lower Support Attachment Damaged	<input type="checkbox"/> See Comments	<input type="checkbox"/> Gasket Damaged
<input type="checkbox"/> Seal Face Corrosion			<input type="checkbox"/> Seepage at Seams
<input type="checkbox"/> Pitting: (max depth)	<input type="checkbox"/> Level Gauge Float Wires Damaged		<input type="checkbox"/> Leakage at Seams
<input type="checkbox"/> See Comments	<input checked="" type="checkbox"/> See Comments		<input type="checkbox"/> See Comments

Shell Internal	Floor (Internal)	Nozzle Internal	Firetube(s)
<input type="checkbox"/> Good Condition	<input checked="" type="checkbox"/> Good Condition	<input type="checkbox"/> RF <input type="checkbox"/> NPT	<input checked="" type="checkbox"/> Not Applicable
<input type="checkbox"/> Internal Corrosion	<input type="checkbox"/> Internal Corrosion	<input type="checkbox"/> Good Condition	<input type="checkbox"/> Good Condition
<input type="checkbox"/> Pitting: (max depth)	<input type="checkbox"/> Pitting: (max depth)	<input type="checkbox"/> Nozzles are Gusseted	<input type="checkbox"/> Corrosion
<input type="checkbox"/> Scale	<input type="checkbox"/> Scale	<input type="checkbox"/> Nozzles Plugged	<input type="checkbox"/> Pitting: (max depth)
<input type="checkbox"/> Blistered	<input type="checkbox"/> Blistered	<input type="checkbox"/> Internal Corrosion	<input type="checkbox"/> Wear/Erosion
<input checked="" type="checkbox"/> Mechanical Damage	<input checked="" type="checkbox"/> Mechanical Damage	<input type="checkbox"/> Damaged/Cracked	<input type="checkbox"/> Cracked
<input type="checkbox"/> Deformation/Distortion	<input type="checkbox"/> Deformation/Distortion	<input type="checkbox"/> Deflection/Distortion	<input type="checkbox"/> Scaled
<input type="checkbox"/> Weld(s) in Good Condition	<input type="checkbox"/> Weld(s) in Good Condition	<input type="checkbox"/> Partial Internal Inspection	<input type="checkbox"/> Coated
<input type="checkbox"/> Weld(s) Corroded	<input type="checkbox"/> Weld(s) Corroded	<input type="checkbox"/> Weld(s) in Good Condition	<input type="checkbox"/> Heat Impinged
<input type="checkbox"/> Weld(s) Poor Quality	<input type="checkbox"/> Weld(s) Poor Quality	<input type="checkbox"/> Weld(s) Corroded	<input type="checkbox"/> Burner Misalignment
<input type="checkbox"/> Weld(s) Cracked	<input type="checkbox"/> Weld(s) Cracked	<input type="checkbox"/> Weld(s) Poor Quality	<input type="checkbox"/> Damaged Supports
<input type="checkbox"/> Previous Repairs	<input type="checkbox"/> Previous Repairs	<input type="checkbox"/> Weld(s) Cracked	<input type="checkbox"/> Damaged Guides/Tracks
<input checked="" type="checkbox"/> See Comments	<input checked="" type="checkbox"/> See Comments	<input type="checkbox"/> See Comments	<input type="checkbox"/> See Comments

Observations:

Tank is in Good, Fair, or Poor Condition

Good: No concerns found (may still have recommendations)
Fair: Minor issues found that do not impair the "fitness for service" of the Tank, (internal coating deterioration, general internal surface corrosion - no measurable metal loss, etc.)
Poor: Equipment had moderate to major concerns found (Tank is damaged; moderate to severe corrosion noted, cracked or broken component(s), etc.)

Based on API 653 Visual Internal Inspection this Tank is fit for service
(This piece of equipment meets the Jurisdictional requirements based on the information available at the time of the inspection.)

- Open top sludge tank. Inspection performed by entering the tank via ladder.
- Tank was adequately cleaned for inspection.
- Minor mechanical damage found throughout the tank shell and floor.
- Pitting/corrosion noted on the tank internal surface on the lower shell. Pitting/ corrosion depths are approximately 0.070" - 0.100" (1.8mm - 2.5mm).
- UT performed; Corrosion/pitting noted on the soil side on the shell and floor. See UT data report for remaining wall thicknesses.
- Minor mechanical deformation of the tank shell on the North side of the tank.

Recommendations:

- None.

Non-Conformance Conditions and Corrective Actions:

Note: Reference any and all Non-Conformance Report (NCR) numbers and Corrective Action Report (CAR) numbers.

- None.

Recommended Inspection Interval:

Recommended Maximum Inspection Interval: 12 Months

Pictures:



(Photo 1) Overview



(Photo 2) Overview (2)

Pictures:



(Photo 3) Overview (3)



(Photo 4) Shell



(Photo 5) Lower Shell

Internal Inspection Performed By:

Print Name: Christopher Russell Earl

Certification No.:

ABSA IPV PESL: 000782
API 510: 45377

Signature:

Christopher Russell Earl

Report Reviewed:

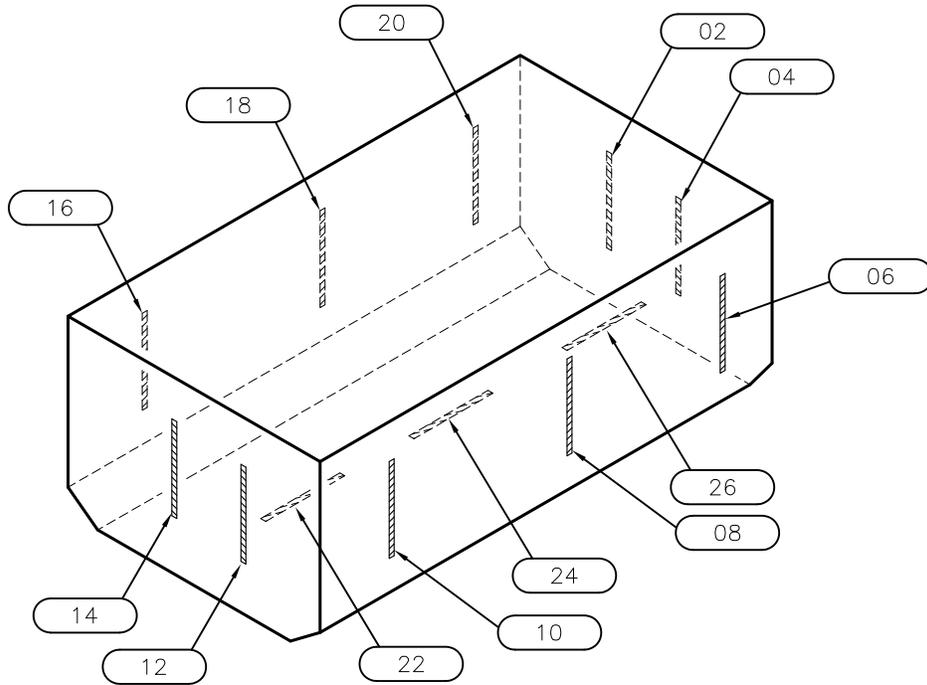
JO
Initial

Chief Inspector /
Client
Representative:

Name (Print)

Signature

Date:



Column
 Cooler
 Exchanger
 Furnace
 Heater
 Plate Exchanger
 Reboiler
 Vessel
 Other

Client:, District:, LSD:, Etc.:

Description:		EAST SLUDGE PIT	
P.R.N. No.:	N/S	Size:	24' X 14' X 8'
Equipment No.:	N/S	N.B. No.:	N/S
Serial No.:	N/S		
HEAD Material:	N/S	Nominal:	N/S
HEAD Material:		Nominal:	
SHELL Material:	N/S	Nominal:	N/S
SHELL Material:		Nominal:	
MAWP S.Side @TEMP:	N/S	MAWP T.Side @TEMP:	

CLEAN HARBORS
RYLEY FACILITY

LSD 04-09-050-17W4M

Comments: NO NAMEPLATE.

Tech.: CRE

Date: 08/2021

ITS Job No.: 1-4549

DWG No.: 017

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	East Sludge Pit		

EQUIPMENT INSPECTION SUMMARY:

NO DATA PLATE

Description: EAST WALL (1) T-B

CML: 017-02

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **18.00 mm**
AVERAGE THICKNESS MEASURED: 18.25 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	19.30	18.90	19.00	18.80	18.80	18.60	18.60	0.0000	0.1192	100.00
2	19.30	18.90	18.90	18.80	18.80	18.30	18.30	0.0000	0.1703	100.00
3	19.40	18.90	18.90	18.60	18.60	18.40	18.40	0.0000	0.1703	100.00
4	19.40	18.70	18.90	18.30	18.30	18.20	18.20	0.0000	0.2044	100.00
5	19.30	18.90	19.00	17.40	17.40	18.00	18.00	0.0000	0.2214	100.00
6	19.40	19.20	18.90	17.40	17.30	18.00	18.00	0.0000	0.2385	100.00

Description: EAST WALL (2) T-B

CML: 017-04

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **17.50 mm**
AVERAGE THICKNESS MEASURED: 18.15 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	19.30	19.40	18.70	18.50	18.50	18.30	18.30	0.0000	0.1703	100.00
2	19.40	19.10	18.90	18.80	18.80	18.10	18.10	0.0000	0.2214	100.00
3	19.50	19.10	18.00	17.60	17.50	17.50	17.50	0.0000	0.3406	100.00
4	19.50	19.00	17.50	18.00	18.00	18.00	18.00	0.0000	0.2555	100.00
5	19.60	18.90	17.90	18.70	18.70	18.70	18.70	0.0000	0.1533	100.00
6	19.50	18.80	19.10	18.70	18.50	18.30	18.30	0.0000	0.2044	100.00

COMMENTS:

2020/08 - PITTING/CORROSION NOTED.

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.

RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	East Sludge Pit		

Description: EAST SOUTH WALL T-B

CML: 017-06

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **16.50 mm**
AVERAGE THICKNESS MEASURED: 17.13 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	18.90	18.40	18.00	18.50	18.50	16.40	16.50	0.0000	0.4088	100.00
2	18.90	18.50	18.10	18.50	18.50	16.80	16.80	0.0000	0.3577	100.00
3	18.80	18.50	18.10	18.10	18.10	16.20	16.60	0.0000	0.3747	100.00
4	18.80	18.10	18.80	18.30	18.30	16.80	16.80	0.0000	0.3406	100.00
5	18.90	18.30	18.50	18.40	18.40	18.10	18.10	0.0000	0.1363	100.00
6	18.90	18.40	18.50	18.20	18.10	18.00	18.00	0.0000	0.1533	100.00

COMMENTS:
2020/08 - PITTING/CORROSION NOTED.

Description: MID SOUTH WALL T-B

CML: 017-08

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **17.80 mm**
AVERAGE THICKNESS MEASURED: 18.10 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	18.90	18.80	18.90	18.60	18.60	17.80	17.80	0.0000	0.1874	100.00
2	18.90	18.60	17.60	18.70	18.50	18.20	18.20	0.0000	0.1192	100.00
3	18.80	18.60	18.70	18.60	18.50	18.10	18.10	0.0000	0.1192	100.00
4	18.70	18.70	17.90	18.40	18.20	18.10	18.10	0.0000	0.1022	100.00
5	18.80	18.80	18.60	18.60	18.20	18.00	18.00	0.0000	0.1363	100.00
6	18.90	18.80	18.80	18.60	18.40	18.40	18.40	0.0000	0.0852	100.00

COMMENTS:
2020/08 - PITTING/CORROSION NOTED.

Minimum Thickness is calculated.
Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.
Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).
Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).
BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.
RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.
CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	East Sludge Pit		

Description: WEST SOUTH WALL T-B
CML: 017-10

 NOM. THICK.: Not Stated
 MILL. TOL.: Not Stated
 CA: Not Stated
 MIN. NOM.: Not Stated

 MATERIAL:
 MINIMUM THICKNESS MEASURED: **18.10 mm**
 AVERAGE THICKNESS MEASURED: 18.27 mm
 CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	18.80	18.80	19.00	18.50	18.50	18.10	18.10	0.0000	0.1192	100.00
2	18.80	18.80	18.90	18.50	18.30	18.30	18.30	0.0000	0.0852	100.00
3	18.90	18.80	18.80	18.50	18.40	17.90	18.10	0.0000	0.1363	100.00
4	18.90	18.90	18.90	18.60	18.40	18.30	18.30	0.0000	0.1022	100.00
5	18.90	18.80	18.80	18.30	18.50	18.50	18.50	0.0000	0.0681	100.00
6	18.90	18.80	18.80	18.40	18.30	18.30	18.30	0.0000	0.1022	100.00

 COMMENTS:
 2020/08 - PITTING/CORROSION NOTED.

Description: WEST WALL (1) T-B
CML: 017-12

 NOM. THICK.: Not Stated
 MILL. TOL.: Not Stated
 CA: Not Stated
 MIN. NOM.: Not Stated

 MATERIAL:
 MINIMUM THICKNESS MEASURED: **18.50 mm**
 AVERAGE THICKNESS MEASURED: 18.68 mm
 CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	19.10	18.40	19.20	19.30	19.30	18.70	18.70	0.0000	0.0681	100.00
2	19.20	19.40	19.20	19.30	19.30	18.60	18.60	0.0000	0.1022	100.00
3	19.40	19.90	19.30	19.20	19.20	18.80	18.80	0.0000	0.1022	100.00
4	19.30	19.40	19.30	18.60	18.60	18.80	18.80	0.0000	0.0852	100.00
5	19.30	19.50	19.50	18.70	18.50	18.50	18.50	0.0000	0.1363	100.00
6	19.20	19.60	19.10	18.80	18.70	18.70	18.70	0.0000	0.0852	100.00

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.
RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

 CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	East Sludge Pit		

Description: WEST WALL (2) T-B

CML: 017-14

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **18.70 mm**
AVERAGE THICKNESS MEASURED: 18.85 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	19.60	19.30	19.10	19.10	19.10	19.00	19.00	0.0000	0.1022	100.00
2	19.70	19.20	19.10	18.80	18.80	18.80	18.70	0.1020	0.1703	100.00
3	19.50	19.20	19.10	18.90	18.90	19.00	19.00	0.0000	0.0852	100.00
4	19.70	19.00	19.10	18.70	18.70	18.70	18.70	0.0000	0.1703	100.00
5	19.50	19.10	19.00	18.80	18.80	18.80	18.80	0.0000	0.1192	100.00
6	19.20	19.20	19.00	18.90	18.90	18.90	18.90	0.0000	0.0511	100.00

Description: WEST NORTH WALL T-B

CML: 017-16

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **17.30 mm**
AVERAGE THICKNESS MEASURED: 17.95 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	19.20	19.20	19.00	18.90	18.90	18.10	18.10	0.0000	0.1874	100.00
2	19.00	19.00	19.10	17.90	18.00	18.00	18.00	0.0000	0.1703	100.00
3	19.30	19.00	18.90	18.60	18.30	17.90	17.80	0.1020	0.2555	100.00
4	18.90	18.90	18.90	18.20	18.20	18.20	18.20	0.0000	0.1192	100.00
5	18.70	19.00	16.20	18.30	18.30	18.30	18.30	0.0000	0.0681	100.00
6	18.60	19.00	17.70	17.40	17.40	17.40	17.30	0.1020	0.2214	100.00

COMMENTS:
2020/08 - PITTING/CORROSION NOTED.

Minimum Thickness is calculated.
Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.
Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).
Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).
BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.
RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.
CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	East Sludge Pit		

Description: MID NORTH WALL T-B
CML: 017-18

 NOM. THICK.: Not Stated
 MILL. TOL.: Not Stated
 CA: Not Stated
 MIN. NOM.: Not Stated

 MATERIAL:
 MINIMUM THICKNESS MEASURED: **17.00 mm**
 AVERAGE THICKNESS MEASURED: 17.97 mm
 CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	18.90	18.80	18.90	18.90	18.90	18.20	18.20	0.0000	0.1192	100.00
2	18.80	18.80	18.90	17.50	17.70	17.70	17.70	0.0000	0.1874	100.00
3	18.90	18.70	18.80	17.00	17.00	17.00	17.00	0.0000	0.3236	100.00
4	18.80	18.70	18.70	18.50	18.20	18.20	18.20	0.0000	0.1022	100.00
5	18.90	18.50	18.70	18.80	18.50	18.30	18.30	0.0000	0.1022	100.00
6	18.80	18.60	18.70	18.60	18.40	18.40	18.40	0.0000	0.0681	100.00

 COMMENTS:
 2020/08 - PITTING/CORROSION NOTED.

Description: EAST NORTH WALL T-B
CML: 017-20

 NOM. THICK.: Not Stated
 MILL. TOL.: Not Stated
 CA: Not Stated
 MIN. NOM.: Not Stated

 MATERIAL:
 MINIMUM THICKNESS MEASURED: **12.20 mm**
 AVERAGE THICKNESS MEASURED: 16.48 mm
 CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	19.10	18.70	18.80	18.20	18.20	13.40	12.20	1.2235	1.1752	100.00
2	19.10	18.80	18.90	18.00	18.00	17.80	17.80	0.0000	0.2214	100.00
3	19.00	18.90	18.80	15.90	15.90	16.50	16.40	0.1020	0.4428	100.00
4	19.00	18.80	17.80	18.00	17.50	17.50	17.50	0.0000	0.2555	100.00
5	18.90	18.70	16.90	17.80	17.30	17.50	17.50	0.0000	0.2385	100.00
6	18.90	18.80	18.00	18.20	17.80	17.50	17.50	0.0000	0.2385	100.00

 COMMENTS:
 2020/08 - PITTING/CORROSION NOTED.

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.
RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

 CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	East Sludge Pit		

Description: WEST FLOOR E-W
CML: 017-22

 NOM. THICK.: Not Stated
 MILL. TOL.: Not Stated
 CA: Not Stated
 MIN. NOM.: Not Stated

 MATERIAL:
 MINIMUM THICKNESS MEASURED: **17.70 mm**
 AVERAGE THICKNESS MEASURED: 17.78 mm
 CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	18.70	18.60	18.50	18.30	18.30	17.80	17.80	0.0000	0.1533	100.00
2	18.60	18.60	18.40	18.30	18.20	17.70	17.70	0.0000	0.1533	100.00
3	18.50	18.50	18.40	18.30	18.00	17.90	17.80	0.1020	0.1192	100.00
4	18.50	18.50	18.50	18.40	18.40	17.70	17.70	0.0000	0.1363	100.00
5	18.60	18.60	18.50	18.20	18.00	17.80	17.80	0.0000	0.1363	100.00
6	18.70	18.70	18.40	18.30	18.00	17.90	17.90	0.0000	0.1363	100.00

 COMMENTS:
 2020/08 - PITTING/CORROSION NOTED.

Description: MID FLOOR E-W
CML: 017-24

 NOM. THICK.: Not Stated
 MILL. TOL.: Not Stated
 CA: Not Stated
 MIN. NOM.: Not Stated

 MATERIAL:
 MINIMUM THICKNESS MEASURED: **17.60 mm**
 AVERAGE THICKNESS MEASURED: 17.73 mm
 CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	18.80	18.70	18.60	18.20	No Access	17.70	17.70	0.0000	0.1874	100.00
2	18.70	18.60	18.60	18.20		17.80	17.80	0.0000	0.1533	100.00
3	18.80	18.60	18.60	18.20		17.80	17.80	0.0000	0.1703	100.00
4	19.00	18.60	18.60	18.20		17.60	17.60	0.0000	0.2385	100.00
5	18.90	18.70	18.60	18.10		17.70	17.70	0.0000	0.2044	100.00
6	18.80	18.70	18.60	18.20		17.80	17.80	0.0000	0.1703	100.00

 COMMENTS:
 2020/08 - PITTING/CORROSION NOTED.

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.
RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

 CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	East Sludge Pit		

Description: EAST FLOOR E-W

CML: 017-26

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **17.50 mm**
AVERAGE THICKNESS MEASURED: 17.63 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
		09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20			
1	18.60	18.60	18.70	18.30	No Access	17.70	17.70	0.0000	0.1533	100.00
2	18.60	18.60	18.80	18.20		17.80	17.70	0.1020	0.1533	100.00
3	18.70	18.70	18.70	18.30		17.60	17.60	0.0000	0.1874	100.00
4	18.90	18.70	18.60	18.20		17.70	17.60	0.1020	0.2214	100.00
5	18.80	18.60	18.20	18.30		17.70	17.70	0.0000	0.1874	100.00
6	18.70	18.60	18.50	18.30		17.50	17.50	0.0000	0.2044	100.00

COMMENTS:
2020/08 - PITTING/CORROSION NOTED.

Minimum Thickness is calculated.
Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.
Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).
Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).
BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.
RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.
CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

TANK INTERNAL INSPECTION REPORT

Customer:	Clean Harbors	ITS Job No.:	1-4549
District:	Central	Date:	10-Aug-2021
Facility:	Ryley Facility	LSD:	04-09-050-17W4M
Tank Description:	South Sludge Pit	Serial No.:	Not Stated
Equip./OIP No.:	Not Stated		

Remedial Action	Access and Coverage	Internal Coating	Heating Coil
<input type="checkbox"/> Adequate Cleaning	<input checked="" type="checkbox"/> Internal Inspection	<input checked="" type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Not Applicable
<input type="checkbox"/> No Action Required	<input type="checkbox"/> Part. Internal Inspection	<input type="checkbox"/> Good Condition	<input type="checkbox"/> Good Condition
<input type="checkbox"/> Paint/Coating Repairs	NDE Examination	<input type="checkbox"/> Coated <input type="checkbox"/> Full <input type="checkbox"/> Partial	<input type="checkbox"/> Corrosion
<input type="checkbox"/> Further Assessment Required	<input checked="" type="checkbox"/> UT	<input type="checkbox"/> Holidays/Cracking	<input type="checkbox"/> Pitting: <small>(max depth)</small>
	<input type="checkbox"/> MT	<input type="checkbox"/> Blisters/Bulges	<input type="checkbox"/> Cracked
<input type="checkbox"/> Condition Damage	<input type="checkbox"/> PT	<input type="checkbox"/> Flaking	<input type="checkbox"/> Scaled
<input type="checkbox"/> Does not comply with applicable code/safe operating requirement.	<input type="checkbox"/> RT	<input type="checkbox"/> See Comments	<input type="checkbox"/> Worn
	<input type="checkbox"/> BH	Internal Supports	<input type="checkbox"/> Loose
<input type="checkbox"/> Repairs Required	<input type="checkbox"/> MFL	<input checked="" type="checkbox"/> Not Applicable	<input type="checkbox"/> Poor Installation
<input checked="" type="checkbox"/> See Comments	<input type="checkbox"/> Other	<input type="checkbox"/> Good Condition	<input type="checkbox"/> See Comments
Manway	<input type="checkbox"/> Double Walled	<input type="checkbox"/> Distorted	Bolted Tanks
<input checked="" type="checkbox"/> Not Applicable	<input type="checkbox"/> See Comments	<input type="checkbox"/> Cracked	<input checked="" type="checkbox"/> Not Applicable
<input type="checkbox"/> Good Condition	Internal Components	<input type="checkbox"/> Broken	<input type="checkbox"/> Good Condition
<input type="checkbox"/> Coating Damage	<input type="checkbox"/> Anodes Present	<input type="checkbox"/> Poor Installation	<input type="checkbox"/> Missing Bolts
<input type="checkbox"/> Internal Corrosion	<input type="checkbox"/> Level Gauge Float in Good Condition	<input type="checkbox"/> Bolts Missing/ Loose/ Damage	<input type="checkbox"/> Gasket in Good Condition
<input type="checkbox"/> Mechanical Damage	<input type="checkbox"/> Level Gauge Float or Lower Support Attachment Damaged	<input type="checkbox"/> See Comments	<input type="checkbox"/> Gasket Damaged
<input type="checkbox"/> Seal Face Corrosion			<input type="checkbox"/> Seepage at Seams
<input type="checkbox"/> Pitting: <small>(max depth)</small>	<input type="checkbox"/> Level Gauge Float Wires Damaged		<input type="checkbox"/> Leakage at Seams
<input type="checkbox"/> See Comments			<input type="checkbox"/> See Comments
	<input checked="" type="checkbox"/> See Comments		

Shell Internal	Floor (Internal)	Nozzle Internal	Firetube(s)
<input type="checkbox"/> Good Condition	<input type="checkbox"/> Good Condition	<input type="checkbox"/> RF <input type="checkbox"/> NPT	<input checked="" type="checkbox"/> Not Applicable
<input type="checkbox"/> Internal Corrosion	<input type="checkbox"/> Internal Corrosion	<input type="checkbox"/> Good Condition	<input type="checkbox"/> Good Condition
<input type="checkbox"/> Pitting: <small>(max depth)</small>	<input type="checkbox"/> Pitting: <small>(max depth)</small>	<input type="checkbox"/> Nozzles are Gusseted	<input type="checkbox"/> Corrosion
<input type="checkbox"/> Scale	<input type="checkbox"/> Scale	<input type="checkbox"/> Nozzles Plugged	<input type="checkbox"/> Pitting: <small>(max depth)</small>
<input type="checkbox"/> Blistered	<input type="checkbox"/> Blistered	<input type="checkbox"/> Internal Corrosion	<input type="checkbox"/> Wear/Erosion
<input checked="" type="checkbox"/> Mechanical Damage	<input checked="" type="checkbox"/> Mechanical Damage	<input type="checkbox"/> Damaged/Cracked	<input type="checkbox"/> Cracked
<input type="checkbox"/> Deformation/Distortion	<input type="checkbox"/> Deformation/Distortion	<input type="checkbox"/> Deflection/Distortion	<input type="checkbox"/> Scaled
<input type="checkbox"/> Weld(s) in Good Condition	<input type="checkbox"/> Weld(s) in Good Condition	<input type="checkbox"/> Partial Internal Inspection	<input type="checkbox"/> Coated
<input type="checkbox"/> Weld(s) Corroded	<input type="checkbox"/> Weld(s) Corroded	<input type="checkbox"/> Weld(s) in Good Condition	<input type="checkbox"/> Heat Impinged
<input type="checkbox"/> Weld(s) Poor Quality	<input type="checkbox"/> Weld(s) Poor Quality	<input type="checkbox"/> Weld(s) Corroded	<input type="checkbox"/> Burner Misalignment
<input type="checkbox"/> Weld(s) Cracked	<input type="checkbox"/> Weld(s) Cracked	<input type="checkbox"/> Weld(s) Poor Quality	<input type="checkbox"/> Damaged Supports
<input type="checkbox"/> Previous Repairs	<input type="checkbox"/> Previous Repairs	<input type="checkbox"/> Weld(s) Cracked	<input type="checkbox"/> Damaged Guides/Tracks
<input checked="" type="checkbox"/> See Comments	<input checked="" type="checkbox"/> See Comments	<input type="checkbox"/> See Comments	<input type="checkbox"/> See Comments

Observations:

Tank is in Good, Fair, or Poor Condition

Good: No concerns found (may still have recommendations)
Fair: Minor issues found that do not impair the "fitness for service" of the Tank, (internal coating deterioration, general internal surface corrosion - no measurable metal loss, etc.)
Poor: Equipment had moderate to major concerns found (Tank is damaged; moderate to severe corrosion noted, cracked or broken component(s), etc.)

Based on API 653 Visual Internal Inspection this Tank is fit for service
(This piece of equipment meets the Jurisdictional requirements based on the information available at the time of the inspection.)

- Open top sludge tank. Inspection performed by entering the tank via ladder.
- Tank was not adequately cleaned for inspection. Limited access for inspection on the South, West, North and East walls due to product build up.
- Minor mechanical damage found on the tank shell and floor with an approximate depth of 0.070" - 0.100" (1.8mm - 2.5mm).
- The lifting lugs in each corner of the tank are all damaged / broken.
- UT performed; pitting/corrosion noted on the soil side of the tank wall and floor. See UT data report for remaining wall thicknesses.

Recommendations:

- None.

Non-Conformance Conditions and Corrective Actions:

Note: Reference any and all Non-Conformance Report (NCR) numbers and Corrective Action Report (CAR) numbers.

- None.

Recommended Inspection Interval:

Recommended Maximum Inspection Interval: 12 Months

Pictures:



(Photo 1) Overview



(Photo 2) Overview (2)

Pictures:



(Photo 3) Overview (3)



(Photo 4) Upper Shell



(Photo 5) Lower Shell



(Photo 6) Floor

Internal Inspection Performed By:

Print Name: Christopher Russell Earl

Certification No.:

ABSA IPV PESL: 000782
API 510: 45377

Signature:

Christopher Russell Earl

Report Reviewed:

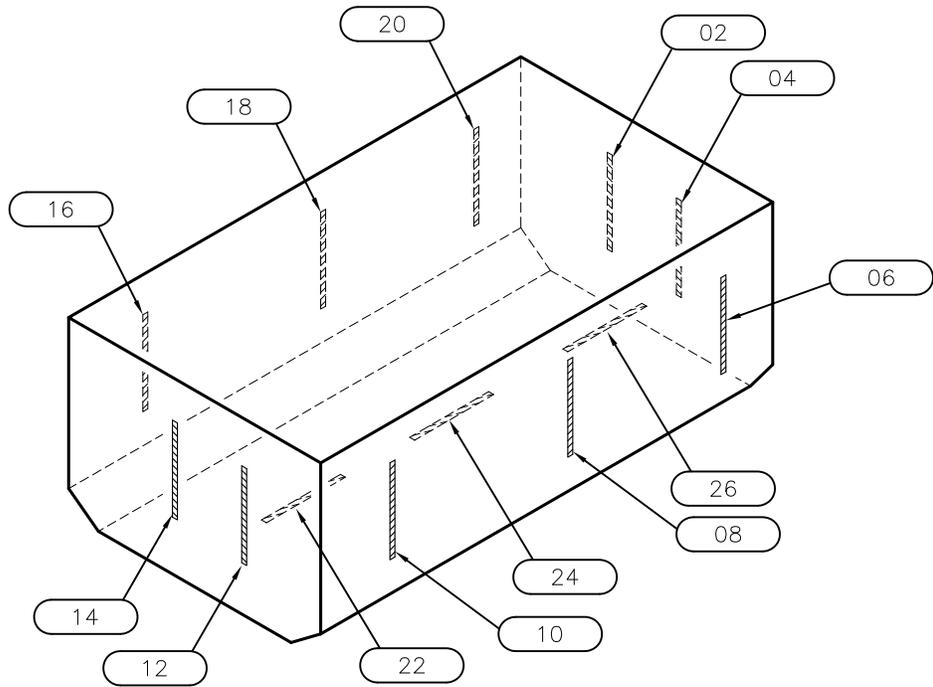
JO
Initial

Chief Inspector /
Client
Representative:

Name (Print)

Signature

Date:



Column
 Cooler
 Exchanger
 Furnace
 Heater
 Plate Exchanger
 Reboiler
 Vessel
 Other

Client:, District:, LSD:, Etc.:

Description:		SOUTH SLUDGE PIT	
P.R.N. No.:	N/S	Size:	24' X 14' X 8'
Equipment No.:	N/S	N.B. No.:	N/S
Serial No.:	N/S		
HEAD Material:	N/S	Nominal:	N/S
HEAD Material:		Nominal:	
SHELL Material:	N/S	Nominal:	N/S
SHELL Material:		Nominal:	
MAWP S.Side @TEMP:	N/S	MAWP T.Side @TEMP:	

CLEAN HARBORS
RYLEY FACILITY

LSD 04-09-050-17W4M

Comments: NO NAMEPLATE.

Tech.: CRE

Date: 08/2021

ITS Job No.: 1-4549

DWG No.: 006

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	South Sludge Pit		

EQUIPMENT INSPECTION SUMMARY:

NO DATA PLATE
2020/08 - ALL READINGS CONFIRMED.

Description: SOUTH WALL T-B

CML: 006-02

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **24.90 mm**
AVERAGE THICKNESS MEASURED: 25.06 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	25.50	25.50	25.50	24.90	24.90	25.20	25.20	0.0000	0.0276	100.00
2	25.48	25.40	25.40	25.00	25.00	25.30	25.30	0.0000	0.0166	100.00
3	25.48	25.30	25.30	25.00	25.00	25.10	25.10	0.0000	0.0350	100.00
4	25.27	25.40	25.20	25.10	25.10	25.10	25.10	0.0000	0.0156	100.00
5	25.68	25.50	25.10	24.90	24.90	24.70	25.00	0.0000	0.0626	100.00
6	25.40	25.30	25.20	24.10	24.10	24.80	24.90	0.0000	0.0460	100.00
7	25.83	25.30	25.40	25.00	25.00	25.00	25.00	0.0000	0.0763	100.00
8	25.55	25.30	25.40	25.00	25.00	24.90	24.90	0.0000	0.0598	100.00

Description: SOUTH WALL T-B

CML: 006-04

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **24.80 mm**
AVERAGE THICKNESS MEASURED: 24.94 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	25.50	25.30	25.00	24.80	24.80	25.00	25.00	0.0000	0.0460	100.00
2	25.76	25.40	25.00	24.70	24.70	25.00	25.00	0.0000	0.0699	100.00
3	25.48	25.50	25.20	24.90	24.80	25.00	25.00	0.0000	0.0442	100.00
4	25.58	25.60	25.30	24.50	24.50	25.00	24.90	0.1020	0.0626	100.00
5	25.50	25.40	25.10	24.50	24.50	25.00	25.00	0.0000	0.0460	100.00
6	25.71	25.50	25.00	24.50	24.50	25.00	25.00	0.0000	0.0653	100.00
7	25.68	25.30	25.00	24.10	24.10	25.00	24.80	0.2039	0.0809	100.00
8	25.68	25.20	25.00	24.10	24.10	25.00	24.80	0.2039	0.0809	100.00

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - If Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.

RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

CA - Corrosion Allowance, CR - Corrosion Rate (Highlight and bolded if CR >= 0.500mm or 0.019in/yr.).

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	South Sludge Pit		

Description: WEST WALL T-B
CML: 006-06

 NOM. THICK.: Not Stated
 MILL. TOL.: Not Stated
 CA: Not Stated
 MIN. NOM.: Not Stated

 MATERIAL:
 MINIMUM THICKNESS MEASURED: **24.60 mm**
 AVERAGE THICKNESS MEASURED: 24.93 mm
 CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	25.50	25.10	25.30	25.00	25.00	25.00	25.80	0.0000	0.0000	100.00
2	25.65	25.10	25.10	24.90	24.90	24.80	24.80	0.0000	0.0782	100.00
3	25.40	25.00	25.20	24.90	24.90	24.90	24.90	0.0000	0.0460	100.00
4	25.50	25.10	24.80	24.90	25.00	25.00	25.00	0.0000	0.0460	100.00
5	25.40	25.10	25.00	24.50	24.50	24.50	24.60	0.0000	0.0736	100.00
6	25.27	25.10	24.80	25.00	24.90	24.80	24.70	0.1020	0.0524	100.00
7	25.48	25.00	24.80	25.00	24.70	24.70	24.80	0.0000	0.0626	100.00
8	25.88	25.00	25.10	25.00	25.00	24.70	24.80	0.0000	0.0993	100.00

Description: WEST WALL T-B
CML: 006-08

 NOM. THICK.: Not Stated
 MILL. TOL.: Not Stated
 CA: Not Stated
 MIN. NOM.: Not Stated

 MATERIAL:
 MINIMUM THICKNESS MEASURED: **24.60 mm**
 AVERAGE THICKNESS MEASURED: 24.81 mm
 CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
	09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	08/10/21			
1	25.86	25.10	25.20	24.70	24.70	24.60	24.60	0.0000	0.1159	100.00
2	25.48	25.10	25.00	24.70	24.90	25.00	24.80	0.2039	0.0626	100.00
3	25.53	25.10	25.10	24.70	24.70	24.90	24.80	0.1020	0.0671	100.00
4	25.43	25.00	25.00	24.80	24.80	24.80	24.90	0.0000	0.0488	100.00
5	25.40	25.00	25.10	24.70	24.80	24.80	24.90	0.0000	0.0460	100.00
6	25.71	25.10	25.10	24.80	24.80	24.80	24.90	0.0000	0.0745	100.00
7	25.45	24.90	25.10	24.90	24.90	24.90	24.80	0.1020	0.0598	100.00
8	25.50	25.10	25.00	25.00	24.80	24.80	24.80	0.0000	0.0644	100.00

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.
RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

 CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	South Sludge Pit		

Description: WEST WALL T-B

CML: 006-10

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **24.60 mm**
AVERAGE THICKNESS MEASURED: 24.80 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
		09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20			
1	25.45	25.30	25.00	24.90	24.90	24.90	24.80	0.1020	0.0598	100.00
2	25.32	25.40	25.00	24.70	24.80	24.80	24.80	0.0000	0.0478	100.00
3	25.45	25.20	25.00	24.70	24.70	24.90	24.90	0.0000	0.0506	100.00
4	25.78	24.90	25.00	24.70	24.70	24.90	24.90	0.0000	0.0809	100.00
5	25.38	25.10	25.00	24.70	24.70	24.70	24.80	0.0000	0.0534	100.00
6	25.68	25.30	24.90	24.80	24.70	24.90	24.80	0.1020	0.0809	100.00
7	25.40	25.20	25.00	24.60	24.60	24.90	24.80	0.1020	0.0552	100.00
8	25.53	25.30	24.90	24.50	24.50	24.50	24.60	0.0000	0.0855	100.00

Description: NORTH WALL T-B

CML: 006-12

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **25.10 mm**
AVERAGE THICKNESS MEASURED: 25.14 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
		09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20			
1	25.78	25.50	25.10	25.10	25.10	25.30	25.20	0.1020	0.0534	100.00
2	25.83	25.40	25.30	25.10	25.10	25.20	25.10	0.1020	0.0671	100.00
3	25.58	25.30	25.30	25.00	25.00	25.30	25.20	0.1020	0.0350	100.00
4	25.50	24.90	25.40	25.10	25.10	25.20	25.20	0.0000	0.0276	100.00
5	25.45	25.00	25.30	25.10	25.10	25.20	25.10	0.1020	0.0322	100.00
6	25.43	25.20	25.30	25.10	25.10	25.20	25.10	0.1020	0.0304	100.00
7	25.50	25.10	25.40	25.10	25.10	25.20	25.10	0.1020	0.0368	100.00
8	25.58	25.20	25.40	25.10	25.10	25.20	25.10	0.1020	0.0442	100.00

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.

RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	South Sludge Pit		

Description: NORTH WALL T-B

CML: 006-14

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **25.10 mm**
AVERAGE THICKNESS MEASURED: 25.15 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
		09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20			
1	25.48	25.50	25.10	25.00	25.00	25.20	25.10	0.1020	0.0350	100.00
2	25.48	25.40	25.00	25.00	25.00	25.20	25.10	0.1020	0.0350	100.00
3	25.50	25.30	25.40	25.00	25.00	25.20	25.10	0.1020	0.0368	100.00
4	25.55	25.40	25.30	25.00	24.90	25.20	25.10	0.1020	0.0414	100.00
5	25.43	25.40	25.30	24.90	24.90	25.30	25.20	0.1020	0.0212	100.00
6	25.53	25.20	25.10	25.00	25.00	25.40	25.20	0.2039	0.0304	100.00
7	25.60	25.30	25.20	25.00	25.00	25.40	25.20	0.2039	0.0368	100.00
8	25.58	25.30	25.20	24.90	24.90	25.40	25.20	0.2039	0.0350	100.00

Description: EAST WALL T-B

CML: 006-16

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **24.40 mm**
AVERAGE THICKNESS MEASURED: 24.55 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
		09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20			
1	25.48	25.50	24.40	24.80	24.80	24.70	24.60	0.1020	0.0809	100.00
2	25.38	25.30	24.90	24.80	24.70	24.30	24.40	0.0000	0.0901	100.00
3	25.40	25.00	24.90	24.80	24.70	24.70	24.60	0.1020	0.0736	100.00
4	25.50	25.10	25.00	24.90	24.80	24.80	24.60	0.2039	0.0828	100.00
5	25.63	25.50	24.90	24.80	24.80	24.50	24.50	0.0000	0.1039	100.00
6	25.60	25.40	25.10	24.80	24.70	24.60	24.60	0.0000	0.0920	100.00
7	25.76	25.40	25.00	24.80	24.70	24.70	24.60	0.1020	0.1067	100.00
8	25.71	25.30	25.10	24.80	24.70	24.50	24.50	0.0000	0.1113	100.00

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.

RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	South Sludge Pit		

Description: EAST WALL T-B
CML: 006-18

 NOM. THICK.: Not Stated
 MILL. TOL.: Not Stated
 CA: Not Stated
 MIN. NOM.: Not Stated

 MATERIAL:
 MINIMUM THICKNESS MEASURED: **24.50 mm**
 AVERAGE THICKNESS MEASURED: 24.59 mm
 CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
		09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20			
1	25.53	25.10	24.30	24.70	24.70	24.70	24.60	0.1020	0.0855	100.00
2	25.43	25.30	24.60	24.70	24.70	24.50	24.60	0.0000	0.0763	100.00
3	25.48	25.20	24.90	24.60	24.60	24.50	24.50	0.0000	0.0901	100.00
4	25.71	25.10	24.90	24.50	24.50	24.60	24.60	0.0000	0.1021	100.00
5	25.40	24.90	24.90	24.60	24.60	24.30	24.50	0.0000	0.0828	100.00
6	25.40	25.00	25.00	24.60	24.60	24.70	24.60	0.1020	0.0736	100.00
7	25.71	25.00	24.90	24.60	24.70	24.80	24.70	0.1020	0.0929	100.00
8	26.01	25.00	24.90	24.60	24.70	24.60	24.60	0.0000	0.1297	100.00

Description: EAST WALL T-B
CML: 006-20

 NOM. THICK.: Not Stated
 MILL. TOL.: Not Stated
 CA: Not Stated
 MIN. NOM.: Not Stated

 MATERIAL:
 MINIMUM THICKNESS MEASURED: **23.90 mm**
 AVERAGE THICKNESS MEASURED: 24.48 mm
 CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
		09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20			
1	25.55	25.10	25.00	24.70	24.70	24.80	24.60	0.2039	0.0874	100.00
2	25.55	25.10	25.00	24.70	24.80	24.70	24.60	0.1020	0.0874	100.00
3	25.50	25.00	25.20	24.50	24.50	24.50	24.50	0.0000	0.0920	100.00
4	25.53	25.00	25.10	24.40	24.40	24.40	23.90	0.5098	0.1499	100.00
5	25.50	24.90	25.10	24.40	24.40	24.50	24.50	0.0000	0.0920	100.00
6	25.73	24.90	25.10	24.50	24.70	24.80	24.70	0.1020	0.0947	100.00
7	25.86	24.90	25.10	24.50	24.30	24.50	24.50	0.0000	0.1251	100.00
8	25.58	24.90	25.10	24.50	24.10	24.50	24.50	0.0000	0.0993	100.00

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.
RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

 CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	South Sludge Pit		

Description: SOUTH FLOOR N-S

CML: 006-22

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **23.70 mm**
AVERAGE THICKNESS MEASURED: 23.90 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
		09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20			
1	25.40	24.20	24.50	24.50	24.50	24.00	24.00	0.0000	0.1288	100.00
2	25.38	24.20	24.50	24.40	24.30	24.00	24.00	0.0000	0.1269	100.00
3	25.76	24.10	24.50	24.30	24.30	23.90	24.00	0.0000	0.1619	100.00
4	25.48	24.10	24.60	24.20	24.30	23.60	23.80	0.0000	0.1545	100.00
5	25.60	23.90	24.50	24.20	24.40	23.80	23.90	0.0000	0.1564	100.00
6	25.38	23.70	24.50	24.20	24.30	24.00	23.90	0.1020	0.1361	100.00
7	25.40	23.60	24.50	24.50	24.30	24.00	23.90	0.1020	0.1380	100.00
8	25.50	23.60	24.40	24.50	24.30	23.50	23.70	0.0000	0.1656	100.00

Description: MID FLOOR N-S

CML: 006-24

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **23.80 mm**
AVERAGE THICKNESS MEASURED: 23.81 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
		09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20			
1	25.38	24.30	24.30	23.80	No Access	23.90	23.90	0.0000	0.1361	100.00
2	25.32	24.10	24.20	23.80		23.80	23.80	0.0000	0.1398	100.00
3	25.40	24.00	24.20	23.90		23.80	23.80	0.0000	0.1472	100.00
4	25.38	23.90	24.20	24.10		23.80	23.80	0.0000	0.1453	100.00
5	25.38	24.10	24.20	24.10		23.80	23.80	0.0000	0.1453	100.00
6	25.38	24.10	24.40	24.10		23.80	23.80	0.0000	0.1453	100.00
7	25.35	24.10	24.30	24.00		23.80	23.80	0.0000	0.1426	100.00
8	25.38	24.10	24.30	24.00		23.80	23.80	0.0000	0.1453	100.00

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.

RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

CLIENT:	Clean Harbors	PROV. REG. #:	Not Stated
FACILITY:	Ryley Facility	SERIAL #:	Not Stated
UNIT/AREA:		EQUIP. NO.:	Not Stated
LSD:	04-09-050-17W4M		
DESCRIPTION:	South Sludge Pit		

Description: NORTH FLOOR N-S

CML: 006-26

NOM. THICK.: Not Stated
MILL. TOL.: Not Stated
CA: Not Stated
MIN. NOM.: Not Stated

MATERIAL:
MINIMUM THICKNESS MEASURED: **23.90 mm**
AVERAGE THICKNESS MEASURED: 24.01 mm
CALCULATED T-MIN: Not Stated

Rdg.	B/L Thick. MM/DD/YY							Short Term mm/yr	Long Term mm/yr	Rem. Half Life
		09/29/10	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20			
1	25.48	24.10	24.50	24.50	No Access	24.30	24.10	0.2039	0.1269	100.00
2	25.50	24.10	24.40	24.40		24.20	24.20	0.0000	0.1196	100.00
3	25.71	24.20	24.50	24.40		24.00	24.00	0.0000	0.1573	100.00
4	25.58	24.30	24.40	24.30		24.10	24.10	0.0000	0.1361	100.00
5	25.55	24.10	24.50	24.40		24.00	24.00	0.0000	0.1426	100.00
6	25.53	24.20	24.50	24.50		24.00	23.90	0.1020	0.1499	100.00
7	25.48	24.20	24.50	24.50		23.90	23.90	0.0000	0.1453	100.00
8	25.50	24.30	24.50	24.60		24.00	23.90	0.1020	0.1472	100.00

COMMENTS:

2020/08 - PITTING/CORROSION NOTED.

Minimum Thickness is calculated.

Design Minimum Thickness = Nom Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.

RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

CA - Corrosion Allowance, CR - Corrosion Rate (**Highlight and bolded if CR >= 0.500mm or 0.019in/yr.**).

APPENDIX J

Response Action Plans

Response Action Plans

No Response Action Plans were required to be submitted in 2021.

APPENDIX K

Annual Dugout and Water Well

Sampling Program Report

2021 Dugout Sampling Program Class 1 Waste Management Facility Ryley, Alberta



PRESENTED TO
Clean Harbors Canada Inc.

FEBRUARY 7, 2022
ISSUED FOR USE
FILE: 704-SWM.SWOP04402-01

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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 Parks (AEP), 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 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-one (21) dugouts were inspected of which 20 were sampled during the 2021 dugout sampling program (one dugout was dry), which is the 25th annual sampling event, including the baseline event. 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 2021 indicates 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 2021 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 range for that parameter.

A select few parameters (ammonia, aluminummanganese, and sulphate) exhibited elevated concentrations in 2021 relative to historical concentrations, and these parameters should be closely monitored in the future events.

A similar sampling program is recommended for October 2022, 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 dugouts sampled on their property once the 2021 report is finalized.

TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 FIELD SAMPLING METHODS	1
2.1 Landowner Summary.....	1
2.2 Sampling Procedure	2
2.3 Quality Control and Quality Assurance.....	4
3.0 FINDINGS AND TREND ANALYSIS	4
4.0 DISCUSSION	8
5.0 CONCLUSIONS AND RECOMMENDATIONS	8
6.0 CLOSURE	9

LIST OF TABLES IN TEXT

Table A: Landowner Information.....	1
Table B: Sample Location Information.....	2
Table C: Dugouts with Parameters in Upward Trends.....	5

APPENDIX SECTIONS

TABLES

Table 1.1 to Table 1.22	Chemical Analytical Results
Table 2	DUP-A Chemical Analytical Results
Table 3	DUP-B Chemical Analytical Results
Table 4	Historical Precipitation Data - Total Precipitation (mm)

FIGURES

Figure 1	Dugout Sampling Location Plan
Figure 2a -2i	Mann Kendall Trends

APPENDICES

Appendix A	Regulatory Approval – Alberta Environment - EPEA Approval No.10348-03-00
Appendix B	Tetra Tech’s Limitations on the Use of This Document
Appendix C	ALS Chemical Analysis Report
Appendix D	Historical Dugout Chemical Analytical Results
Appendix E	Site Photographs

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 Parks (AEP), 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 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 nineteen (19) dugouts were sampled during the 2021 dugout sampling program, which is the 26th annual sampling event, including the baseline event in 1996. The dugout labelled No. 11 in Table B was dry at the time of sampling in 2021 so could not be sampled (Photo 1 in Photos Pages section). 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 2021 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 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 AEP. Landowners and contact information was updated as necessary in October 2021. The location of each sampled water source and residence, if found, is indicated on Figure 1.

Table A: Landowner Information

Landowner (October 2021)	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 239, 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 3A0 gsbfarm@gmail.com	780.646.2001

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

2.2 Sampling Procedure

The water samples were collected on October 21 and 22, 2021 by two Tetra Tech personnel. A Safe Work Form was completed and reviewed prior to initiating sampling. Nineteen (19) dugouts were sampled at seven properties, and 21 samples were collected: one from each dugout, plus two duplicate samples. Dugout 11 was dry at the time of sampling and could not be sampled (Photo 1). 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 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. 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 (dry)	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 CALA certified 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
- Notable sheen, colour or other observations

The analytical reports for each sample collected were forwarded to Tetra Tech once the analysis was completed. The 2021 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 2021 sampling program for each dugout. Appendix D contains the historical dugout chemical analytical results from 1996 up to 2020 data.

2.3 Quality Control and Quality Assurance

To evaluate field sampling reproducibility, duplicate water samples were collected during the 2021 sampling event at an approximate rate of 10%. In October 2021, the duplicates were taken from Dugout 12 (DUP-A) and Dugout 9 (DUP-B) and submitted for laboratory analysis for the same suite of parameters as the original samples.

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:

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

Where \bar{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 six parameters satisfied the requirements (two for DUP-A and five for DUP-B). Dissolved aluminum did not pass the 20% test for either duplicate. The QA/QC reproducibility guidelines were not satisfied for the following parameters:

- DUP-A: Dissolved aluminum (33%) and dissolved copper (25%)
- DUP-B: Total Kjeldahl nitrogen (82%), TSS (60%), dissolved aluminum (44%), dissolved selenium (67%), and dissolved nitrite (43%)

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 DUP-A fails are marginal, and the DUP-B fails include TSS, which may have affected the other parameters in that specific sample. Based on this fact, a limited number of failed results is within acceptable variability, and the duplicate analysis indicates the data are stable and 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 results of previous sampling events, with particular focus on the past 5 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. 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 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 (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 2021 data follows with data in Tables 1, 2 and 3. Mann-Kendall trends are summarized in Figure 2.

The 2021 dugout water levels appeared slightly lower than those observed in recent years with Dugout 11 being completely dry at the time of sampling. This was the first time in 25 years that a dugout sample could not be collected due to no water being present. 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 of the Tables Section of this report. The total annual precipitation in 2021 was 328.5 mm which was 129.2 lower than the precipitation mean (or 72% of average) in the region (several different stations as available) since 1996. The months of June, July and October 2021 were particularly low and at or lower than any other monthly data in the previous 25 years. The 2014, 2015, 2019 and 2021 annual precipitation data was from the Elk Island National Park meteorological station. Note that previous precipitation data (1996 to 2013) were obtained from Tofield North Station when active. The Alberta Agriculture precipitation website² 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 reporting stations over the years are not expected to have a material impact on annual averages but may somewhat affect monthly precipitation data. In addition to lower precipitation in 2021, there were multiple days of temperatures over 35oC in late-June and early-July throughout western Canada which will have resulted in higher-than-average evaporation rates from the dugouts.

The two duplicate samples (DUP-A from Dugout 12 and DUP-B from Dugout 9) 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 investigating possible trends in water quality³ for parameters analyzed for the past 3 to 25 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 (Table 4). Parameters on an upward trend 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	The dugout 1 and 14 concentrations have increased to their highest range in 2021. All other dugout concentrations are within the historical range
Aluminum	1, 2, 3, 4, 6, 7, 9, 19, 20, 21, and 22	All dugout concentrations are within the historical range except dugouts 10, 14, and 22 which had their highest aluminum concentrations in 2021 compared to historical values

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
Ammonia (Ammonia N)	1, 2, 3, 6, 7, 8, 9, 10, 19, and 20	All dugout concentrations are within the historical range except dugout 3 which had an ammonia concentration in 2021 that was highest concentration since 1996
Antimony	3, 4, 5, 6, 7, 9, 15, 18, 20, and 22	All dugout concentrations are within the historical range except dugout 13 which had their highest antimony concentration in 2021 compared to historical values
Arsenic	1, 2, 3, 4, 10, 14, 20, and 22	The dugout concentrations are within the historical range except dugout 1, which had their highest arsenic concentration in 2021 compared to historical values
Barium	19	This dugout concentration is within historical range
Bicarbonate	1, 2, 3, 4, 8, 9, 10, 14, 16, 19, and 21	The dugout concentrations are within the historical range
Boron	1, 3, 4, 5, 7, 8, 9, 10, 12, 14, 18, and 20	The concentrations of all dugouts have been gradually increasing since 1996 with Dugout 13 and 15 increasing in 2021 compared to 2020
Cadmium	2, 5, 7, 8, 9, 10, 12, 13, 16, 19 and 22	The concentrations of all dugouts have been gradually increasing since 1996
Calcium	2, 3, 4, 5, 8, 10, 12, 14, 19, 20, 21, and 22	The concentrations of all dugouts have shown some variability but generally have been gradually increasing since 1996
Chemical Oxygen Demand (COD)	1, 3, 6, 7, 8, 9, 10, 14, 15, and 22	All dugout concentrations are within the historical ranges expect dugout 13 which has increased in 2021 compared to 2020.
Chloride	2, 3, 4, 10, 14, 19, 20, 21, and 22	The concentrations of dugouts 2, 3, 4, 10, 14, 19, 20, 21, and 22 have been gradually increasing since 1996 and dugout 20 has increased in 2021 compared to 2020
Chromium	2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 20, 21, and 22	All concentrations are within the historical range
Cobalt	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 16, 18, 19, 20, 21, and 22	All dugout concentrations are generally within the historical ranges
Copper	1, 4, 8, 19, 20, 21, and 22	The concentration is within the historical ranges
DOC	3, 4, 7, 8, 9, 10, 14, and 20	All dugout concentrations are within the historical ranges except dugout 20 which increased in 2021 compared to 2020
EC	2, 3, 4, 5, 8, 10, 14, 20, 21, and 22	All dugout concentrations are within the historical ranges except dugout 13 which increased in 2021 compared to 2020
Fluoride	10	All concentrations are within the historical ranges
Hardness as CaCO ₃	2, 3, 4, 5, 8, 10, 12, 14, 15, 16, 19, 20, 21, and 22	The dugout concentrations are within the historical ranges
Ionic Balance	9, 16, 18, 19, 21, and 22	All concentrations are within the historical ranges
Iron	1, 4, 6, 7, 18, 19, and 22	All concentrations are within the historical ranges
Lead	1, 2, 3, 4, 5, 6, 9, 10, 14, 19, 20, 21, and 22	All concentrations are within the historical ranges
Lithium	8 and 16	All concentrations are within the historical range
Magnesium	2, 3, 4, 5, 8, 10, 12, 14, 15, 16, 19, 20, 21 and 22	All concentrations are within the historical range.

Table C: Dugouts with Parameters in Upward Trends

Parameter	Dugouts with Upward Trends	Upward Trends Explanation
Manganese	1, 2, 3, 4, 5, 6, 9, 10, 14, 16, and 20	All concentrations are within the historical range.
Mercury	8	All concentrations are within the historical range.
Molybdenum	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 16, 18, 19, 20, 21, and 22	All dugout concentrations are within the historical range except dugouts 8, 9, 12, 13, and 14 which have increased in 2021 compared to 2020
Nickle	8, 10, 12, 17, and 19	All concentrations are within the historical range.
Nitrate (as NO ₃ -N)	2, 3, 7, 8, 9, 10, 16, 19, and 20	All dugout concentrations are within the historical range except dugout 10 which has increased in 2021 compared to 2020
Nitrate and Nitrate (as N)	2, 3, 7, 8, 9, 10, 16, 19, and 20	All dugout concentrations are within the historical range
Nitrite (as NO ₂ -N)	2, 3, 4, 7, 9, 16, 18, and 19	All dugout concentrations are within the historical range
pH	17	The concentration is within the historical range
Phosphorus	1, 3, and 21	The concentration is within the historical range
Potassium	1, 2, 3, 4, 5, 8, 9, 10, 12, 14, 15, 16, 19, 21, and 22	The concentrations for all dugouts have been gradually increasing since 1996
Selenium	1, 3, 4, 6, 7, 9, 10, and 20	All dugout concentrations are within the historical range
Silver	13	The silver concentration for dugout 13 increased in 2021 compared to 2020
Sodium	3, 4, 5, 8, 9, 10, 14, 16, 20, 21, and 22	All dugout concentrations are within the historical range
Sulphate	5, 8, 10, 13, 15, 20, 21, and 22	The concentration of dugouts 13 and 15 has increased significantly in 2021 compares to 2020
Thallium	8	2021 was the first year for thallium in dugout 8 to show an increasing trend
Tin	7	2021 was the first year for tin in dugout 7 to show an increasing trend
Titanium	1, 2, 3, 4, 6, 7, 16, 19, 20, 21, and 22	All dugout concentrations are within the historical range
TDS	2, 3, 4, 8, 10, 12, 14, 20, 21, and 22	The concentration in dugout 13 has increased significantly in 2021 compared to 2020. The concentrations at all other dugouts are generally within historical range
Total Kjeldahl Nitrogen	1, 3, 4, 8, 10, and 14	The concentrations of all dugouts are within the historical range except dugout 1 which has increased significantly in 2021 compared to 2020.
Uranium	8	The uranium concentration in dugout 8 has shown an increasing trend since 2008
Vanadium	2, 3, 4, 6, 14, and 20	All dugout concentrations are within the historical range except dugout 13 had increased in 2021 compared to 2020

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

4.0 DISCUSSION

The dugout water levels were somewhat lower in 2021 to those observed in recent years including Dugout 11 which was dry at the time of sampling (Photo 1). Photos 2 and 3 show typical water levels noted in dugouts during October 2021 with a full photo inventory in the project file.

In general, the concentrations of most parameters analyzed in 2021 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 2021 data that were greater than past results.

The higher upward trend concentrations of ammonia (dugout 3), and sulphate (dugouts 13 and 15) may be attributed to elevated levels of nutrients in the surface water draining into these dugouts, which was observed to contain runoff from cattle manure at the nearby farms. During fieldwork, livestock were observed near both of these dugouts.

The gradually increasing concentrations of calcium (dugouts 2, 3, 4, 5, 8, 10, 12, 14, 19, 20, 21, and 22), chloride (dugouts 2, 3, 4, 10, 14, 19, 20, 21, 22), potassium (dugouts 1, 5, 10, 12, 14, 19, and 22) and TDS (dugout 13) may be attributed to the naturally saline and sodic soils in the area (solonchic soils). Salt precipitate was observed on surficial soils around the edges of most of these dugouts in 2021. Lower precipitation and higher evaporation during 2021 may have affected these concentrations.

The upwards trends of note were boron (dugouts 13 and 15), carbonate (dugout 17), COD (dugout 13), DOC (Dugout 20), molybdenum (dugouts 8, 9, 12, 13, and 14), Nitrate (as NO₃-N) (dugout 10), silver (dugout 13), thallium (dugout 8), TDS (dugout 13), Total Kjeldahl Nitrogen (dugout 1), uranium (dugout 8), and vanadium (dugout 13). Tetra Tech notes that the gradual increases are minor in these dugouts and suggests that they be monitored closely in the future events. Some concentration increases in dissolved metals could be expected in 2021 given lower precipitation for dilution and higher evaporation potential.

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 19 dugouts sampled in 2021.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Analytical results of the dugout sampling program conducted in October 2021 indicates 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 2021 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 range for that parameter.

A select few parameters (ammonia, aluminum, and sulphate) exhibited elevated concentrations in 2021 relative to historical concentrations, and these parameters should be closely monitored in the future events.

A similar sampling program is recommended for October 2022, 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 dugouts sampled on their property once the 2021 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.

FILE: 704-SWM.SWOP04402-01
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Prepared by:
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TABLES

Table 1.1 to Table 1.22	Chemical Analytical Results
Table 2	DUP-A Chemical Analytical Results
Table 3	DUP-B Chemical Analytical Results
Table 4	Historical Precipitation Data - Total Precipitation (mm)

Table 1.1: Chemical Analytical Results

Sample ID:		Booth D.1					
Site Number:		1					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	68	77	98	84	82	95
Ammonia-N	mg/L	1.21	<0.050	0.565	<0.050	<0.050	0.051
Total Kjeldahl Nitrogen	mg/L	3.09	2.58	4.70	2.51	2.75	3.45
Dissolved Organic Carbon	mg/L	21.4	77	29.9	22.9	19.9	28.9
Phenols	mg/L	-	-	0.0019	0.0075	0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	10.6	18.2
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0016	0.0031	0.0056	0.0021	0.0036	0.0049
Antimony	mg/L	0.0002	0.00024	0.00029	0.00020	0.00016	0.00034
Arsenic	mg/L	-	-	0.00703	0.00484	0.00583	0.00809
Barium	mg/L	0.0883	0.0594	0.0714	0.0614	0.0612	0.0471
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.064	0.045	0.049	0.047	0.025	0.037
Cadmium	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt	mg/L	0.00023	0.00034	0.00045	0.00035	0.00030	0.00051
Copper	mg/L	0.00045	0.00054	0.00049	0.00053	0.00040	0.00147
Iron	mg/L	0.021	0.033	0.028	0.121	0.179	0.041
Lead	mg/L	<0.000050	0.000077	<0.000050	0.000072	0.000055	0.000071
Lithium	mg/L	-	-	0.0446	0.0327	0.0335	0.0456
Manganese	mg/L	0.00071	0.00744	0.00864	0.00250	0.00783	0.00753
Mercury	mg/L	0.0000095	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00125	0.00111	0.000989	0.000853	0.000611	0.00117
Nickel	mg/L	0.0043	0.0034	0.00279	0.00353	0.00304	0.00382
Selenium	mg/L	0.000114	0.000115	0.000143	0.000115	0.000156	0.000096
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000016	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00032	0.00049	0.00059	0.00089	0.00077
Uranium	mg/L	-	-	0.000784	0.000578	0.000578	0.000824
Vanadium	mg/L	0.00087	0.00112	0.00135	0.00076	0.00072	0.00221
Zinc	mg/L	<0.0010	0.0021	<0.0010	<0.0010	<0.0010	0.0018
Routine Water							
Ion Balance	%	107	95.5	107	103	94.7	106
Bicarbonate	mg/L	357	396	345	328	358	424
Chloride	mg/L	61.7	59.7	54.6	46.3	40.2	55.0
Carbonate	mg/L	<5.0	10.7	7.6	<5.0	6.4	7.2
Conductivity (EC)	uS/cm	885	893	845	714	712	808
Calcium	mg/L	29	14.8	14.7	21.5	20.4	13.9
Potassium	mg/L	13.9	12.3	15.1	12.5	13.2	16.4
Magnesium	mg/L	13.9	12.5	11.7	10.8	9.69	11.5
Sodium	mg/L	154	167	156	128	120	181
Sulfate	mg/L	70.6	59.6	43.0	43.4	26.6	28.0
Phosphorus	mg/L	0.155	0.128	0.276	0.211	0.466	0.148
pH in H ₂ O	pH	8.37	8.53	8.49	8.36	8.42	8.48
TDS (Calculated)	mg/L	524	531	472	428	413	522
Nitrate	mg/L	0.312	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrite	mg/L	0.026	<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
Hardness as CaCO ₃	mg/L	-	-	84.9	98.2	90.8	82.1
Alkalinity (total as CaCO ₃)	mg/L	-	-	295	276	304	360
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.146	0.284	0.270	0.406
Field Data							
pH in H ₂ O	pH	8.7	9.1	11.1	8.4	8.27	9.57
Conductivity (EC)	uS/cm	893	980	858	80	758	507

Notes:

"-" Not required under previous permit

Table 1.2: Chemical Analytical Results

Sample ID:		Ewert D.1					
Site Number:		2					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	83	122	53	79	78	99
Ammonia-N	mg/L	0.052	1.11	3.79	<0.050	<0.050	0.122
Total Kjeldahl Nitrogen	mg/L	3.06	7.29	5.64	2.70	3.08	2.26
Dissolved Organic Carbon	mg/L	24.3	122	21.6	22.2	21.1	33.7
Phenols	mg/L	-	-	0.0018	0.0101	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	10.6	8.0
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0025	0.0151	0.0303	0.0349	0.0059	0.109
Antimony	mg/L	0.00013	0.0003	<0.00010	0.00025	0.00021	0.00052
Arsenic	mg/L	-	-	0.00165	0.0137	0.00823	0.0103
Barium	mg/L	0.0699	0.0642	0.118	0.0449	0.0508	0.0812
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.073	0.053	0.046	0.040	0.028	0.035
Cadmium	mg/L	0.0000059	0.0000083	<0.0000050	0.0000070	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	0.00018
Cobalt	mg/L	0.00025	0.00064	0.00065	0.00062	0.00046	0.00117
Copper	mg/L	0.00360	0.00193	0.00081	0.00271	0.00065	0.00389
Iron	mg/L	0.012	0.052	0.166	0.077	0.032	0.086
Lead	mg/L	<0.000050	0.000098	0.000113	0.000076	<0.000050	0.000082
Lithium	mg/L	-	-	0.0263	0.0222	0.0236	0.0399
Manganese	mg/L	0.00161	0.0116	0.192	0.0138	0.00492	0.00745
Mercury	mg/L	0.0000081	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00142	0.000884	0.00136	0.00198	0.000868	0.00316
Nickel	mg/L	0.00424	0.00243	0.00389	0.00321	0.00290	0.00698
Selenium	mg/L	0.000248	0.00025	0.000169	0.000258	0.000172	0.000373
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000017	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00044	0.0029	0.00517	0.00055	0.00368
Uranium	mg/L	-	-	0.00123	0.00138	0.00101	0.00290
Vanadium	mg/L	<0.00050	0.00228	0.00067	0.00299	0.00158	0.00442
Zinc	mg/L	<0.0010	0.0057	<0.0010	0.0011	<0.0010	0.0042
Routine Water							
Ion Balance	%	111	88.7	102	100	96.9	106
Bicarbonate	mg/L	354	456	319	304	367	551
Chloride	mg/L	31.5	31.3	30.8	32.9	34.5	56.7
Carbonate	mg/L	6.6	12.7	8.2	38.3	16.4	14.3
Conductivity (EC)	uS/cm	759	851	758	675	732	1110
Calcium	mg/L	24.8	13.3	26.0	21.5	22.6	22.4
Potassium	mg/L	19.2	18.5	19.9	16.0	20.3	26.7
Magnesium	mg/L	12.9	12	12.8	10.2	12.0	14.9
Sodium	mg/L	134	144	109	124	121	255
Sulfate	mg/L	39.6	30.2	65.3	24.3	28.9	103
Phosphorus	mg/L	0.28	0.403	0.065	0.628	0.745	0.408
pH in H ₂ O	pH	8.45	8.54	8.49	9.16	8.69	8.59
TDS (Calculated)	mg/L	444	491	429	417	436	764
Nitrate	mg/L	<0.020	0.024	0.072	0.047	<0.020	0.021
Nitrite	mg/L	<0.010	0.103	<0.010	0.013	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	0.072	0.06	<0.022	<0.022
Hardness as CaCO ₃	mg/L	-	-	118	95.7	106	117
Alkalinity (total as CaCO ₃)	mg/L	-	-	275	313	328	475
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.154	0.372	0.276	0.523
Field Data							
pH in H ₂ O	pH	8.8	9.0	8.7	EF	8.94	9.35
Conductivity (EC)	uS/cm	778	900	776	829	777	344.6

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	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	61	88	127	92	119	133
Ammonia-N	mg/L	<0.05	<0.05	0.113	0.254	1.13	0.67
Total Kjeldahl Nitrogen	mg/L	1.94	3.09	5.07	3.01	4.86	4.98
Dissolved Organic Carbon	mg/L	21	88	44.0	28.2	31.3	42.5
Phenols	mg/L	-	-	0.0018	0.0068	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	13.6	93
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0011	0.0045	0.0317	0.0334	0.0316	0.032
Antimony	mg/L	0.00015	0.00017	0.00038	0.00020	0.00025	0.00064
Arsenic	mg/L	-	-	0.00803	0.00619	0.00841	0.0153
Barium	mg/L	0.041	0.0501	0.0439	0.0364	0.0509	0.0929
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.05	0.039	0.039	0.034	0.011	0.024
Cadmium	mg/L	<0.0000050	<0.0000050	0.0000154	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	0.00011	0.00013	0.00019	0.00013
Cobalt	mg/L	0.00014	0.00053	0.00063	0.00061	0.00125	0.00153
Copper	mg/L	0.00797	0.00111	0.00234	0.00127	0.00082	0.00197
Iron	mg/L	0.045	0.056	0.054	0.256	0.545	0.079
Lead	mg/L	<0.000050	<0.000050	0.00010	0.000164	0.000215	0.000102
Lithium	mg/L	-	-	0.0323	0.0261	0.0291	0.0399
Manganese	mg/L	0.00125	0.107	0.0131	0.00377	0.264	0.0538
Mercury	mg/L	0.0000066	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000744	0.000491	0.0010	0.000761	0.000587	0.00204
Nickel	mg/L	0.00457	0.00417	0.00423	0.00630	0.00565	0.0086
Selenium	mg/L	0.000245	0.000184	0.000319	0.000366	0.000326	0.000582
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.00001	<0.000010	0.000016	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.0003	0.00062	0.00375	0.00694	0.00693	0.00346
Uranium	mg/L	-	-	0.00159	0.000775	0.000892	0.00274
Vanadium	mg/L	0.00072	0.00136	0.00513	0.00218	0.00226	0.0084
Zinc	mg/L	0.0020	0.0085	<0.0010	<0.0010	<0.0010	0.0027
Routine Water							
Ion Balance	%	100	96.1	107	105	94.9	97.5
Bicarbonate	mg/L	355	496	433	407	498	662
Chloride	mg/L	31.3	36.3	35.7	33.3	45.9	62.2
Carbonate	mg/L	5	15.8	11.9	<5.0	12.6	19.9
Conductivity (EC)	uS/cm	723	964	885	844	1220	1590
Calcium	mg/L	28.2	28.6	17.1	25.8	30.1	44.0
Potassium	mg/L	15.5	21.4	20.5	19.0	23.5	28.9
Magnesium	mg/L	11.90	14.00	11.2	13.4	16.6	23.8
Sodium	mg/L	118	168	179	157	222	317
Sulfate	mg/L	48.4	55.8	46.2	77.3	193	284
Phosphorus	mg/L	0.262	0.442	0.542	0.576	1.19	1.14
pH in H ₂ O	pH	8.41	8.56	8.57	8.29	8.49	8.61
TDS (Calculated)	mg/L	434	584	535	531	789	1110
Nitrate	mg/L	<0.02	<0.020	<0.020	0.388	0.099	0.034
Nitrite	mg/L	<0.01	<0.010	<0.010	0.029	0.057	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	0.416	0.156	0.034
Hardness as CaCO ₃	mg/L	-	-	88.8	120	144	208
Alkalinity (total as CaCO ₃)	mg/L	-	-	375	339	429	576
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.194	0.292	0.274	0.466
Field Data							
pH in H ₂ O	pH	8.9	8.8	11.3	6.49	8.17	8.94
Conductivity (EC)	uS/cm	740	1062	950	104.3	1322	986

Notes:

"-" Not required under previous permit

Table 1.4: Chemical Analytical Results

Sample ID:		Ewert D.3					
Site Number:		4					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	74	51	78	106	116	115
Ammonia-N	mg/L	0.641	<0.050	0.655	<0.050	<0.050	0.60
Total Kjeldahl Nitrogen	mg/L	3.84	2.55	3.31	3.22	3.45	4.27
Dissolved Organic Carbon	mg/L	27.2	51	38.0	28.3	29.0	38.2
Phenols	mg/L	-	-	0.0018	0.0058	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	7.6	8.0
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0473	0.0052	0.0673	0.0107	0.0155	0.0129
Antimony	mg/L	0.0001	0.0001	0.00016	0.00016	0.00018	0.00025
Arsenic	mg/L	-	-	0.0032	0.0031	0.00513	0.0077
Barium	mg/L	0.0433	0.0288	0.0656	0.0418	0.0342	0.0468
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.044	0.018	0.035	0.039	0.025	0.032
Cadmium	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	0.00014	<0.00010	0.00018	0.00017	0.00023	0.00011
Cobalt	mg/L	0.00024	0.00046	0.00095	0.00036	0.00075	0.00080
Copper	mg/L	0.00661	0.0013	0.00163	0.00163	0.0010	0.00255
Iron	mg/L	1.79	0.659	0.848	1.01	1.66	0.269
Lead	mg/L	0.000132	0.000168	0.000389	0.000211	0.000278	0.000189
Lithium	mg/L	-	-	0.0153	0.0125	0.0142	0.0173
Manganese	mg/L	0.00451	0.0477	0.194	0.00879	0.0441	0.114
Mercury	mg/L	0.0000069	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000389	0.00046	0.000956	0.000489	0.000407	0.00143
Nickel	mg/L	0.00222	0.00281	0.00396	0.00281	0.00314	0.00375
Selenium	mg/L	0.000153	0.000151	0.000192	0.000188	0.000206	0.000252
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000032	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00264	0.00083	0.00499	0.00168	0.00266	0.00249
Uranium	mg/L	-	-	0.000531	0.000262	0.000262	0.000768
Vanadium	mg/L	0.00102	0.00102	0.00193	0.00144	0.00194	0.00358
Zinc	mg/L	0.0024	0.0151	<0.0010	<0.0010	<0.0010	0.0017
Routine Water							
Ion Balance	%	106	95.1	105	103	94.7	102
Bicarbonate	mg/L	247	326	308	290	338	426
Chloride	mg/L	51	55.8	64.6	56.2	73.5	99.8
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	5.3	<5.0
Conductivity (EC)	uS/cm	549	679	708	622	750	894
Calcium	mg/L	25.7	21.5	23.4	22.5	19.5	25.5
Potassium	mg/L	15	14.9	22.0	14.2	15.7	21.0
Magnesium	mg/L	10.5	9.48	10.9	10.7	10.2	11.5
Sodium	mg/L	76.3	108	114	103	126	173
Sulfate	mg/L	3.93	11.9	19.1	14.3	15.8	13.4
Phosphorus	mg/L	0.596	0.437	0.523	0.605	1.08	0.701
pH in H ₂ O	pH	8.23	8.37	8.05	7.98	8.39	8.40
TDS (Calculated)	mg/L	304	391	406	364	432	560
Nitrate	mg/L	0.083	<0.020	0.198	0.027	<0.020	0.103
Nitrite	mg/L	0.039	<0.010	<0.010	0.010	<0.010	0.016
Nitrate and Nitrite (as N)	mg/L	-	-	0.198	0.037	<0.022	0.119
Hardness as CaCO ₃	mg/L	-	-	103	100	90.7	111
Alkalinity (total as CaCO ₃)	mg/L	-	-	252	238	286	358
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.102	0.169	0.178	0.322
Field Data							
pH in H ₂ O	pH	8.4	8.6	9.9	EF	8.34	8.60
Conductivity (EC)	uS/cm	522	754	971	803	793	275.9

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	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	30	102	86	92	75	124
Ammonia-N	mg/L	<0.050	<0.050	0.120	<0.050	0.235	0.51
Total Kjeldahl Nitrogen	mg/L	2.88	3.48	2.91	3.61	3.64	5.41
Dissolved Organic Carbon	mg/L	29.4	102	38.0	22.7	23.0	35.9
Phenols	mg/L	-	-	0.0015	0.0076	0.0012	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	33.8	69
BTEX, F1 (C6-C10) and F2 (>C10-C16)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	0.77	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0013	0.0062	0.0194	0.0015	0.0425	0.0782
Antimony	mg/L	0.00018	0.00022	0.00025	0.00015	0.00035	0.00057
Arsenic	mg/L	-	-	0.0114	0.00313	0.00692	0.00694
Barium	mg/L	0.0524	0.0903	0.0588	0.0528	0.0823	0.102
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.046	0.04	0.050	0.042	0.018	0.034
Cadmium	mg/L	<0.0000050	<0.0000050	0.0000196	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	0.00012
Cobalt	mg/L	0.00035	0.00051	0.00094	0.00043	0.00113	0.00146
Copper	mg/L	0.00084	0.00095	0.00102	0.00054	0.00123	0.00282
Iron	mg/L	0.04	0.12	0.087	0.026	0.353	0.059
Lead	mg/L	<0.000050	0.000096	0.00010	<0.000050	0.000273	0.000078
Lithium	mg/L	-	-	0.0247	0.016	0.0128	0.0207
Manganese	mg/L	0.00066	0.00532	0.00626	0.00080	0.0246	0.00707
Mercury	mg/L	0.0000108	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00216	0.00196	0.0019	0.00118	0.00177	0.00312
Nickel	mg/L	0.00606	0.00687	0.00569	0.00406	0.00732	0.00852
Selenium	mg/L	0.000302	0.000271	0.000299	0.000217	0.00037	0.000469
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000015	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00069	0.00219	<0.00030	0.00991	0.00321
Uranium	mg/L	-	-	0.001	0.000602	0.00121	0.00245
Vanadium	mg/L	<0.00050	<0.00050	0.00251	<0.00050	0.0018	0.00225
Zinc	mg/L	0.001	0.0031	<0.0010	<0.0010	<0.0010	0.0039
Routine Water							
Ion Balance	%	114	92.9	115	102	96.8	100
Bicarbonate	mg/L	324	442	398	356	312	494
Chloride	mg/L	17.5	19.4	21.7	18	12.9	20.5
Carbonate	mg/L	<5.0	7.2	<5.0	6.6	<5.0	9.8
Conductivity (EC)	uS/cm	599	742	713	624	796	878
Calcium	mg/L	21.9	22	19.1	23.9	28.5	29.5
Potassium	mg/L	13.3	15.5	14.8	14.5	15.3	19.6
Magnesium	mg/L	12	13.4	13.3	13.3	13.4	17.1
Sodium	mg/L	105	125	141	103	118	168
Sulfate	mg/L	15.1	26.8	15.1	20.2	136	80.9
Phosphorus	mg/L	0.248	0.251	0.493	0.225	0.591	0.105
pH in H ₂ O	pH	8.38	8.4	8.32	8.44	8.37	8.50
TDS (Calculated)	mg/L	349	448	424	375	482	583
Nitrate	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	0.011	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	<0.022	<0.022	<0.022
Hardness as CaCO ₃	mg/L	-	-	102	114	126	144
Alkalinity (total as CaCO ₃)	mg/L	-	-	331	303	263	422
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.396	0.499	0.379	0.736
Field Data							
pH in H ₂ O	pH	8.5	8.9	10.4	EF	8.10	9.00
Conductivity (EC)	uS/cm	623	810	780	788	829	551

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	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	71	70	78	89	98	93
Ammonia-N	mg/L	1.35	<0.050	0.063	0.575	0.191	0.054
Total Kjeldahl Nitrogen	mg/L	3.62	2.55	2.89	3.01	3.13	3.19
Dissolved Organic Carbon	mg/L	25	70	28.0	24.7	25.0	29.7
Phenols	mg/L	-	-	0.0013	0.0087	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	5.2	23.6
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0962	0.0097	0.015	0.0306	0.0366	0.0034
Antimony	mg/L	0.00013	0.00014	0.00022	0.00017	0.00017	0.00024
Arsenic	mg/L	-	-	0.00522	0.00531	0.00537	0.00773
Barium	mg/L	0.0448	0.032	0.0495	0.0421	0.0372	0.0330
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.042	0.04	0.050	0.029	<0.010	0.023
Cadmium	mg/L	<0.0000050	<0.0000050	0.0000172	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	0.0002	<0.00010	0.00011	0.0002	0.00028	<0.00010
Cobalt	mg/L	0.0003	0.0004	0.00063	0.00038	0.00065	0.00078
Copper	mg/L	0.00066	0.0006	0.00071	0.00063	0.00060	0.00119
Iron	mg/L	0.629	0.121	0.136	0.958	0.677	0.016
Lead	mg/L	0.000189	0.000056	0.000112	0.000229	0.000149	<0.000050
Lithium	mg/L	-	-	0.0136	0.0074	0.0076	0.0128
Manganese	mg/L	0.00338	0.00586	0.0135	0.00866	0.223	0.00485
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000596	0.000817	0.00112	0.00076	0.000751	0.00132
Nickel	mg/L	0.00337	0.00397	0.00414	0.00361	0.00335	0.00336
Selenium	mg/L	0.000194	0.000194	0.000273	0.000212	0.000251	0.000271
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000017	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00568	0.00088	0.00113	0.00329	0.00355	0.00031
Uranium	mg/L	-	-	0.000909	0.000234	0.00025	0.000932
Vanadium	mg/L	0.00241	0.0021	0.00256	0.00205	0.00227	0.00399
Zinc	mg/L	0.0012	0.0021	<0.0010	0.0016	<0.0010	0.0022
Routine Water							
Ion Balance	%	104	94.3	110	101	95.7	95.0
Bicarbonate	mg/L	277	281	270	217	210	325
Chloride	mg/L	19.4	17.7	20.6	12.9	13.1	18.3
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	523	510	519	405	439	586
Calcium	mg/L	21.2	20.1	22.3	18.6	16.9	29.8
Potassium	mg/L	19.3	17.5	21.7	17.1	13.6	18.1
Magnesium	mg/L	8.52	7.74	8.55	8.46	7.41	10.8
Sodium	mg/L	75.3	75.3	84.3	51	59.0	84.7
Sulfate	mg/L	11.6	27.2	22.3	15	36.4	48.8
Phosphorus	mg/L	0.931	0.555	0.520	1.38	1.23	0.589
pH in H ₂ O	pH	8.26	8.31	8.17	7.91	8.06	8.30
TDS (Calculated)	mg/L	295	307	313	232	250	368
Nitrate	mg/L	0.588	<0.020	<0.020	0.429	<0.020	<0.020
Nitrite	mg/L	0.077	<0.010	<0.010	0.045	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	0.474	<0.022	<0.022
Hardness as CaCO ₃	mg/L	-	-	90.9	81.3	72.7	119
Alkalinity (total as CaCO ₃)	mg/L	-	-	222	178	172	268
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.104	0.155	0.140	0.256
Field Data							
pH in H ₂ O	pH	8.2	8.7	10.4	EF	7.69	9.13
Conductivity (EC)	uS/cm	517	568	566	496	953	355.1

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	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	80	64	70	83	76	182
Ammonia-N	mg/L	0.685	<0.050	1.17	0.414	0.236	0.090
Total Kjeldahl Nitrogen	mg/L	3.69	2.45	4.37	2.58	2.67	9.30
Dissolved Organic Carbon	mg/L	26.9	64	25.0	23.4	20.8	46.8
Phenols	mg/L	-	-	0.0018	0.0075	0.0017	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	3.4	43.5
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0058	0.0096	0.0643	0.0613	0.0189	0.0176
Antimony	mg/L	0.00013	0.00015	0.00021	0.00012	0.00014	0.00025
Arsenic	mg/L	-	-	0.00407	0.00497	0.00461	0.00725
Barium	mg/L	0.0263	0.0364	0.0655	0.0649	0.0240	0.0357
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.026	0.037	0.044	0.022	<0.010	0.032
Cadmium	mg/L	<0.0000050	0.0000098	<0.0000050	<0.0000050	<0.0000050	0.0000065
Chromium	mg/L	0.00017	<0.00010	0.00028	0.00018	0.00016	0.00011
Cobalt	mg/L	0.00029	0.00048	0.00079	0.00049	0.00025	0.00081
Copper	mg/L	0.00073	0.00091	0.00116	0.00083	0.00095	0.00233
Iron	mg/L	0.268	0.083	0.275	1.51	0.472	0.046
Lead	mg/L	<0.000050	0.00015	0.000218	0.000281	0.000087	0.000056
Lithium	mg/L	-	-	0.0137	0.0071	0.0070	0.0113
Manganese	mg/L	0.00297	0.0198	0.122	0.0361	0.0155	0.0101
Mercury	mg/L	0.000007	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000696	0.000893	0.00102	0.00063	0.000745	0.00176
Nickel	mg/L	0.00433	0.00483	0.00453	0.00341	0.00326	0.00415
Selenium	mg/L	0.000252	0.000205	0.00023	0.000212	0.000249	0.000257
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000018	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.0001	0.00018	<0.00010	<0.00010	<0.00010	0.00012
Titanium	mg/L	0.0013	0.00052	0.00545	0.00488	0.00214	0.00090
Uranium	mg/L	-	-	0.000787	0.000266	0.000275	0.00114
Vanadium	mg/L	0.00253	0.00196	0.0023	0.00206	0.00214	0.00444
Zinc	mg/L	0.0026	0.0122	<0.0010	0.0018	<0.0010	0.0046
Routine Water							
Ion Balance	%	101	94.1	109	97.4	98.6	105
Bicarbonate	mg/L	222	296	278	232	202	289
Chloride	mg/L	11.8	20	21.4	15.6	13.0	17.9
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	408	525	536	435	409	515
Calcium	mg/L	19.3	22.5	24.9	17.4	16.9	26.2
Potassium	mg/L	15.2	18.9	21.8	18.5	15.5	21.3
Magnesium	mg/L	7.55	7.81	8.34	7.74	6.42	9.62
Sodium	mg/L	51.6	76.2	79.7	56.5	54.3	82.2
Sulfate	mg/L	12.5	23	15.7	14.5	24.9	32.8
Phosphorus	mg/L	0.954	0.351	0.580	1.13	1.09	0.865
pH in H ₂ O	pH	8.15	8.22	8.24	8.11	8.12	8.25
TDS (Calculated)	mg/L	227	315	310	246	230	333
Nitrate	mg/L	0.02	<0.020	0.316	0.396	<0.020	0.047
Nitrite	mg/L	0.017	<0.010	<0.010	0.042	0.013	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	0.316	0.437	<0.022	0.047
Hardness as CaCO ₃	mg/L	-	-	96.5	75.3	68.6	105
Alkalinity (total as CaCO ₃)	mg/L	-	-	228	190	165	237
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.118	0.176	0.139	0.236
Field Data							
pH in H ₂ O	pH	8.2	8.6	9.3	10.73	7.81	9.07
Conductivity (EC)	uS/cm	397	581	589	529	923	173

Notes:

"-" Not required under previous permit

Table 1.8: Chemical Analytical Results

Sample ID:		Lyons D.3					
Site Number:		8					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	149	232	171	105	116	378
Ammonia-N	mg/L	0.099	0.082	0.186	<0.050	0.286	2.13
Total Kjeldahl Nitrogen	mg/L	6.45	9.34	8.83	3.66	4.93	18.0
Dissolved Organic Carbon	mg/L	35.8	232	41.4	30.9	30.8	108
Phenols	mg/L	-	-	0.0021	0.0137	<0.0010	<0.003
Total Suspended Solids (TSS)	mg/L	-	-	-	-	52.8	1040
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0166	0.0196	0.0563	0.0192	0.0175	1.28
Antimony	mg/L	0.00043	0.00054	0.00096	0.0003	0.00046	0.00131
Arsenic	mg/L	-	-	0.00277	0.00261	0.00407	0.00556
Barium	mg/L	0.0567	0.0797	0.108	0.0461	0.0697	0.185
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011
Boron	mg/L	0.068	0.079	0.035	0.027	0.014	0.060
Cadmium	mg/L	0.0000078	0.0000064	0.000031	0.0000068	<0.0000050	0.0000423
Chromium	mg/L	0.00015	<0.00010	0.00058	0.00010	0.00011	0.00163
Cobalt	mg/L	0.00123	0.00182	0.00183	0.00161	0.00247	0.00303
Copper	mg/L	0.0046	0.00427	0.00582	0.00484	0.00425	0.00613
Iron	mg/L	0.025	0.021	0.046	0.064	0.050	3.00
Lead	mg/L	<0.000005	<0.000050	0.000076	0.000051	<0.000050	0.00289
Lithium	mg/L	-	-	0.028	0.0166	0.015	0.0234
Manganese	mg/L	0.00127	0.00254	0.00185	0.00279	0.0179	0.166
Mercury	mg/L	0.0000051	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000088
Molybdenum	mg/L	0.00669	0.00966	0.0144	0.00452	0.00583	0.0316
Nickel	mg/L	0.0135	0.0133	0.0151	0.0112	0.0125	0.0195
Selenium	mg/L	0.000916	0.00106	0.00113	0.000684	0.000967	0.00153
Silver	mg/L	<0.000001	<0.000010	<0.000010	<0.000010	<0.000010	0.000018
Thallium	mg/L	<0.000001	<0.000010	0.000021	<0.000010	<0.000010	0.000016
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00098	0.00045	0.0040	0.00244	0.00282	0.0326
Uranium	mg/L	-	-	0.01	0.00318	0.00422	0.0213
Vanadium	mg/L	0.0016	0.00149	0.00126	0.00110	0.00171	0.00605
Zinc	mg/L	<0.0010	<0.0010	<0.0010	0.0017	<0.0010	0.0108
Routine Water							
Ion Balance	%	112	95.2	113	103	97.1	86.0
Bicarbonate	mg/L	353	516	409	413	426	557
Chloride	mg/L	25.7	34.7	48.4	22.3	17.5	66.3
Carbonate	mg/L	7.7	24.6	12.7	14.5	15.7	<5.0
Conductivity (EC)	uS/cm	855	1230	1420	978	816	1470
Calcium	mg/L	42.4	33.3	37.6	41.3	31.8	31.8
Potassium	mg/L	27.6	30.2	29.2	22.2	20.9	26.6
Magnesium	mg/L	21.2	25.8	23.1	24.6	17.1	14.5
Sodium	mg/L	118	198	270	149	126	262
Sulfate	mg/L	89.4	167	280	138	60.5	306
Phosphorus	mg/L	0.721	0.741	0.737	0.290	0.447	0.228
pH in H ₂ O	pH	8.45	8.73	8.57	8.60	8.60	8.31
TDS (Calculated)	mg/L	507	771	906	615	500	985
Nitrate	mg/L	<0.020	<0.020	0.689	<0.020	0.079	0.096
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	0.020	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	0.689	<0.022	0.099	0.096
Hardness as CaCO ₃	mg/L	-	-	189	204	150	139
Alkalinity (total as CaCO ₃)	mg/L	-	-	357	362	376	460
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.478	0.472	0.616	1.62
Field Data							
pH in H ₂ O	pH	9.0	9.2	10.1	7.24	8.54	8.58
Conductivity (EC)	uS/cm	876	1346	1488	1198	861	845

Notes:

"-" Not required under previous permit

Table 1.9: Chemical Analytical Results

Sample ID:		Lyons D.4					
Site Number:		9					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	120	202	221	137	137	258
Ammonia-N	mg/L	0.111	3.04	1.82	0.397	0.888	0.43
Total Kjeldahl Nitrogen	mg/L	6.87	11.1	10.3	4.26	4.02	9.10
Dissolved Organic Carbon	mg/L	49.2	202	74.0	42.9	43.2	85.3
Phenols	mg/L	-	-	0.0019	0.0088	0.0013	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	61.0	96
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0755	0.0785	0.0911	0.0764	0.125	0.221
Antimony	mg/L	0.00024	0.00047	0.00058	0.00024	0.00024	0.00117
Arsenic	mg/L	-	-	0.00685	0.00314	0.00702	0.00526
Barium	mg/L	0.0338	0.0643	0.0935	0.0406	0.0370	0.153
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	<0.010	0.026	0.040	0.024	0.011	0.053
Cadmium	mg/L	0.0000097	0.0000079	0.0000297	0.0000099	<0.0000050	0.0000115
Chromium	mg/L	0.00042	0.00025	0.00033	0.00031	0.00035	0.00048
Cobalt	mg/L	0.00063	0.00197	0.0022	0.00060	0.00092	0.00232
Copper	mg/L	0.00152	0.00243	0.00383	0.00123	0.00083	0.00522
Iron	mg/L	0.995	0.108	0.168	0.922	1.32	0.068
Lead	mg/L	0.00028	0.000059	0.000125	0.000283	0.000366	0.000096
Lithium	mg/L	-	-	0.0339	0.016	0.0156	0.0362
Manganese	mg/L	0.00355	0.147	0.0927	0.00266	0.0884	0.0828
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00113	0.00311	0.00662	0.00164	0.000964	0.0136
Nickel	mg/L	0.00526	0.00965	0.0132	0.00455	0.00468	0.0139
Selenium	mg/L	0.000393	0.000497	0.000795	0.000262	0.000408	0.000441
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000019	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.0061	0.00269	0.0104	0.00661	0.0117	0.00754
Uranium	mg/L	-	-	0.00446	0.000924	0.000664	0.0113
Vanadium	mg/L	0.00334	0.00415	0.00393	0.00222	0.00294	0.00398
Zinc	mg/L	0.0027	0.0017	<0.0010	0.0024	<0.0010	0.0022
Routine Water							
Ion Balance	%	110	97.7	112	101	102	98.8
Bicarbonate	mg/L	356	619	564	442	375	734
Chloride	mg/L	29.8	47.5	48.6	22.9	21.0	77.8
Carbonate	mg/L	<5	<5.0	<5.0	<5.0	<5.0	20.2
Conductivity (EC)	uS/cm	675	1050	1050	734	639	1430
Calcium	mg/L	23.5	28.8	28.6	22.2	23.5	36.5
Potassium	mg/L	35.6	45.2	43.5	26.8	28.1	61.4
Magnesium	mg/L	12.4	16.1	16.5	12.7	11.6	21.0
Sodium	mg/L	101	175	197	121	94.5	264
Sulfate	mg/L	6.68	14.9	28.9	5.32	3.99	81.2
Phosphorus	mg/L	2.2	0.98	1.89	0.614	2.71	0.315
pH in H ₂ O	pH	8.4	8.06	8.29	8.23	8.39	8.59
TDS (Calculated)	mg/L	389	640	644	431	373	936
Nitrate	mg/L	<0.020	0.243	0.157	0.336	0.141	2.56
Nitrite	mg/L	<0.010	0.086	<0.010	0.030	0.058	0.050
Nitrate and Nitrite (as N)	mg/L	-	-	0.157	0.365	0.20	2.61
Hardness as CaCO ₃	mg/L	-	-	139	108	106	178
Alkalinity (total as CaCO ₃)	mg/L	-	-	466	363	316	635
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.39	0.369	0.307	1.20
Field Data							
pH in H ₂ O	pH	8.5	8.6	10.2	6.14	8.08	8.60
Conductivity (EC)	uS/cm	703	1170	1133	897	666	68

Notes:

"-" Not required under previous permit

Table 1.10: Chemical Analytical Results

Sample ID:		Magneson D.1					
Site Number:		10					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	320	323	268	339	280	272
Ammonia-N	mg/L	0.571	0.200	0.123	0.104	0.166	0.26
Total Kjeldahl Nitrogen	mg/L	12.3	11.7	10.4	11.0	9.55	8.70
Dissolved Organic Carbon	mg/L	106	323	91.0	102	85.6	84.0
Phenols	mg/L	-	-	0.0017	0.0084	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	4.4	10.6
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.168	0.0146	0.302	0.039	0.187	0.583
Antimony	mg/L	0.00045	0.00057	0.00059	0.0005	0.00054	0.00072
Arsenic	mg/L	-	-	0.0181	0.0175	0.0169	0.0225
Barium	mg/L	0.0623	0.0562	0.0720	0.0701	0.0728	0.0553
Beryllium	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00050
Boron	mg/L	0.107	0.091	0.091	0.091	0.097	0.125
Cadmium	mg/L	0.00005	0.000038	0.000056	0.00005	0.000024	0.000031
Chromium	mg/L	0.00114	0.00096	0.00115	0.00092	0.00097	0.00109
Cobalt	mg/L	0.00442	0.00637	0.00608	0.0051	0.00494	0.00628
Copper	mg/L	0.094	0.0532	0.0521	0.0255	0.0184	0.0301
Iron	mg/L	1.41	0.822	1.41	1.08	1.40	0.887
Lead	mg/L	0.00134	0.00076	0.00118	0.00105	0.00131	0.00091
Lithium	mg/L	-	-	0.0639	0.0537	0.0541	0.0777
Manganese	mg/L	0.179	0.451	0.333	0.587	0.621	0.521
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000086	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00523	0.00447	0.00457	0.00327	0.00339	0.00439
Nickel	mg/L	0.0287	0.0288	0.0293	0.0243	0.0200	0.0255
Selenium	mg/L	0.00077	0.00096	0.00099	0.00080	0.00087	0.00105
Silver	mg/L	0.000034	<0.000020	<0.000020	<0.000020	<0.000020	<0.000050
Thallium	mg/L	<0.000020	<0.000020	0.000023	<0.000020	<0.000020	<0.000050
Tin	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00050
Titanium	mg/L	0.0135	0.00819	0.0552	0.00886	0.0281	0.0271
Uranium	mg/L	-	-	0.00196	0.00185	0.00221	0.00292
Vanadium	mg/L	0.0152	0.0155	0.0154	0.0131	0.0122	0.0189
Zinc	mg/L	0.0123	0.0091	0.0071	0.0076	0.0063	0.0103
Routine Water							
Ion Balance	%	108	91.7	103	102	98.1	97.9
Bicarbonate	mg/L	540	688	617	609	578	707
Chloride	mg/L	174	200	197	202	217	281
Carbonate	mg/L	15	<5.0	17.9	16.1	22.7	24.1
Conductivity (EC)	uS/cm	2030	2190	2150	2150	2230	2690
Calcium	mg/L	48.8	46.1	51.1	51.7	56.8	74.9
Potassium	mg/L	131	132	127	135	116	152
Magnesium	mg/L	25.1	24	26.9	31.0	31.9	43.5
Sodium	mg/L	304	305	327	326	347	426
Sulfate	mg/L	250	250	252	284	363	480
Phosphorus	mg/L	7.1	7.43	8.88	8.91	7.55	7.01
pH in H ₂ O	pH	8.54	8.3	8.54	8.52	8.60	8.61
TDS (Calculated)	mg/L	1220	1330	1310	1350	1440	1830
Nitrate	mg/L	0.43	1.4	0.958	1.12	0.85	1.07
Nitrite	mg/L	0.034	<0.050	<0.020	<0.020	0.062	0.018
Nitrate and Nitrite (as N)	mg/L	-	-	0.958	1.12	0.91	1.09
Hardness as CaCO ₃	mg/L	-	-	238	257	273	366
Alkalinity (total as CaCO ₃)	mg/L	-	-	536	526	512	620
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.129	0.297	0.310	0.365
Field Data							
pH in H ₂ O	pH	8.8	8.1	10.2	9.73	8.63	8.77
Conductivity (EC)	uS/cm	2030	2360	2290	2.66	2390	278

Notes:

"-" Not required under previous permit

Table 1.11: Chemical Analytical Results

Sample ID:		Magneson D.2					
Site Number:		11					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	126	188	160	114	196	Dry
Ammonia-N	mg/L	0.076	0.749	0.137	0.063	<0.050	
Total Kjeldahl Nitrogen	mg/L	4.64	8.26	6.13	3.46	7.09	
Dissolved Organic Carbon	mg/L	41.3	188	60.0	33.5	54.6	
Phenols	mg/L	-	-	0.0028	0.0142	0.0010	
Total Suspended Solids (TSS)	mg/L	-	-	-	-	345	
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	Dry
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	
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	
Xylenes	mg/L	<0.00071	<0.00071	<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	<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	<0.13	<0.10	<0.10	<0.10	<0.10	
Dissolved Metals							
Aluminium	mg/L	0.132	0.0858	0.217	0.168	0.0606	Dry
Antimony	mg/L	0.00021	0.00034	0.00024	0.00018	0.00026	
Arsenic	mg/L	-	-	0.0137	0.00332	0.00542	
Barium	mg/L	0.0276	0.0547	0.0136	0.0524	0.0423	
Beryllium	mg/L	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	
Boron	mg/L	0.038	0.028	0.036	0.024	0.031	
Cadmium	mg/L	0.0000108	0.0000207	0.0000249	0.0000153	0.0000129	
Chromium	mg/L	0.00034	0.00027	0.00053	0.00034	0.00035	
Cobalt	mg/L	0.00079	0.00164	0.00070	0.00057	0.00124	
Copper	mg/L	0.00204	0.00454	0.00276	0.00211	0.00224	
Iron	mg/L	0.7	0.134	0.197	1.43	0.683	
Lead	mg/L	0.000212	0.000154	0.000151	0.000582	0.000394	
Lithium	mg/L	-	-	0.0124	0.0104	0.0118	
Manganese	mg/L	0.00264	0.0402	0.0111	0.00213	0.0308	
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	
Molybdenum	mg/L	0.00198	0.00451	0.00352	0.00111	0.00138	
Nickel	mg/L	0.00687	0.0105	0.00544	0.00512	0.00635	
Selenium	mg/L	0.000297	0.000603	0.000474	0.000263	0.000417	
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Thallium	mg/L	<0.000010	<0.000010	0.000018	<0.000010	<0.000010	
Tin	mg/L	<0.00010	0.00025	<0.00010	<0.00010	<0.00010	
Titanium	mg/L	0.0056	0.00306	0.0158	0.0141	0.00792	
Uranium	mg/L	-	-	0.00188	0.000954	0.00203	
Vanadium	mg/L	0.00443	0.0038	0.0122	0.00364	0.00603	
Zinc	mg/L	0.0019	0.0037	<0.0010	0.0015	<0.0010	
Routine Water							
Ion Balance	%	114	92.1	107	102	100	Dry
Bicarbonate	mg/L	241	527	332	296	338	
Chloride	mg/L	22.4	54.4	48.5	19.2	27.6	
Carbonate	mg/L	<5	<5.0	12.7	<5.0	<5.0	
Conductivity (EC)	uS/cm	499	967	760	516	625	
Calcium	mg/L	22.8	26.1	19.9	20.8	21.0	
Potassium	mg/L	34	45.8	39.1	32.9	33.5	
Magnesium	mg/L	9.57	12.2	8.43	9.31	9.13	
Sodium	mg/L	58.6	143	128	69.1	91.7	
Sulfate	mg/L	2.91	14.1	21.6	5.44	14.5	
Phosphorus	mg/L	1.93	0.622	2.28	1.21	2.61	
pH in H ₂ O	pH	8.28	8.26	8.68	8.19	8.39	
TDS (Calculated)	mg/L	270	559	442	303	369	
Nitrate	mg/L	0.248	0.176	<0.020	0.253	<0.020	
Nitrite	mg/L	<0.010	0.017	<0.010	<0.010	<0.010	
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	0.253	<0.022	
Hardness as CaCO ₃	mg/L	-	-	84.4	90.3	90.0	
Alkalinity (total as CaCO ₃)	mg/L	-	-	293	242	285	
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	
Fluoride	mg/L	-	-	0.284	0.228	0.252	
Field Data							
pH in H ₂ O	pH	8.8	8.8	11.4	10.3	8.42	Dry
Conductivity (EC)	uS/cm	508	1052	786	650	662	

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	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	37	57	Not analyzed	119	48	12
Ammonia-N	mg/L	<0.050	<0.050		<0.050	<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	1.29	1.79		3.49	2.02	0.57
Dissolved Organic Carbon	mg/L	17.3	57		17.9	15.1	8.3
Phenols	mg/L	-	-		0.0136	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-		-	19.2	7.4
BTEX, F1 (C6-C10) and F2 (>C10-C16)							
Benzene	mg/L	<0.00050	<0.00050	Not analyzed	<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	-	-		<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-		<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071		<0.00071	<0.00071	<0.00071
Styrene	mg/L	-	-		<0.00050	<0.00050	<0.00050
F1 (C6-C10)	mg/L	<0.10	<0.10		<0.10	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
F2 - (>C10-C16)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	
Dissolved Metals							
Aluminium	mg/L	0.0023	0.0149	Not analyzed	0.0033	0.0088	0.0125
Antimony	mg/L	0.00031	0.00027		0.00029	0.00029	0.00028
Arsenic	mg/L	-	-		0.00194	0.00169	0.00105
Barium	mg/L	0.0264	0.0913		0.0773	0.053	0.0364
Beryllium	mg/L	<0.00010	<0.00010		<0.00010	<0.00010	<0.00010
Boron	mg/L	0.061	0.071		0.060	0.062	0.050
Cadmium	mg/L	0.0000249	0.0000585		0.0000188	<0.0000050	0.0000153
Chromium	mg/L	<0.00010	<0.00010		0.00016	<0.00010	0.00029
Cobalt	mg/L	0.00018	0.00039		0.00052	0.00022	<0.00010
Copper	mg/L	0.0013	0.00283		0.00242	0.0011	0.00276
Iron	mg/L	<0.010	0.019		0.015	0.013	<0.010
Lead	mg/L	<0.000050	0.000087		<0.000050	<0.000050	<0.000050
Lithium	mg/L	-	-		0.0409	0.0411	0.0202
Manganese	mg/L	0.00027	0.0211		0.00123	0.00125	0.00067
Mercury	mg/L	<0.0000050	<0.0000050		<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.0302	0.0206		0.0254	0.0234	0.0364
Nickel	mg/L	0.0172	0.0121		0.0203	0.0146	0.00476
Selenium	mg/L	0.000322	0.000233		0.000304	0.000259	0.000246
Silver	mg/L	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	0.00033		<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00144		<0.00030	0.00105	<0.00030
Uranium	mg/L	-	-	0.00247	0.00265	0.00127	
Vanadium	mg/L	0.0164	0.00285	0.00262	0.00154	0.00122	
Zinc	mg/L	0.0015	0.0057	0.0028	<0.0010	0.0044	
Routine Water							
Ion Balance	%	99.8	94.8	Not analyzed	102	95.2	98.5
Bicarbonate	mg/L	256	334		268	282	117
Chloride	mg/L	18.2	18.3		14.7	13.6	49.9
Carbonate	mg/L	<5.0	6.4		<5.0	5.0	<5.0
Conductivity (EC)	uS/cm	943	1020		960	947	772
Calcium	mg/L	27.9	29.1		49.1	41.3	43.7
Potassium	mg/L	10.4	11.1		13.6	12.2	3.22
Magnesium	mg/L	15.5	15.3		17.4	16.1	13.5
Sodium	mg/L	153	162		139	144	109
Sulfate	mg/L	234	209		252	253	235
Phosphorus	mg/L	0.038	0.051		0.185	0.081	<0.050
pH in H ₂ O	pH	8.23	8.44		8.38	8.40	7.87
TDS (Calculated)	mg/L	585	616		623	625	478
Nitrate	mg/L	<0.020	<0.020		0.029	<0.020	<0.020
Nitrite	mg/L	<0.010	<0.010		<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-		0.029	<0.022	<0.022
Hardness as CaCO ₃	mg/L	-	-		194	169	165
Alkalinity (total as CaCO ₃)	mg/L	-	-		227	240	95.6
Hydroxide	mg/L	-	-		<5.0	<5.0	<5.0
Fluoride	mg/L	-	-		0.465	0.450	0.459
Field Data							
pH in H ₂ O	pH	8.8	8.8	Not analyzed	11.68	8.36	8.48
Conductivity (EC)	uS/cm	930	1116		1203	1017	483

Notes:

"-" Not required under previous permit

Table 1.13: Chemical Analytical Results

Sample ID:		Magneson D.4					
Site Number:		13					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	1300	1930	960	1370	1300	3420
Ammonia-N	mg/L	3.13	1.37	0.409	2.85	2.02	<2.5
Total Kjeldahl Nitrogen	mg/L	56.1	62	39.4	43.7	42.6	122
Dissolved Organic Carbon	mg/L	507	1930	329	415	295	1070
Phenols	mg/L	-	-	<0.01	0.0116	0.0013	0.0054
Total Suspended Solids (TSS)	mg/L	-	-	-	-	24.4	1660
BTEX, F1 (C6-C10) and F2 (>C10-C16)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.273	0.149	0.145	0.080	0.0915	0.167
Antimony	mg/L	0.00082	0.00088	0.00082	0.00064	0.00074	0.0021
Arsenic	mg/L	-	-	0.0327	0.0275	0.0310	0.0841
Barium	mg/L	0.188	0.236	0.383	0.166	0.195	0.436
Beryllium	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.001
Boron	mg/L	0.289	0.302	0.267	0.204	0.223	0.46
Cadmium	mg/L	0.00094	0.00061	0.00064	0.00079	0.00036	0.00131
Chromium	mg/L	0.00483	0.00492	0.00482	0.00285	0.00373	0.0077
Cobalt	mg/L	0.0128	0.0108	0.00594	0.00794	0.00817	0.0157
Copper	mg/L	0.0138	0.0093	0.0069	0.0093	0.0103	0.0364
Iron	mg/L	3.92	2.86	3.26	1.99	3.63	7.34
Lead	mg/L	0.00385	0.00305	0.00422	0.00304	0.00391	0.00584
Lithium	mg/L	-	-	0.128	0.0902	0.0902	0.330
Manganese	mg/L	0.945	1.06	1.39	0.748	0.882	1.80
Mercury	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Molybdenum	mg/L	0.00911	0.00492	0.00333	0.00193	0.00371	0.0242
Nickel	mg/L	0.0497	0.045	0.0350	0.0350	0.0394	0.0967
Selenium	mg/L	0.00192	0.00218	0.00159	0.00142	0.00184	0.00626
Silver	mg/L	0.000092	0.000075	0.00009	<0.000050	<0.000050	0.00012
Thallium	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.00010
Tin	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010
Titanium	mg/L	0.0677	0.0592	0.0716	0.0444	0.0700	0.103
Uranium	mg/L	-	-	0.00295	0.00214	0.00303	0.0119
Vanadium	mg/L	0.0336	0.0351	0.0277	0.0286	0.0276	0.0466
Zinc	mg/L	0.0421	0.0297	0.0247	0.032	0.0233	0.0410
Routine Water							
Ion Balance	%	114	98.6	101	110	96.9	96.2
Bicarbonate	mg/L	1080	1830	1580	1310	1430	3440
Chloride	mg/L	615	932	894	603	668	3040
Carbonate	mg/L	65.1	94.1	87.5	47.6	64.6	522
Conductivity (EC)	uS/cm	4620	6910	6470	4570	4960	16,400
Calcium	mg/L	89.2	105	118	84.2	82.2	109
Potassium	mg/L	610	870	717	634	602	2420
Magnesium	mg/L	60.3	90	84.4	71.6	69.2	262
Sodium	mg/L	560	881	844	596	655	2840
Sulfate	mg/L	308	659	637	361	530	2940
Phosphorus	mg/L	34.8	44.7	31.3	26.9	26.8	34.8
pH in H ₂ O	pH	8.74	8.74	8.73	8.64	8.68	9.12
TDS (Calculated)	mg/L	2840	4580	4160	3040	3380	11,000
Nitrate	mg/L	<0.10	1.35	0.33	0.570	0.26	<0.20
Nitrite	mg/L	<0.050	<0.050	<0.050	0.083	0.073	<0.10
Nitrate and Nitrite (as N)	mg/L	-	-	0.33	0.65	0.33	<0.22
Hardness as CaCO ₃	mg/L	-	-	642	505	490	1350
Alkalinity (total as CaCO ₃)	mg/L	-	-	1440	1150	1280	3690
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	<0.1	<0.10	1.19	0.270
Field Data							
pH in H ₂ O	pH	9.2	8.7	10.4	9.81	8.59	9.36
Conductivity (EC)	uS/cm	4480	7210	2230	6.83	5430	5513

Notes:

"-" Not required under previous permit

Table 1.14: Chemical Analytical Results

Sample ID:		Magneson D.5					
Site Number:		14					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	184	268	243	370	380	670
Ammonia-N	mg/L	0.138	2.42	0.455	0.600	0.210	0.37
Total Kjeldahl Nitrogen	mg/L	6.84	11.6	10.0	13.9	14.6	23.0
Dissolved Organic Carbon	mg/L	62.4	268	88.0	100	100	171
Phenols	mg/L	-	-	0.0025	0.0071	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	73.0	359
BTEX, F1 (C6-C10) and F2 (>C10-C16)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0636	0.297	0.0245	0.0182	0.0145	1.21
Antimony	mg/L	0.00049	0.00045	0.00101	0.00073	0.00059	0.00079
Arsenic	mg/L	-	-	0.019	0.0155	0.0168	0.0221
Barium	mg/L	0.0324	0.0255	0.0764	0.0337	0.0317	0.0979
Beryllium	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00050
Boron	mg/L	0.038	<0.020	<0.020	0.048	0.059	0.079
Cadmium	mg/L	<0.000010	<0.000010	0.000019	0.000012	<0.000010	0.000026
Chromium	mg/L	0.00043	0.00068	0.00025	0.00055	0.00051	0.00153
Cobalt	mg/L	0.00169	0.00234	0.00364	0.00428	0.00328	0.0032
Copper	mg/L	0.00214	0.00112	0.0052	0.00527	0.00426	0.004
Iron	mg/L	0.322	0.223	0.070	0.277	0.178	1.38
Lead	mg/L	0.00024	0.00021	0.00011	0.00037	0.00017	0.00235
Lithium	mg/L	-	-	0.0576	0.0533	0.050	0.0786
Manganese	mg/L	0.0381	0.633	0.00515	0.220	0.218	0.342
Mercury	mg/L	0.0000118	<0.0000050	<0.0000050	0.0000063	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00595	0.00653	0.0110	0.00592	0.00596	0.016
Nickel	mg/L	0.0165	0.0168	0.0232	0.0225	0.0181	0.0228
Selenium	mg/L	0.00067	0.00062	0.00078	0.00088	0.00096	0.00121
Silver	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000050
Thallium	mg/L	<0.000020	<0.000020	<0.00002	<0.000020	<0.000020	<0.000050
Tin	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00050
Titanium	mg/L	0.00805	0.0116	0.00511	0.00459	0.00431	0.0411
Uranium	mg/L	-	-	0.00351	0.0023	0.00191	0.00347
Vanadium	mg/L	0.0178	0.018	0.0188	0.0269	0.0142	0.0189
Zinc	mg/L	0.0028	0.0033	<0.0020	0.004	0.0039	0.0088
Routine Water							
Ion Balance	%	107	94.4	99.5	104	99.7	75.6
Bicarbonate	mg/L	589	1100	932	850	795	1440
Chloride	mg/L	71.4	143	145	175	207	476
Carbonate	mg/L	22.4	18.7	37.6	21.7	40.1	107
Conductivity (EC)	uS/cm	1520	2080	2030	2120	2230	3780
Calcium	mg/L	38.5	43.4	35.6	50.3	45.7	83.3
Potassium	mg/L	54.5	83.8	67.2	119	122	137
Magnesium	mg/L	20.4	26.1	18.2	35.9	30.6	41.6
Sodium	mg/L	263	375	391	353	370	572
Sulfate	mg/L	144	45.4	71.6	162	185	333
Phosphorus	mg/L	5.4	5.82	2.99	10.1	12.5	2.17
pH in H ₂ O	pH	8.64	8.45	8.66	8.53	8.78	8.89
TDS (Calculated)	mg/L	904	1300	1230	1340	1390	2460
Nitrate	mg/L	<0.040	0.19	<0.040	0.557	0.19	<0.20
Nitrite	mg/L	<0.020	0.053	<0.020	<0.020	0.065	<0.10
Nitrate and Nitrite (as N)	mg/L	-	-	<0.045	0.557	0.25	<0.22
Hardness as CaCO ₃	mg/L	-	-	164	273	240	379
Alkalinity (total as CaCO ₃)	mg/L	-	-	827	733	719	1360
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.512	0.180	0.480	1.01
Field Data							
pH in H ₂ O	pH	8.9	8.8	10.6	11.75	8.81	9.13
Conductivity (EC)	uS/cm	1509	2310	2140	2.78	2300	2551

Notes:

"-" Not required under previous permit

Table 1.15: Chemical Analytical Results

Sample ID:		Magneson D.6					
Site Number:		15					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	106	127	125	125	88	148
Ammonia-N	mg/L	0.056	0.27	<0.050	<0.050	<0.050	0.28
Total Kjeldahl Nitrogen	mg/L	4.16	4.05	4.58	4.16	3.27	2.55
Dissolved Organic Carbon	mg/L	33	127	43.0	33.1	26.6	39.0
Phenols	mg/L	-	-	0.0021	0.013	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	11.2	14.2
BTEX, F1 (C6-C10) and F2 (>C10-C16)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0167	<0.0050	0.0151	0.0051	0.0136	0.0211
Antimony	mg/L	0.0007	0.00103	0.00113	0.00086	0.00067	0.00107
Arsenic	mg/L	-	-	0.019	0.0134	0.0139	0.0337
Barium	mg/L	0.0266	0.0375	0.0302	0.0512	0.0370	0.0465
Beryllium	mg/L	<0.00050	<0.00050	<0.00020	<0.00020	<0.00020	<0.00050
Boron	mg/L	0.279	0.337	0.301	0.237	0.230	0.302
Cadmium	mg/L	<0.000025	<0.000025	0.000018	0.000012	<0.000010	<0.000025
Chromium	mg/L	<0.0005	<0.00050	<0.00020	<0.00020	<0.00020	<0.00050
Cobalt	mg/L	0.00086	0.00133	0.00089	0.00075	0.0011	0.00084
Copper	mg/L	0.0016	<0.0010	0.00103	0.00174	0.00085	0.0013
Iron	mg/L	<0.050	0.063	0.037	0.023	0.082	<0.050
Lead	mg/L	<0.00025	<0.00025	<0.00010	<0.00010	<0.00010	<0.00025
Lithium	mg/L	-	-	0.13	0.0978	0.088	0.148
Manganese	mg/L	0.00561	0.532	0.00962	0.00599	0.172	0.505
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00254	0.0016	0.00211	0.00179	0.00128	0.00099
Nickel	mg/L	0.0069	0.0086	0.0067	0.0082	0.0059	0.0070
Selenium	mg/L	0.00037	<0.00025	0.00032	0.00029	0.00027	0.00029
Silver	mg/L	<0.000050	<0.000050	<0.000020	<0.000020	<0.000020	<0.000050
Thallium	mg/L	<0.000050	<0.000050	<0.00002	<0.000020	<0.000020	<0.000050
Tin	mg/L	<0.00050	<0.00050	<0.00020	<0.00020	<0.00020	<0.00050
Titanium	mg/L	<0.0015	<0.0015	0.00146	0.00134	0.00232	<0.0015
Uranium	mg/L	-	-	0.00442	0.00507	0.0040	0.00358
Vanadium	mg/L	0.0052	0.0044	0.0042	0.0063	0.0026	0.0040
Zinc	mg/L	<0.0050	<0.0050	0.0020	<0.0020	<0.0020	<0.0050
Routine Water							
Ion Balance	%	106	94.3	98.7	101	101	93.0
Bicarbonate	mg/L	343	694	538	520	427	577
Chloride	mg/L	235	340	359	286	294	453
Carbonate	mg/L	13.1	20	14.5	16.6	11.2	12.7
Conductivity (EC)	uS/cm	2790	4020	4070	3120	3050	4140
Calcium	mg/L	40.2	70.2	41.7	97.9	91.4	83.6
Potassium	mg/L	27.1	29.6	29.8	34.1	26.6	40.2
Magnesium	mg/L	42.5	56.4	58.5	56.6	57.8	82.8
Sodium	mg/L	528	729	794	558	510	823
Sulfate	mg/L	711	1030	1120	818	772	1380
Phosphorus	mg/L	0.385	0.963	0.486	0.745	0.582	1.25
pH in H ₂ O	pH	8.56	8.52	8.47	8.52	8.48	8.47
TDS (Calculated)	mg/L	1770	2620	2680	2120	1970	2920
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.050	<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
Hardness as CaCO ₃	mg/L	-	-	345	478	466	550
Alkalinity (total as CaCO ₃)	mg/L	-	-	465	454	369	494
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.22	0.35	0.290	0.380
Field Data							
pH in H ₂ O	pH	9.5	8.5	10.9	9.48	8.37	8.55
Conductivity (EC)	uS/cm	2730	4300	4140	3.82	3170	2705

Notes:

"-" Not required under previous permit

Table 1.16: Chemical Analytical Results

Sample ID:		Beaver D.1					
Site Number:		16					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	74	56	66	93	84	114
Ammonia-N	mg/L	<0.05	1.00	1.10	0.071	0.200	2.20
Total Kjeldahl Nitrogen	mg/L	2.67	2.78	4.27	2.46	3.01	2.38
Dissolved Organic Carbon	mg/L	22.5	56.0	25.6	28.1	26.2	36.8
Phenols	mg/L	-	-	0.0023	0.0099	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	8.0	12
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0011	0.008	0.0064	0.0036	0.0039	0.0218
Antimony	mg/L	0.00024	0.00023	0.00024	0.00022	0.00027	0.00057
Arsenic	mg/L	-	-	0.00455	0.00586	0.00534	0.0131
Barium	mg/L	0.0581	0.0707	0.0833	0.0489	0.0504	0.0955
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.058	0.037	0.051	0.039	0.020	0.041
Cadmium	mg/L	<0.0000050	0.000005	<0.0000050	0.0000056	<0.0000050	0.0000066
Chromium	mg/L	<0.00010	<0.00010	<0.00010	0.00013	0.00014	0.00016
Cobalt	mg/L	0.0003	0.00078	0.00094	0.00038	0.00050	0.00136
Copper	mg/L	0.00034	0.00101	0.00057	0.00071	0.00037	0.00154
Iron	mg/L	0.011	0.033	0.026	0.049	0.125	0.032
Lead	mg/L	<0.000050	0.000075	<0.000050	<0.000050	<0.000050	0.000059
Lithium	mg/L	-	-	0.0329	0.0308	0.0262	0.0443
Manganese	mg/L	0.00062	0.182	0.387	0.00491	0.134	0.494
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000986	0.00105	0.00153	0.00067	0.00047	0.00268
Nickel	mg/L	0.00521	0.00592	0.00697	0.00493	0.00347	0.00754
Selenium	mg/L	0.000194	0.000206	0.000284	0.000205	0.000184	0.000491
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000015	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	0.00016	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00044	0.00086	0.00069	0.00114	0.00121
Uranium	mg/L	-	-	0.00225	0.00115	0.000827	0.00362
Vanadium	mg/L	0.00328	0.00439	0.00363	0.00324	0.00251	0.00877
Zinc	mg/L	<0.0010	0.0098	<0.0010	<0.0010	<0.0010	0.0044
Routine Water							
Ion Balance	%	100	104	103	109	98.5	98.0
Bicarbonate	mg/L	396	566	451	464	479	714
Chloride	mg/L	137	203	237	182	150	274
Carbonate	mg/L	8.4	<5.0	7.9	6.7	7.4	22.8
Conductivity (EC)	uS/cm	1230	1660	1780	1490	1400	2010
Calcium	mg/L	49.4	58.5	67.2	53.7	45.5	75.0
Potassium	mg/L	16.8	20.6	19.6	19.1	15.3	25.4
Magnesium	mg/L	20.4	26.6	28.5	28.2	21.0	34.7
Sodium	mg/L	185	279	275	266	233	367
Sulfate	mg/L	93.7	98	163	131	116	173
Phosphorus	mg/L	0.612	0.82	0.464	1.41	1.68	1.30
pH in H ₂ O	pH	8.44	8.08	8.39	8.37	8.42	8.58
TDS (Calculated)	mg/L	705	967	1020	915	824	1230
Nitrate	mg/L	<0.020	<0.10	0.299	<0.020	<0.020	0.153
Nitrite	mg/L	<0.010	<0.050	<0.010	<0.010	0.017	0.149
Nitrate and Nitrite (as N)	mg/L	-	-	0.299	<0.022	<0.022	0.302
Hardness as CaCO ₃	mg/L	-	-	285	250	200	330
Alkalinity (total as CaCO ₃)	mg/L	-	-	383	392	405	623
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.129	0.208	0.179	0.398
Field Data							
pH in H ₂ O	pH	8.5	8.1	9.6	10.32	8.15	8.53
Conductivity (EC)	uS/cm	1225	1863	1875	1940	1458	1307

Notes:

"-" Not required under previous permit

Table 1.18: Chemical Analytical Results

Sample ID:		Beaver D.2						
Site Number:		18						
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021	
Chem. O ₂ Demand	mg/L	80	78	35	158	106	Not monitored	
Ammonia-N	mg/L	0.553	<0.050	<0.050	<0.050	0.183		
Total Kjeldahl Nitrogen	mg/L	2.67	2.74	1.71	4.19	3.29		
Dissolved Organic Carbon	mg/L	27.7	78	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	<0.00050	<0.00050	Not monitored	
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		
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050		
Xylenes	mg/L	<0.00071	<0.00071	<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	<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	<0.13	<0.10	<0.10	<0.10	<0.10		
Dissolved Metals								
Aluminium	mg/L	0.0086	0.0025	0.0034	0.0035	0.0195	Not monitored	
Antimony	mg/L	0.00012	0.00011	0.00027	0.00021	0.00015		
Arsenic	mg/L	-	-	0.00107	0.00247	0.00172		
Barium	mg/L	0.0642	0.0801	0.0924	0.0716	0.0934		
Beryllium	mg/L	<0.00010	<0.00010	<0.00020	<0.00020	<0.00010		
Boron	mg/L	0.077	0.032	0.024	0.053	0.017		
Cadmium	mg/L	<0.0000050	<0.0000050	0.000018	<0.000010	<0.0000050		
Chromium	mg/L	0.00015	0.00013	<0.0002	<0.00020	0.00019		
Cobalt	mg/L	0.00033	0.00048	0.0101	0.00040	0.00062		
Copper	mg/L	0.00022	0.00031	0.00127	0.00049	0.00027		
Iron	mg/L	0.129	0.081	0.064	0.111	0.505		
Lead	mg/L	<0.000050	<0.000050	<0.00010	<0.00010	0.000172		
Lithium	mg/L	-	-	0.0698	0.0423	0.0294		
Manganese	mg/L	0.00168	0.229	5.26	0.00533	0.713		
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050		
Molybdenum	mg/L	0.000341	0.000524	0.00304	0.00095	0.000111		
Nickel	mg/L	0.00333	0.00448	0.0113	0.0042	0.00261		
Selenium	mg/L	0.000118	0.000092	0.00013	0.00018	0.000429		
Silver	mg/L	<0.000010	<0.000010	<0.000020	<0.000020	<0.000010		
Thallium	mg/L	<0.000010	<0.000010	0.000022	<0.000020	<0.000010		
Tin	mg/L	<0.00010	<0.00010	<0.00020	<0.00020	<0.00010		
Titanium	mg/L	0.00072	0.00033	<0.00060	<0.0006	0.00065		
Uranium	mg/L	-	-	0.0197	0.000974	0.000385		
Vanadium	mg/L	0.0016	0.00151	<0.0010	0.0013	<0.00050		
Zinc	mg/L	0.0013	0.0012	0.0064	<0.0020	0.0028		
Routine Water								
Ion Balance	%	104	97.9	109	107	97.1		Not monitored
Bicarbonate	mg/L	417	573	558	784	598		
Chloride	mg/L	156	265	688	285	235		
Carbonate	mg/L	11.2	10.3	<5.0	<5.0	5.0		
Conductivity (EC)	uS/cm	1180	1800	3810	2120	1690		
Calcium	mg/L	59.9	79.6	298	109	75.3		
Potassium	mg/L	19.2	20	26.1	26.1	15.2		
Magnesium	mg/L	21.8	31	87.2	43.8	25.2		
Sodium	mg/L	171	267	498	330	256		
Sulfate	mg/L	28.8	76.1	592	78.4	61.2		
Phosphorus	mg/L	1.02	0.527	0.243	1.02	0.732		
pH in H ₂ O	pH	8.47	8.41	8.18	8.10	8.33		
TDS (Calculated)	mg/L	673	1040	2460	1260	968		
Nitrate	mg/L	<0.020	<0.10	<0.10	<0.040	<0.020		
Nitrite	mg/L	<0.010	<0.050	<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 ₂ O	pH	8.8	8.3	8.3	9.89	7.95	Not monitored	
Conductivity (EC)	uS/cm	1220	2040	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	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	69	83	92	75	83	73
Ammonia-N	mg/L	<0.05	1.08	0.058	<0.050	0.251	0.71
Total Kjeldahl Nitrogen	mg/L	3.52	4.11	4.01	2.52	3.99	1.40
Dissolved Organic Carbon	mg/L	27	83	27.3	24.2	21.7	24.9
Phenols	mg/L	-	-	0.0026	0.0077	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	13.0	11.2
BTEX, F1 (C6-C10) and F2 (>C10-C16)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	<0.0010	0.0038	0.0085	0.0017	0.0022	0.0096
Antimony	mg/L	0.00021	0.00023	0.00030	0.0002	0.00029	0.00037
Arsenic	mg/L	-	-	0.00574	0.00471	0.00454	0.00579
Barium	mg/L	0.0633	0.0359	0.0623	0.0412	0.0729	0.0779
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.046	0.034	0.037	0.039	0.029	0.044
Cadmium	mg/L	<0.0000050	<0.0000050	0.0000168	<0.0000050	<0.0000050	0.0000071
Chromium	mg/L	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	0.00011
Cobalt	mg/L	0.00022	0.00065	0.00055	0.00035	0.00062	0.00056
Copper	mg/L	0.00021	0.00033	0.00043	0.00027	0.00026	0.00177
Iron	mg/L	0.019	0.054	0.038	0.011	0.041	0.034
Lead	mg/L	<0.0000050	0.000055	0.000061	<0.0000050	<0.0000050	0.000055
Lithium	mg/L	-	-	0.0279	0.0235	0.0169	0.0247
Manganese	mg/L	0.00088	0.276	0.0371	0.00135	0.0111	0.136
Mercury	mg/L	0.000006	0.0000058	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00036	0.000554	0.000512	0.000602	0.000589	0.000873
Nickel	mg/L	0.00214	0.0035	0.00316	0.00287	0.00304	0.00361
Selenium	mg/L	0.000232	0.00021	0.000206	0.000204	0.000192	0.000263
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000015	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00078	0.00093	<0.0003	<0.00030	0.00041
Uranium	mg/L	-	-	0.00159	0.00116	0.00136	0.00194
Vanadium	mg/L	0.00107	0.00167	0.00163	0.00094	0.00166	0.00184
Zinc	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0130
Routine Water							
Ion Balance	%	100	96.3	107	104	107	97.4
Bicarbonate	mg/L	446	563	469	416	359	370
Chloride	mg/L	38.3	59.3	58.7	71.6	76.8	103
Carbonate	mg/L	9.3	<5.0	<5.0	10.8	7.6	<5.0
Conductivity (EC)	uS/cm	997	1190	1070	1060	1020	1120
Calcium	mg/L	32.4	43.8	26.8	39.2	44.7	33.1
Potassium	mg/L	13.7	16.4	15.8	15.7	12.7	16.5
Magnesium	mg/L	18.7	22.9	21.3	23.7	24.1	26.9
Sodium	mg/L	168	190	197	174	164	179
Sulfate	mg/L	99.6	111	92.4	106	123	166
Phosphorus	mg/L	0.515	0.419	0.339	0.263	0.425	0.306
pH in H ₂ O	pH	8.48	8.22	8.36	8.51	8.46	8.32
TDS (Calculated)	mg/L	600	725	648	646	630	709
Nitrate	mg/L	<0.020	<0.020	<0.020	0.025	0.064	0.035
Nitrite	mg/L	<0.010	<0.010	<0.010	0.014	0.025	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	0.039	0.089	0.035
Hardness as CaCO ₃	mg/L	-	-	155	195	211	193
Alkalinity (total as CaCO ₃)	mg/L	-	-	393	359	307	307
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.16	0.292	0.229	0.304
Field Data							
pH in H ₂ O	pH	8.6	8.6	10.7	10.44	8.50	8.57
Conductivity (EC)	uS/cm	1004	1295	1123	1306	1049	608

Notes:

"-" Not required under previous permit

Table 1.20: Chemical Analytical Results

Sample ID:		Balash D.1					
Site Number:		20					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	81	77	61	79	75	65
Ammonia-N	mg/L	0.618	0.67	<0.050	0.824	0.356	1.32
Total Kjeldahl Nitrogen	mg/L	3.93	2.06	1.73	3.35	3.20	1.46
Dissolved Organic Carbon	mg/L	20.9	77	21.5	25.3	24.1	25.1
Phenols	mg/L	-	-	0.0018	0.0052	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	34.8	8.2
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0018	0.004	0.0046	0.0052	0.0128	0.0067
Antimony	mg/L	<0.00010	0.00013	0.00016	0.00013	0.00017	0.00011
Arsenic	mg/L	-	-	0.00218	0.00283	0.00274	0.00397
Barium	mg/L	0.104	0.0911	0.104	0.0997	0.0979	0.116
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.04	0.023	0.033	0.028	<0.010	<0.010
Cadmium	mg/L	<0.0000050	<0.0000050	0.0000237	0.0000063	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	0.00013	0.00012	0.00016	0.00011
Cobalt	mg/L	0.00012	0.0004	0.00053	0.00031	0.00027	0.00057
Copper	mg/L	0.00027	0.00037	0.00027	0.00026	0.00023	0.0011
Iron	mg/L	0.878	0.526	0.185	0.815	0.739	0.302
Lead	mg/L	<0.000050	0.000111	0.000067	0.000071	0.000138	0.0001
Lithium	mg/L	-	-	0.0237	0.0178	0.017	0.0241
Manganese	mg/L	0.00173	0.104	0.0629	0.00851	0.0070	0.655
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000584	0.00068	0.00061	0.00039	0.000304	0.000301
Nickel	mg/L	0.00267	0.00373	0.00305	0.00293	0.00282	0.00257
Selenium	mg/L	0.000212	0.00019	0.00018	0.000188	0.000245	0.00019
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000024	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00074	0.00053	0.00095	0.00216	0.00063
Uranium	mg/L	-	-	0.000372	0.000199	0.000235	0.000194
Vanadium	mg/L	<0.00050	0.00059	0.00071	0.00095	0.00087	0.00062
Zinc	mg/L	<0.0010	0.0027	<0.0010	<0.0010	<0.0010	0.0029
Routine Water							
Ion Balance	%	109	91.1	108	106	105	92.3
Bicarbonate	mg/L	227	294	269	277	259	322
Chloride	mg/L	19.8	38.5	37.6	43.9	55.5	63.0
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	431	634	569	574	654	696
Calcium	mg/L	32.7	39.1	35.2	43.6	45.2	49.8
Potassium	mg/L	13.6	15.8	17.8	14.8	10.6	13.7
Magnesium	mg/L	12.5	15.8	16.3	15.8	16.8	16.7
Sodium	mg/L	43.4	61.8	66.1	57.3	74.3	67.1
Sulfate	mg/L	12.4	40	23.8	12.1	47.5	36.6
Phosphorus	mg/L	0.396	0.27	0.106	0.463	0.552	0.454
pH in H ₂ O	pH	8.04	8.15	8.19	8.13	8.09	8.28
TDS (Calculated)	mg/L	246	366	329	324	378	406
Nitrate	mg/L	<0.020	<0.020	<0.020	0.037	0.053	<0.020
Nitrite	mg/L	<0.010	<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
Hardness as CaCO ₃	mg/L	-	-	155	174	182	193
Alkalinity (total as CaCO ₃)	mg/L	-	-	220	227	213	265
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.101	0.199	0.154	0.219
Field Data							
pH in H ₂ O	pH	8.1	8.3	10.3	9.26	7.73	7.81
Conductivity (EC)	uS/cm	4.53	689	600	714	681	450.9

Notes:

"-" Not required under previous permit

Table 1.21: Chemical Analytical Results

Sample ID:		Balash D.2					
Site Number:		21					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	21-Oct-2021
Chem. O ₂ Demand	mg/L	81	97	112	93	130	175
Ammonia-N	mg/L	<0.05	0.059	0.090	<0.050	0.072	0.26
Total Kjeldahl Nitrogen	mg/L	2.92	3.91	4.39	2.75	4.86	2.69
Dissolved Organic Carbon	mg/L	26.8	97	32.4	29.5	35.3	56.8
Phenols	mg/L	-	-	0.0018	0.0093	<0.0010	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	29.6	53.0
BTEX, F1 (C6-C10) and F2(>C10-C16)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.002	0.003	0.0177	0.0071	0.0118	0.0035
Antimony	mg/L	0.00031	0.00044	0.00061	0.00024	0.0003	0.00053
Arsenic	mg/L	-	-	0.00898	0.00575	0.0064	0.0155
Barium	mg/L	0.101	0.107	0.114	0.0766	0.0595	0.103
Beryllium	mg/L	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.094	<0.020	0.021	0.05	<0.010	<0.010
Cadmium	mg/L	<0.000050	<0.000010	0.0000199	<0.000050	<0.000050	<0.000050
Chromium	mg/L	<0.00010	<0.00020	0.00014	<0.00010	0.00014	<0.00010
Cobalt	mg/L	0.00053	0.00124	0.00158	0.00056	0.00090	0.00198
Copper	mg/L	0.00132	0.00141	0.00202	0.00071	0.00061	0.0025
Iron	mg/L	0.011	0.03	0.037	0.038	0.138	0.016
Lead	mg/L	<0.000050	<0.00010	0.00006	<0.000050	0.000061	<0.000050
Lithium	mg/L	-	-	0.0595	0.0419	0.0311	0.0589
Manganese	mg/L	0.00076	0.0129	0.00528	0.00437	0.0204	0.0227
Mercury	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Molybdenum	mg/L	0.00303	0.00251	0.00298	0.000719	0.000283	0.00164
Nickel	mg/L	0.00722	0.0057	0.0072	0.00398	0.00343	0.00751
Selenium	mg/L	0.000239	0.00027	0.000366	0.000201	0.000239	0.000475
Silver	mg/L	<0.000010	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000020	0.000017	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00132	0.00333	0.00134	0.00587	0.00049
Uranium	mg/L	-	-	0.00437	0.0021	0.00127	0.00338
Vanadium	mg/L	0.0016	0.0048	0.00433	0.0018	0.00266	0.00815
Zinc	mg/L	0.0014	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010
Routine Water							
Ion Balance	%	105	98.9	105	106	115	107
Bicarbonate	mg/L	396	504	429	435	472	671
Chloride	mg/L	238	357	304	244	311	537
Carbonate	mg/L	<5.0	10.9	<5.0	<5.0	8.3	25.7
Conductivity (EC)	uS/cm	1420	2020	1710	1580	1800	2580
Calcium	mg/L	52.4	52.3	46.7	69.8	61.4	86.6
Potassium	mg/L	27.8	30.3	28.5	22.6	37.7	47.2
Magnesium	mg/L	41.4	54.1	45.7	47.4	47.2	74.1
Sodium	mg/L	195	281	254	210	295	442
Sulfate	mg/L	62.2	73.9	67.1	104	57.2	92.7
Phosphorus	mg/L	0.287	0.641	0.654	0.755	1.50	0.717
pH in H ₂ O	pH	8.29	8.43	8.30	8.22	8.41	8.61
TDS (Calculated)	mg/L	812	1110	960	912	1050	1430
Nitrate	mg/L	<0.020	<0.10	<0.020	<0.020	<0.020	0.031
Nitrite	mg/L	<0.010	<0.050	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	<0.022	<0.022	0.031
Hardness as CaCO ₃	mg/L	-	-	305	369	348	521
Alkalinity (total as CaCO ₃)	mg/L	-	-	356	357	400	593
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.188	0.184	0.131	0.324
Field Data							
pH in H ₂ O	pH	8.60	9.10	10.7	9.22	8.07	8.86
Conductivity (EC)	uS/cm	1476	2100	1198	1960	1869	799

Notes:

"-" Not required under previous permit

Table 1.22: Chemical Analytical Results

Sample ID:		Balash D.3					
Site Number:		22					
Date Sampled:	Units	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019	8-Oct-2020	22-Oct-2021
Chem. O ₂ Demand	mg/L	70	112	101	535	127	186
Ammonia-N	mg/L	<0.050	0.120	0.055	0.075	0.059	1.32
Total Kjeldahl Nitrogen	mg/L	2.33	3.4	3.57	17.0	4.78	3.25
Dissolved Organic Carbon	mg/L	25.3	112	34.2	31.2	44.0	55.4
Phenols	mg/L	-	-	0.0012	0.0067	0.0014	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	27.4	434
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	-	<0.0005	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
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	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0017	0.0114	0.0455	0.0165	0.0065	0.641
Antimony	mg/L	0.00017	0.00026	0.00029	0.00019	0.00022	0.00037
Arsenic	mg/L	-	-	0.00555	0.0057	0.00519	0.00704
Barium	mg/L	0.0559	0.0462	0.0659	0.0437	0.0434	0.107
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.041	0.036	0.031	0.033	<0.010	<0.010
Cadmium	mg/L	<0.0000050	<0.0000050	0.0000172	<0.0000050	<0.0000050	0.0000152
Chromium	mg/L	<0.00010	<0.00010	0.00012	0.00014	0.00014	0.00078
Cobalt	mg/L	0.00027	0.00085	0.00099	0.00101	0.00050	0.00166
Copper	mg/L	0.00052	0.0008	0.00118	0.00101	<0.00020	0.00283
Iron	mg/L	0.021	0.088	0.130	0.898	0.182	1.06
Lead	mg/L	<0.000050	0.000068	0.00012	0.000139	<0.000050	0.000967
Lithium	mg/L	-	-	0.0158	0.013	0.023	0.0343
Manganese	mg/L	0.00054	0.0158	0.0104	0.410	0.00827	0.288
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00197	0.00135	0.00183	0.000865	0.000193	0.00154
Nickel	mg/L	0.00391	0.00359	0.00364	0.00233	0.00188	0.00503
Selenium	mg/L	0.000227	0.000222	0.000252	0.000201	0.000168	0.000324
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000017	<0.000010	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00067	0.00854	0.00139	0.00118	0.0211
Uranium	mg/L	-	-	0.00247	0.000959	0.000561	0.00331
Vanadium	mg/L	<0.00050	0.00144	0.00229	0.0018	0.00107	0.0054
Zinc	mg/L	0.001	0.0015	<0.0010	0.0012	<0.0010	0.0074
Routine Water							
Ion Balance	%	107	101	110	107	117	94.7
Bicarbonate	mg/L	216	350	290	264	408	607
Chloride	mg/L	170	238	222	246	294	515
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	15.7
Conductivity (EC)	uS/cm	889	1330	1190	1230	1640	2450
Calcium	mg/L	27.9	40.2	37.5	45.1	53.5	81.9
Potassium	mg/L	22.9	32.3	32.8	26.0	37.1	45.5
Magnesium	mg/L	18.5	29	26.7	29.2	40.4	55.6
Sodium	mg/L	129	182	177	173	269	359
Sulfate	mg/L	9.21	24.2	20.6	37.4	43.3	93.9
Phosphorus	mg/L	0.111	0.312	0.283	2.55	1.28	0.334
pH in H ₂ O	pH	8.05	8.15	8.25	7.99	8.32	8.50
TDS (Calculated)	mg/L	484	718	660	687	941	1470
Nitrate	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.039
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.011
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	<0.022	<0.022	0.050
Hardness as CaCO ₃	mg/L	-	-	204	233	300	433
Alkalinity (total as CaCO ₃)	mg/L	-	-	238	217	339	524
Hydroxide	mg/L	-	-	<5	<5.0	<5.0	<5.0
Fluoride	mg/L	-	-	0.113	0.028	0.117	0.279
Field Data							
pH in H ₂ O	pH	8.9	9.1	10.5	9.67	8.01	7.84
Conductivity (EC)	uS/cm	862	1429	1274	1545	1687	849.1

Notes:

"-" Not required under previous permit

Table 2: Duplicate 1 Chemical Analytical Results

Sample ID:			MAGNESON D.3				
Parameter	Units	RDL	Site Number:	DUGOUT 12	DUP-A	% RPD	Pass/ Fail (>20%)
			MAGNESON D.3	21-Oct-2021	21-Oct-2021		
Date Sampled:			21-Oct-2021	21-Oct-2021			
Chem. O ₂ Demand	mg/L	10	12	28	-	Pass	
Ammonia-N	mg/L	0.05	<0.050	<0.050	-	Pass	
Total Kjeldahl Nitrogen	mg/L	0.2	0.57	<0.20	-	Pass	
Dissolved Organic Carbon	mg/L	1	8.3	7.6	9%	Pass	
Phenols	mg/L	0.001	<0.0010	<0.0010	-	Pass	
Total Suspended Solids (TSS)	mg/L	3	7.4	8.4	-	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	<0.00050	<0.00050	-	Pass	
Xylene (o)	mg/L	0.0005	<0.00050	<0.00050	-	Pass	
Xylenes	mg/L	0.00071	<0.00071	<0.00071	-	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	0.0125	0.009	33%	Fail	
Antimony	mg/L	0.0001	0.00028	0.00028	-	Pass	
Arsenic	mg/L	0.0001	0.00105	0.00104	1%	Pass	
Barium	mg/L	0.0001	0.0364	0.0388	6%	Pass	
Beryllium	mg/L	0.0001	<0.00010	<0.00010	-	Pass	
Boron	mg/L	0.01	0.050	0.048	-	Pass	
Cadmium	mg/L	0.000005	0.0000153	0.000018	-	Pass	
Chromium	mg/L	0.0001	0.00029	0.00032	-	Pass	
Cobalt	mg/L	0.0001	<0.00010	<0.00010	-	Pass	
Copper	mg/L	0.0002	0.00276	0.00215	25%	Fail	
Iron	mg/L	0.01	<0.010	<0.010	-	Pass	
Lead	mg/L	0.00005	<0.000050	<0.000050	-	Pass	
Lithium	mg/L	0.001	0.0202	0.0201	0.5%	Pass	
Manganese	mg/L	0.0001	0.00067	0.00070	4%	Pass	
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	-	Pass	
Molybdenum	mg/L	0.00005	0.0364	0.0363	0%	Pass	
Nickel	mg/L	0.0005	0.00476	0.00506	6%	Pass	
Selenium	mg/L	0.00005	0.000246	0.000219	-	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	<0.00030	<0.00030	-	Pass	
Uranium	mg/L	0.00001	0.00127	0.00138	8%	Pass	
Vanadium	mg/L	0.0005	0.00122	0.00128	-	Pass	
Zinc	mg/L	0.001	0.0044	0.0038	-	Pass	
Routine Water							
Bicarbonate	mg/L	5	117	117	0%	Pass	
Chloride	mg/L	0.5	49.9	48.8	2%	Pass	
Carbonate	mg/L	5	<5.0	<5.0	-	Pass	
Conductivity (EC)	uS/cm	2	772	780	1%	Pass	
Calcium	mg/L	0.5	43.7	42.7	2%	Pass	
Potassium	mg/L	0.5	3.22	3.32	3%	Pass	
Magnesium	mg/L	0.1	13.5	14.1	4%	Pass	
Sodium	mg/L	1	109	112	3%	Pass	
Sulfate	mg/L	0.3	235	229	3%	Pass	
Phosphorus	mg/L	0.05	<0.050	<0.050	-	Pass	
pH in H ₂ O	pH	0.1	7.87	7.89	0%	Pass	
TDS (Calculated)	mg/L	10	478	451	6%	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	<0.022	<0.022	-	Pass	
Hardness as CaCO ₃	mg/L	N/A	165	165	0%	Pass	
Alkalinity (total as CaCO ₃)	mg/L	2	95.6	96.0	0%	Pass	
Hydroxide	mg/L	5	<5.0	<5.0	-	Pass	
Fluoride	mg/L	0.02	0.459	0.435	5%	Pass	

Notes:

RDL - Reportable detection limit

RPD - Relative Percentage Difference calculated as $RPD(\%) = \frac{|V1-V2|}{(V1+V2)/2} * 100$ 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:			BOOTH D.1			
Site Number:			DUGOUT 9 LYONS D.4	DUP-B	% RPD	Pass/ Fail (>20%)
Date Sampled:			21-Oct-2021	21-Oct-2021		
Parameter	Units	RDL				
Chem. O ₂ Demand	mg/L	10	258	266	3%	Pass
Ammonia-N	mg/L	0.05	0.43	0.43	0%	Pass
Total Kjeldahl Nitrogen	mg/L	0.2	9.10	3.79	82%	Fail
Dissolved Organic Carbon	mg/L	1	85.3	87.8	3%	Pass
Phenols	mg/L	0.001	<0.0010	<0.0010	-	Pass
Total Suspended Solids (TSS)	mg/L	3	96	178	60%	Fail
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	<0.00050	<0.00050	-	Pass
Xylene (o)	mg/L	0.0005	<0.00050	<0.00050	-	Pass
Xylenes	mg/L	0.00071	<0.00071	<0.00071	-	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	0.221	0.0191	168%	Fail
Antimony	mg/L	0.0001	0.00117	0.00142	19%	Pass
Arsenic	mg/L	0.0001	0.00526	0.00497	6%	Pass
Barium	mg/L	0.0001	0.153	0.142	7%	Pass
Beryllium	mg/L	0.0001	<0.00010	<0.00050	-	Pass
Boron	mg/L	0.01	0.053	0.063	17%	Pass
Cadmium	mg/L	0.000005	0.0000115	<0.000025	-	Pass
Chromium	mg/L	0.0001	0.00048	<0.00050	-	Pass
Cobalt	mg/L	0.0001	0.00232	0.00253	9%	Pass
Copper	mg/L	0.0002	0.00522	0.0049	6%	Pass
Iron	mg/L	0.01	0.068	<0.050	-	Pass
Lead	mg/L	0.00005	0.000096	<0.00025	-	Pass
Lithium	mg/L	0.001	0.0362	0.0391	8%	Pass
Manganese	mg/L	0.0001	0.0828	0.0773	7%	Pass
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	-	Pass
Molybdenum	mg/L	0.00005	0.0136	0.0164	19%	Pass
Nickel	mg/L	0.0005	0.0139	0.0151	8%	Pass
Selenium	mg/L	0.00005	0.000441	0.00089	67%	Fail
Silver	mg/L	0.00001	<0.000010	<0.000050	-	Pass
Thallium	mg/L	0.00001	<0.000010	<0.000050	-	Pass
Tin	mg/L	0.0001	<0.00010	<0.00050	-	Pass
Titanium	mg/L	0.0003	0.00754	<0.0015	-	Pass
Uranium	mg/L	0.00001	0.0113	0.0128	12%	Pass
Vanadium	mg/L	0.0005	0.00398	0.00380	5%	Pass
Zinc	mg/L	0.001	0.0022	<0.0050	-	Pass
Routine Water						
Bicarbonate	mg/L	5	734	722	2%	Pass
Chloride	mg/L	0.5	77.8	76.1	2%	Pass
Carbonate	mg/L	5	20.2	21.2	-	Pass
Conductivity (EC)	uS/cm	2	1430	1460	2%	Pass
Calcium	mg/L	0.5	36.5	40.3	10%	Pass
Potassium	mg/L	0.5	61.4	63.4	3%	Pass
Magnesium	mg/L	0.1	21.0	22.4	6%	Pass
Sodium	mg/L	1	264	300	13%	Pass
Sulfate	mg/L	0.3	81.2	79.2	2%	Pass
Phosphorus	mg/L	0.05	0.315	<0.25	-	Pass
pH in H ₂ O	pH	0.1	8.59	8.60	0%	Pass
TDS (Calculated)	mg/L	10	936	970	4%	Pass
Nitrate	mg/L	0.02	2.56	2.51	2%	Pass
Nitrite	mg/L	0.01	0.050	0.077	43%	Fail
Nitrate and Nitrite (as N)	mg/L	0.022	2.61	2.58	1%	Pass
Hardness as CaCO ₃	mg/L	N/A	178	193	8%	Pass
Alkalinity (total as CaCO ₃)	mg/L	2	635	627	1%	Pass
Hydroxide	mg/L	5	<5.0	<5.0	-	Pass
Fluoride	mg/L	0.02	1.20	1.14	5%	Pass

Notes:

RDL - Reportable detection limit

RPD - Relative Percentage Difference calculated as $RPD(\%) = \frac{|V1-V2|}{(V1+V2)/2} * 100$ 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 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
Mean	21.6	12.6	19.1	29.8	49.7	78.6	97.9	49.9	36.6	19.8	22.2	20.0	457.7

1. Denotes - Based on Incompleted Data so annual total is not reliable.

2. Data collected from Elk Island National Park Station (2014-2015, 2019-2021), Holden AGDM Stations (2016-2018) and Tofield North (1996-2013)

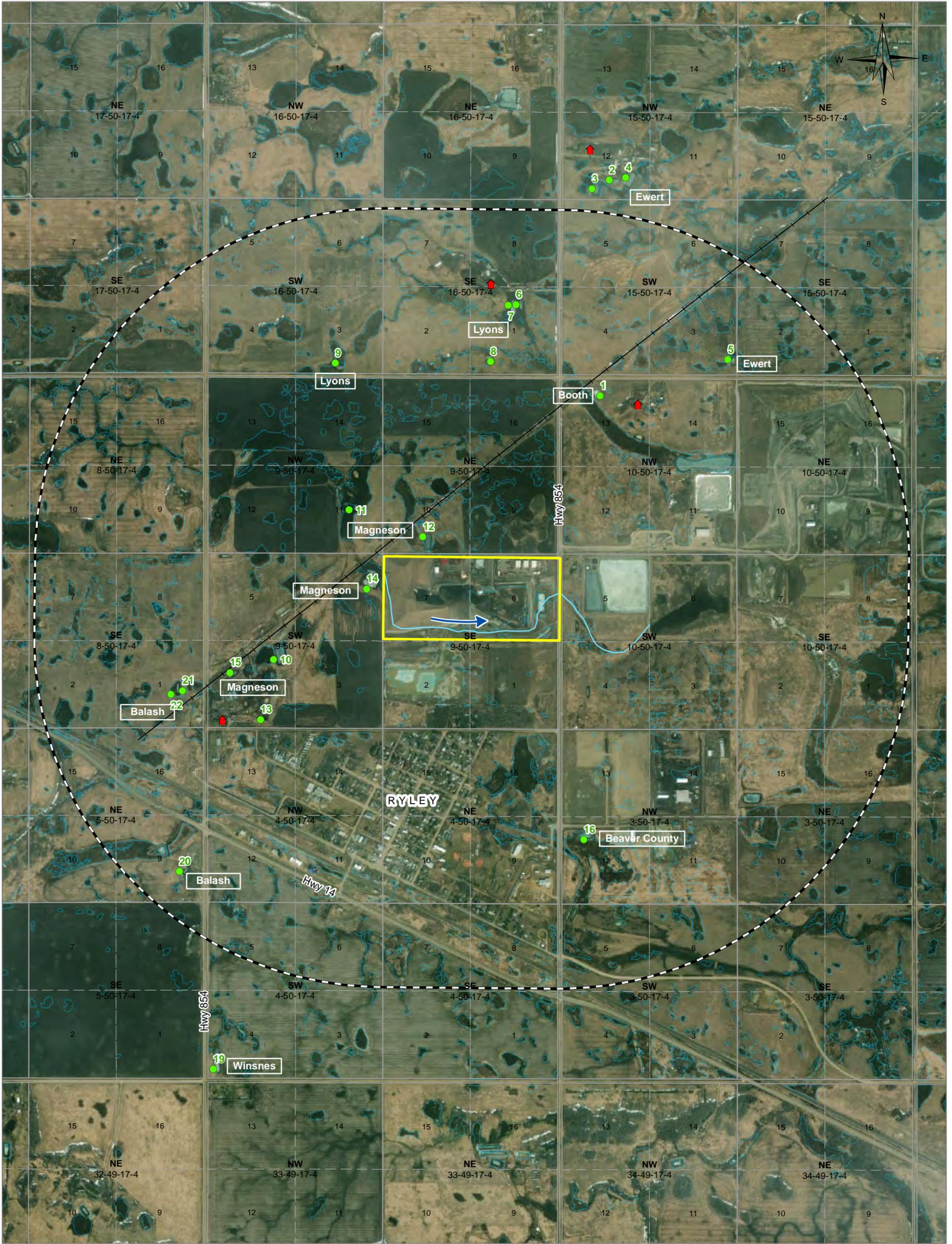
3. Link to 1996-2013, 2014-2015, 2019-2021 Data: http://climate.weather.gc.ca/historical_data/search_historic_data_e.html

4. Link to 2016-2018 data: <http://agriculture.alberta.ca/acis/alberta-weather-data-viewer.jsp>

FIGURES

Figure 1 Dugout Sampling Location Plan

Figure 2a -2i Mann Kendall Trends



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)

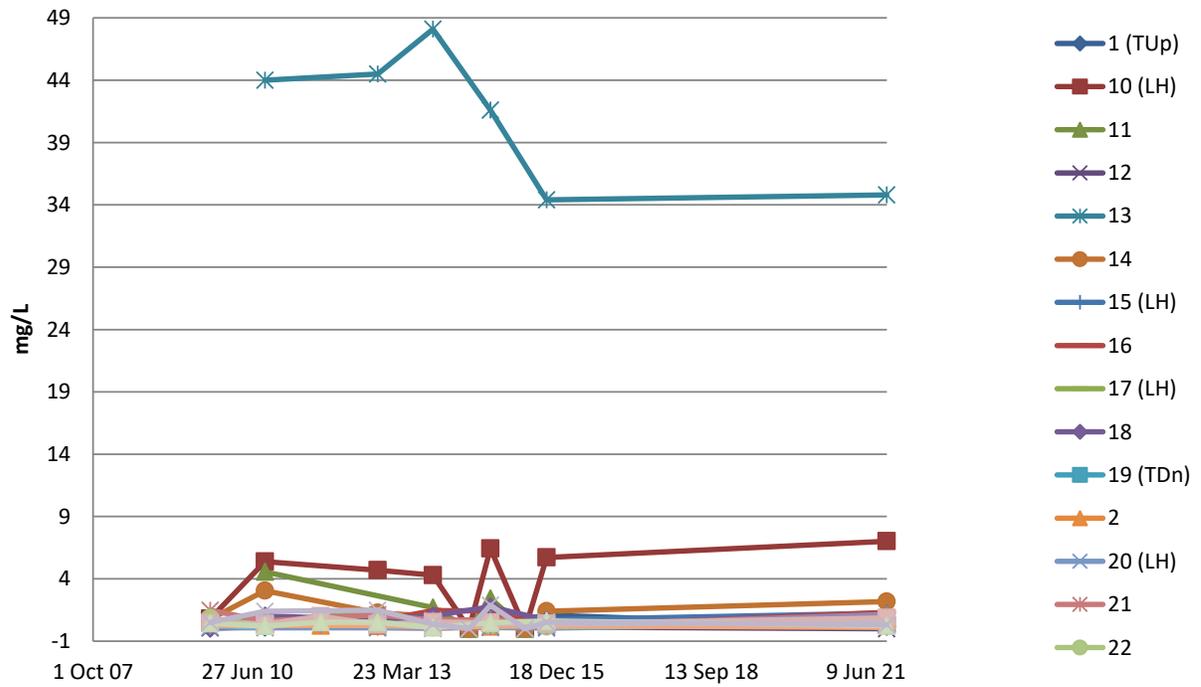
**2021 DUGOUT SAMPLING PROGRAM
 CLASS 1 WASTE MANAGEMENT FACILITY
 RYLEY, AB**

Dugout Sampling Location Plan

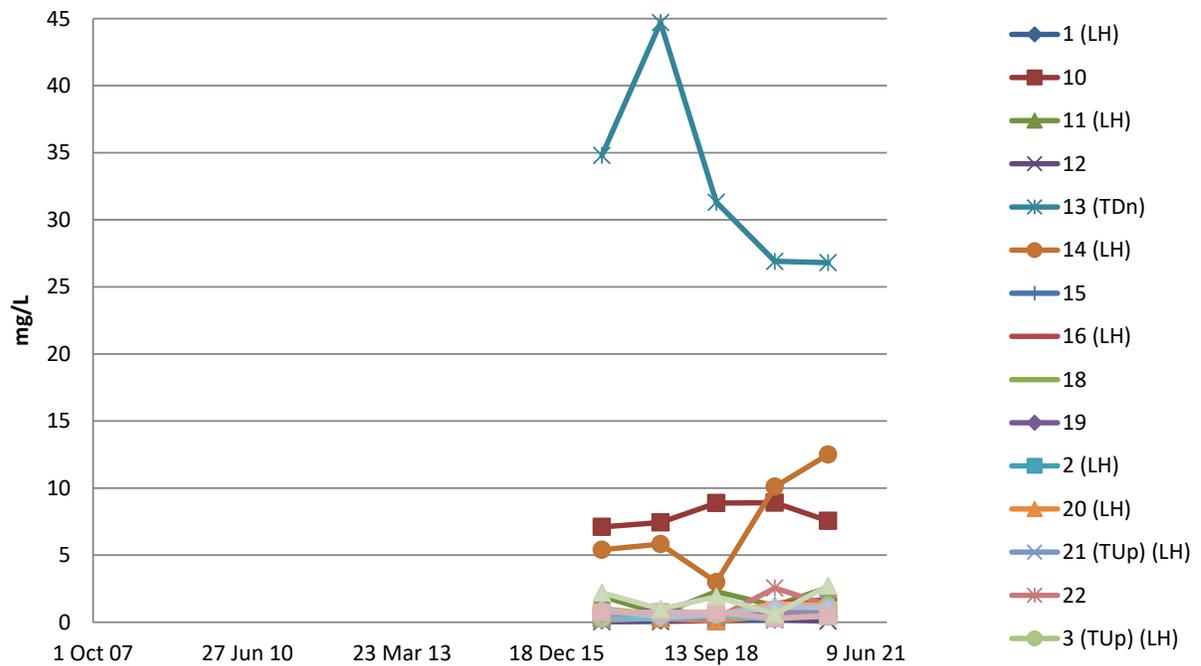
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OFFICE Tt-EDM	DWN DS	CKD SL
APVD MD	REV 0	CLIENT
DATE December 20, 2021	PROJECT NO. SWM.SWOP04402-01	
Figure 1		

STATUS
ISSUED FOR USE

Phosphorus-F



Phosphorus-T



STATUS
Issued for Use

Client



2021 DUGOUT SAMPLING PROGRAM

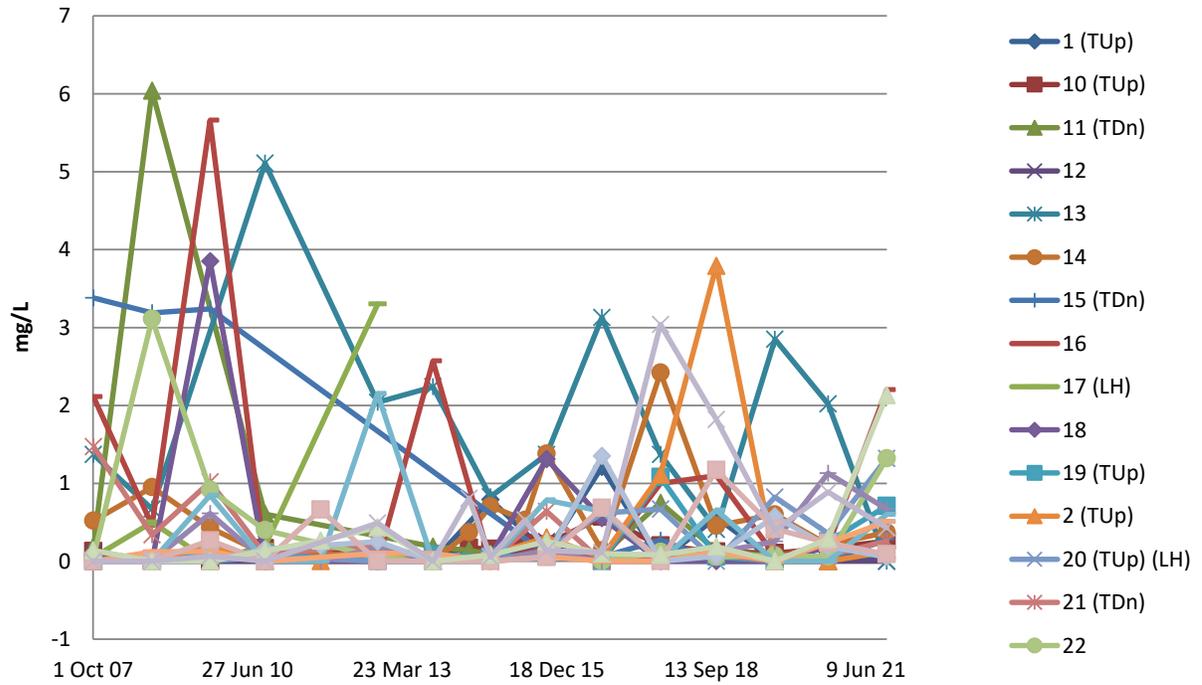
Phosphorus

PROJECT NO. 704-SWM.SWOP04402-01

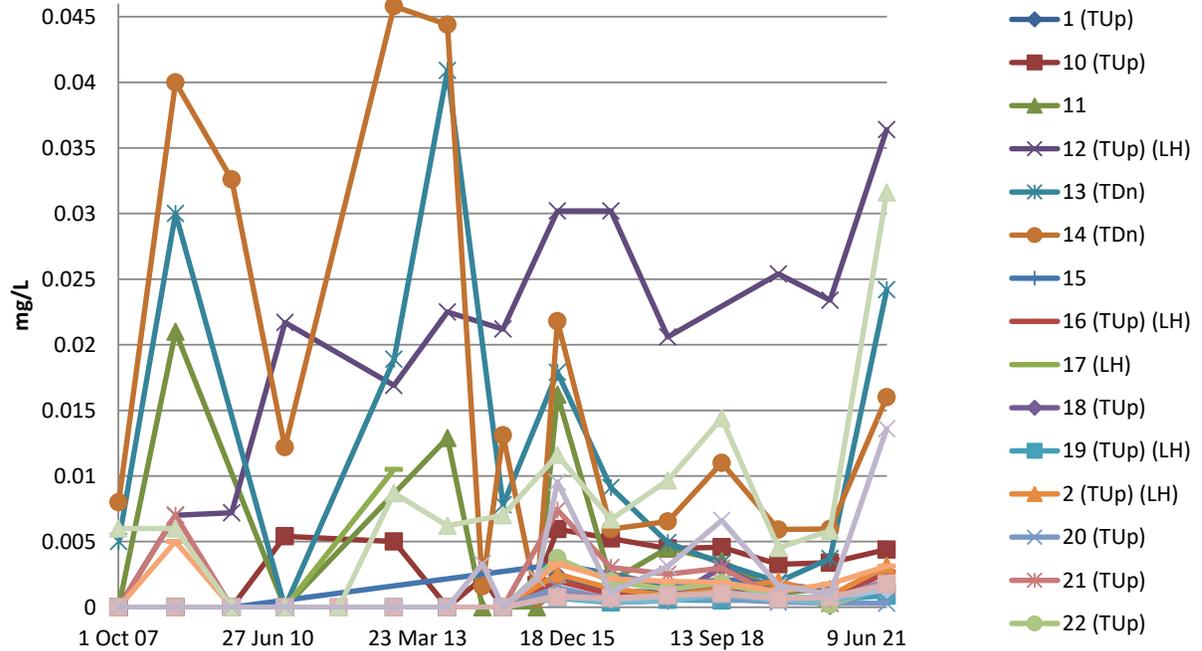
DATE February 2022

Figure 2a

Ammonia as N-T



Molybdenum-F



STATUS
Issued for Use

Client



2021 DUGOUT SAMPLING PROGRAM

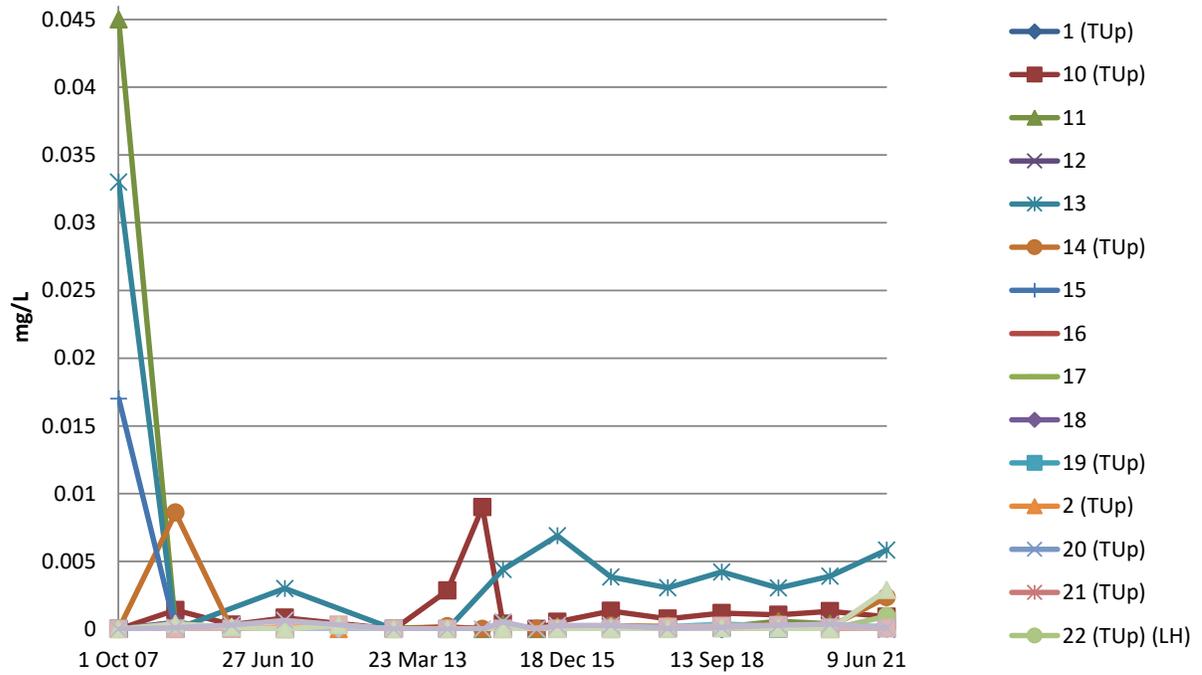
Ammonia and Molybdenum

PROJECT NO. 704-SWM.SWOP04402-01

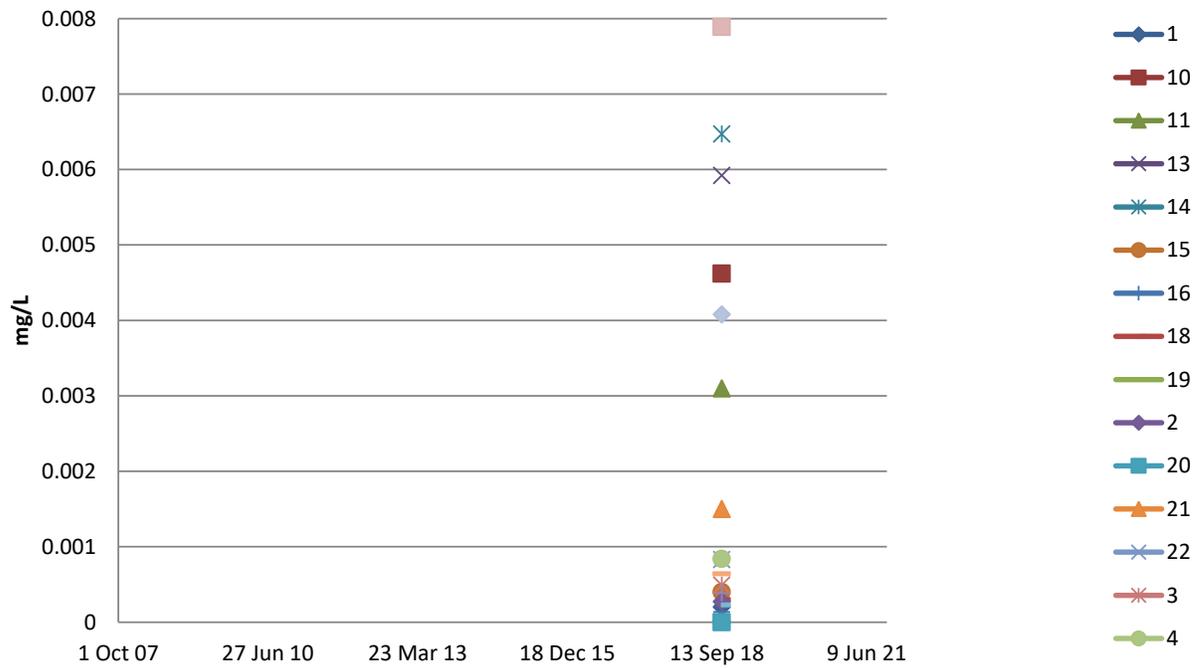
DATE February 2022

Figure 2b

Lead-F



Lead-T



STATUS
Issued for Use

Client



2021 DUGOUT SAMPLING PROGRAM

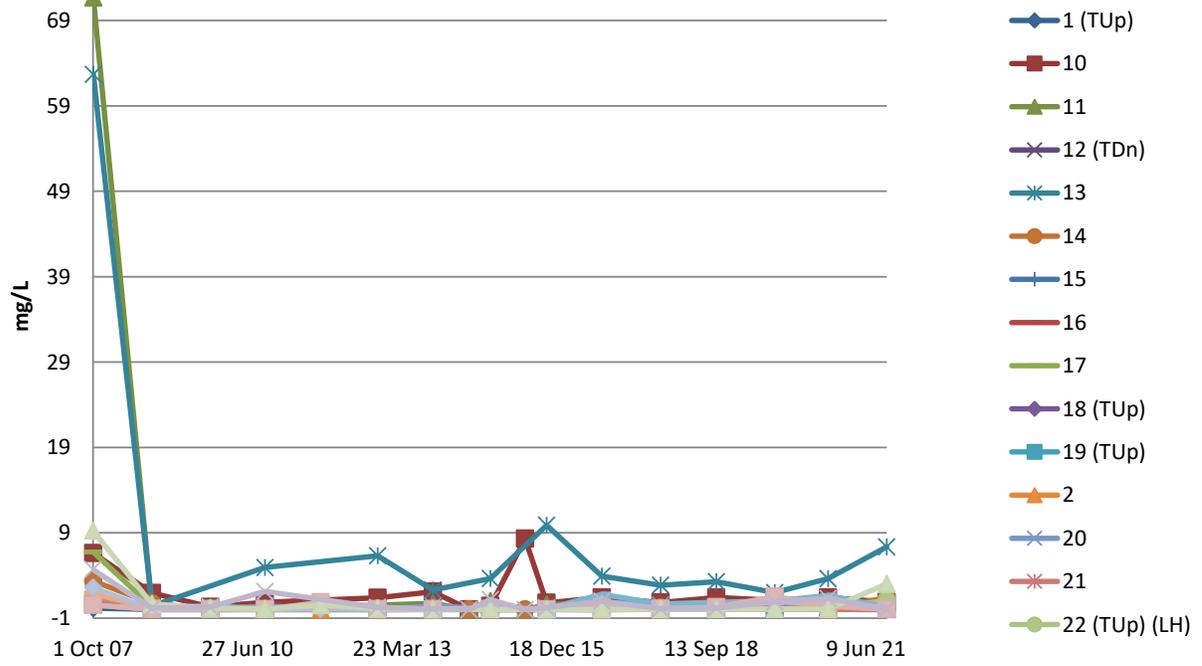
Lead

PROJECT NO. 704-SWM.SWOP04402-01

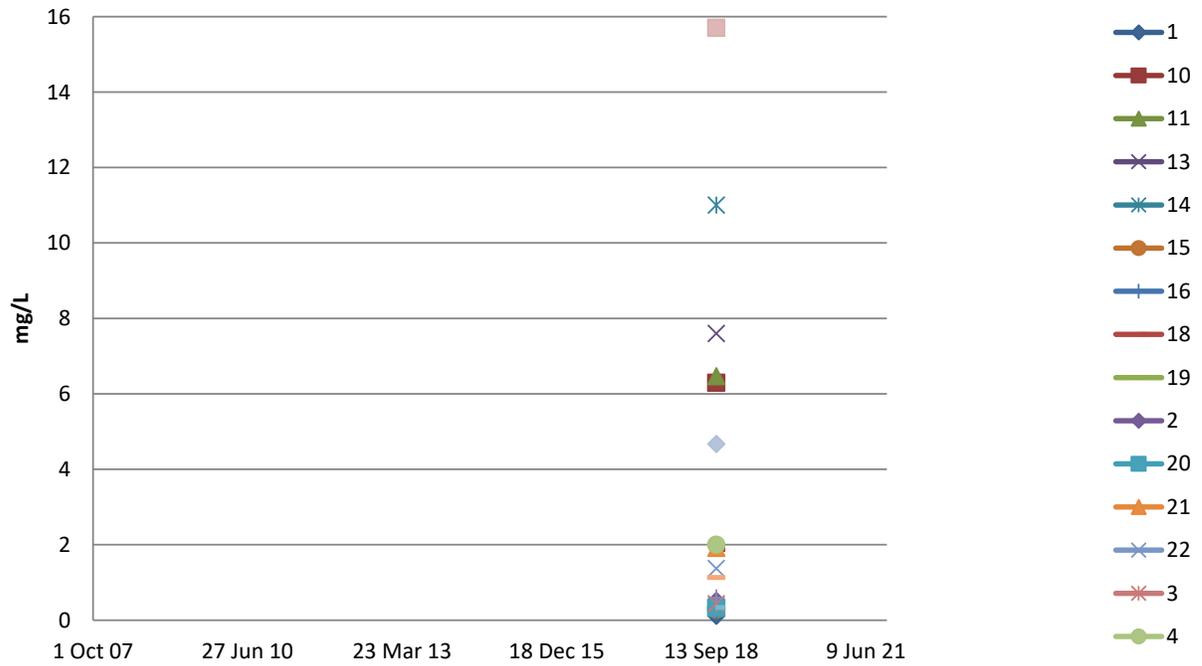
DATE February 2022

Figure 2c

Iron-F



Iron-T



STATUS
Issued for Use

Client



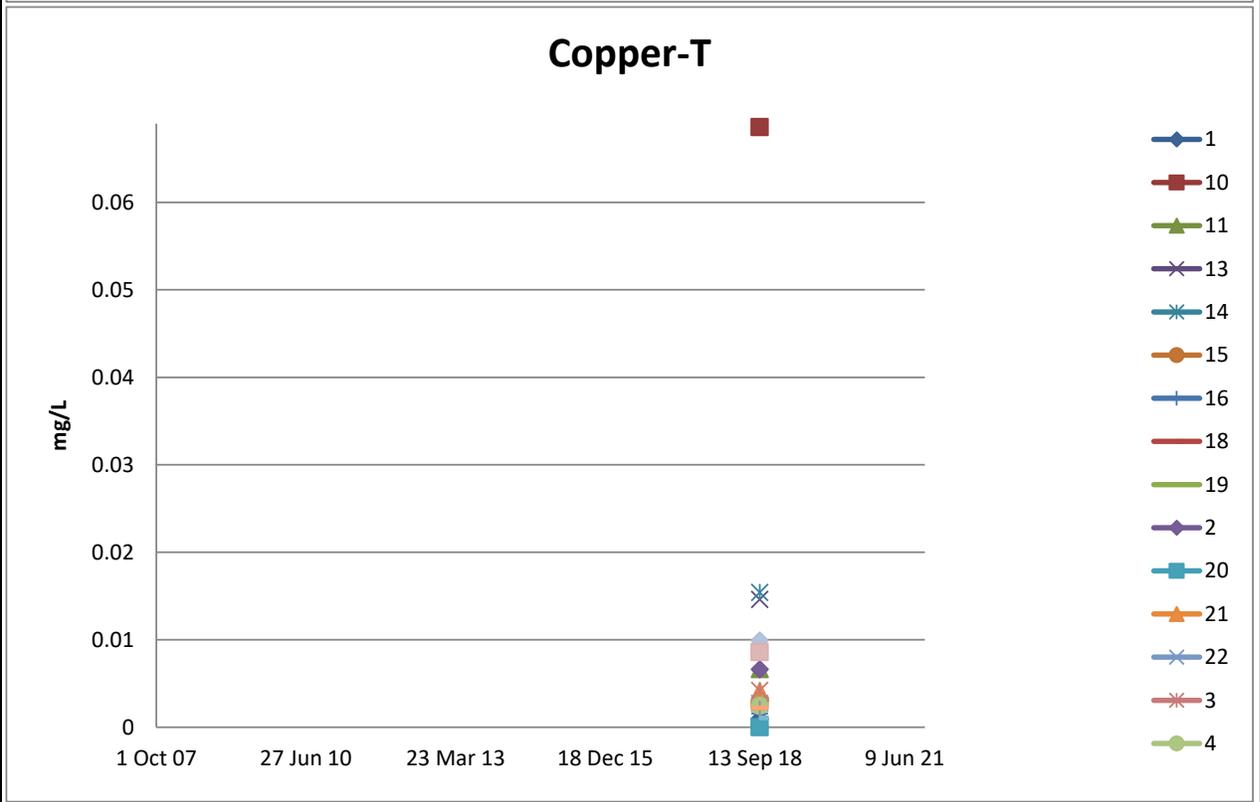
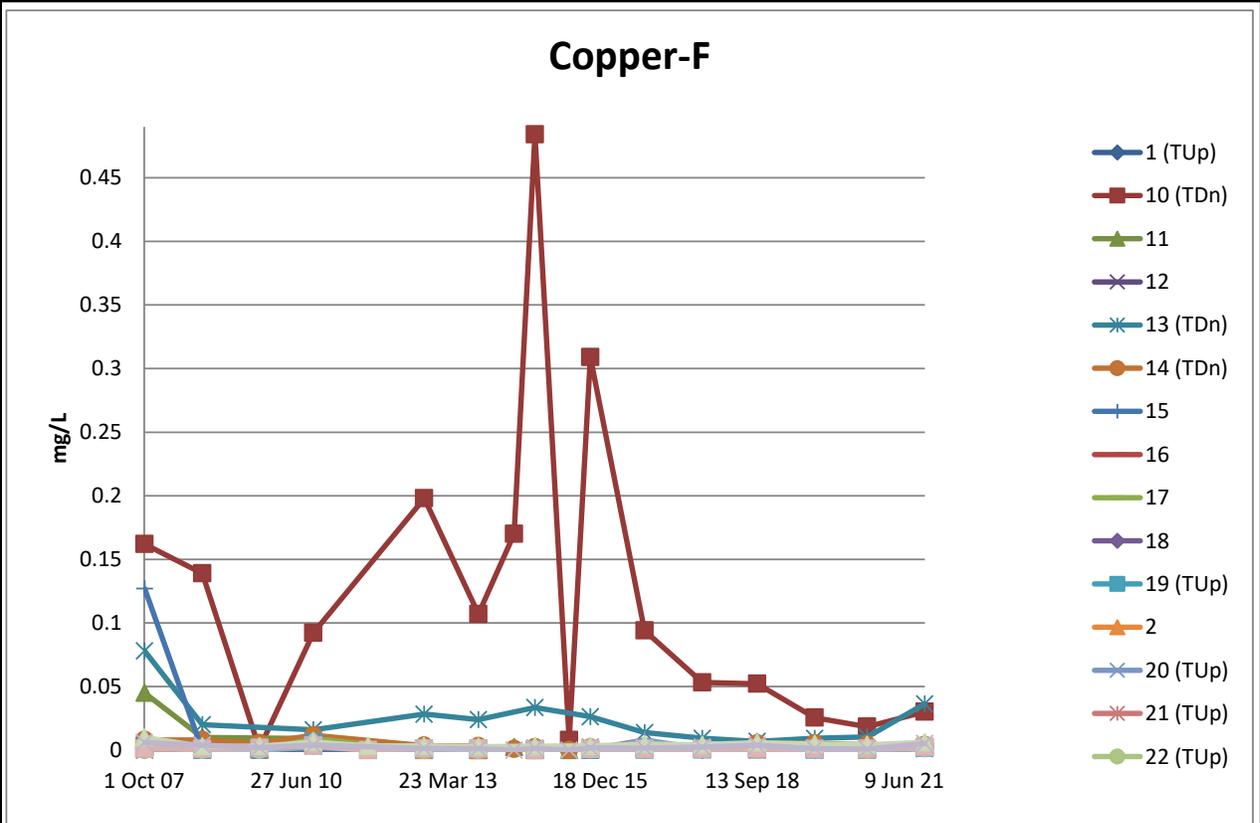
2021 DUGOUT SAMPLING PROGRAM

Iron

PROJECT NO. 704-SWM.SWOP04402-01

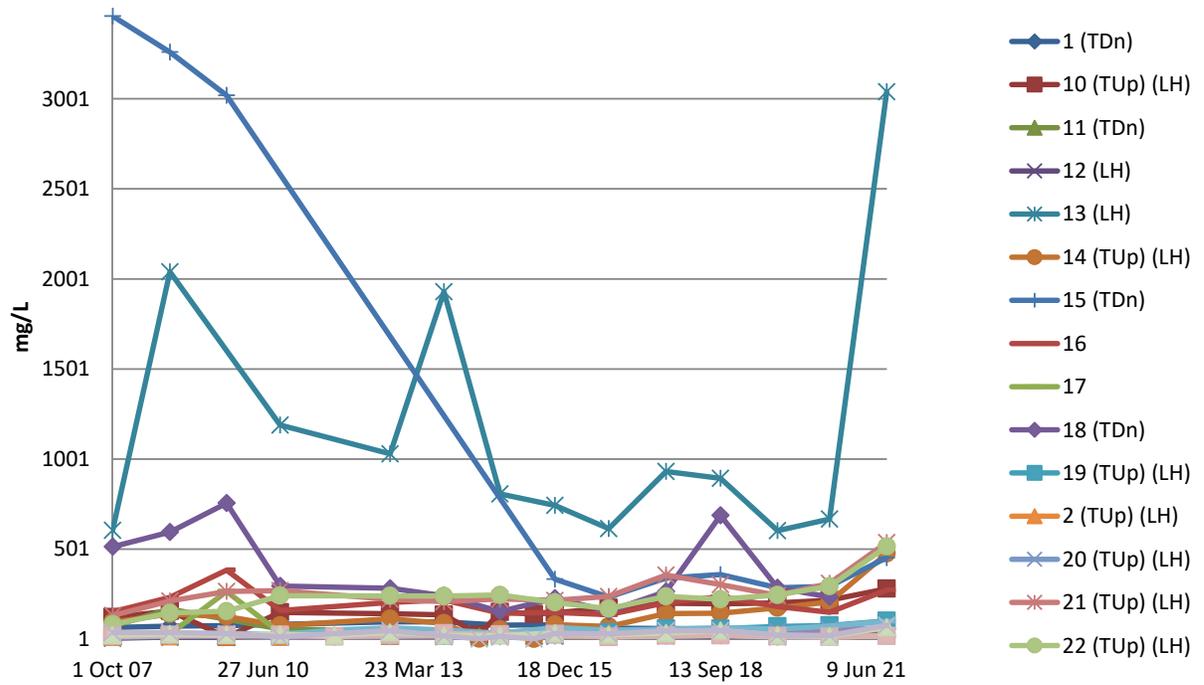
DATE February 2022

Figure 2d

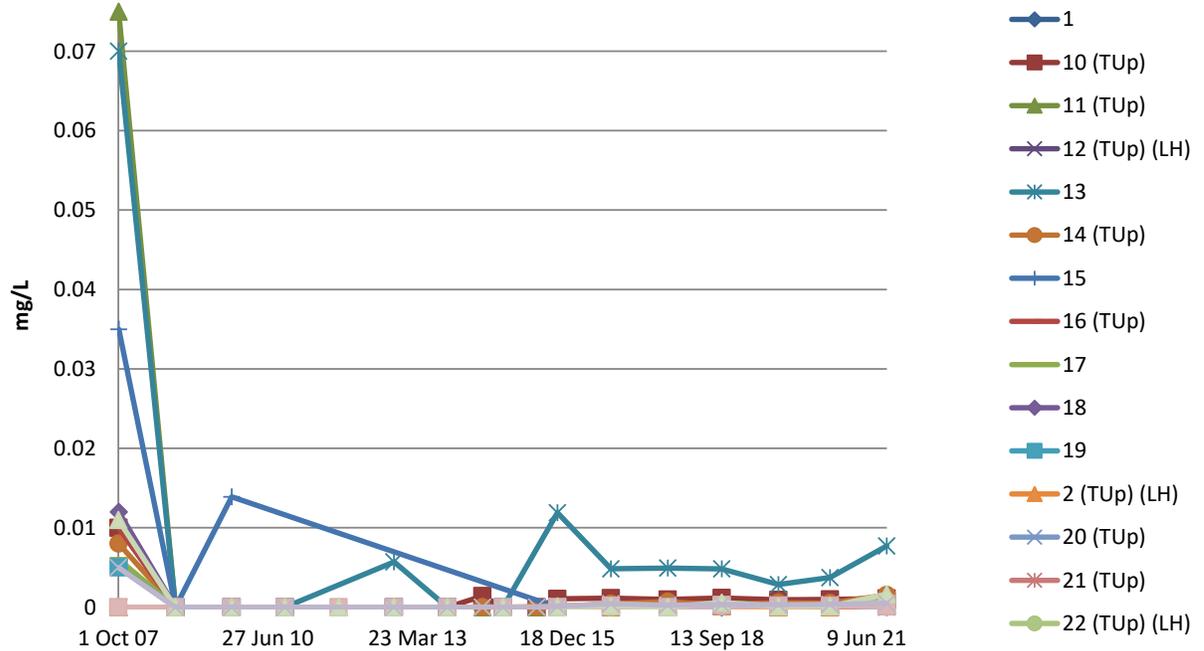


<p>TETRA TECH</p> <p style="font-size: small;">STATUS Issued for Use</p>	<p>Client</p>	2021 DUGOUT SAMPLING PROGRAM	
		Copper	
		PROJECT NO. 704-SWM.SWOP04402-01	Figure 2e
		DATE February 2022	

Chloride-T



Chromium-F



STATUS
Issued for Use

Client



2021 DUGOUT SAMPLING PROGRAM

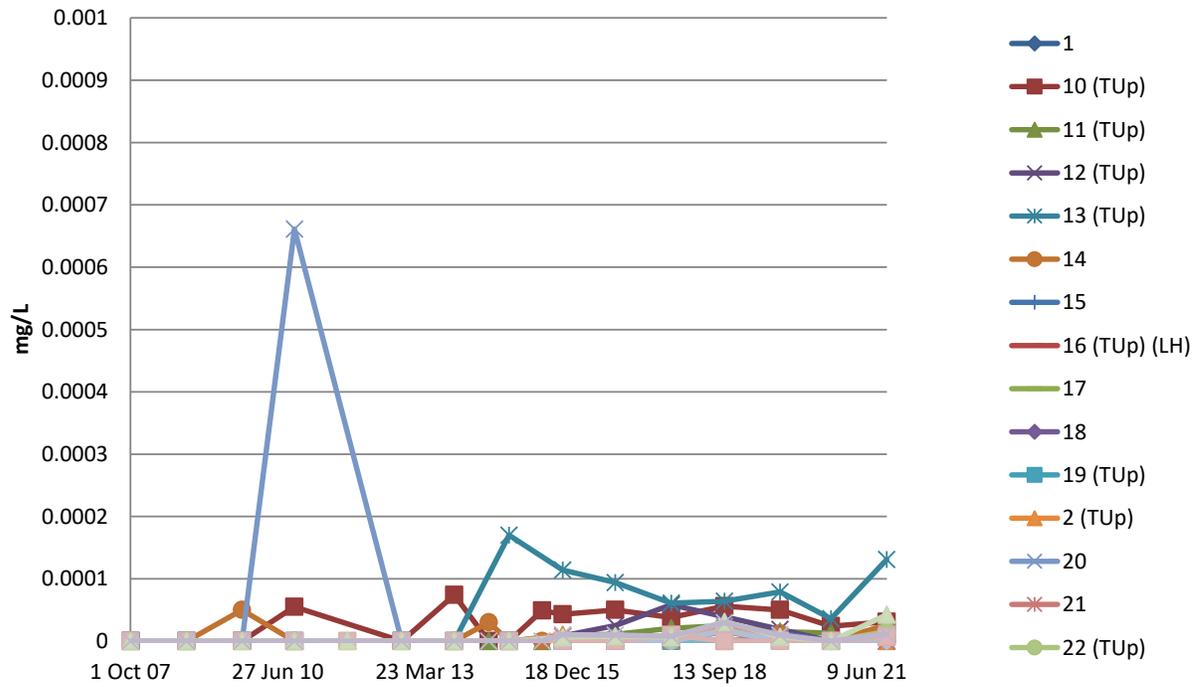
Chloride and Chromium

PROJECT NO. 704-SWM.SWOP04402-01

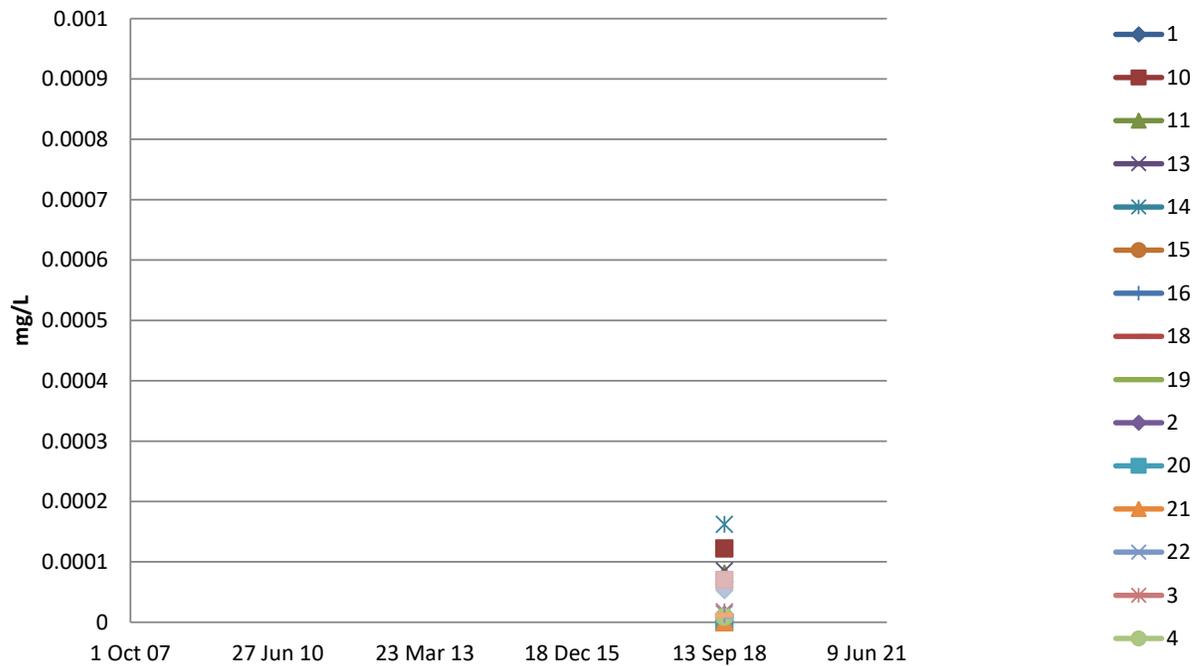
DATE February 2022

Figure 2f

Cadmium-F



Cadmium-T



STATUS
Issued for Use

Client



2021 DUGOUT SAMPLING PROGRAM

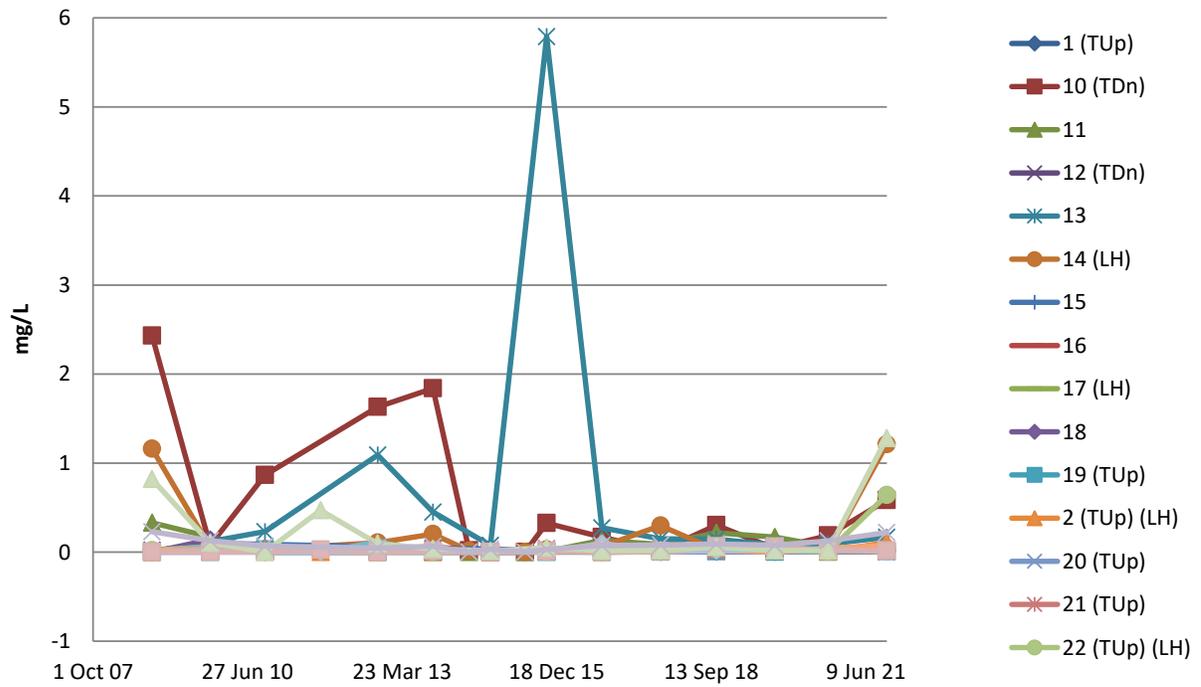
Cadmium

PROJECT NO. 704-SWM.SWOP04402-01

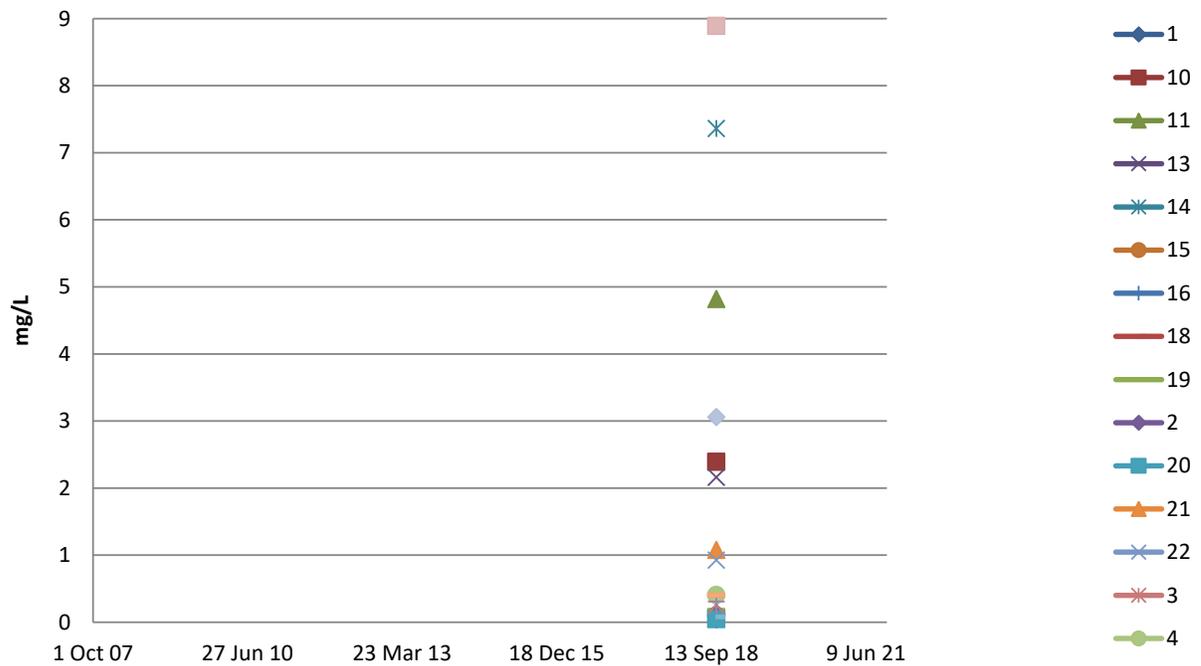
DATE February 2022

Figure 2g

Aluminum-F



Aluminum-T



STATUS
Issued for Use

Client



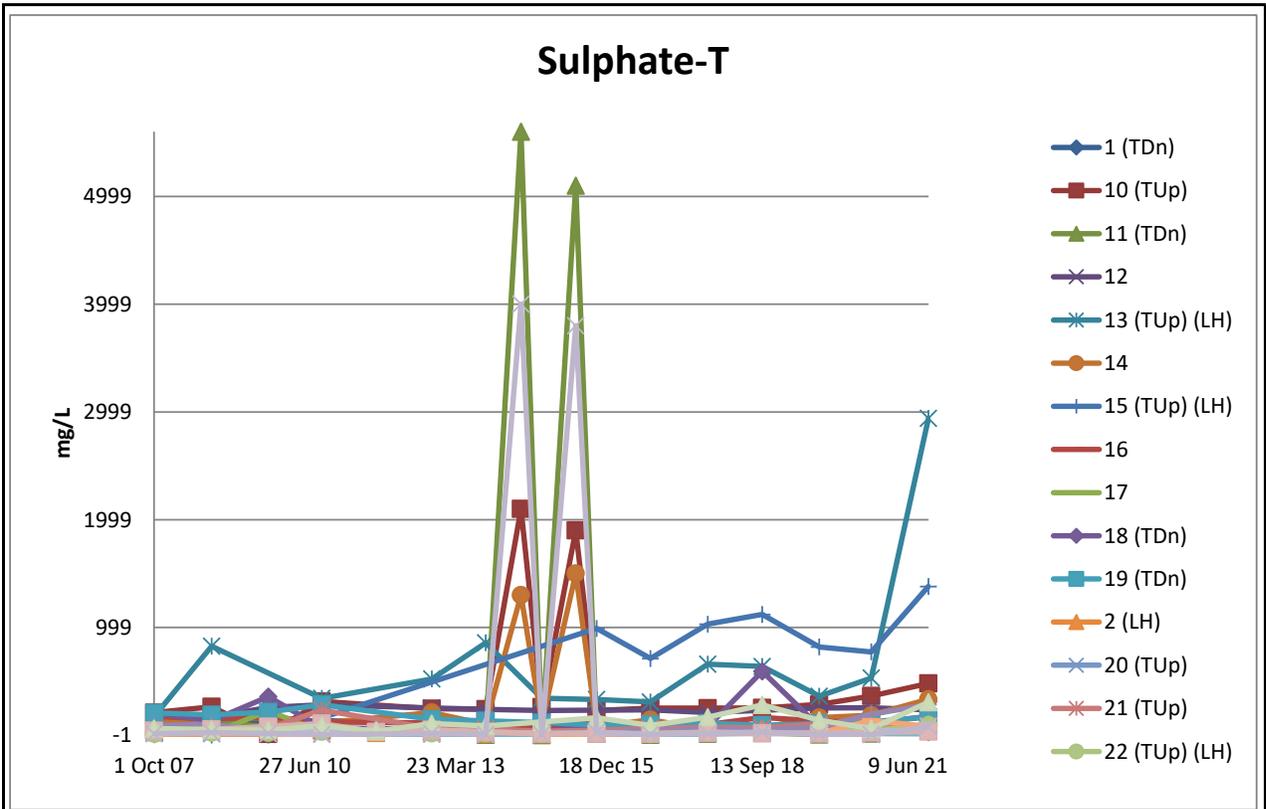
2021 DUGOUT SAMPLING PROGRAM

Aluminum

PROJECT NO.
704-SWM.SWOP04402-01

DATE
February 2022

Figure 2h



 TETRA TECH <small>STATUS Issued for Use</small>	Client 	2021 DUGOUT SAMPLING PROGRAM			
	Sulphate		Figure 2i		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;"><small>PROJECT NO.</small></td> <td style="padding: 2px;">704-SWM.SWOP04402-01</td> </tr> <tr> <td style="padding: 2px;"><small>DATE</small></td> <td style="padding: 2px;">February 2022</td> </tr> </table>			<small>PROJECT NO.</small>	704-SWM.SWOP04402-01
<small>PROJECT NO.</small>	704-SWM.SWOP04402-01				
<small>DATE</small>	February 2022				

APPENDIX A

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

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,



Annette Vawter
Application Coordinator

Enclosure

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

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;

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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;

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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;

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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;

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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.

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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,

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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

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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,

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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.

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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

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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} m²/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} m²/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

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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.

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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.

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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:

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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

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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.

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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.

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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:

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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

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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

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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 (<i>Oncorhynchus mykiss</i>)	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

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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 (<i>oncorhynchus mykiss</i>)	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 <i>daphnia magna</i>					
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, December 2000, 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

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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.

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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

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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.

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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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TERMS AND CONDITIONS ATTACHED TO APPROVAL

- (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;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

- (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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TERMS AND CONDITIONS ATTACHED TO APPROVAL

- (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.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

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										XXXXX
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.

** Identify 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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TERMS AND CONDITIONS ATTACHED TO APPROVAL

- 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.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

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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TERMS AND CONDITIONS ATTACHED TO APPROVAL

- 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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TERMS AND CONDITIONS ATTACHED TO APPROVAL

- (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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TERMS AND CONDITIONS ATTACHED TO APPROVAL

- 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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TERMS AND CONDITIONS ATTACHED TO APPROVAL

- 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 *the Alberta User Guide for Waste Managers*, May 1995, as amended;

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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.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

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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TERMS AND CONDITIONS ATTACHED TO APPROVAL

- (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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

- (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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TERMS AND CONDITIONS ATTACHED TO APPROVAL

- 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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TERMS AND CONDITIONS ATTACHED TO APPROVAL

- (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);

.....
TERMS AND CONDITIONS ATTACHED TO APPROVAL

- (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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TERMS AND CONDITIONS ATTACHED TO APPROVAL

- 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

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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,

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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.

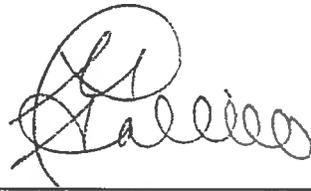
PART 8: DECOMMISSIONING AND LAND RECLAMATION OF OLD SURFACE WATER DETENTION POND

- 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



TETRA TECH CANADA INC..
ATTN: Brian Adeney
14940 123 Ave NW
Edmonton AB T5V 1B4

Date Received: 22-OCT-21
Report Date: 19-NOV-21 15:37 (MT)
Version: FINAL REV. 2

Client Phone: 780-451-2121

Certificate of Analysis

Lab Work Order #: L2654602
Project P.O. #: NOT SUBMITTED
Job Reference: 704.SWM.SWOP04402
C of C Numbers: 20-972080
Legal Site Desc: Ryley Dugouts

Comments: ADDITIONAL 18-NOV-21 13:49


Kieran Tordoff
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9450 17 Avenue NW, Edmonton, AB T6N 1M9 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-1 DUGOUT 1 BOOTH D.1							
Sampled By: CLIENT on 21-OCT-21 @ 11:45							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	108.1		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	81.6		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	115.3		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632137
Surrogate: 2-Bromobenzotrifluoride	107.5		60-140	%	26-OCT-21	28-OCT-21	R5632137
Miscellaneous Parameters							
Ammonia, Total (as N)	0.051		0.050	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	95		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	28.9		2.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	622	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	3.45		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	28.8		2.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	18.2		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	55.0		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629833
Aluminum (Al)-Dissolved	0.0049		0.0010	mg/L		27-OCT-21	R5629852
Antimony (Sb)-Dissolved	0.00034		0.00010	mg/L		27-OCT-21	R5629852
Arsenic (As)-Dissolved	0.00809		0.00010	mg/L		27-OCT-21	R5629852
Barium (Ba)-Dissolved	0.0471		0.00010	mg/L		27-OCT-21	R5629852
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629852
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629852
Boron (B)-Dissolved	0.037		0.010	mg/L		27-OCT-21	R5629852
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		27-OCT-21	R5629852
Calcium (Ca)-Dissolved	13.9		0.50	mg/L		27-OCT-21	R5629852
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629852
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629852
Cobalt (Co)-Dissolved	0.00051		0.00010	mg/L		27-OCT-21	R5629852
Copper (Cu)-Dissolved	0.00147		0.00020	mg/L		27-OCT-21	R5629852
Iron (Fe)-Dissolved	0.041		0.010	mg/L		27-OCT-21	R5629852
Lead (Pb)-Dissolved	0.000071		0.000050	mg/L		27-OCT-21	R5629852
Lithium (Li)-Dissolved	0.0456		0.0010	mg/L		27-OCT-21	R5629852
Magnesium (Mg)-Dissolved	11.5		0.10	mg/L		27-OCT-21	R5629852
Manganese (Mn)-Dissolved	0.00753		0.00010	mg/L		27-OCT-21	R5629852

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-1 DUGOUT 1 BOOTH D.1							
Sampled By: CLIENT on 21-OCT-21 @ 11:45							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Molybdenum (Mo)-Dissolved	0.00117		0.000050	mg/L		27-OCT-21	R5629852
Nickel (Ni)-Dissolved	0.00382		0.00050	mg/L		27-OCT-21	R5629852
Phosphorus (P)-Dissolved	0.148		0.050	mg/L		27-OCT-21	R5629852
Potassium (K)-Dissolved	16.4		0.50	mg/L		27-OCT-21	R5629852
Rubidium (Rb)-Dissolved	0.00117		0.00020	mg/L		27-OCT-21	R5629852
Selenium (Se)-Dissolved	0.000096		0.000050	mg/L		27-OCT-21	R5629852
Silicon (Si)-Dissolved	<0.050		0.050	mg/L		27-OCT-21	R5629852
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629852
Sodium (Na)-Dissolved	181		1.0	mg/L		27-OCT-21	R5629852
Strontium (Sr)-Dissolved	0.198		0.00020	mg/L		27-OCT-21	R5629852
Sulfur (S)-Dissolved	11.2		0.50	mg/L		27-OCT-21	R5629852
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629852
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629852
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629852
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629852
Titanium (Ti)-Dissolved	0.00077		0.00030	mg/L		27-OCT-21	R5629852
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629852
Uranium (U)-Dissolved	0.000824		0.000010	mg/L		27-OCT-21	R5629852
Vanadium (V)-Dissolved	0.00221		0.00050	mg/L		27-OCT-21	R5629852
Zinc (Zn)-Dissolved	0.0018		0.0010	mg/L		27-OCT-21	R5629852
Zirconium (Zr)-Dissolved	0.00056		0.00020	mg/L		27-OCT-21	R5629852
Fluoride in Water by IC							
Fluoride (F)	0.406		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	106			%		10-NOV-21	
TDS (Calculated)	522			mg/L		10-NOV-21	
Hardness (as CaCO3)	82.1			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	28.0		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.48		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	808		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	424		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	7.2		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	360		2.0	mg/L		30-OCT-21	R5633371
L2654602-2 DUGOUT 2 EWET D.1							
Sampled By: CLIENT on 21-OCT-21 @ 11:10							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-2 DUGOUT 2 EWET D.1							
Sampled By: CLIENT on 21-OCT-21 @ 11:10							
Matrix: Surface Water							
BTEX, Styrene and F1 (C6-C10)							
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	106.9		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	82.5		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	103.1		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632137
Surrogate: 2-Bromobenzotrifluoride	103.8		60-140	%	26-OCT-21	28-OCT-21	R5632137
Miscellaneous Parameters							
Ammonia, Total (as N)	0.122		0.050	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	99		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	33.7		2.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	782	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	2.26		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	33.1		2.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	8.0		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	56.7		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629833
Aluminum (Al)-Dissolved	0.109		0.0010	mg/L		27-OCT-21	R5629852
Antimony (Sb)-Dissolved	0.00052		0.00010	mg/L		27-OCT-21	R5629852
Arsenic (As)-Dissolved	0.0103		0.00010	mg/L		27-OCT-21	R5629852
Barium (Ba)-Dissolved	0.0812		0.00010	mg/L		27-OCT-21	R5629852
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629852
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629852
Boron (B)-Dissolved	0.035		0.010	mg/L		27-OCT-21	R5629852
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		27-OCT-21	R5629852
Calcium (Ca)-Dissolved	22.4		0.50	mg/L		27-OCT-21	R5629852
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629852
Chromium (Cr)-Dissolved	0.00018		0.00010	mg/L		27-OCT-21	R5629852
Cobalt (Co)-Dissolved	0.00117		0.00010	mg/L		27-OCT-21	R5629852
Copper (Cu)-Dissolved	0.00389		0.00020	mg/L		27-OCT-21	R5629852
Iron (Fe)-Dissolved	0.086		0.010	mg/L		27-OCT-21	R5629852
Lead (Pb)-Dissolved	0.000082		0.000050	mg/L		27-OCT-21	R5629852
Lithium (Li)-Dissolved	0.0399		0.0010	mg/L		27-OCT-21	R5629852
Magnesium (Mg)-Dissolved	14.9		0.10	mg/L		27-OCT-21	R5629852
Manganese (Mn)-Dissolved	0.00745		0.00010	mg/L		27-OCT-21	R5629852
Molybdenum (Mo)-Dissolved	0.00316		0.000050	mg/L		27-OCT-21	R5629852
Nickel (Ni)-Dissolved	0.00698		0.00050	mg/L		27-OCT-21	R5629852
Phosphorus (P)-Dissolved	0.408		0.050	mg/L		27-OCT-21	R5629852
Potassium (K)-Dissolved	26.7		0.50	mg/L		27-OCT-21	R5629852
Rubidium (Rb)-Dissolved	0.00153		0.00020	mg/L		27-OCT-21	R5629852

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-2 DUGOUT 2 EWET D.1							
Sampled By: CLIENT on 21-OCT-21 @ 11:10							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Selenium (Se)-Dissolved	0.000373		0.000050	mg/L		27-OCT-21	R5629852
Silicon (Si)-Dissolved	0.354		0.050	mg/L		27-OCT-21	R5629852
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629852
Sodium (Na)-Dissolved	255		1.0	mg/L		27-OCT-21	R5629852
Strontium (Sr)-Dissolved	0.270		0.00020	mg/L		27-OCT-21	R5629852
Sulfur (S)-Dissolved	38.2		0.50	mg/L		27-OCT-21	R5629852
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629852
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629852
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629852
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629852
Titanium (Ti)-Dissolved	0.00368		0.00030	mg/L		27-OCT-21	R5629852
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629852
Uranium (U)-Dissolved	0.00290		0.000010	mg/L		27-OCT-21	R5629852
Vanadium (V)-Dissolved	0.00442		0.00050	mg/L		27-OCT-21	R5629852
Zinc (Zn)-Dissolved	0.0042		0.0010	mg/L		27-OCT-21	R5629852
Zirconium (Zr)-Dissolved	0.00081		0.00020	mg/L		27-OCT-21	R5629852
Fluoride in Water by IC							
Fluoride (F)	0.523		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	106			%		10-NOV-21	
TDS (Calculated)	764			mg/L		10-NOV-21	
Hardness (as CaCO3)	117			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	0.021		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	103		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.59		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	1110		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	551		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	14.3		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	475		2.0	mg/L		30-OCT-21	R5633371
L2654602-3 DUGOUT 3 EWET D.2							
Sampled By: CLIENT on 21-OCT-21 @ 10:50							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-3 DUGOUT 3 EWET D.2							
Sampled By: CLIENT on 21-OCT-21 @ 10:50							
Matrix: Surface Water							
BTEX, Styrene and F1 (C6-C10)							
Surrogate: 1,4-Difluorobenzene (SS)	108.7		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	84.3		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	112.7		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	91.2		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	0.67		0.25	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	133		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	42.5		2.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	1140	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	4.98		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	44.5		2.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	93.0		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	62.2		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0320		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00064		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.0153		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.0929		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.024		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	44.0		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.00013		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00153		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00197		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	0.079		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	0.000102		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0399		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	23.8		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.0538		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.00204		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.00860		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	1.14		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	28.9		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00259		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.000582		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	1.58		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	317		1.0	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-3 DUGOUT 3 EWET D.2							
Sampled By: CLIENT on 21-OCT-21 @ 10:50							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Strontium (Sr)-Dissolved	0.478		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	107		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.00346		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.00274		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.00840		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0027		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.00175		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.466		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	97.5			%		10-NOV-21	
TDS (Calculated)	1110			mg/L		10-NOV-21	
Hardness (as CaCO3)	208			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	0.034		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.034		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	284		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.61		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	1590		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	662		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	19.9		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	576		2.0	mg/L		30-OCT-21	R5633371
L2654602-4 DUGOUT 4 EWET D.3							
Sampled By: CLIENT on 21-OCT-21 @ 11:30							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	109.3		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	77.8		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	109.6		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-4 DUGOUT 4 EWET D.3							
Sampled By: CLIENT on 21-OCT-21 @ 11:30							
Matrix: Surface Water							
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	128.3		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	0.60		0.25	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	115		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	38.2		2.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	563	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	4.27		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	41.0		2.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	8.0		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.000050		0.000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	99.8		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0129		0.0010	mg/L		28-OCT-21	R5632083
Antimony (Sb)-Dissolved	0.00025		0.00010	mg/L		28-OCT-21	R5632083
Arsenic (As)-Dissolved	0.00770		0.00010	mg/L		28-OCT-21	R5632083
Barium (Ba)-Dissolved	0.0468		0.00010	mg/L		28-OCT-21	R5632083
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		28-OCT-21	R5632083
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		28-OCT-21	R5632083
Boron (B)-Dissolved	0.032		0.010	mg/L		28-OCT-21	R5632083
Cadmium (Cd)-Dissolved	<0.000050		0.000050	mg/L		28-OCT-21	R5632083
Calcium (Ca)-Dissolved	25.5		0.50	mg/L		28-OCT-21	R5632083
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		28-OCT-21	R5632083
Chromium (Cr)-Dissolved	0.00011		0.00010	mg/L		28-OCT-21	R5632083
Cobalt (Co)-Dissolved	0.00080		0.00010	mg/L		28-OCT-21	R5632083
Copper (Cu)-Dissolved	0.00255		0.00020	mg/L		28-OCT-21	R5632083
Iron (Fe)-Dissolved	0.269		0.010	mg/L		28-OCT-21	R5632083
Lead (Pb)-Dissolved	0.000189		0.000050	mg/L		28-OCT-21	R5632083
Lithium (Li)-Dissolved	0.0173		0.0010	mg/L		28-OCT-21	R5632083
Magnesium (Mg)-Dissolved	11.5		0.10	mg/L		28-OCT-21	R5632083
Manganese (Mn)-Dissolved	0.114		0.00010	mg/L		28-OCT-21	R5632083
Molybdenum (Mo)-Dissolved	0.00143		0.000050	mg/L		28-OCT-21	R5632083
Nickel (Ni)-Dissolved	0.00375		0.00050	mg/L		28-OCT-21	R5632083
Phosphorus (P)-Dissolved	0.701		0.050	mg/L		28-OCT-21	R5632083
Potassium (K)-Dissolved	21.0		0.50	mg/L		28-OCT-21	R5632083
Rubidium (Rb)-Dissolved	0.00183		0.00020	mg/L		28-OCT-21	R5632083
Selenium (Se)-Dissolved	0.000252		0.000050	mg/L		28-OCT-21	R5632083
Silicon (Si)-Dissolved	1.94		0.050	mg/L		28-OCT-21	R5632083
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		28-OCT-21	R5632083
Sodium (Na)-Dissolved	173		1.0	mg/L		28-OCT-21	R5632083
Strontium (Sr)-Dissolved	0.224		0.00020	mg/L		28-OCT-21	R5632083
Sulfur (S)-Dissolved	6.32		0.50	mg/L		28-OCT-21	R5632083
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		28-OCT-21	R5632083
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		28-OCT-21	R5632083

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-4 DUGOUT 4 EWET D.3							
Sampled By: CLIENT on 21-OCT-21 @ 11:30							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		28-OCT-21	R5632083
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		28-OCT-21	R5632083
Titanium (Ti)-Dissolved	0.00249		0.00030	mg/L		28-OCT-21	R5632083
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		28-OCT-21	R5632083
Uranium (U)-Dissolved	0.000768		0.000010	mg/L		28-OCT-21	R5632083
Vanadium (V)-Dissolved	0.00358		0.00050	mg/L		28-OCT-21	R5632083
Zinc (Zn)-Dissolved	0.0017		0.0010	mg/L		28-OCT-21	R5632083
Zirconium (Zr)-Dissolved	0.00113		0.00020	mg/L		28-OCT-21	R5632083
Fluoride in Water by IC							
Fluoride (F)	0.322		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	102			%		10-NOV-21	
TDS (Calculated)	560			mg/L		10-NOV-21	
Hardness (as CaCO3)	111			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	0.103		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.119		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	0.016		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	13.4		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.40		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	894		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	426		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	358		2.0	mg/L		30-OCT-21	R5633371
L2654602-5 DUGOUT 5 EWET D.4							
Sampled By: CLIENT on 21-OCT-21 @ 12:00							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	108.9		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	76.6		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	120.0		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	116.6		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	0.51		0.25	mg/L		08-NOV-21	R5641096

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-5 DUGOUT 5 EWET D.4							
Sampled By: CLIENT on 21-OCT-21 @ 12:00							
Matrix: Surface Water							
Chemical Oxygen Demand	124		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	35.9		2.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	583	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	5.41		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	34.4		2.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	69.0		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	20.5		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0782		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00057		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.00694		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.102		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.034		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	29.5		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.00012		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00146		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00282		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	0.059		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	0.000078		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0207		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	17.1		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.00707		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.00312		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.00852		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	0.105		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	19.6		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00176		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.000469		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	0.178		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	168		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.328		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	31.1		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.00321		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.00245		0.000010	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-5 DUGOUT 5 EWET D.4							
Sampled By: CLIENT on 21-OCT-21 @ 12:00							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Vanadium (V)-Dissolved	0.00225		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0039		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.00081		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.736		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	100			%		10-NOV-21	
TDS (Calculated)	590			mg/L		10-NOV-21	
Hardness (as CaCO3)	144			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	80.9		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.50		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	878		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	494		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	9.8		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	422		2.0	mg/L		30-OCT-21	R5633371
L2654602-6 DUGOUT 6 LYONS D.1							
Sampled By: CLIENT on 21-OCT-21 @ 10:30							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	106.0		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	74.9		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	101.8		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	112.0		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	0.054		0.050	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	93		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	29.7		2.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	368	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	3.19		0.20	mg/L		09-NOV-21	R5639826

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-6 DUGOUT 6 LYONS D.1							
Sampled By: CLIENT on 21-OCT-21 @ 10:30							
Matrix: Surface Water							
Total Organic Carbon	31.4		2.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	23.6		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	18.3		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0034		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00024		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.00773		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.0330		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.023		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	29.8		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00078		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00119		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	0.016		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0128		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	10.8		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.00485		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.00132		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.00336		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	0.589		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	18.1		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00164		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.000271		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	2.13		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	84.7		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.229		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	19.4		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.00031		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.000932		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.00399		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0022		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.00050		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.256		0.020	mg/L		23-OCT-21	R5628639

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-6 DUGOUT 6 LYONS D.1							
Sampled By: CLIENT on 21-OCT-21 @ 10:30							
Matrix: Surface Water							
Ion Balance Calculation							
Ion Balance	95.0			%		10-NOV-21	
TDS (Calculated)	372			mg/L		10-NOV-21	
Hardness (as CaCO3)	119			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	48.8		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.30		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	586		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	325		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	268		2.0	mg/L		30-OCT-21	R5633371
L2654602-7 DUGOUT 7 LYONS D.2							
Sampled By: CLIENT on 21-OCT-21 @ 10:45							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	107.1		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	75.9		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	114.1		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	105.8		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	0.090		0.050	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	182		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	46.8		5.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	338	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	9.3		1.0	mg/L		09-NOV-21	R5639826
Total Organic Carbon	54.0		2.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	43.5	DLHC	8.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-7 DUGOUT 7 LYONS D.2							
Sampled By: CLIENT on 21-OCT-21 @ 10:45							
Matrix: Surface Water							
Chloride in Water by IC							
Chloride (Cl)	17.9		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0176		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00025		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.00725		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.0357		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.032		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	0.0000065		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	26.2		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.00011		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00081		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00233		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	0.046		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	0.000056		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0113		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	9.62		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.0101		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.00176		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.00415		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	0.865		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	21.3		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00225		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.000257		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	1.37		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	82.2		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.200		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	15.0		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	0.00012		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.00090		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.00114		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.00444		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0046		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.00042		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.236		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	105			%		14-NOV-21	
TDS (Calculated)	333			mg/L		14-NOV-21	
Hardness (as CaCO3)	105			mg/L		14-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	0.047		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-7 DUGOUT 7 LYONS D.2							
Sampled By: CLIENT on 21-OCT-21 @ 10:45							
Matrix: Surface Water							
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.047		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	32.8		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.25		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	515		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	289		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	237		2.0	mg/L		30-OCT-21	R5633371
L2654602-8 DUGOUT 8 LYONS D.3							
Sampled By: CLIENT on 21-OCT-21 @ 09:05							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	106.9		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	78.1		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	117.2		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	107.1		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	2.13		0.50	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	378	DLM	20	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	108		10	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0030	DLM	0.0030	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	1040	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	18.0		1.0	mg/L		10-NOV-21	R5639826
Total Organic Carbon	103		10	mg/L		08-NOV-21	R5638487
Total Suspended Solids	1040	DLHC	30	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	0.0000088		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	66.3		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	1.28		0.0010	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-8 DUGOUT 8 LYONS D.3							
Sampled By: CLIENT on 21-OCT-21 @ 09:05							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Antimony (Sb)-Dissolved	0.00131		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.00556		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.185		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	0.00011		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.060		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	0.0000423		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	31.8		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	0.000086		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.00163		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00303		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00613		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	3.00		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	0.00289		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0234		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	14.5		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.166		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.0316		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.0195		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	0.228		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	26.6		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00278		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.00153		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	3.92		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	0.000018		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	262		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.392		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	111		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	0.000016		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	0.00029		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.0326		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.0213		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.00605		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0108		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.00563		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	1.62		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	86.0	BL:INT		%		10-NOV-21	
TDS (Calculated)	985			mg/L		10-NOV-21	
Hardness (as CaCO3)	139			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	0.096		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.096		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	306		0.30	mg/L		23-OCT-21	R5628639

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-8 DUGOUT 8 LYONS D.3 Sampled By: CLIENT on 21-OCT-21 @ 09:05 Matrix: Surface Water							
pH, Conductivity and Total Alkalinity							
pH	8.31		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	1470		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	557		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	460		2.0	mg/L		30-OCT-21	R5633371
L2654602-9 DUGOUT 9 LYONS D.4 Sampled By: CLIENT on 21-OCT-21 @ 09:45 Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	107.9		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	76.5		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	115.2		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	106.2		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	0.43		0.25	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	258		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	85.3		5.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	1130	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	9.1		1.0	mg/L		10-NOV-21	R5639826
Total Organic Carbon	90.1		5.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	96.0	DLHC	8.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	77.8		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.221		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00117		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.00526		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.153		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.053		0.010	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-9 DUGOUT 9 LYONS D.4							
Sampled By: CLIENT on 21-OCT-21 @ 09:45							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Cadmium (Cd)-Dissolved	0.0000115		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	36.5		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	0.000016		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.00048		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00232		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00522		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	0.068		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	0.000096		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0362		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	21.0		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.0828		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.0136		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.0139		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	0.315		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	61.4		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00290		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.000441		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	0.810		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	264		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.288		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	11.5		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.00754		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	0.00012		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.0113		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.00398		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0022		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.00273		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	1.20		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	98.8			%		10-NOV-21	
TDS (Calculated)	936			mg/L		10-NOV-21	
Hardness (as CaCO3)	178			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	2.56		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.61		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	0.050		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	81.2		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.59		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	1430		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	734		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	20.2		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-10 DUGOUT 10 MAGNESON D.1							
Sampled By: CLIENT on 21-OCT-21 @ 13:45							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Copper (Cu)-Dissolved	0.0301		0.0010	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	0.887		0.050	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	0.00091		0.00025	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0777		0.0050	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	43.5		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.521		0.00050	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.00439		0.00025	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.0255		0.0025	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	7.01		0.25	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	152		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.0159		0.0010	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.00105		0.00025	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	8.75		0.25	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	426		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.723		0.0010	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	168		2.5	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.0010		0.0010	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.0271		0.0015	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.00292		0.000050	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.0189		0.0025	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0103		0.0050	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.0052		0.0010	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.365		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	97.9			%		10-NOV-21	
TDS (Calculated)	1830			mg/L		10-NOV-21	
Hardness (as CaCO3)	366			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	1.07		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.09		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	0.018		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	480		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.61		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	2690		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	707		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	24.1		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	620		2.0	mg/L		30-OCT-21	R5633371
L2654602-11 DUGOUT 12 MAGNESON D.3							
Sampled By: CLIENT on 21-OCT-21 @ 08:30							
Matrix: Surface Water							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-11 DUGOUT 12 MAGNESON D.3							
Sampled By: CLIENT on 21-OCT-21 @ 08:30							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	106.8		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	80.9		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	110.2		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	106.3		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	12		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	8.3		1.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	478	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	0.57		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	9.0		2.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	7.4		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	49.9		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0125		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00028		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.00105		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.0364		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.050		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	0.0000153		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	43.7		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.00029		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00276		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	<0.010		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0202		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	13.5		0.10	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-11 DUGOUT 12 MAGNESON D.3							
Sampled By: CLIENT on 21-OCT-21 @ 08:30							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Manganese (Mn)-Dissolved	0.00067		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.0364		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.00476		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	3.22		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00077		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.000246		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	<0.050		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	109		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.378		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	83.7		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.00127		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.00122		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0044		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.459		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	98.5			%		10-NOV-21	
TDS (Calculated)	512			mg/L		10-NOV-21	
Hardness (as CaCO3)	165			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	235		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	7.87		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	772		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	117		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	95.6		2.0	mg/L		30-OCT-21	R5633371
L2654602-12 DUGOUT 13							
Sampled By: CLIENT on 21-OCT-21 @ 14:25							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-12 DUGOUT 13							
Sampled By: CLIENT on 21-OCT-21 @ 14:25							
Matrix: Surface Water							
BTEX, Styrene and F1 (C6-C10)							
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	106.8		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	85.4		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	101.1		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	111.8		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	<2.5	DLM	2.5	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	3420	DLHC	100	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	1070		50	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	0.0054	DLM	0.0030	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	11000	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	122		10	mg/L		10-NOV-21	R5639826
Total Organic Carbon	1100		50	mg/L		08-NOV-21	R5638487
Total Suspended Solids	1660	DLHC	30	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.000050	DLM	0.000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	3040	DLDS	5.0	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					27-OCT-21	R5629846
Dissolved Metals Filtration Location	LAB					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.167		0.010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.0021		0.0010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.0841		0.0010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.436		0.0010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.0010		0.0010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.46		0.10	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	0.000131		0.000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	109		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.0077		0.0010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.0157		0.0010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.0364		0.0020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	7.34		0.10	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	0.00584		0.00050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.330		0.010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	262		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	1.80		0.0010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.0242		0.00050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.0967		0.0050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	34.8		0.50	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-12 DUGOUT 13							
Sampled By: CLIENT on 21-OCT-21 @ 14:25							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Potassium (K)-Dissolved	2420		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.315		0.0020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.00626		0.00050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	9.12		0.50	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	0.00012		0.00010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	2840		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	1.24		0.0020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	1070		5.0	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.0020		0.0020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	0.0028		0.0010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.0010		0.0010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.103		0.0030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.0010		0.0010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.0119		0.00010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.0466		0.0050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.041		0.010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.0551		0.0020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.27	DLDS	0.20	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	96.2			%		14-NOV-21	
TDS (Calculated)	13800			mg/L		14-NOV-21	
Hardness (as CaCO3)	1350			mg/L		14-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLDS	0.20	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.22		0.22	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	2940	DLDS	3.0	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	9.12		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	16400		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	3440		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	522		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	3690		2.0	mg/L		30-OCT-21	R5633371
L2654602-13 DUGOUT 14							
Sampled By: CLIENT on 21-OCT-21 @ 14:05							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-13 DUGOUT 14							
Sampled By: CLIENT on 21-OCT-21 @ 14:05							
Matrix: Surface Water							
BTEX, Styrene and F1 (C6-C10)							
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	107.0		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	86.3		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	116.8		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	106.7		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	0.37		0.25	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	670		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	171		10	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	2740	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	23		10	mg/L		10-NOV-21	R5639826
Total Organic Carbon	148		10	mg/L		08-NOV-21	R5638487
Total Suspended Solids	359	DLHC	8.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	476	DLDS	5.0	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	1.21		0.0050	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00079		0.00050	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.0221		0.00050	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.0979		0.00050	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.00025		0.00025	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.079		0.050	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	0.000026		0.000025	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	83.3		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	0.000088		0.000050	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.00153		0.00050	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00320		0.00050	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.0040		0.0010	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	1.38		0.050	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	0.00235		0.00025	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0786		0.0050	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	41.6		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.342		0.00050	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.0160		0.00025	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.0228		0.0025	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	2.17		0.25	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	137		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.0096		0.0010	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.00121		0.00025	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	9.04		0.25	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-13 DUGOUT 14							
Sampled By: CLIENT on 21-OCT-21 @ 14:05							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	572		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.745		0.0010	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	125		2.5	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.0010		0.0010	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.0411		0.0015	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	0.00089		0.00050	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.00347		0.000050	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.0189		0.0025	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0088		0.0050	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.0090		0.0010	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	1.01	DLDS	0.20	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	75.6	BL:INT		%		10-NOV-21	
TDS (Calculated)	2460			mg/L		10-NOV-21	
Hardness (as CaCO3)	379			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLDS	0.20	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.22		0.22	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	333	DLDS	3.0	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.89		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	3780		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	1440		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	107		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	1360		2.0	mg/L		30-OCT-21	R5633371
L2654602-14 DUGOUT 15							
Sampled By: CLIENT on 21-OCT-21 @ 13:55							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	106.9		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	79.5		70-130	%	28-OCT-21	28-OCT-21	R5617306

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-14 DUGOUT 15							
Sampled By: CLIENT on 21-OCT-21 @ 13:55							
Matrix: Surface Water							
BTEX, Styrene and F1 (C6-C10)							
Surrogate: 3,4-Dichlorotoluene (SS)	106.9		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	107.3		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	0.28		0.25	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	148		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	39.0		1.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	2920	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	2.55		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	46.5		1.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	14.2		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	453	DLDS	2.5	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0211		0.0050	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00107		0.00050	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.0337		0.00050	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.0465		0.00050	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.00025		0.00025	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.302		0.050	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	<0.000025		0.000025	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	83.6		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00084		0.00050	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.0013		0.0010	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	<0.050		0.050	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	<0.00025		0.00025	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.148		0.0050	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	82.8		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.505		0.00050	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.00099		0.00025	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.0070		0.0025	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	1.25		0.25	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	40.2		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.0029		0.0010	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.00029		0.00025	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	0.86		0.25	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	823		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	1.24		0.0010	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	486		2.5	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-14 DUGOUT 15							
Sampled By: CLIENT on 21-OCT-21 @ 13:55							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Tellurium (Te)-Dissolved	<0.0010		0.0010	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	<0.0015		0.0015	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.00358		0.000050	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.0040		0.0025	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	<0.0050		0.0050	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.0014		0.0010	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.38	DLDS	0.10	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	93.0			%		10-NOV-21	
TDS (Calculated)	3160			mg/L		10-NOV-21	
Hardness (as CaCO3)	550			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.11		0.11	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	1380	DLDS	1.5	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.47		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	4140		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	577		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	12.7		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	494		2.0	mg/L		30-OCT-21	R5633371
L2654602-15 DUGOUT 16							
Sampled By: CLIENT on 21-OCT-21 @ 12:20							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	105.5		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	80.2		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	105.0		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	106.3		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-15 DUGOUT 16							
Sampled By: CLIENT on 21-OCT-21 @ 12:20							
Matrix: Surface Water							
Ammonia, Total (as N)	2.2		1.3	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	114		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	36.8		1.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	1230	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	2.38		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	39.7		2.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	12.0		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	274		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0218		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00057		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.0131		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.0955		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.041		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	0.0000066		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	75.0		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.00016		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00136		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00154		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	0.032		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	0.000059		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0443		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	34.7		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.494		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.00268		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.00754		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	1.30		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	25.4		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00236		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.000491		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	4.59		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	367		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.627		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	69.7		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.00121		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	0.00013		0.00010	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-15 DUGOUT 16							
Sampled By: CLIENT on 21-OCT-21 @ 12:20							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Uranium (U)-Dissolved	0.00362		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.00877		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0044		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.00121		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.398		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	98.0			%		10-NOV-21	
TDS (Calculated)	1320			mg/L		10-NOV-21	
Hardness (as CaCO3)	330			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	0.153		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.302		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	0.149		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	173		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.58		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	2010		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	714		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	22.8		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	623		2.0	mg/L		30-OCT-21	R5633371
L2654602-16 DUGOUT 19							
Sampled By: CLIENT on 21-OCT-21 @ 12:40							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	105.5		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	79.3		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	86.4		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	109.2		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	0.71		0.25	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	73		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	24.9		1.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	747	DLDS	20	mg/L		06-NOV-21	R5637214

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-16 DUGOUT 19							
Sampled By: CLIENT on 21-OCT-21 @ 12:40							
Matrix: Surface Water							
Total Kjeldahl Nitrogen	1.40		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	28.2		1.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	11.2		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.000050		0.000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	103		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC IC PMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0096		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00037		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.00579		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.0779		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.044		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	0.0000071		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	33.1		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.00011		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00056		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00177		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	0.034		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	0.000055		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0247		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	26.9		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.136		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.000873		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.00361		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	0.306		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	16.5		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00164		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.000263		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	0.380		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	179		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.460		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	66.2		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.00041		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.00194		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.00184		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0130		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.00046		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-16 DUGOUT 19 Sampled By: CLIENT on 21-OCT-21 @ 12:40 Matrix: Surface Water							
Fluoride in Water by IC							
Fluoride (F)	0.304		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	97.4			%		10-NOV-21	
TDS (Calculated)	709			mg/L		10-NOV-21	
Hardness (as CaCO3)	193			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	0.035		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.035		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	166		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.32		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	1120		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	370		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	307		2.0	mg/L		30-OCT-21	R5633371
L2654602-17 DUGOUT 20 Sampled By: CLIENT on 21-OCT-21 @ 13:00 Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	105.6		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	73.9		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	117.4		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	111.9		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	1.32		0.50	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	65		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	25.1		1.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	411	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	1.46		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	25.0		1.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	8.2		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-17 DUGOUT 20							
Sampled By: CLIENT on 21-OCT-21 @ 13:00							
Matrix: Surface Water							
Dissolved Mercury in Water by CVAAS							
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	63.0		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629884
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629884
Aluminum (Al)-Dissolved	0.0067		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00011		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.00397		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.116		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	<0.010		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	49.8		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.00011		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00057		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00110		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	0.302		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	0.000100		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0241		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	16.7		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.655		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.000301		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.00257		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	0.454		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	13.7		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00242		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.000190		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	9.27		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	67.1		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.330		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	15.2		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.00063		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.000194		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.00062		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0029		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.00046		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.219		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	92.3			%		10-NOV-21	
TDS (Calculated)	406			mg/L		10-NOV-21	
Hardness (as CaCO3)	193			mg/L		10-NOV-21	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-17 DUGOUT 20 Sampled By: CLIENT on 21-OCT-21 @ 13:00 Matrix: Surface Water							
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	36.6		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.28		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	696		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	322		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	265		2.0	mg/L		30-OCT-21	R5633371
L2654602-18 DUGOUT 21 Sampled By: CLIENT on 21-OCT-21 @ 13:20 Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	106.2		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	73.8		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	110.3		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	105.8		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	0.260		0.050	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	175		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	56.8		1.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	1430	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	2.69		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	56.7		2.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	53.0	DLHC	8.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	537		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					27-OCT-21	R5629846

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-18 DUGOUT 21							
Sampled By: CLIENT on 21-OCT-21 @ 13:20							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0035		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00053		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.0155		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.103		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	<0.010		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	86.6		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00198		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00250		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	0.016		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0589		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	74.1		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.0227		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.00164		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.00751		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	0.717		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	47.2		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00380		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.000475		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	6.28		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	442		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.715		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	37.0		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.00049		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.00338		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.00815		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.00112		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.324		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	107			%		14-NOV-21	
TDS (Calculated)	1640			mg/L		14-NOV-21	
Hardness (as CaCO3)	521			mg/L		14-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	0.031		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.031		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-18 DUGOUT 21 Sampled By: CLIENT on 21-OCT-21 @ 13:20 Matrix: Surface Water							
Sulfate in Water by IC							
Sulfate (SO4)	92.7		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.61		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	2580		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	671		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	25.7		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	593		2.0	mg/L		30-OCT-21	R5633371
L2654602-19 DUGOUT 22 Sampled By: CLIENT on 22-OCT-21 @ 09:00 Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	28-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	28-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	28-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	107.0		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	78.5		70-130	%	28-OCT-21	28-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	117.8		70-130	%	28-OCT-21	28-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	110.5		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	1.32		0.50	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	186		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	55.4		1.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	1620	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	3.25		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	59.1		2.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	434	DLHC	8.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	515		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.641		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00037		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.00704		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.107		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-19 DUGOUT 22							
Sampled By: CLIENT on 22-OCT-21 @ 09:00							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	<0.010		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	0.0000152		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	81.9		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	0.000038		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.00078		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	0.00166		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00283		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	1.06		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	0.000967		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0343		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	55.6		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.288		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.00154		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.00503		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	0.334		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	45.5		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00577		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.000324		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	5.97		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	359		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.540		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	40.4		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	0.00011		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	0.0211		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.00331		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.00540		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0074		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	0.00301		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.279		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	94.7			%		10-NOV-21	
TDS (Calculated)	1470			mg/L		10-NOV-21	
Hardness (as CaCO3)	433			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	0.039		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.050		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	0.011		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	93.9		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.50		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	2450		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	607		5.0	mg/L		30-OCT-21	R5633371

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-19 DUGOUT 22							
Sampled By: CLIENT on 22-OCT-21 @ 09:00							
Matrix: Surface Water							
pH, Conductivity and Total Alkalinity							
Carbonate (CO3)	15.7		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	524		2.0	mg/L		30-OCT-21	R5633371
L2654602-20 TRIP BLANK							
Sampled By: CLIENT on 21-OCT-21 @ 08:30							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	29-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	29-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	29-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	105.4		70-130	%	28-OCT-21	29-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	83.3		70-130	%	28-OCT-21	29-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	108.4		70-130	%	28-OCT-21	29-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	108.6		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	23		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	<1.0		1.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	<10		10	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	<0.20		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	<1.0		1.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	<3.0		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	<0.50		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0014		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	<0.010		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	<0.50		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-20 TRIP BLANK							
Sampled By: CLIENT on 21-OCT-21 @ 08:30							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	<0.010		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	<0.0010		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	<0.10		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	<0.50		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	<0.050		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	<1.0		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	<0.50		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	<0.020		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	Low TDS			%		10-NOV-21	
TDS (Calculated)	<1.0			mg/L		10-NOV-21	
Hardness (as CaCO3)	<1.0			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	<0.30		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	5.42		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	<2.0		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	<2.0		2.0	mg/L		30-OCT-21	R5633371

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-21 FIELD BLANK							
Sampled By: CLIENT on 21-OCT-21 @ 10:30							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	29-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	29-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	29-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	105.6		70-130	%	28-OCT-21	29-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	78.5		70-130	%	28-OCT-21	29-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	103.9		70-130	%	28-OCT-21	29-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	108.3		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	<10		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	<1.0		1.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	<10		10	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	<0.20		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	<1.0		1.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	<3.0		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	<0.50		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0043		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.00062		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	<0.010		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	<0.50		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00164		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	<0.010		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	<0.0010		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	<0.10		0.10	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-21 FIELD BLANK							
Sampled By: CLIENT on 21-OCT-21 @ 10:30							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Manganese (Mn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.000057		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L		27-OCT-21	R5629884
Potassium (K)-Dissolved	<0.50		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	<0.050		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	<1.0		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	<0.50		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	0.00094		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0011		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	<0.020		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	Low TDS			%		10-NOV-21	
TDS (Calculated)	<1.0			mg/L		10-NOV-21	
Hardness (as CaCO3)	<1.0			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	<0.30		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	6.77		0.10	pH		01-NOV-21	R5633371
Conductivity (EC)	<2.0		2.0	uS/cm		01-NOV-21	R5633371
Bicarbonate (HCO3)	<5.0		5.0	mg/L		01-NOV-21	R5633371
Carbonate (CO3)	<5.0		5.0	mg/L		01-NOV-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		01-NOV-21	R5633371
Alkalinity, Total (as CaCO3)	<2.0		2.0	mg/L		02-NOV-21	R5635146
L2654602-22 DUP-A							
Sampled By: CLIENT on 21-OCT-21 @ 08:30							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-22 DUP-A							
Sampled By: CLIENT on 21-OCT-21 @ 08:30							
Matrix: Surface Water							
BTEX, Styrene and F1 (C6-C10)							
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	29-OCT-21	R5617306
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	29-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	29-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	104.6		70-130	%	28-OCT-21	29-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	82.4		70-130	%	28-OCT-21	29-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	107.4		70-130	%	28-OCT-21	29-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	111.6		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	28		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	7.6		1.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	451	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	<0.20		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	7.8		2.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	8.4		3.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	48.8		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Dissolved Metals Filtration Location	FIELD					27-OCT-21	R5629846
Aluminum (Al)-Dissolved	0.0090		0.0010	mg/L		27-OCT-21	R5629884
Antimony (Sb)-Dissolved	0.00028		0.00010	mg/L		27-OCT-21	R5629884
Arsenic (As)-Dissolved	0.00104		0.00010	mg/L		27-OCT-21	R5629884
Barium (Ba)-Dissolved	0.0388		0.00010	mg/L		27-OCT-21	R5629884
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Boron (B)-Dissolved	0.048		0.010	mg/L		27-OCT-21	R5629884
Cadmium (Cd)-Dissolved	0.0000180		0.0000050	mg/L		27-OCT-21	R5629884
Calcium (Ca)-Dissolved	42.7		0.50	mg/L		27-OCT-21	R5629884
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Chromium (Cr)-Dissolved	0.00032		0.00010	mg/L		27-OCT-21	R5629884
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Copper (Cu)-Dissolved	0.00215		0.00020	mg/L		27-OCT-21	R5629884
Iron (Fe)-Dissolved	<0.010		0.010	mg/L		27-OCT-21	R5629884
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		27-OCT-21	R5629884
Lithium (Li)-Dissolved	0.0201		0.0010	mg/L		27-OCT-21	R5629884
Magnesium (Mg)-Dissolved	14.1		0.10	mg/L		27-OCT-21	R5629884
Manganese (Mn)-Dissolved	0.00070		0.00010	mg/L		27-OCT-21	R5629884
Molybdenum (Mo)-Dissolved	0.0363		0.000050	mg/L		27-OCT-21	R5629884
Nickel (Ni)-Dissolved	0.00506		0.00050	mg/L		27-OCT-21	R5629884
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L		27-OCT-21	R5629884

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-22 DUP-A							
Sampled By: CLIENT on 21-OCT-21 @ 08:30							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Potassium (K)-Dissolved	3.32		0.50	mg/L		27-OCT-21	R5629884
Rubidium (Rb)-Dissolved	0.00085		0.00020	mg/L		27-OCT-21	R5629884
Selenium (Se)-Dissolved	0.000219		0.000050	mg/L		27-OCT-21	R5629884
Silicon (Si)-Dissolved	<0.050		0.050	mg/L		27-OCT-21	R5629884
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Sodium (Na)-Dissolved	112		1.0	mg/L		27-OCT-21	R5629884
Strontium (Sr)-Dissolved	0.359		0.00020	mg/L		27-OCT-21	R5629884
Sulfur (S)-Dissolved	86.7		0.50	mg/L		27-OCT-21	R5629884
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		27-OCT-21	R5629884
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		27-OCT-21	R5629884
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L		27-OCT-21	R5629884
Uranium (U)-Dissolved	0.00138		0.000010	mg/L		27-OCT-21	R5629884
Vanadium (V)-Dissolved	0.00128		0.00050	mg/L		27-OCT-21	R5629884
Zinc (Zn)-Dissolved	0.0038		0.0010	mg/L		27-OCT-21	R5629884
Zirconium (Zr)-Dissolved	<0.00020		0.00020	mg/L		27-OCT-21	R5629884
Fluoride in Water by IC							
Fluoride (F)	0.435		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	102			%		10-NOV-21	
TDS (Calculated)	508			mg/L		10-NOV-21	
Hardness (as CaCO3)	165			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	229		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	7.89		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	780		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	117		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	96.0		2.0	mg/L		30-OCT-21	R5633371
L2654602-23 DUP-B							
Sampled By: CLIENT on 21-OCT-21 @ 09:45							
Matrix: Surface Water							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
Toluene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
EthylBenzene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
m+p-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
o-Xylene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
Styrene	<0.00050		0.00050	mg/L	28-OCT-21	29-OCT-21	R5617306
F1(C6-C10)	<0.10		0.10	mg/L	28-OCT-21	29-OCT-21	R5617306

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-23 DUP-B							
Sampled By: CLIENT on 21-OCT-21 @ 09:45							
Matrix: Surface Water							
BTEX, Styrene and F1 (C6-C10)							
F1-BTEX	<0.10		0.10	mg/L	28-OCT-21	29-OCT-21	R5617306
Xylenes	<0.00071		0.00071	mg/L	28-OCT-21	29-OCT-21	R5617306
Surrogate: 1,4-Difluorobenzene (SS)	104.1		70-130	%	28-OCT-21	29-OCT-21	R5617306
Surrogate: 4-Bromofluorobenzene (SS)	79.3		70-130	%	28-OCT-21	29-OCT-21	R5617306
Surrogate: 3,4-Dichlorotoluene (SS)	96.1		70-130	%	28-OCT-21	29-OCT-21	R5617306
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	26-OCT-21	28-OCT-21	R5632138
Surrogate: 2-Bromobenzotrifluoride	108.2		60-140	%	26-OCT-21	28-OCT-21	R5632138
Miscellaneous Parameters							
Ammonia, Total (as N)	0.43		0.25	mg/L		08-NOV-21	R5641096
Chemical Oxygen Demand	266		10	mg/L		28-OCT-21	R5632639
Dissolved Organic Carbon	87.8		1.0	mg/L		13-NOV-21	R5646477
Phenols (4AAP)	<0.0010		0.0010	mg/L		26-OCT-21	R5629773
Total Dissolved Solids	1180	DLDS	20	mg/L		06-NOV-21	R5637214
Total Kjeldahl Nitrogen	3.79		0.20	mg/L		09-NOV-21	R5639826
Total Organic Carbon	91.5		5.0	mg/L		08-NOV-21	R5638487
Total Suspended Solids	178	DLHC	8.0	mg/L		29-OCT-21	R5633169
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					28-OCT-21	R5630596
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		28-OCT-21	R5631905
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	76.1		0.50	mg/L		23-OCT-21	R5628639
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					28-OCT-21	R5630900
Aluminum (Al)-Dissolved	0.0191		0.0050	mg/L		28-OCT-21	R5632083
Antimony (Sb)-Dissolved	0.00142		0.00050	mg/L		28-OCT-21	R5632083
Arsenic (As)-Dissolved	0.00497		0.00050	mg/L		28-OCT-21	R5632083
Barium (Ba)-Dissolved	0.142		0.00050	mg/L		28-OCT-21	R5632083
Beryllium (Be)-Dissolved	<0.00050		0.00050	mg/L		28-OCT-21	R5632083
Bismuth (Bi)-Dissolved	<0.00025		0.00025	mg/L		28-OCT-21	R5632083
Boron (B)-Dissolved	0.063		0.050	mg/L		28-OCT-21	R5632083
Cadmium (Cd)-Dissolved	<0.000025		0.000025	mg/L		28-OCT-21	R5632083
Calcium (Ca)-Dissolved	40.3		0.50	mg/L		28-OCT-21	R5632083
Cesium (Cs)-Dissolved	<0.000050		0.000050	mg/L		28-OCT-21	R5632083
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L		28-OCT-21	R5632083
Cobalt (Co)-Dissolved	0.00253		0.00050	mg/L		28-OCT-21	R5632083
Copper (Cu)-Dissolved	0.0049		0.0010	mg/L		28-OCT-21	R5632083
Iron (Fe)-Dissolved	<0.050		0.050	mg/L		28-OCT-21	R5632083
Lead (Pb)-Dissolved	<0.00025		0.00025	mg/L		28-OCT-21	R5632083
Lithium (Li)-Dissolved	0.0391		0.0050	mg/L		28-OCT-21	R5632083
Magnesium (Mg)-Dissolved	22.4		0.10	mg/L		28-OCT-21	R5632083
Manganese (Mn)-Dissolved	0.0773		0.00050	mg/L		28-OCT-21	R5632083
Molybdenum (Mo)-Dissolved	0.0164		0.00025	mg/L		28-OCT-21	R5632083
Nickel (Ni)-Dissolved	0.0151		0.0025	mg/L		28-OCT-21	R5632083
Phosphorus (P)-Dissolved	<0.25		0.25	mg/L		28-OCT-21	R5632083
Potassium (K)-Dissolved	63.4		0.50	mg/L		28-OCT-21	R5632083
Rubidium (Rb)-Dissolved	0.0025		0.0010	mg/L		28-OCT-21	R5632083
Selenium (Se)-Dissolved	0.00089		0.00025	mg/L		28-OCT-21	R5632083
Silicon (Si)-Dissolved	1.56		0.25	mg/L		28-OCT-21	R5632083
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L		28-OCT-21	R5632083

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2654602-23 DUP-B							
Sampled By: CLIENT on 21-OCT-21 @ 09:45							
Matrix: Surface Water							
Dissolved Metals in Water by CRC ICPMS							
Sodium (Na)-Dissolved	300		1.0	mg/L		28-OCT-21	R5632083
Strontium (Sr)-Dissolved	0.316		0.0010	mg/L		28-OCT-21	R5632083
Sulfur (S)-Dissolved	31.0		2.5	mg/L		28-OCT-21	R5632083
Tellurium (Te)-Dissolved	<0.0010		0.0010	mg/L		28-OCT-21	R5632083
Thallium (Tl)-Dissolved	<0.000050		0.000050	mg/L		28-OCT-21	R5632083
Thorium (Th)-Dissolved	<0.00050		0.00050	mg/L		28-OCT-21	R5632083
Tin (Sn)-Dissolved	<0.00050		0.00050	mg/L		28-OCT-21	R5632083
Titanium (Ti)-Dissolved	<0.0015		0.0015	mg/L		28-OCT-21	R5632083
Tungsten (W)-Dissolved	<0.00050		0.00050	mg/L		28-OCT-21	R5632083
Uranium (U)-Dissolved	0.0128		0.000050	mg/L		28-OCT-21	R5632083
Vanadium (V)-Dissolved	0.0038		0.0025	mg/L		28-OCT-21	R5632083
Zinc (Zn)-Dissolved	<0.0050		0.0050	mg/L		28-OCT-21	R5632083
Zirconium (Zr)-Dissolved	0.0030		0.0010	mg/L		28-OCT-21	R5632083
Fluoride in Water by IC							
Fluoride (F)	1.14		0.020	mg/L		23-OCT-21	R5628639
Ion Balance Calculation							
Ion Balance	112	BL:INT		%		10-NOV-21	
TDS (Calculated)	970			mg/L		10-NOV-21	
Hardness (as CaCO3)	193			mg/L		10-NOV-21	
Nitrate in Water by IC							
Nitrate (as N)	2.51		0.020	mg/L		23-OCT-21	R5628639
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.58		0.022	mg/L		26-OCT-21	
Nitrite in Water by IC							
Nitrite (as N)	0.077		0.010	mg/L		23-OCT-21	R5628639
Sulfate in Water by IC							
Sulfate (SO4)	79.2		0.30	mg/L		23-OCT-21	R5628639
pH, Conductivity and Total Alkalinity							
pH	8.60		0.10	pH		30-OCT-21	R5633371
Conductivity (EC)	1460		2.0	uS/cm		30-OCT-21	R5633371
Bicarbonate (HCO3)	722		5.0	mg/L		30-OCT-21	R5633371
Carbonate (CO3)	21.2		5.0	mg/L		30-OCT-21	R5633371
Hydroxide (OH)	<5.0		5.0	mg/L		30-OCT-21	R5633371
Alkalinity, Total (as CaCO3)	627		2.0	mg/L		30-OCT-21	R5633371

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
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).
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method.			
C-DIS-ORG-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
C-TOT-ORG-CL	Water	Total Organic Carbon	APHA 5310 B-Instrumental
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-T-COL-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-D-CVAA-ED	Water	Dissolved Mercury in Water by CVAAS	APHA 3030B/EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H2SO4 is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
PHENOLS-4AAP-ED	Water	Phenols (4AAP)	EPA 9066 AUTO-DISTILL-COLORIMETRIC
This automated method is based on the distillation of phenol and subsequent reaction of the distillate with an oxidizing agent (alkaline potassium ferricyanide), and 4-aminoantipyrine to form a red complex which is measured at 505 nm. The method will include ortho and meta-substituted phenols, and is collectively named 4AAP phenols.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-ED	Water	Total Dissolved Solids	APHA 2540 C
Gravimetric determination of solids in waters by filtration and evaporating filtrate to dryness at 180 degrees Celsius.			
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
Gravimetric determination of solids in waters by filtration and drying filter at 104 degrees Celsius.			
TKN-F-CL	Water	Total Kjeldahl Nitrogen by Fluorescence	APHA 4500-NORG (TKN)
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

20-972080

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 1 of 23

Client: TETRA TECH CANADA INC..
14940 123 Ave NW
Edmonton AB T5V 1B4

Contact: Brian Adeney

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED		Water						
Batch	R5617306							
WG3647521-4	DUP	L2654602-1						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	28-OCT-21
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	28-OCT-21
EthylBenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	28-OCT-21
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	28-OCT-21
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	28-OCT-21
Styrene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	28-OCT-21
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	28-OCT-21
WG3647677-4	DUP	L2654602-20						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	29-OCT-21
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	29-OCT-21
EthylBenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	29-OCT-21
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	29-OCT-21
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	29-OCT-21
Styrene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	29-OCT-21
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	29-OCT-21
WG3647521-2	LCS							
Benzene			97.8		%		70-130	28-OCT-21
Toluene			108.7		%		70-130	28-OCT-21
EthylBenzene			109.4		%		70-130	28-OCT-21
m+p-Xylene			110.7		%		70-130	28-OCT-21
o-Xylene			109.6		%		70-130	28-OCT-21
Styrene			110.3		%		70-130	28-OCT-21
WG3647521-3	LCS							
F1(C6-C10)			98.8		%		70-130	28-OCT-21
WG3647677-2	LCS							
Benzene			105.6		%		70-130	29-OCT-21
Toluene			108.2		%		70-130	29-OCT-21
EthylBenzene			100.8		%		70-130	29-OCT-21
m+p-Xylene			112.5		%		70-130	29-OCT-21
o-Xylene			107.4		%		70-130	29-OCT-21
Styrene			113.9		%		70-130	29-OCT-21
WG3647677-3	LCS							
F1(C6-C10)			91.5		%		70-130	29-OCT-21
WG3647521-1	MB							
Benzene			<0.00050		mg/L		0.0005	28-OCT-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 2 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED								
	Water							
Batch	R5617306							
WG3647521-1	MB							
Toluene			<0.00050		mg/L		0.0005	28-OCT-21
EthylBenzene			<0.00050		mg/L		0.0005	28-OCT-21
m+p-Xylene			<0.00050		mg/L		0.0005	28-OCT-21
o-Xylene			<0.00050		mg/L		0.0005	28-OCT-21
Styrene			<0.00050		mg/L		0.0005	28-OCT-21
F1(C6-C10)			<0.10		mg/L		0.1	28-OCT-21
Surrogate: 1,4-Difluorobenzene (SS)			119.7		%		70-130	28-OCT-21
Surrogate: 4-Bromofluorobenzene (SS)			90.6		%		70-130	28-OCT-21
Surrogate: 3,4-Dichlorotoluene (SS)			116.9		%		70-130	28-OCT-21
WG3647677-1	MB							
Benzene			<0.00050		mg/L		0.0005	29-OCT-21
Toluene			<0.00050		mg/L		0.0005	29-OCT-21
EthylBenzene			<0.00050		mg/L		0.0005	29-OCT-21
m+p-Xylene			<0.00050		mg/L		0.0005	29-OCT-21
o-Xylene			<0.00050		mg/L		0.0005	29-OCT-21
Styrene			<0.00050		mg/L		0.0005	29-OCT-21
F1(C6-C10)			<0.10		mg/L		0.1	29-OCT-21
Surrogate: 1,4-Difluorobenzene (SS)			106.5		%		70-130	29-OCT-21
Surrogate: 4-Bromofluorobenzene (SS)			82.7		%		70-130	29-OCT-21
Surrogate: 3,4-Dichlorotoluene (SS)			123.0		%		70-130	29-OCT-21
WG3647521-5	MS	L2654602-19						
Benzene			104.8		%		50-140	28-OCT-21
Toluene			99.7		%		50-140	28-OCT-21
EthylBenzene			96.3		%		50-140	28-OCT-21
m+p-Xylene			113.9		%		50-140	28-OCT-21
o-Xylene			106.0		%		50-140	28-OCT-21
Styrene			106.7		%		50-140	28-OCT-21
C-DIS-ORG-CL								
	Water							
Batch	R5646477							
WG3658079-2	LCS							
Dissolved Organic Carbon			93.9		%		80-120	13-NOV-21
WG3658079-6	LCS							
Dissolved Organic Carbon			103.6		%		80-120	13-NOV-21
WG3658079-1	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	13-NOV-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 3 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-CL								
	Water							
Batch	R5646477							
WG3658079-5	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	13-NOV-21
C-TOT-ORG-CL								
	Water							
Batch	R5638487							
WG3655463-3	DUP	L2654602-20						
Total Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	08-NOV-21
WG3655463-2	LCS							
Total Organic Carbon			93.1		%		80-120	08-NOV-21
WG3655463-1	MB							
Total Organic Carbon			<1.0		mg/L		1	08-NOV-21
WG3655463-4	MS	L2654602-21						
Total Organic Carbon			97.3		%		70-130	08-NOV-21
CL-IC-N-ED								
	Water							
Batch	R5628639							
WG3644102-3	DUP	L2654602-20						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	23-OCT-21
WG3644102-13	LCS							
Chloride (Cl)			104.1		%		90-110	23-OCT-21
WG3644102-15	LCS							
Chloride (Cl)			104.7		%		90-110	23-OCT-21
WG3644102-17	LCS							
Chloride (Cl)			105.0		%		90-110	23-OCT-21
WG3644102-19	LCS							
Chloride (Cl)			105.2		%		90-110	23-OCT-21
WG3644102-2	LCS							
Chloride (Cl)			103.8		%		90-110	23-OCT-21
WG3644102-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	23-OCT-21
WG3644102-14	MB							
Chloride (Cl)			<0.50		mg/L		0.5	23-OCT-21
WG3644102-16	MB							
Chloride (Cl)			<0.50		mg/L		0.5	23-OCT-21
WG3644102-18	MB							
Chloride (Cl)			<0.50		mg/L		0.5	23-OCT-21
WG3644102-20	MB							
Chloride (Cl)			<0.50		mg/L		0.5	23-OCT-21
WG3644102-4	MS	L2654602-20						



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 4 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-N-ED								
	Water							
Batch	R5628639							
WG3644102-4	MS	L2654602-20						
Chloride (Cl)			106.1		%		75-125	23-OCT-21
COD-T-COL-ED								
	Water							
Batch	R5632639							
WG3647784-3	DUP	L2654602-1						
Chemical Oxygen Demand		95	96		mg/L	1.1	20	28-OCT-21
WG3647784-7	DUP	L2654602-21						
Chemical Oxygen Demand		<10	<10	RPD-NA	mg/L	N/A	20	28-OCT-21
WG3647784-2	LCS							
Chemical Oxygen Demand			98.04		mg/L			28-OCT-21
WG3647784-6	LCS							
Chemical Oxygen Demand			99.81		mg/L			28-OCT-21
WG3647784-1	MB							
Chemical Oxygen Demand			<10		mg/L		10	28-OCT-21
WG3647784-5	MB							
Chemical Oxygen Demand			<10		mg/L		10	28-OCT-21
WG3647784-4	MS	L2654602-1						
Chemical Oxygen Demand			100.6		%		75-125	28-OCT-21
WG3647784-8	MS	L2654602-21						
Chemical Oxygen Demand			100.7		%		75-125	28-OCT-21
F-IC-N-ED								
	Water							
Batch	R5628639							
WG3644102-3	DUP	L2654602-20						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	23-OCT-21
WG3644102-13	LCS							
Fluoride (F)			102.9		%		90-110	23-OCT-21
WG3644102-15	LCS							
Fluoride (F)			90.7		%		90-110	23-OCT-21
WG3644102-17	LCS							
Fluoride (F)			103.5		%		90-110	23-OCT-21
WG3644102-19	LCS							
Fluoride (F)			99.2		%		90-110	23-OCT-21
WG3644102-2	LCS							
Fluoride (F)			93.6		%		90-110	23-OCT-21
WG3644102-1	MB							
Fluoride (F)			<0.020		mg/L		0.02	23-OCT-21
WG3644102-14	MB							



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 5 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-ED								
	Water							
Batch	R5628639							
WG3644102-14	MB							
Fluoride (F)			<0.020		mg/L		0.02	23-OCT-21
WG3644102-16	MB							
Fluoride (F)			<0.020		mg/L		0.02	23-OCT-21
WG3644102-18	MB							
Fluoride (F)			<0.020		mg/L		0.02	23-OCT-21
WG3644102-20	MB							
Fluoride (F)			<0.020		mg/L		0.02	23-OCT-21
WG3644102-4	MS	L2654602-20						
Fluoride (F)			104.1		%		75-125	23-OCT-21
F2-ED								
	Water							
Batch	R5632137							
WG3646027-2	LCS	DIESEL/MOTOR OIL						
F2 (C10-C16)			104.6		%		70-130	28-OCT-21
WG3646027-1	MB							
F2 (C10-C16)			<0.10		mg/L		0.1	28-OCT-21
Surrogate: 2-Bromobenzotrifluoride			107.0		%		60-140	28-OCT-21
Batch	R5632138							
WG3646156-2	LCS	DIESEL/MOTOR OIL						
F2 (C10-C16)			106.9		%		70-130	28-OCT-21
WG3646156-1	MB							
F2 (C10-C16)			<0.10		mg/L		0.1	28-OCT-21
Surrogate: 2-Bromobenzotrifluoride			105.1		%		60-140	28-OCT-21
HG-D-CVAA-ED								
	Water							
Batch	R5631905							
WG3647523-27	DUP	L2654602-15						
Mercury (Hg)-Dissolved			<0.0000050	<0.000005C	mg/L	RPD-NA	20	28-OCT-21
WG3647523-22	LCS							
Mercury (Hg)-Dissolved			88.2		%		80-120	28-OCT-21
WG3647523-26	LCS							
Mercury (Hg)-Dissolved			89.5		%		80-120	28-OCT-21
WG3647523-21	MB							
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	28-OCT-21
WG3647523-25	MB							
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	28-OCT-21
WG3647523-28	MS	L2654602-16						
Mercury (Hg)-Dissolved			91.2		%		70-130	28-OCT-21
MET-D-CCMS-ED								
	Water							



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 6 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R5629852							
WG3647078-2	LCS							
Aluminum (Al)-Dissolved			108.9		%		80-120	27-OCT-21
Antimony (Sb)-Dissolved			101.7		%		80-120	27-OCT-21
Arsenic (As)-Dissolved			104.8		%		80-120	27-OCT-21
Barium (Ba)-Dissolved			106.3		%		80-120	27-OCT-21
Beryllium (Be)-Dissolved			99.6		%		80-120	27-OCT-21
Bismuth (Bi)-Dissolved			91.2		%		80-120	27-OCT-21
Boron (B)-Dissolved			87.9		%		80-120	27-OCT-21
Cadmium (Cd)-Dissolved			106.1		%		80-120	27-OCT-21
Calcium (Ca)-Dissolved			103.7		%		80-120	27-OCT-21
Cesium (Cs)-Dissolved			102.2		%		80-120	27-OCT-21
Chromium (Cr)-Dissolved			108.4		%		80-120	27-OCT-21
Cobalt (Co)-Dissolved			104.5		%		80-120	27-OCT-21
Copper (Cu)-Dissolved			106.7		%		80-120	27-OCT-21
Iron (Fe)-Dissolved			102.7		%		80-120	27-OCT-21
Lead (Pb)-Dissolved			102.8		%		80-120	27-OCT-21
Lithium (Li)-Dissolved			99.1		%		80-120	27-OCT-21
Magnesium (Mg)-Dissolved			106.3		%		80-120	27-OCT-21
Manganese (Mn)-Dissolved			101.7		%		80-120	27-OCT-21
Molybdenum (Mo)-Dissolved			99.3		%		80-120	27-OCT-21
Nickel (Ni)-Dissolved			109.2		%		80-120	27-OCT-21
Phosphorus (P)-Dissolved			111.0		%		80-120	27-OCT-21
Potassium (K)-Dissolved			105.7		%		80-120	27-OCT-21
Rubidium (Rb)-Dissolved			103.0		%		80-120	27-OCT-21
Selenium (Se)-Dissolved			108.4		%		80-120	27-OCT-21
Silicon (Si)-Dissolved			109.1		%		80-120	27-OCT-21
Silver (Ag)-Dissolved			103.5		%		80-120	27-OCT-21
Sodium (Na)-Dissolved			109.2		%		80-120	27-OCT-21
Strontium (Sr)-Dissolved			101.3		%		80-120	27-OCT-21
Sulfur (S)-Dissolved			96.1		%		80-120	27-OCT-21
Tellurium (Te)-Dissolved			93.5		%		80-120	27-OCT-21
Thallium (Tl)-Dissolved			101.6		%		80-120	27-OCT-21
Thorium (Th)-Dissolved			92.8		%		80-120	27-OCT-21
Tin (Sn)-Dissolved			99.3		%		80-120	27-OCT-21
Titanium (Ti)-Dissolved			101.8		%		80-120	27-OCT-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 7 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R5629852							
WG3647078-2	LCS							
Tungsten (W)-Dissolved			99.8		%		80-120	27-OCT-21
Uranium (U)-Dissolved			104.1		%		80-120	27-OCT-21
Vanadium (V)-Dissolved			108.4		%		80-120	27-OCT-21
Zinc (Zn)-Dissolved			99.2		%		80-120	27-OCT-21
Zirconium (Zr)-Dissolved			94.9		%		80-120	27-OCT-21
WG3647078-1	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	27-OCT-21
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	27-OCT-21
Boron (B)-Dissolved			<0.010		mg/L		0.01	27-OCT-21
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	27-OCT-21
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	27-OCT-21
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	27-OCT-21
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	27-OCT-21
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	27-OCT-21
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	27-OCT-21
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	27-OCT-21
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	27-OCT-21
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	27-OCT-21
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	27-OCT-21
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	27-OCT-21
Potassium (K)-Dissolved			<0.050		mg/L		0.05	27-OCT-21
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	27-OCT-21
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	27-OCT-21
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	27-OCT-21
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	27-OCT-21
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	27-OCT-21
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	27-OCT-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 8 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R5629852							
WG3647078-1	MB							
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	27-OCT-21
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	27-OCT-21
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	27-OCT-21
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	27-OCT-21
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	27-OCT-21
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	27-OCT-21
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	27-OCT-21
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	27-OCT-21
Batch	R5629884							
WG3647082-6	DUP	L2654602-3						
Aluminum (Al)-Dissolved		0.0320	0.0300		mg/L	6.7	20	27-OCT-21
Antimony (Sb)-Dissolved		0.00064	0.00062		mg/L	3.7	20	27-OCT-21
Arsenic (As)-Dissolved		0.0153	0.0154		mg/L	0.7	20	27-OCT-21
Barium (Ba)-Dissolved		0.0929	0.102		mg/L	9.1	20	27-OCT-21
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-OCT-21
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	27-OCT-21
Boron (B)-Dissolved		0.024	0.024		mg/L	0.7	20	27-OCT-21
Cadmium (Cd)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	27-OCT-21
Calcium (Ca)-Dissolved		44.0	43.2		mg/L	1.8	20	27-OCT-21
Cesium (Cs)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	27-OCT-21
Chromium (Cr)-Dissolved		0.00013	0.00016		mg/L	17	20	27-OCT-21
Cobalt (Co)-Dissolved		0.00153	0.00157		mg/L	2.9	20	27-OCT-21
Copper (Cu)-Dissolved		0.00197	0.00197		mg/L	0.1	20	27-OCT-21
Iron (Fe)-Dissolved		0.079	0.077		mg/L	3.2	20	27-OCT-21
Lead (Pb)-Dissolved		0.000102	0.000099		mg/L	3.4	20	27-OCT-21
Lithium (Li)-Dissolved		0.0399	0.0441		mg/L	10	20	27-OCT-21
Magnesium (Mg)-Dissolved		23.8	24.2		mg/L	1.7	20	27-OCT-21
Manganese (Mn)-Dissolved		0.0538	0.0543		mg/L	0.9	20	27-OCT-21
Molybdenum (Mo)-Dissolved		0.00204	0.00189		mg/L	7.8	20	27-OCT-21
Nickel (Ni)-Dissolved		0.00860	0.00861		mg/L	0.2	20	27-OCT-21
Phosphorus (P)-Dissolved		1.14	1.18		mg/L	3.3	20	27-OCT-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 9 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R5629884							
WG3647082-6	DUP	L2654602-3						
Potassium (K)-Dissolved		28.9	30.1		mg/L	3.9	20	27-OCT-21
Rubidium (Rb)-Dissolved		0.00259	0.00255		mg/L	1.6	20	27-OCT-21
Silicon (Si)-Dissolved		1.58	1.63		mg/L	3.4	20	27-OCT-21
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	27-OCT-21
Sodium (Na)-Dissolved		317	328		mg/L	3.4	20	27-OCT-21
Strontium (Sr)-Dissolved		0.478	0.457		mg/L	4.4	20	27-OCT-21
Sulfur (S)-Dissolved		107	108		mg/L	1.3	20	27-OCT-21
Tellurium (Te)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	27-OCT-21
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	27-OCT-21
Thorium (Th)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-OCT-21
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-OCT-21
Titanium (Ti)-Dissolved		0.00346	0.00303		mg/L	13	20	27-OCT-21
Tungsten (W)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-OCT-21
Uranium (U)-Dissolved		0.00274	0.00270		mg/L	1.4	20	27-OCT-21
Vanadium (V)-Dissolved		0.00840	0.00854		mg/L	1.7	20	27-OCT-21
Zinc (Zn)-Dissolved		0.0027	0.0023		mg/L	16	20	27-OCT-21
Zirconium (Zr)-Dissolved		0.00175	0.00166		mg/L	5.5	20	27-OCT-21
WG3647082-7								
LCS								
Aluminum (Al)-Dissolved			103.0		%		80-120	27-OCT-21
Antimony (Sb)-Dissolved			106.9		%		80-120	27-OCT-21
Arsenic (As)-Dissolved			111.5		%		80-120	27-OCT-21
Barium (Ba)-Dissolved			118.9		%		80-120	27-OCT-21
Beryllium (Be)-Dissolved			109.8		%		80-120	27-OCT-21
Bismuth (Bi)-Dissolved			106.7		%		80-120	27-OCT-21
Boron (B)-Dissolved			99.0		%		80-120	27-OCT-21
Cadmium (Cd)-Dissolved			111.6		%		80-120	27-OCT-21
Calcium (Ca)-Dissolved			102.5		%		80-120	27-OCT-21
Cesium (Cs)-Dissolved			107.7		%		80-120	27-OCT-21
Chromium (Cr)-Dissolved			105.9		%		80-120	27-OCT-21
Cobalt (Co)-Dissolved			108.4		%		80-120	27-OCT-21
Copper (Cu)-Dissolved			109.8		%		80-120	27-OCT-21
Iron (Fe)-Dissolved			112.8		%		80-120	27-OCT-21
Lead (Pb)-Dissolved			103.3		%		80-120	27-OCT-21
Lithium (Li)-Dissolved			113.5		%		80-120	27-OCT-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 10 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R5629884							
WG3647082-7	LCS							
Magnesium (Mg)-Dissolved			104.4		%		80-120	27-OCT-21
Manganese (Mn)-Dissolved			105.4		%		80-120	27-OCT-21
Molybdenum (Mo)-Dissolved			99.8		%		80-120	27-OCT-21
Nickel (Ni)-Dissolved			106.1		%		80-120	27-OCT-21
Phosphorus (P)-Dissolved			104.1		%		80-120	27-OCT-21
Potassium (K)-Dissolved			102.7		%		80-120	27-OCT-21
Rubidium (Rb)-Dissolved			92.1		%		80-120	27-OCT-21
Selenium (Se)-Dissolved			92.2		%		80-120	27-OCT-21
Silicon (Si)-Dissolved			109.5		%		80-120	27-OCT-21
Silver (Ag)-Dissolved			98.3		%		80-120	27-OCT-21
Sodium (Na)-Dissolved			97.4		%		80-120	27-OCT-21
Strontium (Sr)-Dissolved			113.9		%		80-120	27-OCT-21
Sulfur (S)-Dissolved			103.2		%		80-120	27-OCT-21
Tellurium (Te)-Dissolved			109.0		%		80-120	27-OCT-21
Thallium (Tl)-Dissolved			101.2		%		80-120	27-OCT-21
Thorium (Th)-Dissolved			106.2		%		80-120	27-OCT-21
Tin (Sn)-Dissolved			92.2		%		80-120	27-OCT-21
Titanium (Ti)-Dissolved			106.9		%		80-120	27-OCT-21
Tungsten (W)-Dissolved			103.5		%		80-120	27-OCT-21
Uranium (U)-Dissolved			105.8		%		80-120	27-OCT-21
Vanadium (V)-Dissolved			107.3		%		80-120	27-OCT-21
Zinc (Zn)-Dissolved			104.9		%		80-120	27-OCT-21
Zirconium (Zr)-Dissolved			105.2		%		80-120	27-OCT-21
WG3647082-5	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	27-OCT-21
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	27-OCT-21
Boron (B)-Dissolved			<0.010		mg/L		0.01	27-OCT-21
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	27-OCT-21
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	27-OCT-21
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	27-OCT-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 11 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R5629884							
WG3647082-5	MB							
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	27-OCT-21
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	27-OCT-21
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	27-OCT-21
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	27-OCT-21
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	27-OCT-21
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	27-OCT-21
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	27-OCT-21
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	27-OCT-21
Potassium (K)-Dissolved			<0.050		mg/L		0.05	27-OCT-21
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	27-OCT-21
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	27-OCT-21
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	27-OCT-21
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	27-OCT-21
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	27-OCT-21
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	27-OCT-21
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	27-OCT-21
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	27-OCT-21
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	27-OCT-21
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	27-OCT-21
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	27-OCT-21
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	27-OCT-21
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	27-OCT-21
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	27-OCT-21
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	27-OCT-21
Batch	R5632083							
WG3647604-2	LCS							
Aluminum (Al)-Dissolved			114.8		%		80-120	28-OCT-21
Antimony (Sb)-Dissolved			116.9		%		80-120	28-OCT-21
Arsenic (As)-Dissolved			117.7		%		80-120	28-OCT-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 12 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R5632083							
WG3647604-2	LCS							
Barium (Ba)-Dissolved			115.0		%		80-120	28-OCT-21
Beryllium (Be)-Dissolved			108.7		%		80-120	28-OCT-21
Bismuth (Bi)-Dissolved			89.8		%		80-120	28-OCT-21
Boron (B)-Dissolved			94.3		%		80-120	28-OCT-21
Cadmium (Cd)-Dissolved			117.2		%		80-120	28-OCT-21
Calcium (Ca)-Dissolved			113.5		%		80-120	28-OCT-21
Cesium (Cs)-Dissolved			109.3		%		80-120	28-OCT-21
Chromium (Cr)-Dissolved			118.5		%		80-120	28-OCT-21
Cobalt (Co)-Dissolved			115.1		%		80-120	28-OCT-21
Copper (Cu)-Dissolved			116.4		%		80-120	28-OCT-21
Iron (Fe)-Dissolved			113.7		%		80-120	28-OCT-21
Lead (Pb)-Dissolved			112.4		%		80-120	28-OCT-21
Lithium (Li)-Dissolved			106.7		%		80-120	28-OCT-21
Magnesium (Mg)-Dissolved			118.9		%		80-120	28-OCT-21
Manganese (Mn)-Dissolved			112.1		%		80-120	28-OCT-21
Molybdenum (Mo)-Dissolved			112.2		%		80-120	28-OCT-21
Nickel (Ni)-Dissolved			115.9		%		80-120	28-OCT-21
Phosphorus (P)-Dissolved			117.8		%		80-120	28-OCT-21
Potassium (K)-Dissolved			117.4		%		80-120	28-OCT-21
Rubidium (Rb)-Dissolved			119.5		%		80-120	28-OCT-21
Selenium (Se)-Dissolved			122.7	MES	%		80-120	28-OCT-21
Silicon (Si)-Dissolved			122.6	MES	%		80-120	28-OCT-21
Silver (Ag)-Dissolved			112.0		%		80-120	28-OCT-21
Sodium (Na)-Dissolved			115.2		%		80-120	28-OCT-21
Strontium (Sr)-Dissolved			113.5		%		80-120	28-OCT-21
Sulfur (S)-Dissolved			105.6		%		80-120	28-OCT-21
Tellurium (Te)-Dissolved			110.5		%		80-120	28-OCT-21
Thallium (Tl)-Dissolved			112.9		%		80-120	28-OCT-21
Thorium (Th)-Dissolved			98.5		%		80-120	28-OCT-21
Tin (Sn)-Dissolved			112.6		%		80-120	28-OCT-21
Titanium (Ti)-Dissolved			112.5		%		80-120	28-OCT-21
Tungsten (W)-Dissolved			109.7		%		80-120	28-OCT-21
Uranium (U)-Dissolved			107.4		%		80-120	28-OCT-21
Vanadium (V)-Dissolved			116.8		%		80-120	28-OCT-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 13 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R5632083							
WG3647604-2	LCS							
Zinc (Zn)-Dissolved			111.4		%		80-120	28-OCT-21
Zirconium (Zr)-Dissolved			113.9		%		80-120	28-OCT-21
WG3647604-1	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	28-OCT-21
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	28-OCT-21
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	28-OCT-21
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	28-OCT-21
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	28-OCT-21
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	28-OCT-21
Boron (B)-Dissolved			<0.010		mg/L		0.01	28-OCT-21
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	28-OCT-21
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	28-OCT-21
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	28-OCT-21
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	28-OCT-21
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	28-OCT-21
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	28-OCT-21
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	28-OCT-21
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	28-OCT-21
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	28-OCT-21
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	28-OCT-21
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	28-OCT-21
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	28-OCT-21
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	28-OCT-21
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	28-OCT-21
Potassium (K)-Dissolved			<0.050		mg/L		0.05	28-OCT-21
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	28-OCT-21
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	28-OCT-21
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	28-OCT-21
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	28-OCT-21
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	28-OCT-21
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	28-OCT-21
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	28-OCT-21
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	28-OCT-21
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	28-OCT-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 14 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R5632083							
WG3647604-1	MB							
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	28-OCT-21
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	28-OCT-21
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	28-OCT-21
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	28-OCT-21
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	28-OCT-21
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	28-OCT-21
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	28-OCT-21
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	28-OCT-21
WG3647082-4	MS	L2654602-4						
Aluminum (Al)-Dissolved			99.7		%		70-130	28-OCT-21
Antimony (Sb)-Dissolved			107.0		%		70-130	28-OCT-21
Arsenic (As)-Dissolved			98.1		%		70-130	28-OCT-21
Barium (Ba)-Dissolved			N/A	MS-B	%		-	28-OCT-21
Beryllium (Be)-Dissolved			103.9		%		70-130	28-OCT-21
Bismuth (Bi)-Dissolved			90.9		%		70-130	28-OCT-21
Boron (B)-Dissolved			70.8		%		70-130	28-OCT-21
Cadmium (Cd)-Dissolved			97.7		%		70-130	28-OCT-21
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	28-OCT-21
Cesium (Cs)-Dissolved			99.8		%		70-130	28-OCT-21
Chromium (Cr)-Dissolved			97.6		%		70-130	28-OCT-21
Cobalt (Co)-Dissolved			80.4		%		70-130	28-OCT-21
Copper (Cu)-Dissolved			91.0		%		70-130	28-OCT-21
Iron (Fe)-Dissolved			91.5		%		70-130	28-OCT-21
Lead (Pb)-Dissolved			96.1		%		70-130	28-OCT-21
Lithium (Li)-Dissolved			98.5		%		70-130	28-OCT-21
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	28-OCT-21
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	28-OCT-21
Molybdenum (Mo)-Dissolved			99.7		%		70-130	28-OCT-21
Nickel (Ni)-Dissolved			82.4		%		70-130	28-OCT-21
Phosphorus (P)-Dissolved			98.1		%		70-130	28-OCT-21
Potassium (K)-Dissolved			N/A	MS-B	%		-	28-OCT-21
Rubidium (Rb)-Dissolved			97.1		%		70-130	28-OCT-21
Selenium (Se)-Dissolved			96.1		%		70-130	28-OCT-21
Silicon (Si)-Dissolved			94.2		%		70-130	28-OCT-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 15 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
Water								
Batch	R5632083							
WG3647082-4	MS	L2654602-4						
Silver (Ag)-Dissolved			97.1		%		70-130	28-OCT-21
Sodium (Na)-Dissolved			N/A	MS-B	%		-	28-OCT-21
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	28-OCT-21
Sulfur (S)-Dissolved			99.6		%		70-130	28-OCT-21
Tellurium (Te)-Dissolved			95.9		%		70-130	28-OCT-21
Thallium (Tl)-Dissolved			97.0		%		70-130	28-OCT-21
Thorium (Th)-Dissolved			100.2		%		70-130	28-OCT-21
Tin (Sn)-Dissolved			100.8		%		70-130	28-OCT-21
Titanium (Ti)-Dissolved			100.8		%		70-130	28-OCT-21
Tungsten (W)-Dissolved			101.7		%		70-130	28-OCT-21
Uranium (U)-Dissolved			98.3		%		70-130	28-OCT-21
Vanadium (V)-Dissolved			100.3		%		70-130	28-OCT-21
Zinc (Zn)-Dissolved			90.6		%		70-130	28-OCT-21
Zirconium (Zr)-Dissolved			104.2		%		70-130	28-OCT-21
NH3-F-CL								
Water								
Batch	R5641096							
WG3654760-7	DUP	L2654602-20						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	08-NOV-21
WG3654760-2	LCS							
Ammonia, Total (as N)			99.0		%		85-115	08-NOV-21
WG3654760-6	LCS							
Ammonia, Total (as N)			..1951		mg/L			08-NOV-21
WG3654760-1	MB							
Ammonia, Total (as N)			<0.050		mg/L		0.05	08-NOV-21
WG3654760-5	MB							
Ammonia, Total (as N)			<0.050		mg/L		0.05	08-NOV-21
WG3654760-8	MS	L2654602-21						
Ammonia, Total (as N)			101.4		%		75-125	08-NOV-21
NO2-IC-N-ED								
Water								
Batch	R5628639							
WG3644102-3	DUP	L2654602-20						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	23-OCT-21
WG3644102-13	LCS							
Nitrite (as N)			104.2		%		90-110	23-OCT-21
WG3644102-15	LCS							
Nitrite (as N)			105.6		%		90-110	23-OCT-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 16 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-N-ED								
	Water							
Batch	R5628639							
WG3644102-17	LCS							
Nitrite (as N)			102.3		%		90-110	23-OCT-21
WG3644102-19	LCS							
Nitrite (as N)			103.0		%		90-110	23-OCT-21
WG3644102-2	LCS							
Nitrite (as N)			102.2		%		90-110	23-OCT-21
WG3644102-1	MB							
Nitrite (as N)			<0.010		mg/L		0.01	23-OCT-21
WG3644102-14	MB							
Nitrite (as N)			<0.010		mg/L		0.01	23-OCT-21
WG3644102-16	MB							
Nitrite (as N)			<0.010		mg/L		0.01	23-OCT-21
WG3644102-18	MB							
Nitrite (as N)			<0.010		mg/L		0.01	23-OCT-21
WG3644102-20	MB							
Nitrite (as N)			<0.010		mg/L		0.01	23-OCT-21
WG3644102-4	MS	L2654602-20						
Nitrite (as N)			103.0		%		75-125	23-OCT-21
NO3-IC-N-ED								
	Water							
Batch	R5628639							
WG3644102-3	DUP	L2654602-20						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	23-OCT-21
WG3644102-13	LCS							
Nitrate (as N)			102.0		%		90-110	23-OCT-21
WG3644102-15	LCS							
Nitrate (as N)			102.8		%		90-110	23-OCT-21
WG3644102-17	LCS							
Nitrate (as N)			103.3		%		90-110	23-OCT-21
WG3644102-19	LCS							
Nitrate (as N)			104.1		%		90-110	23-OCT-21
WG3644102-2	LCS							
Nitrate (as N)			102.4		%		90-110	23-OCT-21
WG3644102-1	MB							
Nitrate (as N)			<0.020		mg/L		0.02	23-OCT-21
WG3644102-14	MB							
Nitrate (as N)			<0.020		mg/L		0.02	23-OCT-21
WG3644102-16	MB							
Nitrate (as N)			<0.020		mg/L		0.02	23-OCT-21
WG3644102-18	MB							



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 17 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-ED								
Water								
Batch	R5628639							
WG3644102-18	MB							
Nitrate (as N)			<0.020		mg/L		0.02	23-OCT-21
WG3644102-20	MB							
Nitrate (as N)			<0.020		mg/L		0.02	23-OCT-21
WG3644102-4	MS	L2654602-20						
Nitrate (as N)			105.0		%		75-125	23-OCT-21
PH/EC/ALK-ED								
Water								
Batch	R5633371							
WG3649141-5	DUP	L2654602-15						
pH		8.58	8.48	J	pH	0.10	0.3	30-OCT-21
Conductivity (EC)		2010	2020		uS/cm	0.5	10	30-OCT-21
Bicarbonate (HCO3)		714	722		mg/L	1.1	25	30-OCT-21
Carbonate (CO3)		22.8	15.0	J	mg/L	7.8	10	30-OCT-21
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	30-OCT-21
Alkalinity, Total (as CaCO3)		623	617		mg/L	1.0	20	30-OCT-21
WG3649141-12	LCS	ED-PH6						
pH			6.01		pH		5.8-6.2	30-OCT-21
WG3649141-13	LCS	MID_1412						
Conductivity (EC)			95.8		%		90-110	30-OCT-21
WG3649141-14	LCS	PCTITRATE_LCS						
Alkalinity, Total (as CaCO3)			101.0		%		85-115	30-OCT-21
WG3649141-2	LCS	ED-PH6						
pH			6.01		pH		5.8-6.2	30-OCT-21
WG3649141-3	LCS	MID_1412						
Conductivity (EC)			94.8		%		90-110	30-OCT-21
WG3649141-4	LCS	PCTITRATE_LCS						
Alkalinity, Total (as CaCO3)			101.0		%		85-115	30-OCT-21
WG3649141-7	LCS	ED-PH6						
pH			6.02		pH		5.8-6.2	30-OCT-21
WG3649141-8	LCS	MID_1412						
Conductivity (EC)			94.5		%		90-110	30-OCT-21
WG3649141-9	LCS	PCTITRATE_LCS						
Alkalinity, Total (as CaCO3)			101.7		%		85-115	30-OCT-21
WG3649141-1	MB							
Conductivity (EC)			<2.0		uS/cm		2	30-OCT-21
Bicarbonate (HCO3)			<5.0		mg/L		5	30-OCT-21
Carbonate (CO3)			<5.0		mg/L		5	30-OCT-21
Hydroxide (OH)			<5.0		mg/L		5	30-OCT-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 19 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-ED								
Batch	R5629773							
WG3646004-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	26-OCT-21
WG3646004-12 MS		L2654602-20						
Phenols (4AAP)			95.6		%		75-125	26-OCT-21
SO4-IC-N-ED								
Batch	R5628639							
WG3644102-3 DUP		L2654602-20						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	23-OCT-21
WG3644102-13 LCS								
Sulfate (SO4)			104.1		%		90-110	23-OCT-21
WG3644102-15 LCS								
Sulfate (SO4)			101.2		%		90-110	23-OCT-21
WG3644102-17 LCS								
Sulfate (SO4)			104.2		%		90-110	23-OCT-21
WG3644102-19 LCS								
Sulfate (SO4)			101.7		%		90-110	23-OCT-21
WG3644102-2 LCS								
Sulfate (SO4)			99.3		%		90-110	23-OCT-21
WG3644102-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	23-OCT-21
WG3644102-14 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	23-OCT-21
WG3644102-16 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	23-OCT-21
WG3644102-18 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	23-OCT-21
WG3644102-20 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	23-OCT-21
WG3644102-4 MS		L2654602-20						
Sulfate (SO4)			105.2		%		75-125	23-OCT-21
SOLIDS-TDS-ED								
Batch	R5637214							
WG3653080-9 DUP		L2654602-12						
Total Dissolved Solids		11000	12900		mg/L	16	20	06-NOV-21
WG3653080-5 LCS								
Total Dissolved Solids			106.0		%		85-115	06-NOV-21
WG3653080-8 LCS								
Total Dissolved Solids			102.0		%		85-115	06-NOV-21



Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 20 of 23

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-ED								
	Water							
Batch	R5637214							
WG3653080-4	MB							
Total Dissolved Solids			<10		mg/L		10	06-NOV-21
WG3653080-7	MB							
Total Dissolved Solids			<10		mg/L		10	06-NOV-21
SOLIDS-TOTSUS-ED								
	Water							
Batch	R5633169							
WG3647634-9	DUP	L2654602-20						
Total Suspended Solids		<3.0	<3.0	RPD-NA	mg/L	N/A	20	29-OCT-21
WG3647634-5	LCS							
Total Suspended Solids			101.9		%		85-115	29-OCT-21
WG3647634-8	LCS							
Total Suspended Solids			105.6		%		85-115	29-OCT-21
WG3647634-4	MB							
Total Suspended Solids			<3.0		mg/L		3	29-OCT-21
WG3647634-7	MB							
Total Suspended Solids			<3.0		mg/L		3	29-OCT-21
TKN-F-CL								
	Water							
Batch	R5639826							
WG3655978-2	LCS							
Total Kjeldahl Nitrogen			96.0		%		75-125	09-NOV-21
WG3655978-1	MB							
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	09-NOV-21

Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 21 of 23

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 22 of 23

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Total Dissolved Solids							
	1	21-OCT-21 11:45	06-NOV-21 00:00	7	16	days	EHT
	2	21-OCT-21 11:10	06-NOV-21 00:00	7	16	days	EHT
	3	21-OCT-21 10:50	06-NOV-21 00:00	7	16	days	EHT
	4	21-OCT-21 11:30	06-NOV-21 00:00	7	16	days	EHT
	5	21-OCT-21 12:00	06-NOV-21 00:00	7	16	days	EHT
	6	21-OCT-21 10:30	06-NOV-21 00:00	7	16	days	EHT
	7	21-OCT-21 10:45	06-NOV-21 00:00	7	16	days	EHT
	8	21-OCT-21 09:05	06-NOV-21 00:00	7	16	days	EHT
	9	21-OCT-21 09:45	06-NOV-21 00:00	7	16	days	EHT
	10	21-OCT-21 13:45	06-NOV-21 00:00	7	15	days	EHT
	11	21-OCT-21 08:30	06-NOV-21 00:00	7	16	days	EHT
	12	21-OCT-21 14:25	06-NOV-21 00:00	7	15	days	EHT
	13	21-OCT-21 14:05	06-NOV-21 00:00	7	15	days	EHT
	14	21-OCT-21 13:55	06-NOV-21 00:00	7	15	days	EHT
	15	21-OCT-21 12:20	06-NOV-21 00:00	7	15	days	EHT
	16	21-OCT-21 12:40	06-NOV-21 00:00	7	15	days	EHT
	17	21-OCT-21 13:00	06-NOV-21 00:00	7	15	days	EHT
	18	21-OCT-21 13:20	06-NOV-21 00:00	7	15	days	EHT
	19	22-OCT-21 09:00	06-NOV-21 00:00	7	15	days	EHT
	20	21-OCT-21 08:30	06-NOV-21 00:00	7	16	days	EHT
	21	21-OCT-21 10:30	06-NOV-21 00:00	7	16	days	EHT
	22	21-OCT-21 08:30	06-NOV-21 00:00	7	16	days	EHT
	23	21-OCT-21 09:45	06-NOV-21 00:00	7	16	days	EHT
Total Suspended Solids							
	1	21-OCT-21 11:45	29-OCT-21 15:52	7	8	days	EHT
	2	21-OCT-21 11:10	29-OCT-21 15:52	7	8	days	EHT
	3	21-OCT-21 10:50	29-OCT-21 15:52	7	8	days	EHT
	4	21-OCT-21 11:30	29-OCT-21 15:52	7	8	days	EHT
	5	21-OCT-21 12:00	29-OCT-21 15:52	7	8	days	EHT
	6	21-OCT-21 10:30	29-OCT-21 15:52	7	8	days	EHT
	7	21-OCT-21 10:45	29-OCT-21 15:52	7	8	days	EHT
	8	21-OCT-21 09:05	29-OCT-21 15:52	7	8	days	EHT
	9	21-OCT-21 09:45	29-OCT-21 15:52	7	8	days	EHT
	10	21-OCT-21 13:45	29-OCT-21 15:52	7	8	days	EHT
	11	21-OCT-21 08:30	29-OCT-21 15:52	7	8	days	EHT
	12	21-OCT-21 14:25	29-OCT-21 15:52	7	8	days	EHT
	13	21-OCT-21 14:05	29-OCT-21 15:52	7	8	days	EHT
	14	21-OCT-21 13:55	29-OCT-21 15:52	7	8	days	EHT
	15	21-OCT-21 12:20	29-OCT-21 15:52	7	8	days	EHT
	16	21-OCT-21 12:40	29-OCT-21 15:52	7	8	days	EHT
	17	21-OCT-21 13:00	29-OCT-21 15:52	7	8	days	EHT
	18	21-OCT-21 13:20	29-OCT-21 15:52	7	8	days	EHT
	20	21-OCT-21 08:30	29-OCT-21 15:52	7	8	days	EHT
	21	21-OCT-21 10:30	29-OCT-21 15:52	7	8	days	EHT
	22	21-OCT-21 08:30	29-OCT-21 15:52	7	8	days	EHT
	23	21-OCT-21 09:45	29-OCT-21 15:52	7	8	days	EHT

Legend & Qualifier Definitions:

- EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
- EHTR: Exceeded ALS recommended hold time prior to sample receipt.
- EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
- EHT: Exceeded ALS recommended hold time prior to analysis.
- Rec. HT: ALS recommended hold time (see units).

Notes*:
 Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
 Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2654602 were received on 22-OCT-21 14:26.

Quality Control Report

Workorder: L2654602

Report Date: 19-NOV-21

Page 23 of 23

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

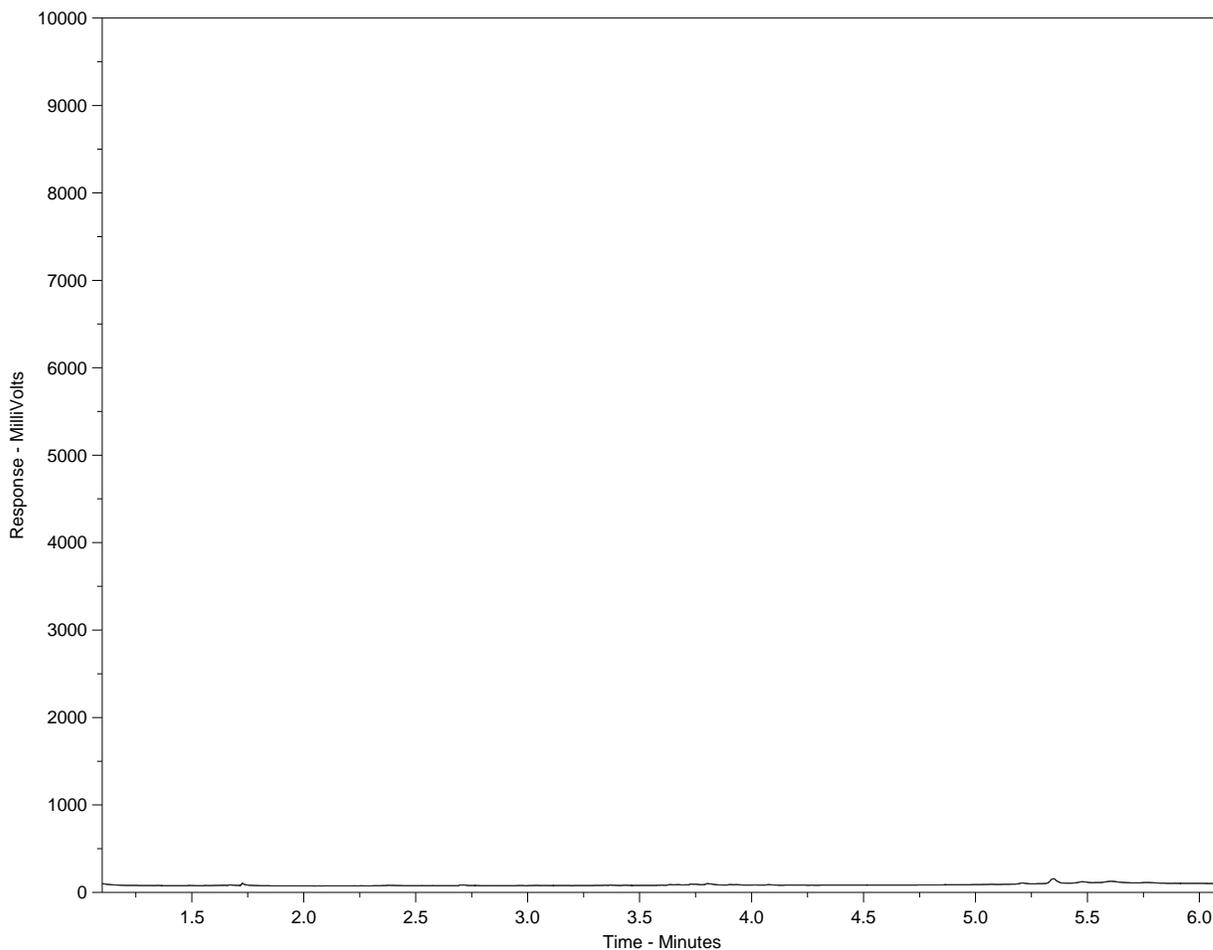
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-1
 Client ID: DUGOUT 1 BOOTH D.1



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

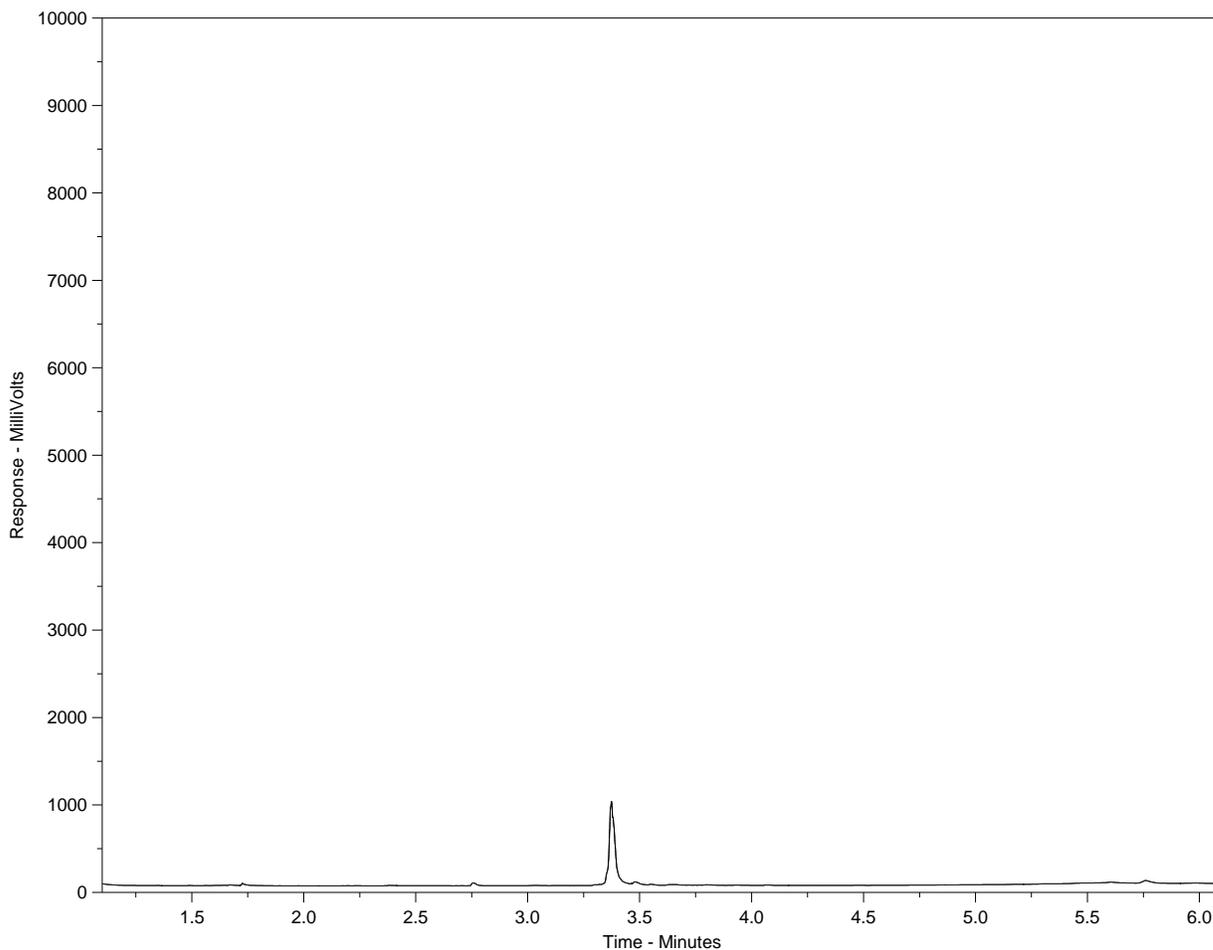
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-2
 Client ID: DUGOUT 2 EWET D.1



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

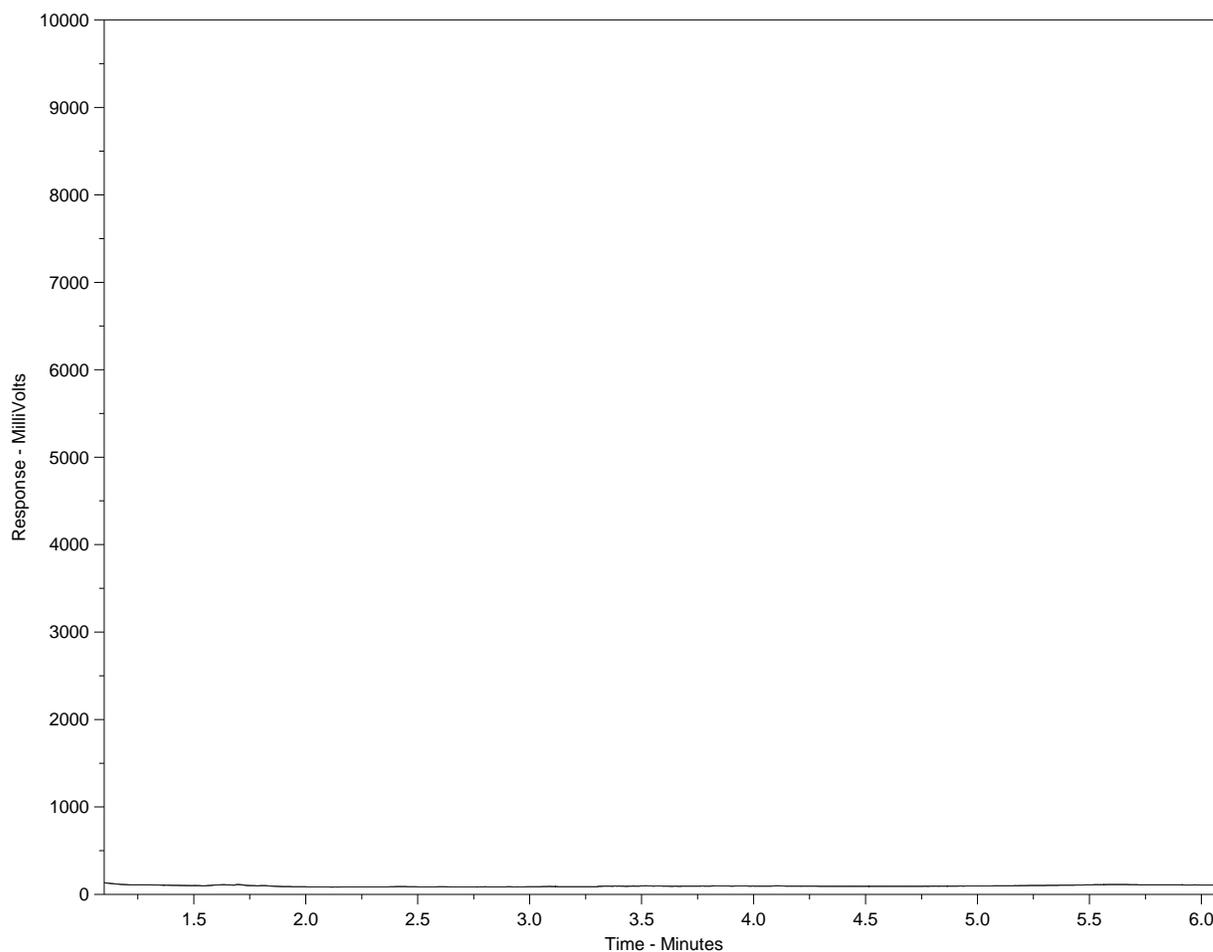
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-3
 Client ID: DUGOUT 3 EWET D.2



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

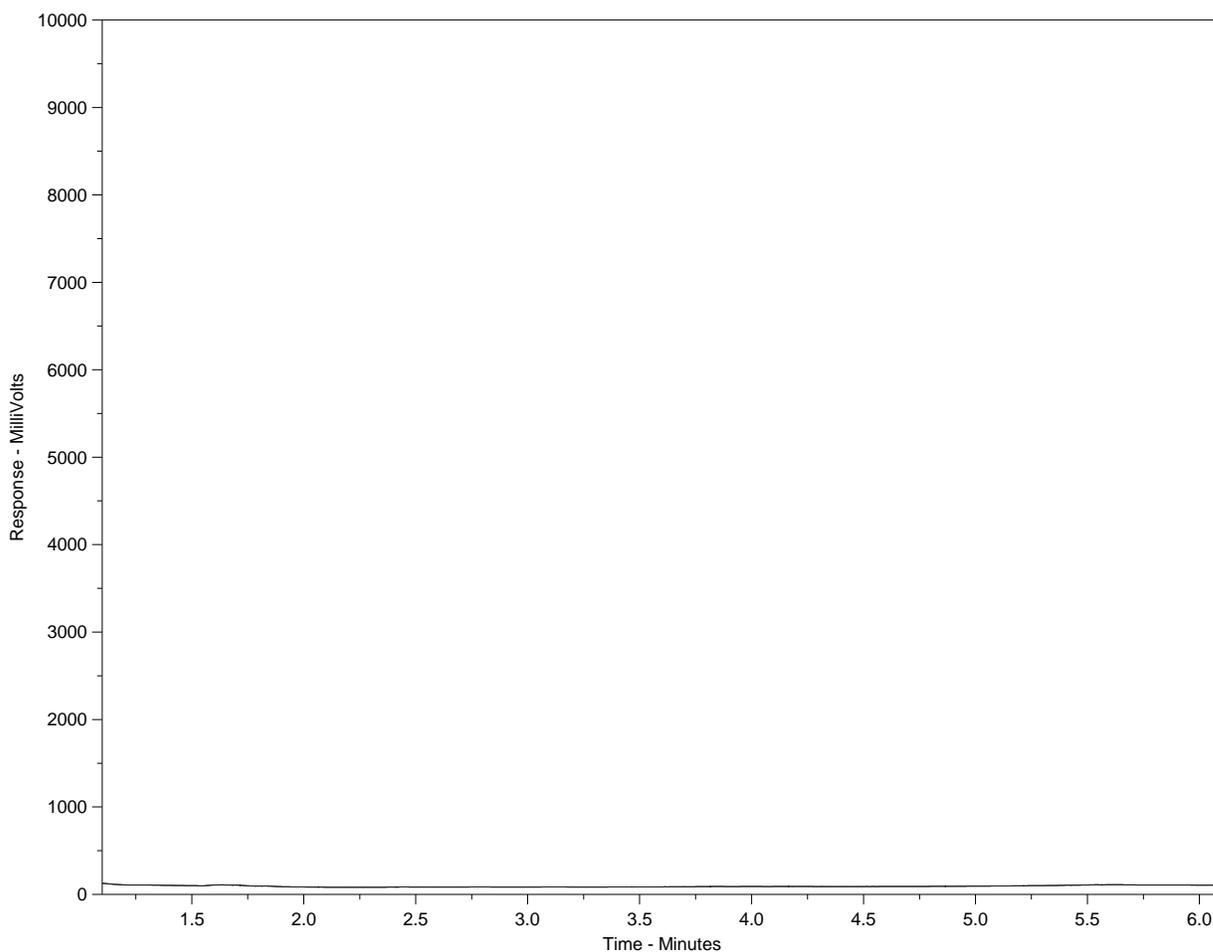
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-4
 Client ID: DUGOUT 4 EWET D.3



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

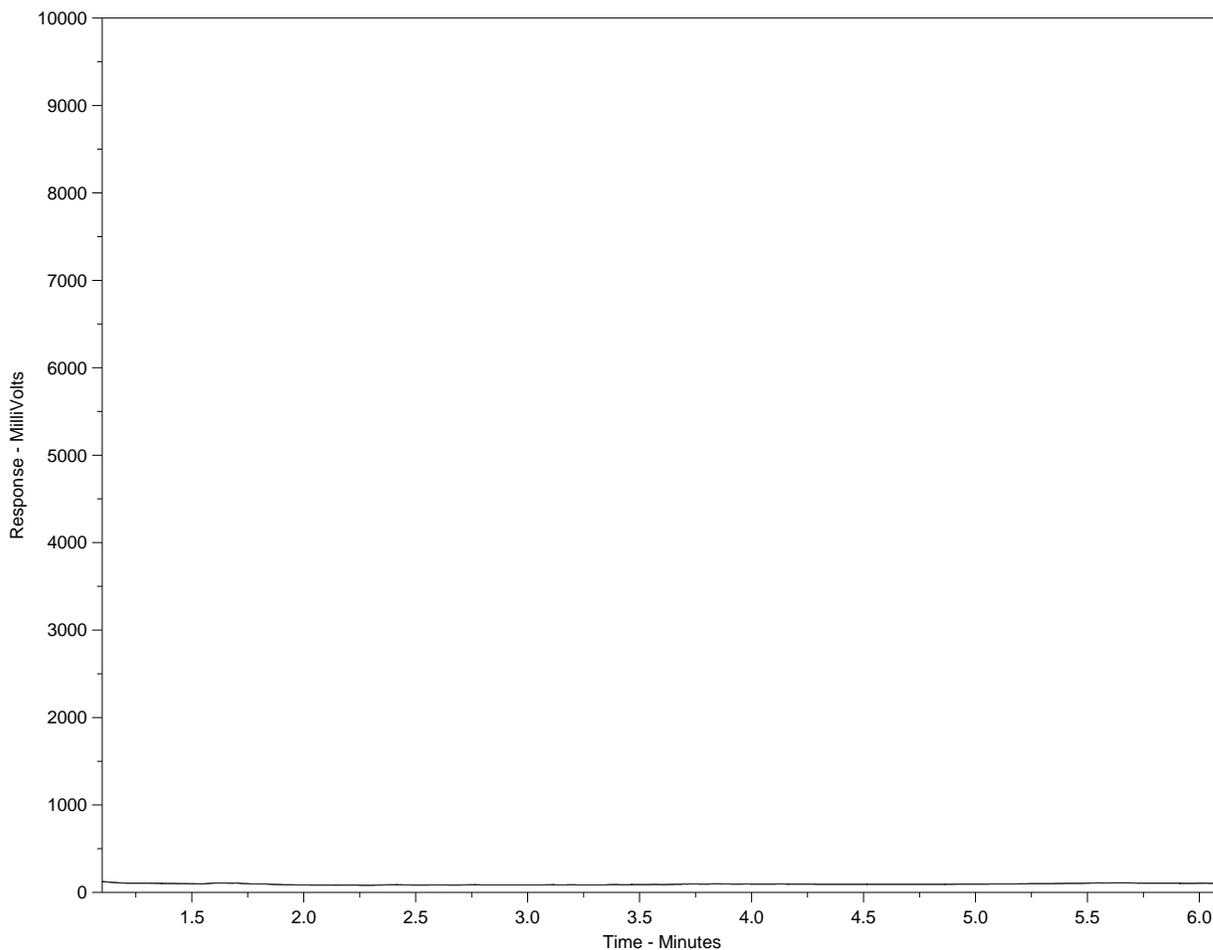
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-5
 Client ID: DUGOUT 5 EWET D.4



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

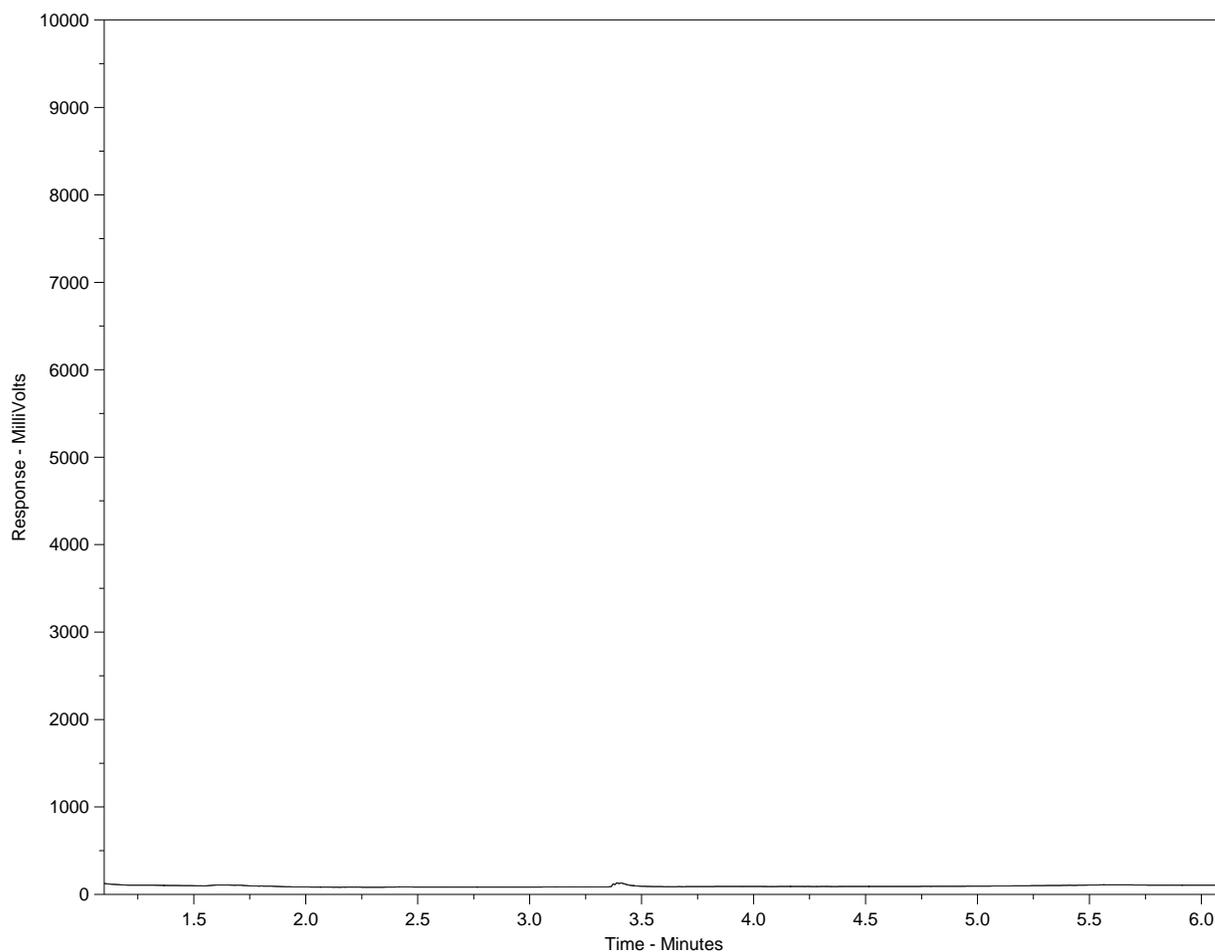
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-6
 Client ID: DUGOUT 6 LYONS D.1



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

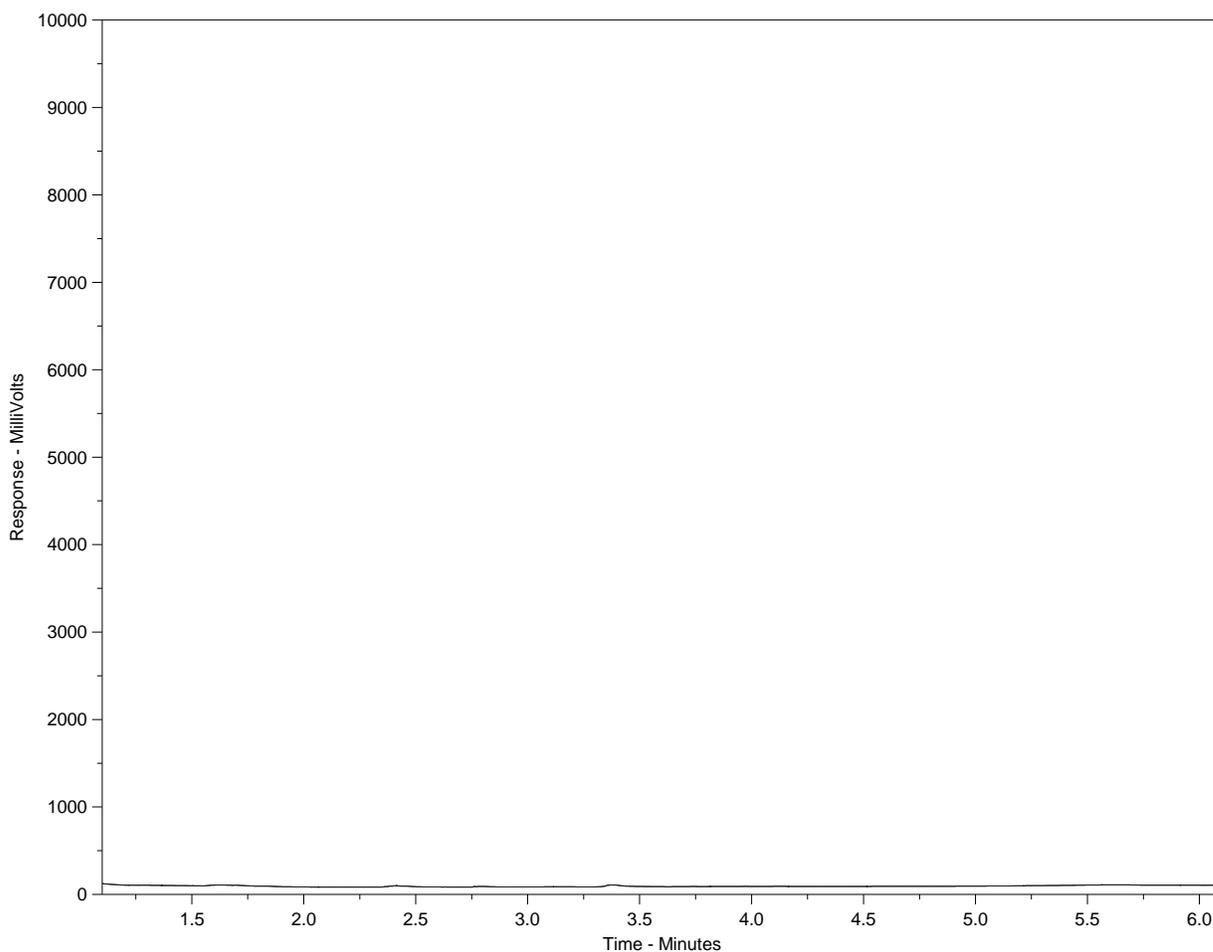
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-7
 Client ID: DUGOUT 7 LYONS D.2



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →				← Motor Oils/ Lube Oils/ Grease →	

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

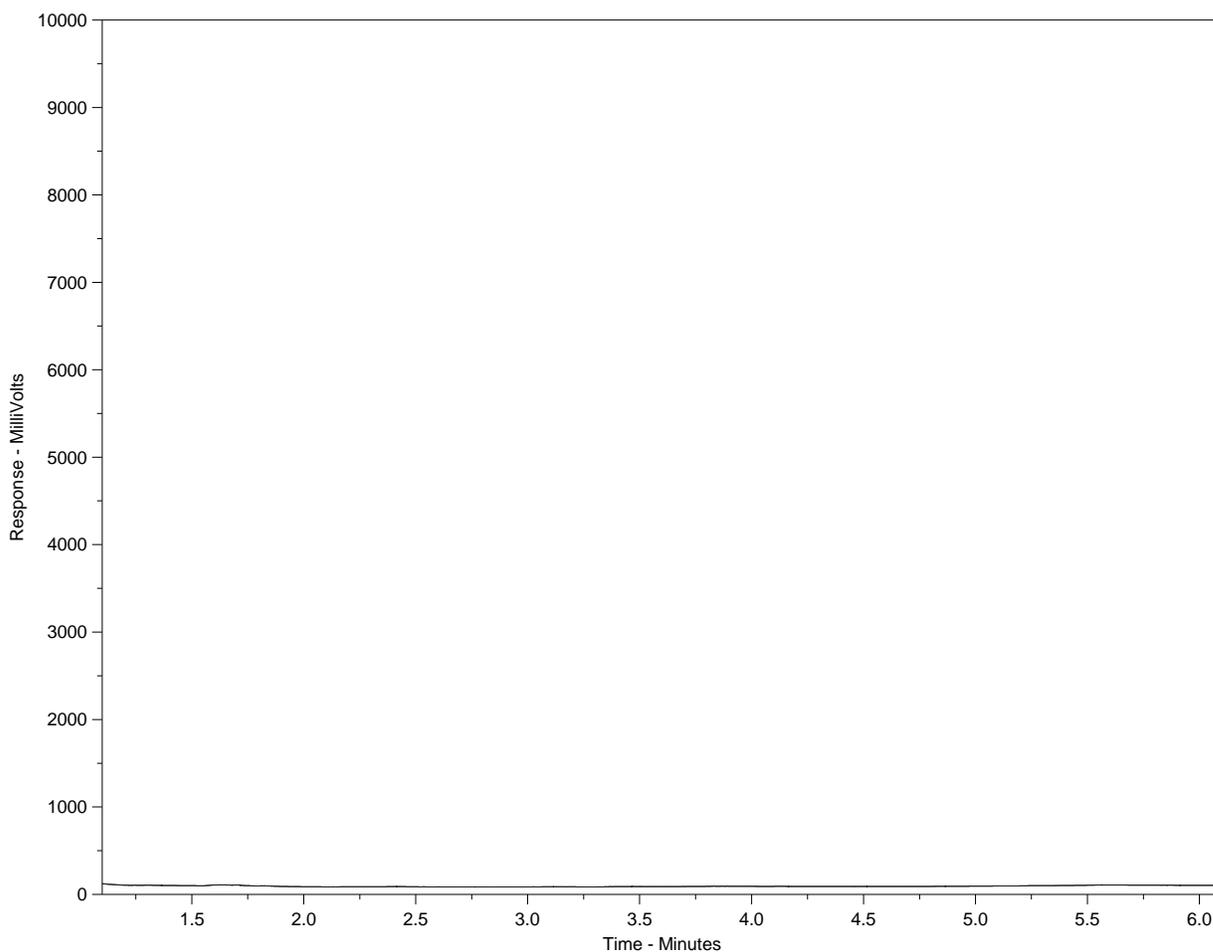
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-8
 Client ID: DUGOUT 8 LYONS D.3



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

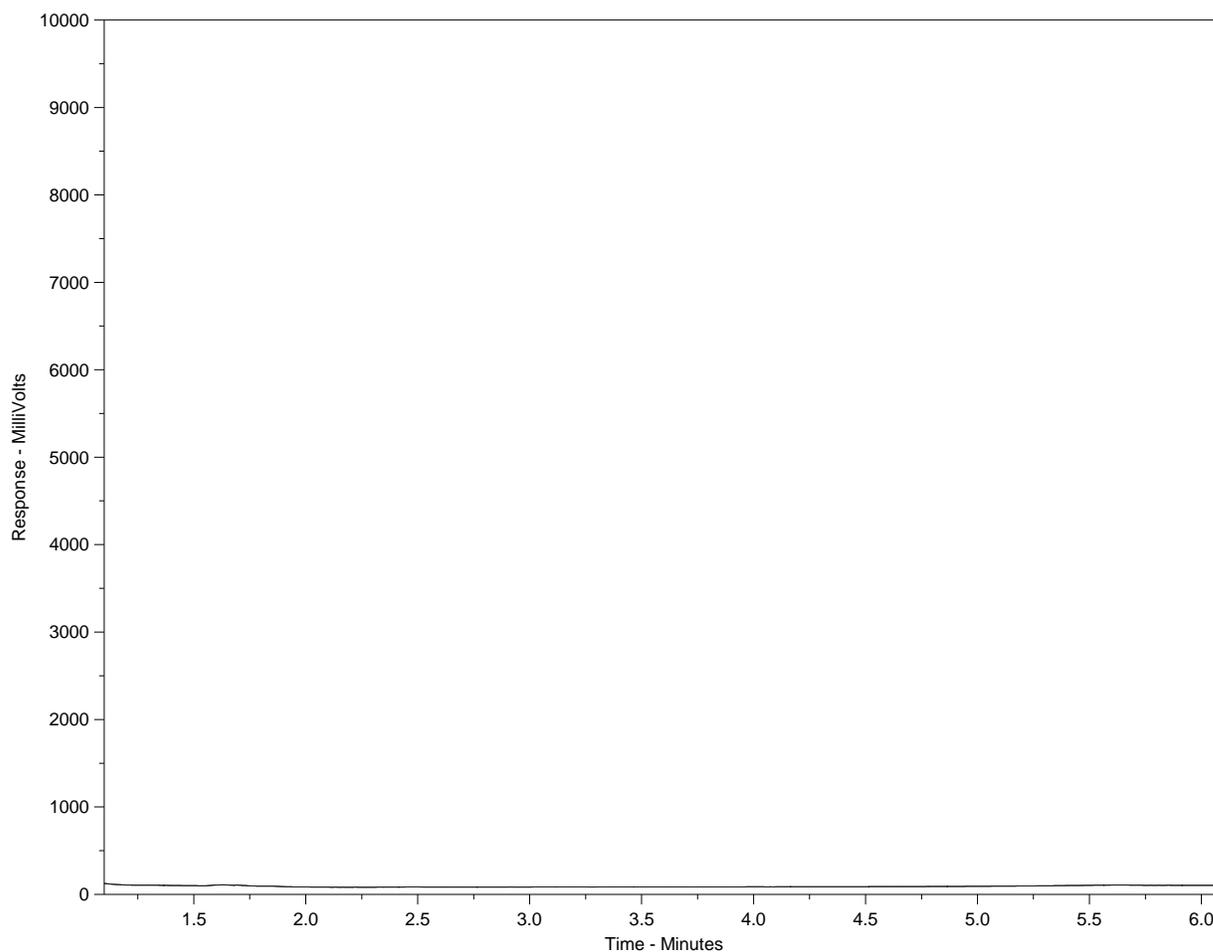
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-9
 Client ID: DUGOUT 9 LYONS D.4



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

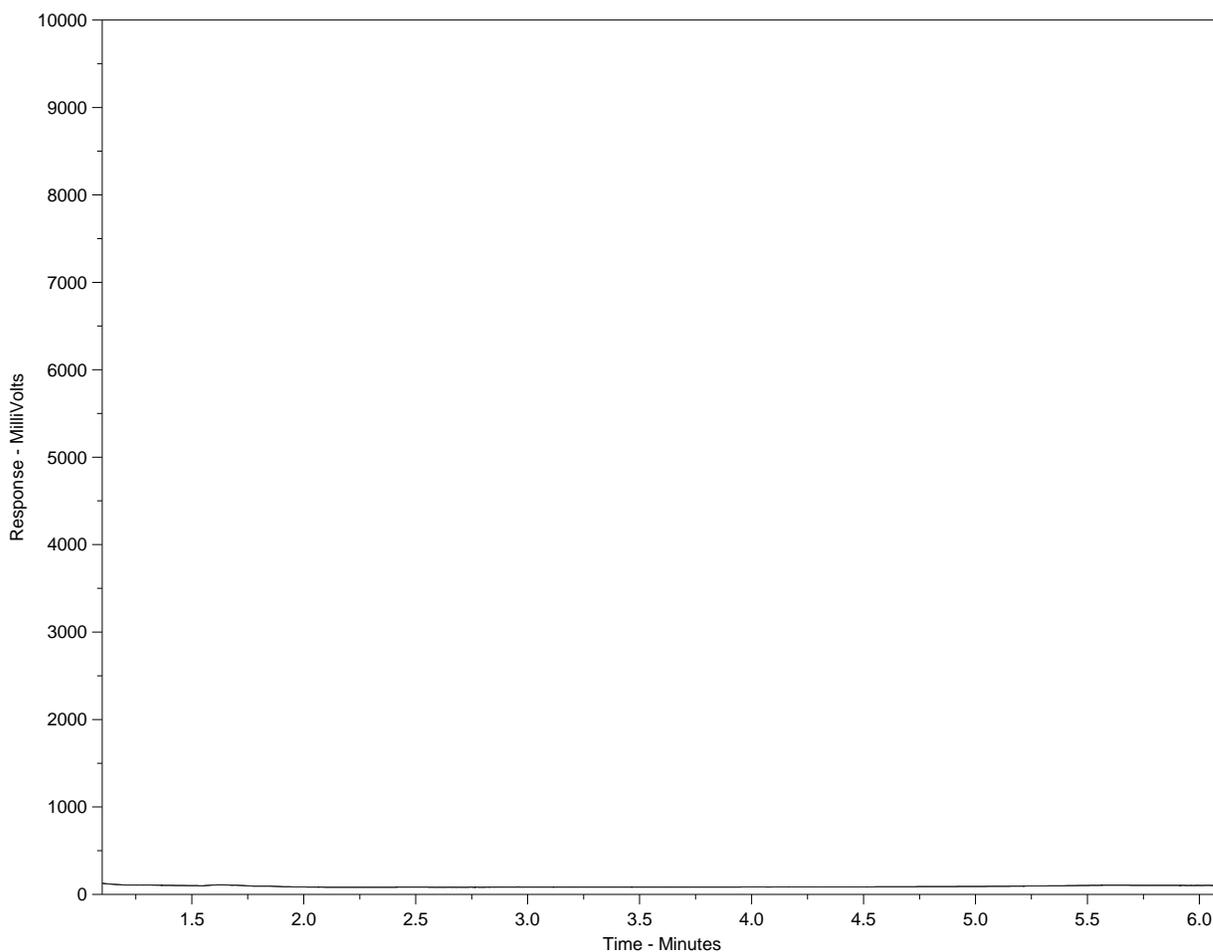
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-10
 Client ID: DUGOUT 10 MAGNESON D.1



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

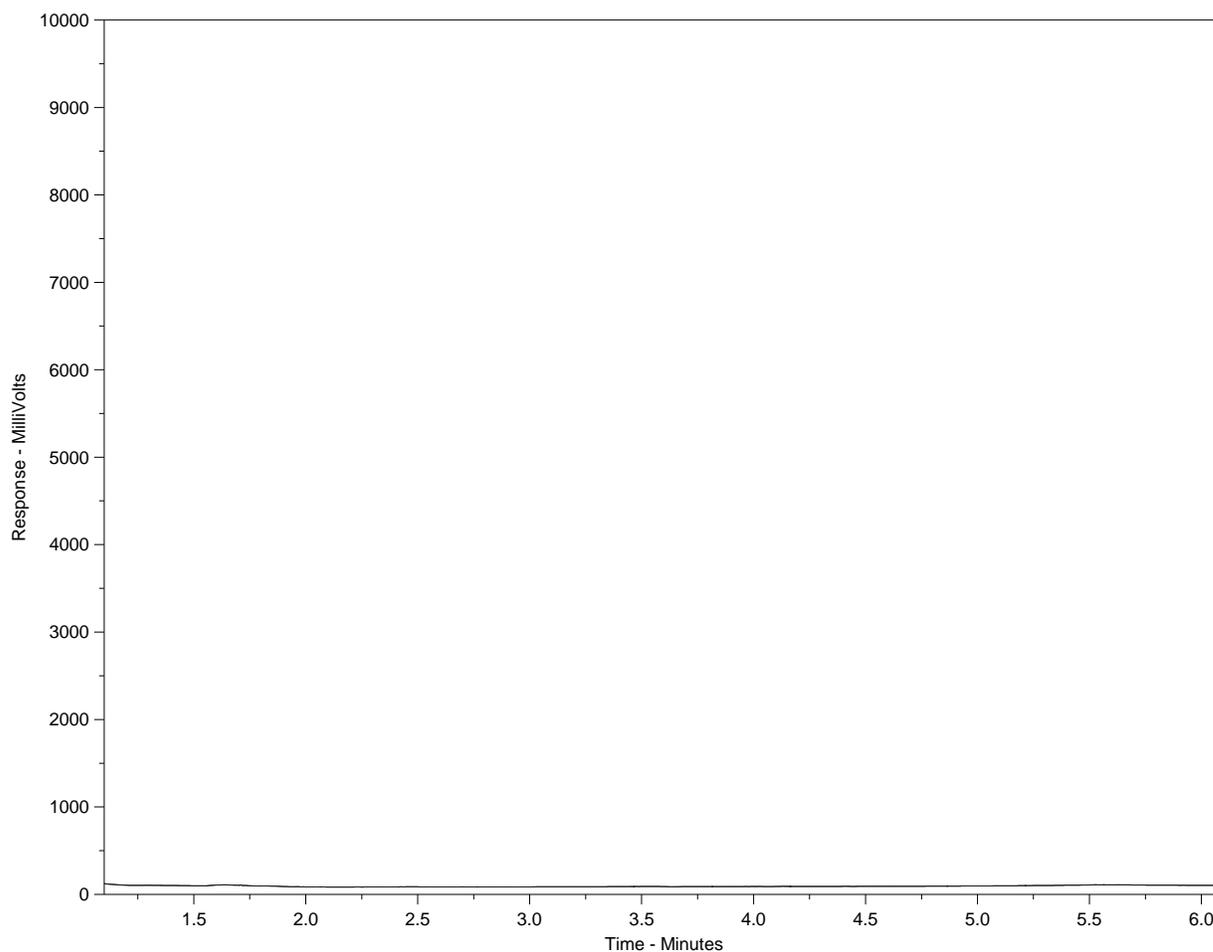
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-11
 Client ID: DUGOUT 12 MAGNESON D.3



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

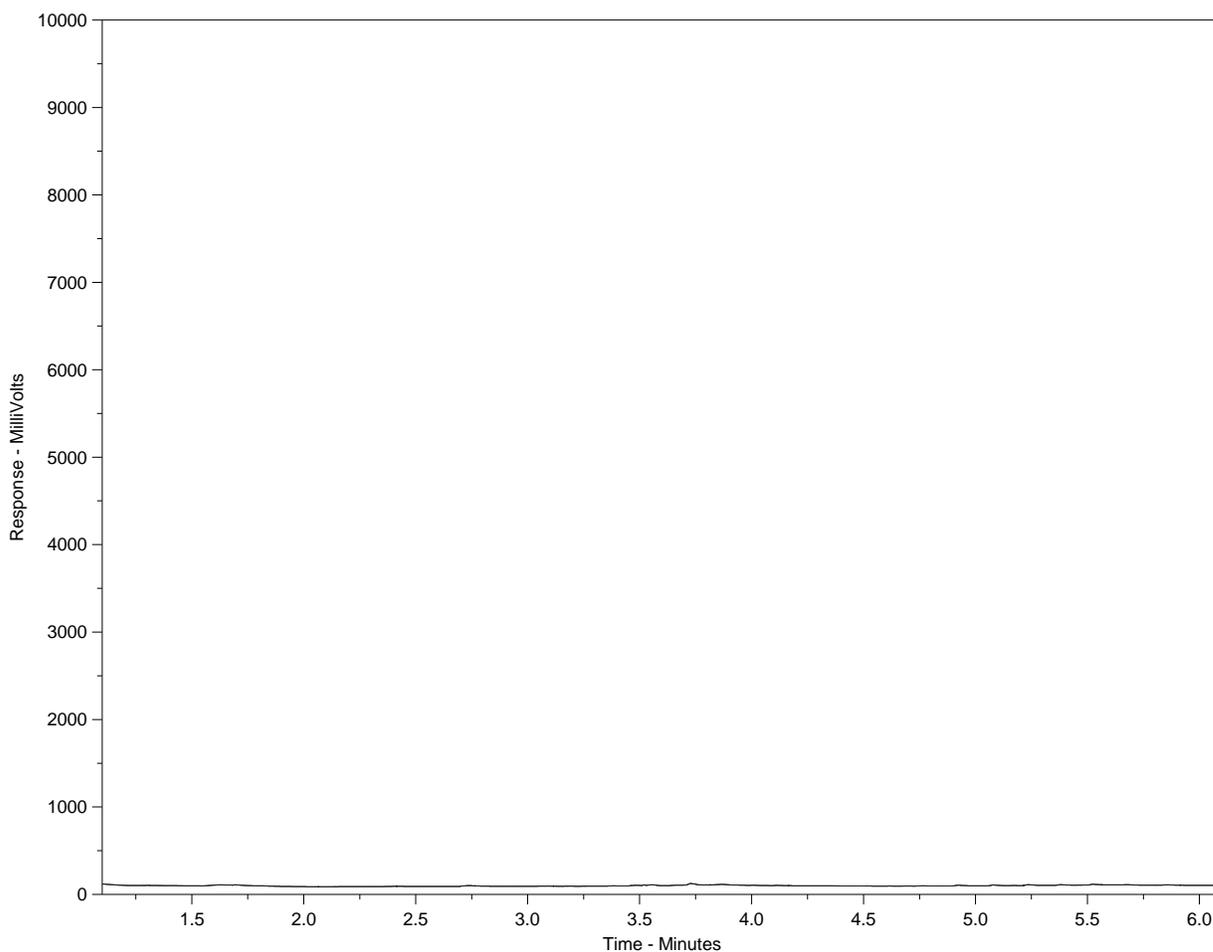
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-12
 Client ID: DUGOUT 13



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

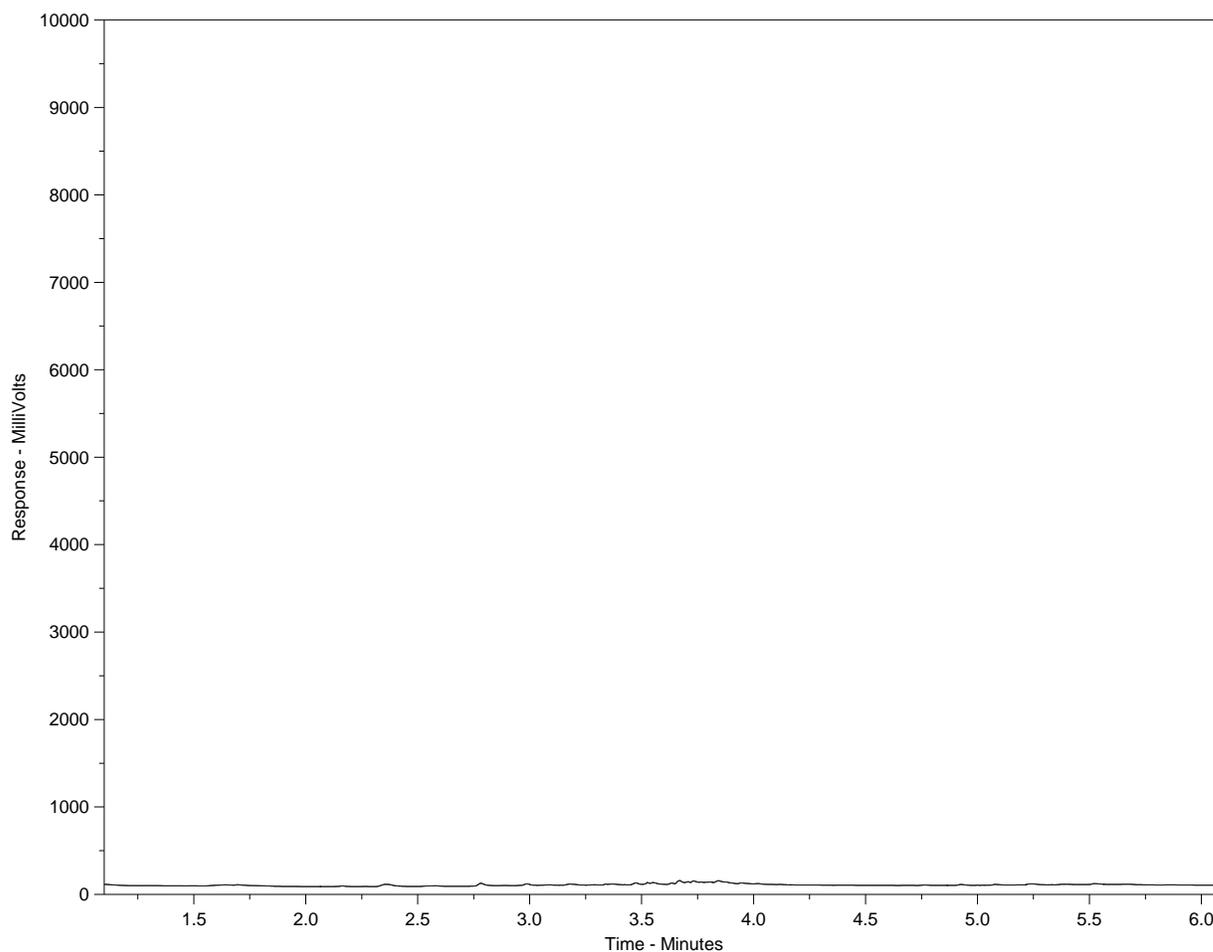
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-13
Client ID: DUGOUT 14



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

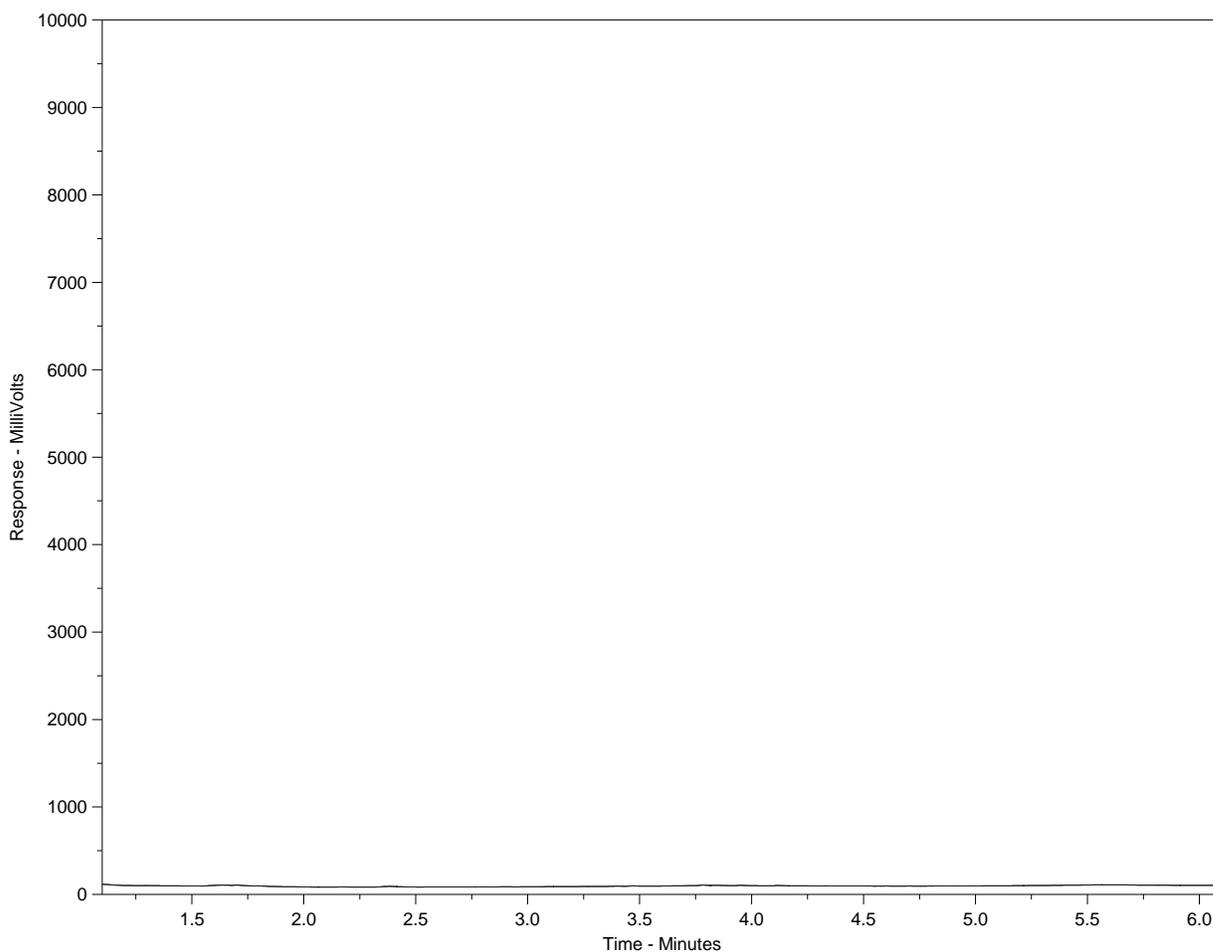
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-14
 Client ID: DUGOUT 15



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

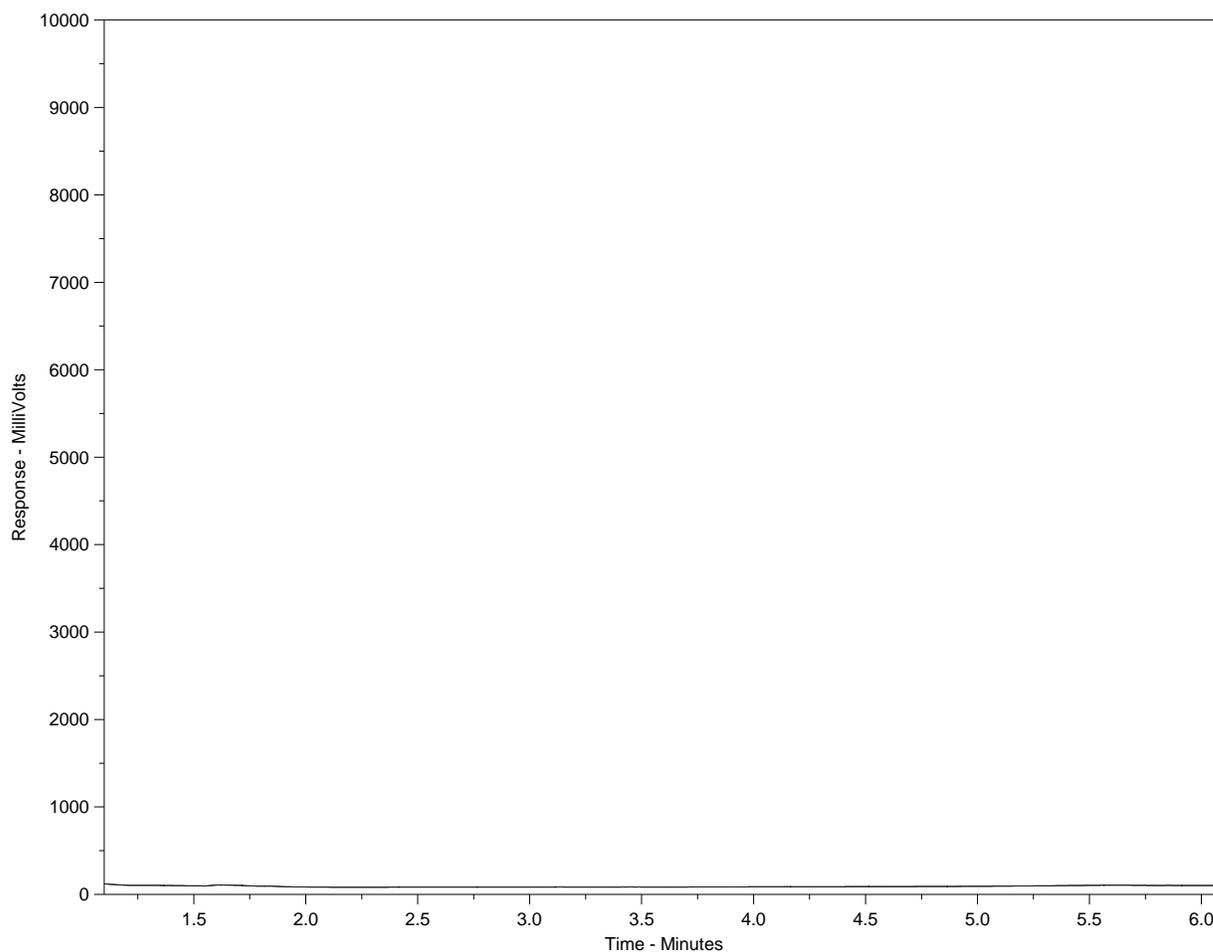
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-15
Client ID: DUGOUT 16



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

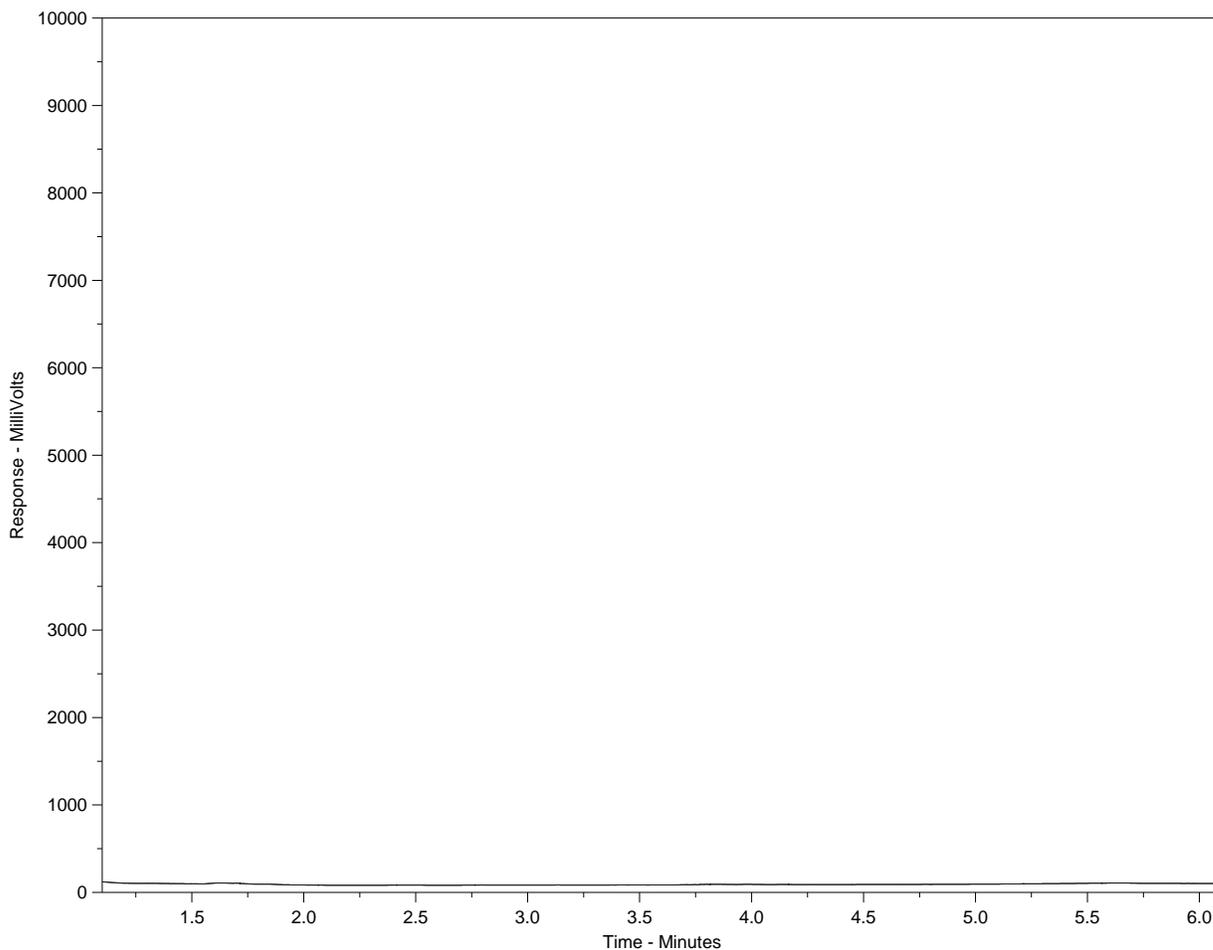
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-16
 Client ID: DUGOUT 19



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

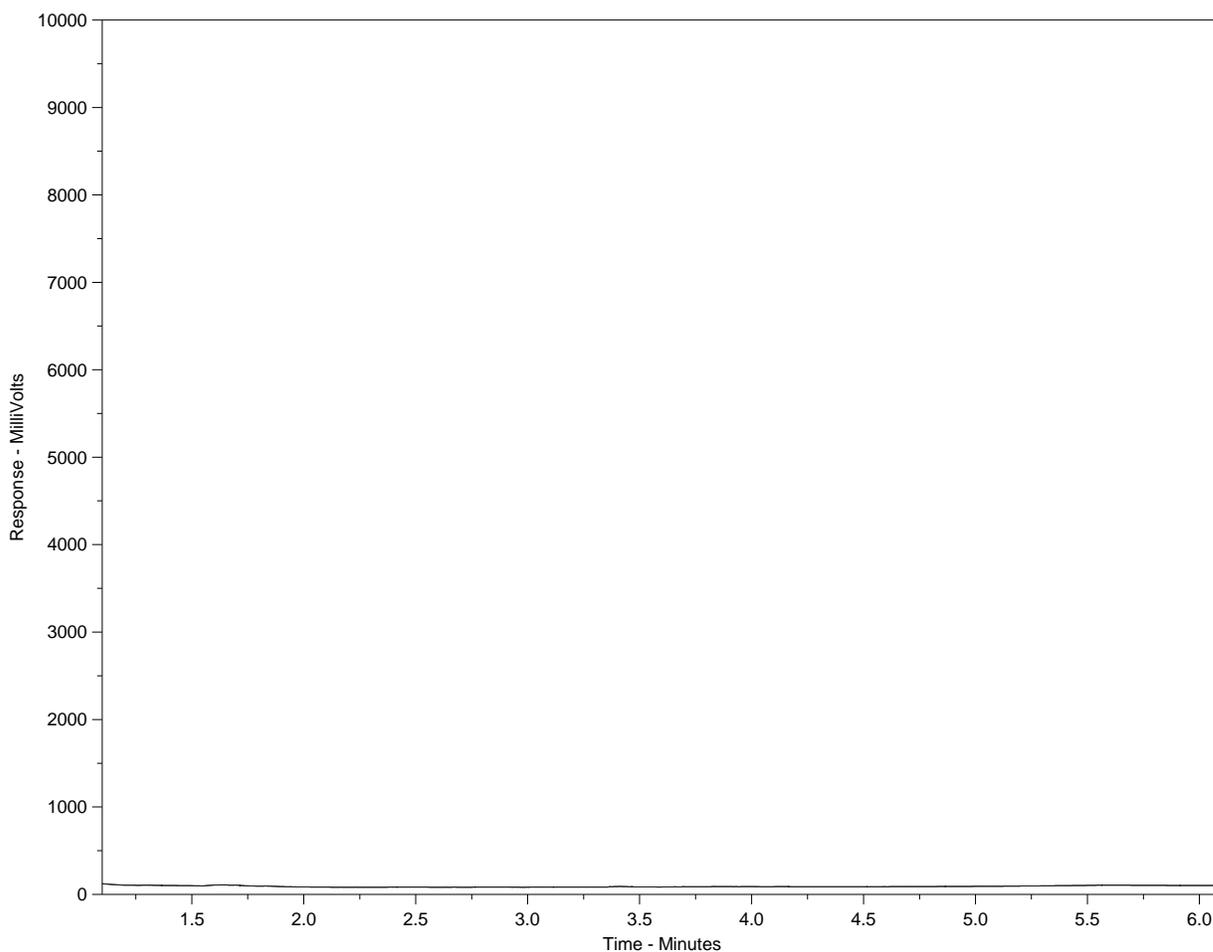
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-17
 Client ID: DUGOUT 20



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

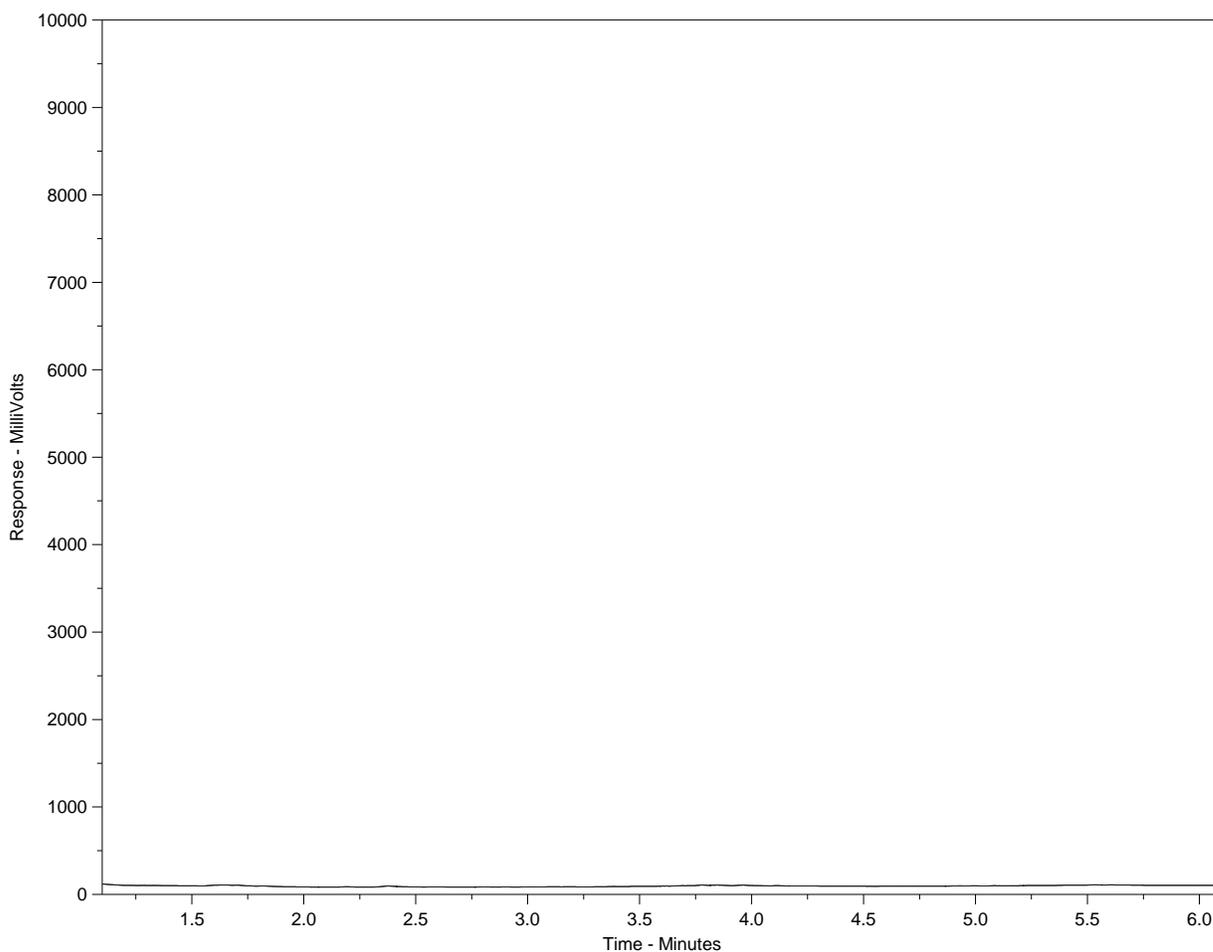
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-18
 Client ID: DUGOUT 21



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

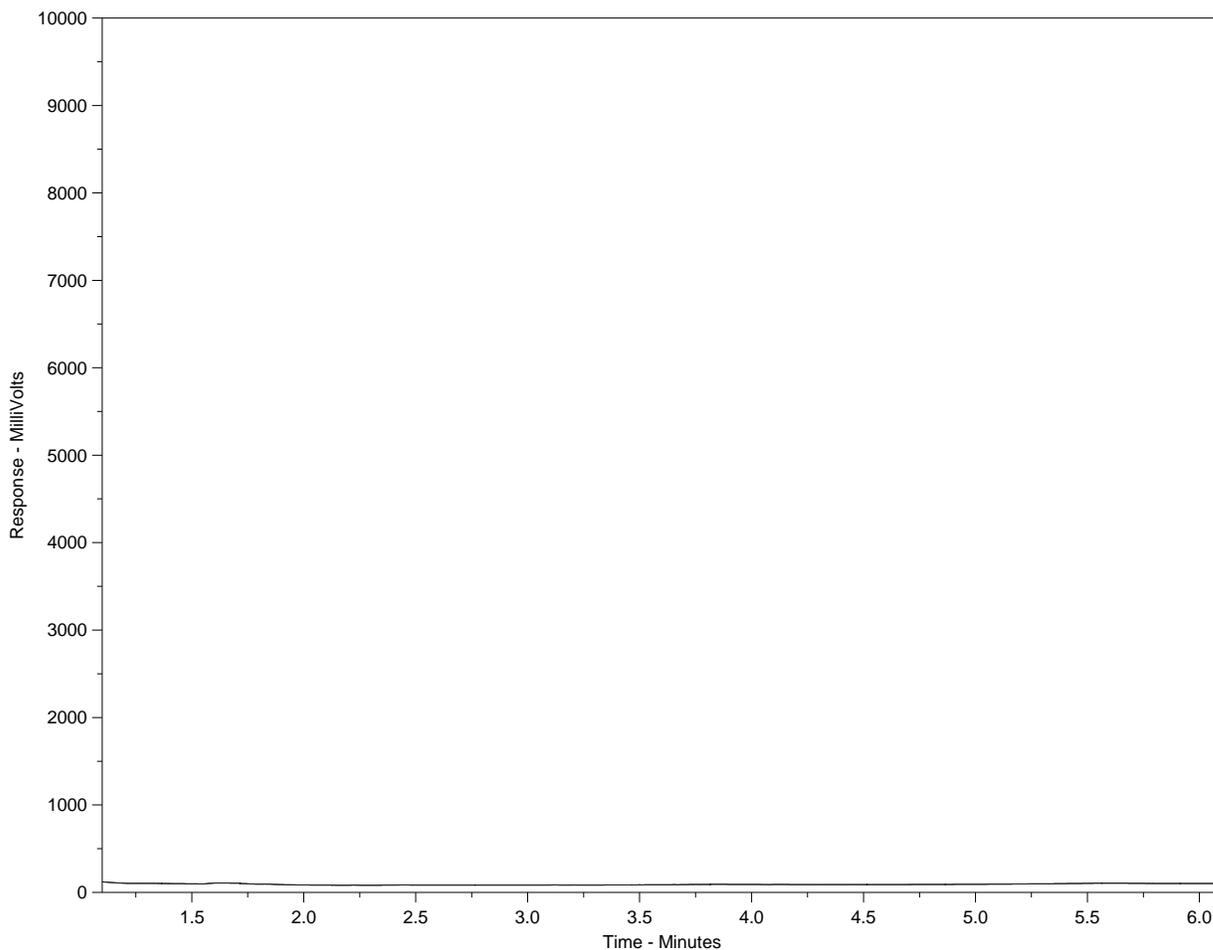
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-19
 Client ID: DUGOUT 22



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

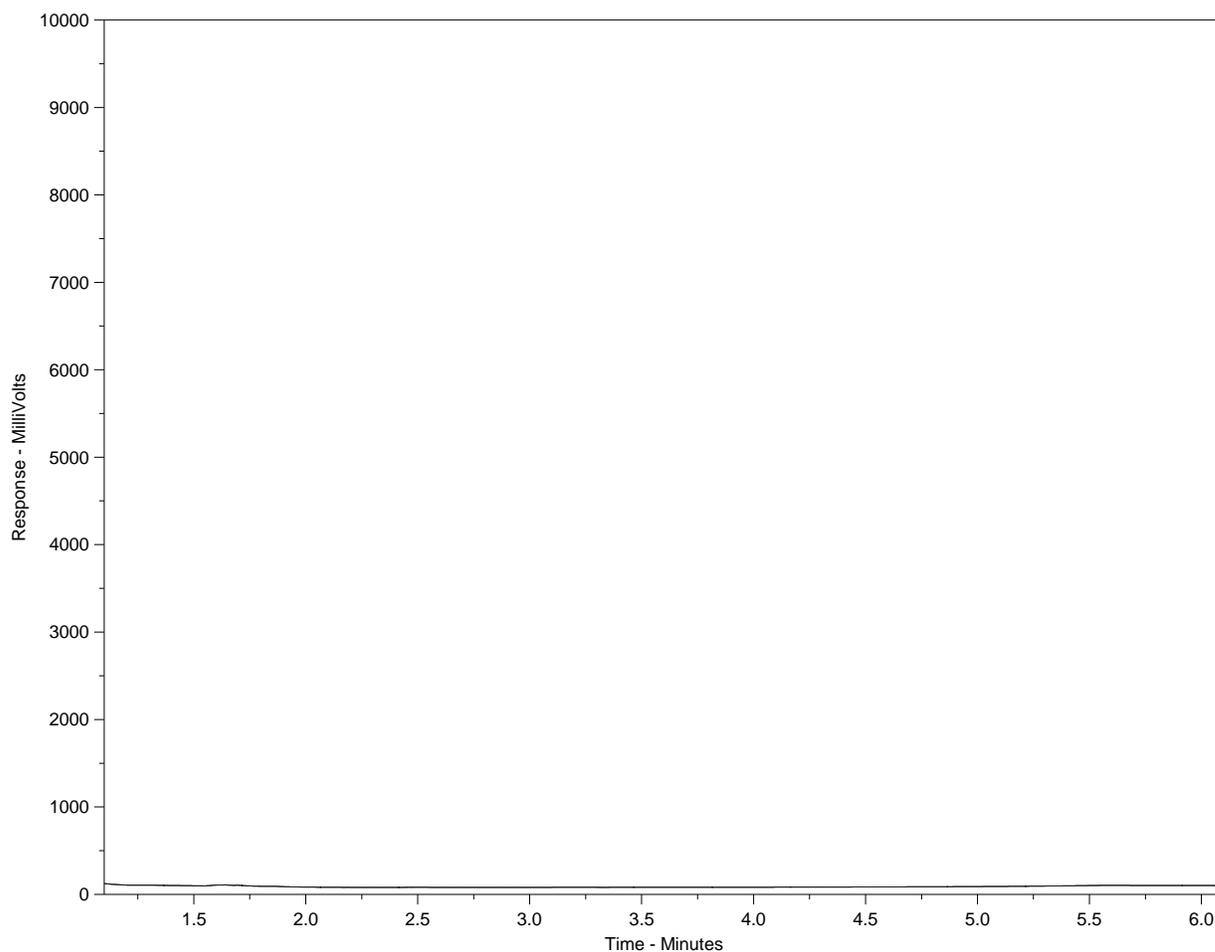
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-20
 Client ID: TRIP BLANK



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

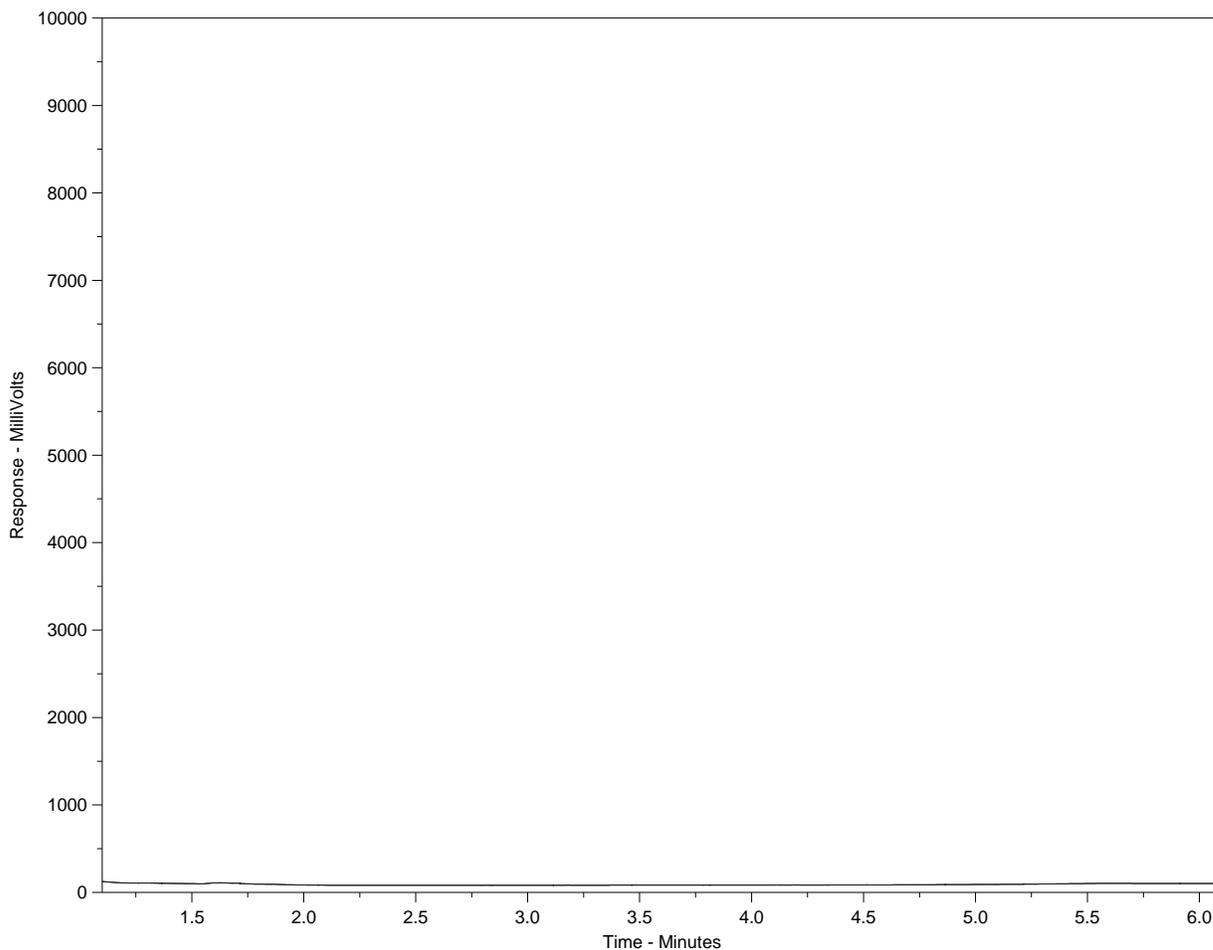
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-21
 Client ID: FIELD BLANK



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

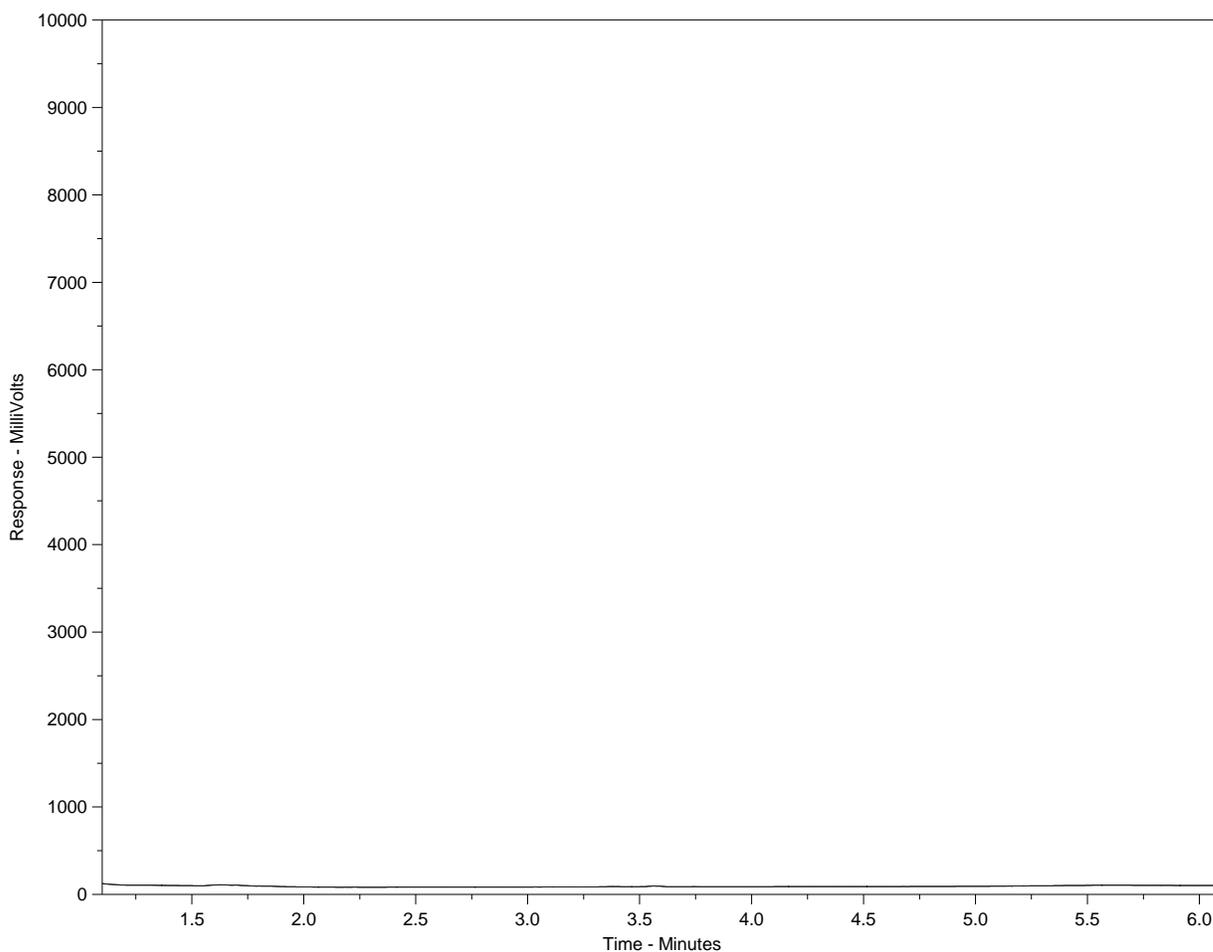
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-22
 Client ID: DUP-A



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

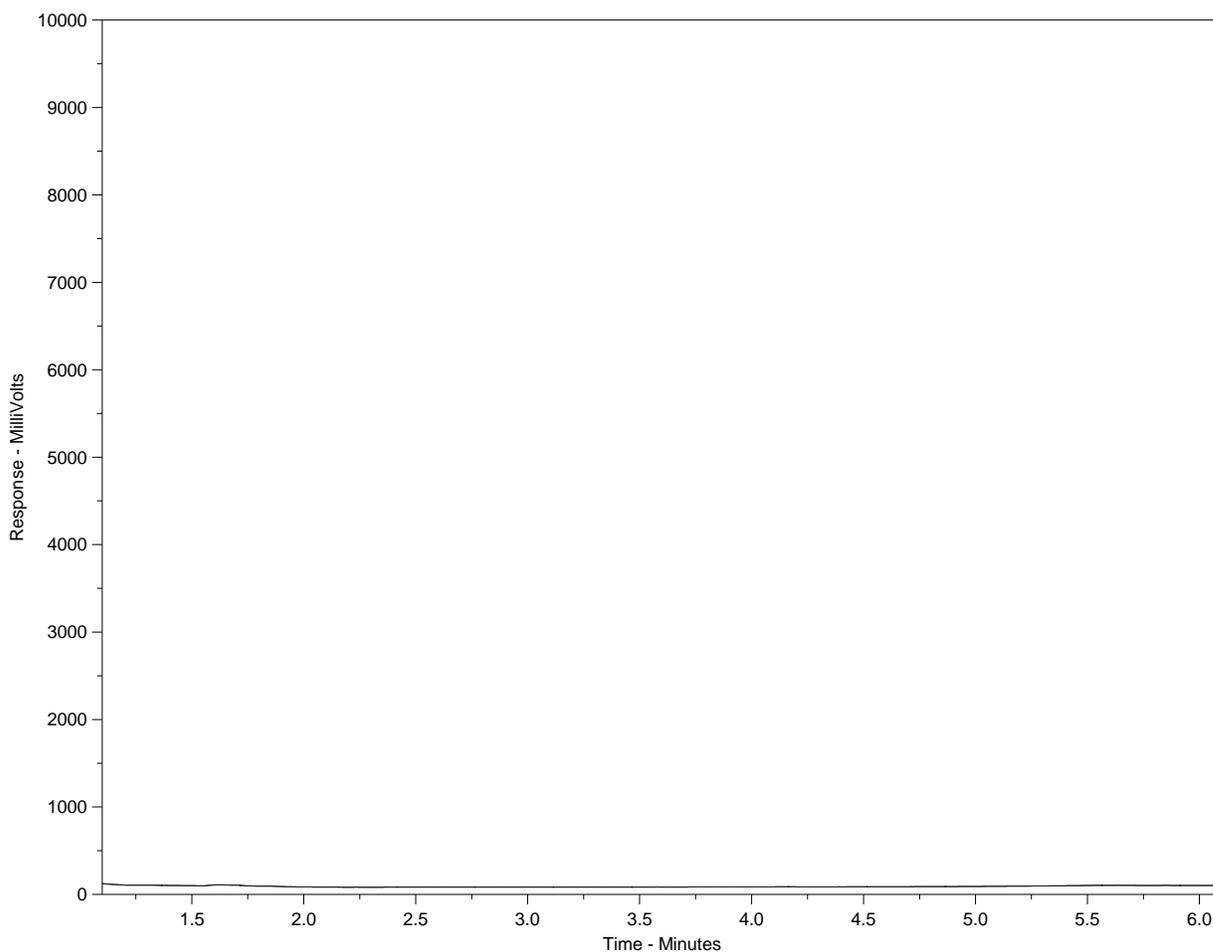
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L2654602-23
 Client ID: DUP-B



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.



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Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

COC Number: 20 - 972080

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Report To Contact and company name below will appear on the final report		Reports / Recipients			Turnaround Time (TAT) Requested																																				
Company: Tetra Tech Canada Inc.		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input checked="" type="checkbox"/> EDD (DIGITAL)			<input checked="" type="checkbox"/> Routine [R] if received by 3pm M-F - no surcharge																																				
Contact: Brian Adeney		Merge QC/QCI Reports with COA <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A			<input type="checkbox"/> 4 day [P4] if received by 3pm M-F - 20% rush s																																				
Phone: 780-451-2121		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked			<input type="checkbox"/> 3 day [P3] if received by 3pm M-F - 25% rush s																																				
Company address below will appear on the final report		Select Distribution: <input type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			<input type="checkbox"/> 2 day [P2] if received by 3pm M-F - 50% rush s																																				
Street: 14940 123 AVE		Email 1 or Fax: Brian.Adeney@tetratech.com			<input type="checkbox"/> 1 day [E] if received by 3pm M-F - 100% rush s																																				
City/Province: Edmonton AB		Email 2: Michael.DelSole@tetratech.com			<input type="checkbox"/> Same day [E2] if received by 10am M-S - 200% rush may apply to rush requests on weekends, statutory h.																																				
Postal Code: T5E 3E6 TSV 1B4		Email 3: Lab.data@tetratech.com			Date and Time Required for all E&P TATs:																																				
Invoice To: Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Invoice Recipients			For all tests with rush TATs requested, please contact your A/C to confirm availability.																																				
Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Analysis Request																																				
Company:		Email 1 or Fax: Accounts.Payable@tetratech.com			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below:																																				
Contact:		Email 2:			<table border="1"> <tr> <th rowspan="2">NUMBER OF CONTAINERS</th> <th colspan="10"></th> <th rowspan="2">SAMPLES ON HOLD</th> <th rowspan="2">EXTENDED STORAGE REQUIRED</th> <th rowspan="2">SUSPECTED HAZARD (see notes)</th> </tr> <tr> <th>Routine</th> <th>Dissolved Metals</th> <th>BTEX</th> <th>FI-Fa</th> <th>TDS, TSS</th> <th>COD</th> <th>DOC</th> <th>Nutrients</th> <th>Phenols</th> <th></th> <th></th> <th></th> <th></th> </tr> </table>										NUMBER OF CONTAINERS											SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)	Routine	Dissolved Metals	BTEX	FI-Fa	TDS, TSS	COD	DOC	Nutrients	Phenols				
NUMBER OF CONTAINERS											SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)																												
	Routine	Dissolved Metals	BTEX	FI-Fa	TDS, TSS	COD	DOC	Nutrients	Phenols																																
Project Information		Oil and Gas Required Fields (client use)																																							
ALS Account # / Quote #:		AFE/Cost Center:			PO#:																																				
Job #: 704-SWH-SUCOP 04402		Major/Minor Code:			Routing Code:																																				
PO / AFE:		Requisitioner:																																							
LSD: Ryley Dugoutis		Location:																																							
ALS Lab Work Order # (ALS use only):		ALS Contact:			Sampler:																																				
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																																					
	Dugout 1 - Basin D.1	Oct 21	11:45	Surface water	11	X	X	X	X	X	X	X	X	X																											
	Dugout 2 - Basin D.1		11:10		11	X	X	X	X	X	X	X	X	X																											
	Dugout 3 - Basin D.2		10:50		11	X	X	X	X	X	X	X	X	X																											
	Dugout 4 - Basin D.3		11:30		11	X	X	X	X	X	X	X	X	X																											
	Dugout 5 - Basin D.4		12:00		11	X	X	X	X	X	X	X	X	X																											
	Dugout 6 - Lyons D.1		10:30		11	X	X	X	X	X	X	X	X	X																											
	Dugout 7 - Lyons D.2		10:45		11	X	X	X	X	X	X	X	X	X																											
	Dugout 8 - Lyons D.3		9:05		11	X	X	X	X	X	X	X	X	X																											
	Dugout 9 - Lyons D.4		9:45		11	X	X	X	X	X	X	X	X	X																											
	Dugout 10 - Magnesium D.1		13:45		11	X	X	X	X	X	X	X	X	X																											
	Dugout 11 - No Sample				11	X	X	X	X	X	X	X	X	X			no sample																								
	Dugout 12 - Magnesium D.3		8:30		11	X	X	X	X	X	X	X	X	X																											
Drinking Water (DW) Samples (client use)		Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)			SAMPLE RECEIPT DETAILS (ALS use only)																																				
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO		Include sample I.D's from COC on Report			Cooling Method: <input type="checkbox"/> NONE <input type="checkbox"/> ICE <input checked="" type="checkbox"/> ICE PACKS <input type="checkbox"/> FROZEN <input type="checkbox"/> COOLING INITIATED																																				
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO					Submission Comments identified on Sample Receipt Notification: <input type="checkbox"/> YES <input type="checkbox"/> NO																																				
					Cooler Custody Seals Intact: <input type="checkbox"/> YES <input type="checkbox"/> N/A Sample Custody Seals Intact: <input type="checkbox"/> YES <input type="checkbox"/> N/A																																				
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SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)																																				
Released by: [Signature]	Date: Oct 22 2021	Time: 11:50	Received by: [Signature]	Date: 22-10-2021	Time: 2:26p																																				

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.



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Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 972081

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Report To Contact and company name below will appear on the final report		Reports / Recipients			Turnaround Time (TAT) Requested																																				
Company:		Select Report Format: <input type="checkbox"/> PDF <input type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			<input checked="" type="checkbox"/> Routine [R] if received by 3pm M-F - no surchar																																				
Contact:		Merge QC/QCI Reports with COA <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A			<input type="checkbox"/> 4 day [P4] if received by 3pm M-F - 20% rush																																				
Phone:		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked			<input type="checkbox"/> 3 day [P3] if received by 3pm M-F - 25% rush																																				
Company address below will appear on the final report		Select Distribution: <input type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			<input type="checkbox"/> 2 day [P2] if received by 3pm M-F - 50% rush																																				
Street:		Email 1 or Fax			<input type="checkbox"/> 1 day [E] if received by 3pm M-F - 100% rush																																				
City/Province:		Email 2			<input type="checkbox"/> Same day [E2] if received by 10am M-S - 200% r may apply to rush requests on weekends, statutory																																				
Postal Code:		Email 3			Date and Time Required for all E&P TATs:																																				
Invoice To		Invoice Recipients			For all tests with rush TATs requested, please contact your AM to confirm availability.																																				
Same as Report To <input type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Analysis Request																																				
Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Email 1 or Fax			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																																				
Company:		Email 2			<table border="1"> <tr> <th rowspan="2">NUMBER OF CONTAINERS</th> <th colspan="10"></th> <th rowspan="2">SAMPLES ON HOLD</th> <th rowspan="2">EXTENDED STORAGE REQUIRED</th> <th rowspan="2">SUSPECTED HAZARD (see notes)</th> </tr> <tr> <th>Routine</th> <th>Dissolved Metals</th> <th>BTEX</th> <th>Flu-F2</th> <th>TDS-TSS</th> <th>COD</th> <th>DOC</th> <th>Nutrients</th> <th>phenols</th> <th></th> <th></th> <th></th> <th></th> </tr> </table>										NUMBER OF CONTAINERS											SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)	Routine	Dissolved Metals	BTEX	Flu-F2	TDS-TSS	COD	DOC	Nutrients	phenols				
NUMBER OF CONTAINERS											SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)																												
	Routine	Dissolved Metals	BTEX	Flu-F2	TDS-TSS	COD	DOC	Nutrients	phenols																																
Project Information		Oil and Gas Required Fields (client use)																																							
ALS Account # / Quote #:		AFE/Cost Center:			PO#																																				
Job #:		Major/Minor Code:			Routing Code:																																				
PO / AFE:		Requisitioner:																																							
LSD:		Location:																																							
ALS Lab Work Order # (ALS use only):		ALS Contact:			Sampler:																																				
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																																					
	Dugout 13	Oct 21 2024	14:25	Surface water	11	X	/	/	/	/	/	/	/	/	/																										
	Dugout 14		14:05		11	X	/	/	/	/	/	/	/	/	/																										
	Dugout 15		13:55		11	X	/	/	/	/	/	/	/	/	/																										
	Dugout 16		12:20		11	X	/	/	/	/	/	/	/	/	/																										
	Dugout 19		12:40		11	X	/	/	/	/	/	/	/	/	/																										
	Dugout 20		13:00		11	X	/	/	/	/	/	/	/	/	/																										
	Dugout 21		13:20		11	X	/	/	/	/	/	/	/	/	/																										
	Dugout 22	Oct 21 2024	9:00		11	X	/	/	/	/	/	/	/	/	/																										
	Trip Blank	Oct 21 2024	8:30		11	X	X	X	X	X	X	/	/	/	/																										
	Field Blank		10:30		11	X	X	X	X	X	X	/	/	/	/																										
	DUP-A		8:30		11	X	X	X	X	X	X	/	/	/	/																										
	DUP-B		9:45		11	X	X	X	X	X	X	/	/	/	/																										
Drinking Water (DW) Samples (client use)		Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)			SAMPLE RECEIPT DETAILS (ALS use only)																																				
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO					Cooling Method: <input type="checkbox"/> NONE <input type="checkbox"/> ICE <input type="checkbox"/> ICE PACKS <input type="checkbox"/> FROZEN <input type="checkbox"/> COOLING INITIATED																																				
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO					Submission Comments identified on Sample Receipt Notification: <input type="checkbox"/> YES <input type="checkbox"/> NO																																				
					Cooler Custody Seals Intact: <input type="checkbox"/> YES <input type="checkbox"/> N/A Sample Custody Seals Intact: <input type="checkbox"/> YES <input type="checkbox"/> 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:	Received by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:																								
<i>[Signature]</i>	20 th 22 2024	11:30	<i>[Signature]</i>																																						

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY 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	8-Oct-2020			
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	82			
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	<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	2.75			
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	19.9			
Phenols	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	0.0019	0.0075	0.0010	
Total Suspended Solids (TSS)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.6	
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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050		
Toluene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050		
Ethylbenzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			
Xylenes (m & p)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
Xylene (o)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
Xylenes	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071		
Styrene	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
F1 (C6-C10)	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
F1 (C6-C10) - BTEX	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
F2 (>C10-C16)	mg/L	Not required under previous permit												<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.13	<0.10	<0.10	<0.10		
Dissolved Metals																													
Aluminum	mg/L	Not required under previous permit												<0.1	0.01	<0.010	<0.010	<0.010	0.013	<0.1	0.0035	0.0016	0.0031	0.0056	0.0021	0.0036			
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	<0.00080	0.00043	<0.0004	0.00077	0.0002	0.00024	0.00029	0.00020	0.00016				
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	0.00703	0.00484	0.00583	
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	0.0612				
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		
Boron	mg/L	Not required under previous permit												<0.05	<0.050	0.054	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050		
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	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050				
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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050				
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	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020				
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	<0.0010	<0.0010	0.00045	0.00054	0.00049	0.00053	0.00040			
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	0.179			
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	<0.00010	<0.00010	<0.00011	<0.00010	<0.000050	0.000077	<0.000050	0.000072	0.000055			
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	0.0446	0.0327	0.0335
Manganese	mg/L	Not required under previous permit												0.003	0.005	<0.0020	<0.0020	<0.0020	0.0025	0.0024	0.154	0.00071	0.00744	0.00864	0.00250	0.00783			
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	<0.00010	<0.000050	0.000095	<0.000050	<0.000050	<0.000050				
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	0.00244	0.00125	0.00111	0.000989	0.000853	0.000611				
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	0.00304			
Selenium	mg/L	Not required under previous permit												<0.0004	<0.00080	<0.00040	<0.00040	<0.00080	<0.00040	<0.00040	0.00045	0.000114	0.000115	0.000143	0.000115	0.000156			
Silver	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Thallium	mg/L	Not required under previous permit												0.0002	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000016	<0.000010	<0.000010		
Tin	mg/L	Not required under previous permit												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050		
Titanium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	<0.001	<0.00060	<0.00030	0.00032	0.00049	0.00058	0.00058			
Uranium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	0.000784	0.000578	0.000578
Vanadium	mg/L	Not required under previous permit												0.001	<0.0010	<0.0010	<0.0010	0.0017	0.0026	0.0015	0.0053	0.00087	0.00112	0.00135	0.00072	0.00072			
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	94.7			
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	358			
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	40.2			
Carbonate	mg/L	<5	<5	<5	<5	<5	<5	76	37	45	<5	<5	12	29.3	15	11.7	28.7	36.1	11.2	24.6	<5.0	10.7	7.6	<5.0	6.4				
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	712			
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												

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	8-Oct-2020										
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	78										
Ammonia-N	mg/L	1.65	0.36	0.8	<0.05	<0.05	0.28	<0.05	<0.05	<0.05	1.64	<0.05	<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	<0.050										
Total Kjeldahl Nitrogen	mg/L	3.3	2.7	3	2.5	1.7	0.9	3.9	4.8	2.7	3.9	2.3	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	3.08										
Total Organic Carbon	mg/L	17	24	23	19	19	31	37	29	23	31	20	24	-	-	-	-	-	-	-	-	-	-	-	-	-										
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	18	29.1	31.7	20	24.8	24.9	23.4	37.2	24.3	122	21.6	22.2	21.1										
Phenols	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	0.018	0.0101	<0.0010									
Total Suspended Solids (TSS)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.6									
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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050					
Toluene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050						
Ethylbenzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050							
Xylenes (m & p)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050			
Xylene (o)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050		
Xylenes	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071		
Styrene	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050
F1 (C ₆ -C ₁₀)	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10			
F1 (C ₆ -C ₁₀) - BTEX	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10			
F2 (C ₁₀ -C ₁₆)	mg/L	Not required under previous permit												<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10				
Dissolved Metals																																				
Aluminum	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	0.0059										
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	0.00021	0.00021	0.00021								
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00165	0.0137	0.00823	
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	-	0.0642	0.118	0.0449	0.0508										
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010				
Boron	mg/L	Not required under previous permit												0.05	0.052	0.057	0.058	0.057	0.052	0.061	0.059	0.073	0.053	0.046	0.040	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	<0.000050	<0.000050	<0.0010	<0.00050	<0.000050	0.0000099	0.0000059	0.0000083	<0.0000050	0.0000070	<0.0000050										
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	<0.0050	0.00013	<0.00010	0.00011	<0.00010	<0.00010	<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	<0.0020	0.00060	0.00025	0.00064	0.00065	0.00062	0.00046										
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	<0.0010	0.00180	0.00360	0.00193	0.00081	0.00271	0.00065										
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	0.032										
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	<0.00050	<0.00010	<0.0001	0.000176	<0.000050	0.000098	0.000113	0.000076	<0.000050										
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0263	0.0236					
Manganese	mg/L	Not required under previous permit												0.002	0.0075	0.0096	<0.0050	<0.0020	0.0046	<0.002	0.00448	0.00161	0.0116	0.0192	0.0138	0.00492										
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	<0.00010	0.0000052	0.0000081	<0.0000050	<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	<0.0050	0.00252	0.00142	0.000884	0.00136	0.00198	0.000868										
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	0.00290										
Selenium	mg/L	Not required under previous permit												0.0005	0.00058	<0.00040	<0.00040	<0.00080	<0.00040	<0.00040	0.000347	0.000248	0.00025	0.000169	0.000258	0.000172										
Silver	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010						
Thallium	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010							
Tin	mg/L	Not required under previous permit												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010							
Titanium	mg/L	Not required under previous permit												<0.001	0.0026	0.0027	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00118	<0.00030	0.00044	0.0029	0.00517	0.00055								
Uranium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	0.00123	0.00138	0.00101								
Vanadium	mg/L	Not required under previous permit												<0.001	0.002	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00286	<0.00050	0.00228	0.00067	0.00299	0.00158								
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	<0.0010										
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	96.9										
Bicarbonate	mg/L																																			

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	8-Oct-2020						
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	116						
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	<0.050						
Total Kjeldahl Nitrogen	mg/L	3.1	2.1	2.7	2.8	1.8	3.6	<0.05	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	3.45						
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	29.0						
Phenols	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	0.0018	0.0068	<0.0010			
Total Suspended Solids (TSS)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.6	7.6			
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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Ethylbenzene	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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050		
Xylenes (m & p)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
Xylene (o)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
Xylenes	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	
Styrene	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
F1 (C ₆ -C ₁₀)	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
F1 (C ₆ -C ₁₀) - BTEX	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
F2 - (C ₁₀ -C ₁₆)	mg/L	Not required under previous permit												<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25		
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	0.0155						
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	0.00018						
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	0.00803	0.00619	0.00513			
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	0.0342						
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010			
Boron	mg/L	Not required under previous permit												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.038	0.039	0.039	0.039	0.039	0.039	0.034	0.025				
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	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050						
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	<0.0010	<0.0010	<0.0010	<0.0010	<0.0011	0.00013	0.00023					
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	0.00075						
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	0.0010						
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	1.66						
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	<0.00050	<0.00010	<0.0001	0.000072	<0.000050	<0.000050	0.00010	0.000164	0.000278						
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	0.0323	0.0142				
Manganese	mg/L	Not required under previous permit												0.003	<0.0020	<0.0020	<0.0050	0.0021	0.0067	<0.002	0.00205	0.00125	0.107	0.0131	0.00377	0.0441						
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	<0.000050	0.000066	<0.000050	<0.000050	<0.000050							
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	0.000407						
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	0.00314						
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	0.000206						
Silver	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.00050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010					
Thallium	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<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	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010					
Titanium	mg/L	Not required under previous permit												0.001	0.0013	<0.0010	<0.0010	0.003	<0.0010	<0.001	0.00034	<0.0003	0.00062	0.00375	0.00694	0.00266						
Uranium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	0.00159	0.000775	0.000262			
Vanadium	mg/L	Not required under previous permit												0.001	0.0019	<0.0010	<0.0010	0.0012	<0.0010	<0.001	0.00096	0.00072	0.00136	0.00513	0.00218	0.00194						
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	94.7						
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	338						
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	73.5						
Carbonate	mg/L	<5	25	13	17	<5	14	51	17	111	15	<5	<5	19	9.4																	

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	8-Oct-2020			
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	116			
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	<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	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	3.45				
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	29.0		
Phenols	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	0.0018	0.0058	<0.0010
Total Suspended Solids (TSS)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.6
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	<0.00050	<0.00050	<0.00050
Toluene	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	<0.00050	<0.00050	
Ethylbenzene	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	<0.00050	<0.00050	
Xylenes (m & p)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050
Xylene (o)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	Not required under previous permit													<0.0005	<0.00050	<0.00050	<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	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050
F1 (C ₆ -C ₁₀)	mg/L	Not required under previous permit													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	Not required under previous permit													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (C ₁₀ -C ₁₆)	mg/L	Not required under previous permit													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																													
Aluminum	mg/L	Not required under previous permit													<0.01	0.069	<0.010	<0.010	0.113	<0.010	<0.01	0.024	0.0473	0.0052	0.0673	0.0107	0.0155		
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	0.0018	0.0001	0.0001	0.00016	0.00016	0.00018			
Arsenic	mg/L	Not required under previous permit													<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.0018	0.0001	0.0001	0.00016	0.00016	0.00018		
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	0.0342			
Beryllium	mg/L	Not required under previous permit													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Boron	mg/L	Not required under previous permit													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.029	0.044	0.018	0.035	0.039	0.025		
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	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050			
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	<0.0050	<0.0010	0.00014	0.00018	0.00018	0.00017	0.00023			
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	0.00075			
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	0.0010			
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	1.66			
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	<0.00050	<0.00010	<0.0001	<0.000050	0.000132	0.000168	0.000389	0.000211	0.000278			
Lithium	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	0.0153	0.0125	0.0142
Manganese	mg/L	Not required under previous permit													0.008	0.0812	<0.0020	<0.0050	0.082	0.0027	<0.002	0.0025	0.00451	0.0477	0.194	0.00879	0.0441		
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	<0.000050	0.000069	<0.000050	<0.000050	<0.000050				
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	0.000407			
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	0.00314			
Selenium	mg/L	Not required under previous permit													<0.0004	<0.00080	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000135	0.000151	0.000192	0.000188	0.000188	0.000206		
Silver	mg/L	Not required under previous permit													<0.0001	<0.00010	<0.00010	<0.00010	<0.00050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Thallium	mg/L	Not required under previous permit													0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<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	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Titanium	mg/L	Not required under previous permit													<0.001	0.0031	<0.0010	<0.0010	0.004	<0.0010	<0.001	<0.00030	0.00264	0.00083	0.00499	0.00168	0.00266		
Uranium	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	0.000531	0.000262	0.000262
Vanadium	mg/L	Not required under previous permit													<0.001	<0.0010	<0.0010	<0.0010	0.0013	<0.0010	<0.001	0.00099	0.00102	0.00102	0.00102	0.00193	0.00144	0.00194	
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	<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	94.7			
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	338			
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	73.5			
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	5.3			
Conductivity (EC)	uS/cm	462	480	476	488	523	543	860	403	545	277	363	460	488	577	506	608	682	547										

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	8-Oct-2020			
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	75			
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	0.235			
Total Kjeldahl Nitrogen	mg/L	1.5	1.2	2.7	2.3	1.7	3.1	3.4	2.1	3.1	4	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	3.64				
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	23.0		
Phenols	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	0.0015	0.0076	0.0012	
Total Suspended Solids (TSS)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	-	-	33.8
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	<0.00050	<0.00050	<0.00050
Toluene	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	<0.00050	<0.00050	
Ethylbenzene	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	<0.00050	<0.00050	
Xylenes (m & p)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050
Xylene (o)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	Not required under previous permit													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	
Styrene	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050
F1 (C6-C10)	mg/L	Not required under previous permit													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C6-C10) - BTEX	mg/L	Not required under previous permit													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (C10-C16)	mg/L	Not required under previous permit													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.13	<0.10	<0.10	<0.10	<0.10
Dissolved Metals																													
Aluminum	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	0.0194	0.0425	
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	0.00035			
Arsenic	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	0.0114	0.00313	0.00692
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	0.0823			
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	<0.00010	<0.00010	
Boron	mg/L	Not required under previous permit													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.035	0.046	0.04	0.04	0.05	0.042	0.018	
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	<0.000050	<0.000050	<0.000050	<0.000050	0.0000196	<0.000050	<0.000050			
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	<0.005	<0.0050	<0.0050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00013			
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	0.00113			
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	0.00123			
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	0.353			
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	<0.00050	<0.0001	0.000119	<0.000050	0.000096	0.00010	<0.000050	0.000273				
Lithium	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	0.0247	0.0128		
Manganese	mg/L	Not required under previous permit													0.004	0.0021	0.007	<0.0020	0.0024	<0.0020	<0.002	0.0038	0.00066	0.00532	0.00626	0.00080	0.0246		
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	<0.000050	0.0000108	<0.000050	<0.000050	<0.000050				
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	0.00329	0.00216	0.00196	0.0019	0.00118	0.00177				
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	0.00732			
Selenium	mg/L	Not required under previous permit													0.0006	0.00056	0.00046	<0.00040	<0.00080	<0.00040	<0.00040	0.000372	0.000302	0.000271	0.000299	0.000217	0.00037		
Silver	mg/L	Not required under previous permit													<0.0001	<0.00010	<0.00010	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Thallium	mg/L	Not required under previous permit													<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
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	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Titanium	mg/L	Not required under previous permit													0.001	0.002	0.0037	<0.0010	0.0025	<0.0010	<0.001	0.00345	<0.00030	0.00069	0.00219	<0.00030	0.0091		
Uranium	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	0.001	0.000602	0.00121	
Vanadium	mg/L	Not required under previous permit													<0.001	0.001	0.0013	<0.0010	0.0014	<0.0010	<0.001	0.00294	<0.00050	<0.00050	0.00251	<0.00050	0.0018		
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	0.002	<0.0020	0.0087	<0.0010	0.001	0.0031	<0.0010	<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	96.8			
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	312			
Chloride	mg/L	4.2	4.3	3.4	6.0	6.0	9.0	14	12	16	28	20	23	23	21.7	19.7	15.2	19.4	21.4	15.2	18.5	17.5	19.4	21.7	18	12.9			
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	<5.0			
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	796			
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											

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	8-Oct-2020				
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	98				
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	0.191				
Total Kjeldahl Nitrogen	mg/L	1.2	2	2.9	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	3.13				
Total Organic Carbon	mg/L	19	20	26	24	27	31	40	22	26	21	20	36	-	-	-	-	-	-	-	-	-	-	-	-				
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	21	27.4	22.9	28.6	26.8	27.1	19.8	26.8	25	70	28.0	25.0				
Phenols	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	0.0013	<0.0010		
Total Suspended Solids (TSS)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.2				
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	<0.00050	<0.00050	
Toluene	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	<0.00050	<0.00050	
Ethylbenzene	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	<0.00050	<0.00050	
Xylenes (m & p)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	
Xylene (o)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L	Not required under previous permit													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	
Styrene	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C ₆ -C ₁₀)	mg/L	Not required under previous permit													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F1 (C ₆ -C ₁₀) - BTEX	mg/L	Not required under previous permit													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F2 - (C ₁₀ -C ₁₆)	mg/L	Not required under previous permit													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<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	0.0366			
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	0.00537	
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	0.0448	0.032	0.0495	0.0372					
Beryllium	mg/L	Not required under previous permit													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		
Boron	mg/L	Not required under previous permit													0.05	0.056	<0.050	<0.050	0.078	0.065	0.055	0.052	0.04	0.050	0.04	0.050	<0.010		
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	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050				
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	<0.0050	<0.0010	0.0002	<0.00010	0.0002	0.00028				
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	<0.0020	<0.0020	0.00050	0.0003	0.0004	0.00063				
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	0.00060				
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	0.677				
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	<0.00050	<0.00010	<0.0001	<0.000050	0.000189	0.000056	0.000112	0.000149				
Lithium	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	0.0136	0.0076	
Manganese	mg/L	Not required under previous permit													0.002	0.033	<0.0020	<0.0050	0.0023	0.0127	<0.002	0.0052	0.00338	0.00586	0.0135	0.223			
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	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050				
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	0.000751				
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	0.00335				
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	0.000251			
Silver	mg/L	Not required under previous permit													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010		
Thallium	mg/L	Not required under previous permit													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<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	<0.00010	<0.00010	<0.00010	<0.00010		
Titanium	mg/L	Not required under previous permit													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.001	0.00047	0.00568	0.00088	0.00113	0.00355			
Uranium	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	0.000909	0.00025	
Vanadium	mg/L	Not required under previous permit													0.001	0.0018	<0.0010	0.0016	0.0026	0.0023	0.0011	0.00334	0.00241	0.0021	0.00256	0.00227			
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	<0.0010				
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	95.7				
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	210				
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	13.1				
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					
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	439				
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	16.9				
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								

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	8-Oct-2020						
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	76						
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	0.236						
Total Kjeldahl Nitrogen	mg/L	2.5	2.8	2.8	3.8	2.7	4.9	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	2.67							
Total Organic Carbon	mg/L	24	23	25	24	23	26	30	25	35	23	29	30	-	-	-	-	-	-	-	-	-	-	-	-	-						
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	20	25.9	20.5	30.4	25	25.2	21.5	27.4	26.9	64	25.0	23.4	20.8						
Phenols	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	0.0018	0.0075	0.0017					
Total Suspended Solids (TSS)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.4						
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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Toluene	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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Ethylbenzene	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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050		
Xylenes (m & p)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050
Xylene (o)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050
F1 (C ₆ -C ₁₀)	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F1 (C ₆ -C ₁₀) - BTEX	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F2 (C ₁₀ -C ₁₆)	mg/L	Not required under previous permit												<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Dissolved Metals																																
Aluminum	mg/L	Not required under previous permit												<0.01	<0.010	<0.010	0.027	<0.010	0.015	<0.01	0.070	0.0058	0.0096	0.0643	0.0613	0.0189						
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	0.00014						
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	0.00407	0.00497	0.00461			
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	0.0240						
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010			
Boron	mg/L	Not required under previous permit												<0.05	<0.050	<0.050	0.056	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.026	0.037	0.044	0.022	<0.010				
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	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000098	<0.000050	<0.000050	<0.000050						
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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050						
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	<0.0020	<0.0020	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	0.00095						
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	0.472						
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	<0.00015	0.000218	0.000281	0.000087							
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	0.0137	0.0071				
Manganese	mg/L	Not required under previous permit												0.02	0.0318	<0.0020	0.0075	0.0055	0.0028	0.0026	0.0031	0.00297	0.0198	0.122	0.0361	0.0155						
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	<0.00010	<0.00010	<0.00007	<0.000050	<0.000050	<0.000050							
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	<0.0050	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	<0.00040	0.000175	0.000252	0.000205	0.00023	0.00023	0.00023	0.000212	0.000249				
Silver	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010				
Thallium	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010					
Tin	mg/L	Not required under previous permit												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.00010	<0.0001	0.00018	<0.00010	<0.00010				
Titanium	mg/L	Not required under previous permit												0.001	<0.0010	<0.0010	0.0028	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	0.00052	0.00545	0.00488	0.00214					
Uranium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	0.000787	0.000266	0.000275			
Vanadium	mg/L	Not required under previous permit												0.002	0.0027	0.0022	0.0022	0.002	0.0022	0.001	0.00394	0.00253	0.00196	0.0023	0.00206	0.00214						
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	<0.0010						
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							

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	8-Oct-2020				
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	116				
Ammonia-N	mg/L	0.05	0.74	<0.05	<0.05	0.31	<0.05	0.11	<0.05	<0.05	<0.05	0.14	<0.05	<0.05	0.133	0.264	0.434	<0.050	0.08	0.256	0.099	0.082	0.186	<0.050	0.286					
Total Kjeldahl Nitrogen	mg/L	2.7	4.7	2.7	3	3.2	6.5	22.2	2.8	2.7	2.4	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	4.93					
Total Organic Carbon	mg/L	19	36	27	30	34	42	151	27	29	26	32	33	-	-	-	-	-	-	-	-	-	-	-	-					
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	31	41.8	24.5	30.4	34.9	29.5	27.6	47.3	35.8	232	41.4	30.9	30.8				
Phenols	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	0.0021	0.0137	<0.0010			
Total Suspended Solids (TSS)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52.8				
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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	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	<0.00050	<0.00050	<0.00050	<0.00050	
Ethylbenzene	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	<0.00050	<0.00050	<0.00050		
Xylenes (m & p)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050		
Xylene (o)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050		
Xylenes	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071		
Styrene	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050		
F1 (C ₆ -C ₁₀)	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
F1 (C ₆ -C ₁₀) - BTEX	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
F2 (C ₁₀ -C ₁₆)	mg/L	Not required under previous permit												<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.13	<0.10	<0.10	<0.10	<0.10		
Dissolved Metals																														
Aluminum	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	0.0175				
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	0.00046				
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	0.00277	0.00261	0.00407		
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	0.0697				
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		
Boron	mg/L	Not required under previous permit												<0.05	<0.050	0.055	<0.050	<0.050	<0.050	0.061	0.052	0.068	0.079	0.035	0.079	0.035	0.014			
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	<0.00010	<0.000050	<0.000050	0.000062	0.000078	0.000064	0.000031	0.000068	<0.000050				
Chromium	mg/L	0.012	0.006	<0.005	<0.005	<0.005	0.017	<0.005	<0.005	<0.005	<0.005	<0.005	0.011	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010	0.00015	<0.00010	0.00058	0.00010	0.00011				
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	0.00247				
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	0.00425				
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	0.050				
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	0.0004	0.00015	<0.00010	0.00029	<0.00050	<0.00010	<0.0001	<0.000050	<0.000050	<0.000050	0.000076	0.000051	<0.000050					
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	0.028	0.015			
Manganese	mg/L	Not required under previous permit												0.035	0.0062	0.0089	0.0088	0.0195	0.0021	0.0174	0.00259	0.00127	0.00254	0.00185	0.00279	0.0179				
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	<0.00010	<0.000050	0.000051	<0.000050	<0.000050	<0.000050					
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	0.00583				
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	0.0125				
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	0.000967				
Silver	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Thallium	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.00010	<0.000001	<0.000010	<0.000010	<0.000010	0.000021	<0.000010	<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	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Titanium	mg/L	Not required under previous permit												0.032	0.0065	<0.0010	0.0168	0.0057	0.0022	0.0019	0.00143	0.00098	0.00045	0.0040	0.00244	0.00282				
Uranium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	0.01	0.00318	0.00422			
Vanadium	mg/L	Not required under previous permit												0.003	0.0035	<0.0010	0.0034	<0.0010	0.0018	0.0028	0.00110	0.0016	0.00149	0.00126	0.00110	0.00171				
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	<0.0010				
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	97.1				
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	426				
Chloride	mg/L	11.7	22.5	14.0	16.0	19.0	32.0	120	29	17	23	23	29	29	25.1	27.4	20.8	37.8	21.5	20.4	34.0	25.7	34.7	48.4	22.3	17.5				
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	15.7				
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						

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	8-Oct-2020							
Chem. O ₂ Demand	mg/L	60	50	190	730	250	290	E M P T Y	90	90	126	112	130	132	131	84.4	165	149	95	132	155	120	202	221	137	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	0.888							
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	4.02							
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	43.2					
Phenols	mg/L	Not required by previous permit							Not required by previous permit							-	-	-	-	-	-	-	-	-	-	-	0.0019	0.0088	0.0013				
Total Suspended Solids (TSS)	mg/L	Not required by previous permit							Not required by previous permit							-	-	-	-	-	-	-	-	-	-	-	-	-	61.0				
BTEX, F1 (C6-C10) and F2 (>C10-C16)																																	
Benzene	mg/L	Not required by previous permit							Not required by previous permit							<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050				
Toluene	mg/L	Not required by previous permit							Not required by previous permit							<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050				
Ethylbenzene	mg/L	Not required by previous permit							Not required by previous permit							<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050					
Xylenes (m & p)	mg/L	Not required by previous permit							Not required by previous permit							-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050				
Xylene (o)	mg/L	Not required by previous permit							Not required by previous permit							-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050			
Xylenes	mg/L	Not required by previous permit							Not required by previous permit							<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071				
Styrene	mg/L	Not required by previous permit							Not required by previous permit							-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050			
F1 (C6-C10)	mg/L	Not required by previous permit							Not required by previous permit							<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10			
F1 (C6-C10) - BTEX	mg/L	Not required by previous permit							Not required by previous permit							<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10				
F2 (C10-C16)	mg/L	Not required by previous permit							Not required by previous permit							<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.13	<0.10	<0.10	<0.10	<0.10			
Dissolved Metals																																	
Aluminum	mg/L	Not required by previous permit							Not required by previous permit							0.0014	0.0021	0.0012	0.0016	0.0012	0.0006	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	0.00069	0.00024	0.00047	0.00058	0.00024	0.00024	0.00024
Antimony	mg/L	0.0009	0.0009	0.003	<0.0004	0.0021	0.0011	Not required by previous permit							0.0006	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.00040	0.00069	0.00024	0.00047	0.00058	0.00024	0.00024	0.00024	0.00024				
Arsenic	mg/L	Not required by previous permit							Not required by previous permit							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	0.0370
Barium	mg/L	0.097	0.106	0.143	0.677	0.388	0.399	Not required by previous permit							0.057	0.0671	0.0785	0.0171	0.0556	0.0851	0.0658	0.124	0.0338	0.0643	0.0935	0.0406	0.0370						
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	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010			
Boron	mg/L	Not required by previous permit							Not required by previous permit							<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050			
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	<0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000103	0.000097	0.000079	0.0000297	0.000099	0.000099	<0.000050						
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	<0.0050	<0.0050	0.00011	0.00042	0.00025	0.00033	0.00031	0.00031	0.00035						
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	<0.0020	<0.0020	0.00133	0.00063	0.00197	0.0022	0.00060	0.00092							
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	0.00083								
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	1.32								
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	<0.00050	<0.00010	0.00054	0.000267	0.00028	0.000059	0.000125	0.000283	0.000366								
Lithium	mg/L	Not required by previous permit							Not required by previous permit							-	-	-	-	-	-	-	-	-	-	-	-	0.0339	0.0156				
Manganese	mg/L	Not required by previous permit							Not required by previous permit							0.001	0.004	0.03	0.0484	0.0031	0.0022	0.0062	0.00197	0.00355	0.147	0.0927	0.00266	0.0884					
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	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050						
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	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00953	0.00113	0.00311	0.00662	0.00164	0.000964								
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	0.00468								
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	<0.000626	0.000393	0.000497	0.000795	0.000262	0.000408						
Silver	mg/L	Not required by previous permit							Not required by previous permit							<0.0001	<0.00010	<0.00010	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010					
Thallium	mg/L	Not required by previous permit							Not required by previous permit							<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010					
Tin	mg/L	Not required by previous permit							Not required by previous permit							<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010				
Titanium	mg/L	Not required by previous permit							Not required by previous permit							0.01	0.008	0.0092	0.0024	0.0083	0.0026	0.0109	0.00518	0.0061	0.00269	0.0104	0.00661	0.0117					
Uranium	mg/L	Not required by previous permit							Not required by previous permit							-	-	-	-	-	-	-	-	-	-	-	0.00446	0.000924	0.000664				
Vanadium	mg/L	Not required by previous permit							Not required by previous permit							0.006	0.0025	0.003	0.0014	0.0051	0.0018	0.0022	0.00199	0.00334	0.00415	0.00393	0.00222	0.00294					
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	<0.0010								
Routine Water																																	
Ion Balance	%	98	108	100	99	114	105	104	103	105	102	98.1	98.6	99.9	109	92.8	94.8	110	104	98.9	110	97.7	112	101	102								
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	375								
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	21.0								
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	<5.0								
Conductivity (EC)	uS/cm	742	713	745	1740	1390	1840	887	891	730	879	760	774	758																			

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	8-Oct-2020			
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	280			
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	0.166			
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	9.55			
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	85.6			
Phenols	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	0.0017	0.0084	<0.0010	
Total Suspended Solids (TSS)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.4	
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	<0.00050	<0.00050	<0.00050	
Toluene	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	<0.00050	<0.00050		
Ethylbenzene	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	<0.00050			
Xylenes (m & p)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
Xylene (o)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
Xylenes	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071		
Styrene	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
F1 (C6-C10)	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
F1 (C6-C10) - BTEX	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
F2 (C10-C16)	mg/L	Not required under previous permit												<0.2	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25		
Dissolved Metals																													
Aluminum	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	0.187			
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	0.00054			
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	0.0181	0.0175	0.0169
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	0.0728			
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	<0.00020	<0.00020		
Boron	mg/L	Not required under previous permit												0.11	<0.050	0.115	0.072	0.086	0.085	0.087	0.087	0.107	0.091	0.091	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	<0.00050	0.000055	0.000055	<0.0010	0.000074	<0.00005	0.000043	0.00005	0.000038	0.000056	0.00005	0.000024			
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	0.00104	0.00114	0.00096	0.00115	0.00092	0.00097				
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	0.00494			
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	0.0184			
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	1.40			
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	0.00131			
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	0.0639	0.0541	
Manganese	mg/L	Not required under previous permit												0.029	0.0223	0.079	0.0699	0.232	0.440	0.0279	0.280	0.179	0.451	0.333	0.587	0.621			
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	<0.00010	0.0000205	<0.000050	<0.000050	<0.000086	<0.000050				
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	0.00339			
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	0.0200			
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	0.00087			
Silver	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Thallium	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Tin	mg/L	Not required under previous permit												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020		
Titanium	mg/L	Not required under previous permit												0.119	0.006	0.0546	0.0342	0.0754	0.0836	0.0031	0.0226	0.0135	0.00819	0.0552	0.00886	0.0281			
Uranium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	0.00196	0.00185	0.00221	
Vanadium	mg/L	Not required under previous permit												0.016	0.0034	0.0121	0.0106	0.0246	0.0201	0.0108	0.0139	0.0152	0.0155	0.0154	0.0131	0.0122			
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	0.0063			
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	98.1			
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	578			
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	217			
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	22.7			
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	2230			
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	56.8			
Potassium	mg/L	22.9	33.4	46.2	45.7	49.1	55.8	68	61.8																				

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	8-Oct-2020						
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	196						
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	0.346	7.09					
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	7.09						
Total Organic Carbon	mg/L	96	88	183	154	100	144		170	66	114	61	125	-		-	-		51.2	77	-	51.9	39.3	35.6	41.3	188	60.0	33.5	54.6			
Dissolved Organic Carbon	mg/L	Not required under previous permit							Not required under previous permit							117	-		-	-	-	-	-	-	-	-	-	-	-			
Phenols	mg/L	Not required under previous permit							Not required under previous permit							-	-		-	-	-	-	-	-	-	-	-	-	-	-		
Total Suspended Solids (TSS)	mg/L	Not required under previous permit							Not required under previous permit							-	-		-	-	-	-	-	-	-	-	-	-	-	345		
BTEX, F1 (C6-C10) and F2 (>C10-C16)																																
Benzene	mg/L	Not required under previous permit							Not required under previous permit							<0.0005	<0.00050		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			
Toluene	mg/L	Not required under previous permit							Not required under previous permit							<0.0005	<0.00050		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			
Ethylbenzene	mg/L	Not required under previous permit							Not required under previous permit							<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050				
Xylenes (m & p)	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Xylene (o)	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Xylenes	mg/L	Not required under previous permit							Not required under previous permit							<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050				
Styrene	mg/L	Not required under previous permit							Not required under previous permit							<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050				
F1 (C6-C10)	mg/L	Not required under previous permit							Not required under previous permit							<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10			
F1 (C6-C10) - BTEX	mg/L	Not required under previous permit							Not required under previous permit							<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10			
F2 (C10-C16)	mg/L	Not required under previous permit							Not required under previous permit							<0.2	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25		
Dissolved Metals																																
Aluminum	mg/L	Not required under previous permit							Not required under previous permit							0.33	0.021	0.095	0.016	0.018	0.0069	0.132	0.0858	0.217	0.168	0.0606						
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	0.00026									
Arsenic	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	-	-	-	-	-				
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	0.0423									
Beryllium	mg/L	Not required under previous permit							Not required under previous permit							<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010						
Boron	mg/L	Not required under previous permit							Not required under previous permit							0.07	0.058	0.050	0.038	0.028	0.036	0.024	0.031									
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	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050									
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	0.147	0.022	<0.0050	<0.0050	0.00053	0.00027	0.00053	0.00034	0.00035										
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	0.042	0.008	0.002	<0.0020	0.002	<0.0020	0.0024	0.00164	0.00070	0.00057	0.00124								
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	0.102	0.016	0.0091	0.0044	0.0091	0.0044	0.00204	0.00454	0.00276	0.00211	0.00224								
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	130	18.2	0.11	0.159	0.11	0.159	0.134	0.197	1.43	0.683									
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	0.07	0.011	<0.00010	0.00014	<0.00010	0.00014	0.000212	0.000154	0.000151	0.000582	0.000394								
Lithium	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	-	-	-	-					
Manganese	mg/L	Not required under previous permit							Not required under previous permit							0.197	0.0342	0.0063	0.424	0.344	0.384	0.00264	0.0402	0.0111	0.00213	0.0308						
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	<0.000050	<0.000050	<0.000050	0.000050	0.000050								
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	0.01	0.018	<0.0050	<0.0050	0.0129	<0.005	0.0162	0.00198	0.00451	0.00352	0.00111	0.00138							
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	0.111	0.028	0.0149	0.014	0.0118	0.0104	0.0129	0.00687	0.0105	0.00544	0.00512	0.00635							
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	0.000417						
Silver	mg/L	Not required under previous permit							Not required under previous permit							<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010					
Thallium	mg/L	Not required under previous permit							Not required under previous permit							<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010					
Tin	mg/L	Not required under previous permit							Not required under previous permit							<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050				
Titanium	mg/L	Not required under previous permit							Not required under previous permit							0.025	0.0027	0.0065	0.0019	0.0018	0.00171	0.0056	0.00306	0.0158	0.0141	0.00792						
Uranium	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	0.00188	0.000954	0.00203						
Vanadium	mg/L	Not required under previous permit							Not required under previous permit							0.008	0.0074	0.0069	0.0075	0.0019	0.00533	0.00443	0.0038	0.0122	0.00364	0.00603						
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	0.0024	<0.0020	0.0065	0.0013	0.0019	0.0037	<0.0010	0.0015	<0.0010							
Routine Water																																
Ion Balance	%	101	97	105	107	112	107	101	104	102	100	98.7	96	110	91.3	102	107	97	114	92.1	107	102	100									
Bicarbonate	mg/L	597	520	514	562	541	521	847	495	598	318	592	745	335	501	457	297	409	241	527	332	296	338									
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	27.6									
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	<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	625									
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	44.8	34.4	44.8	34.4	40.5	22.8	26.1	19.9	20.8	21.0									
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	33.5									
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	9.13									
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	91.7									
Sulfate	mg/L	53	26	35.5	2																											

Table D.12: Chemical Analytical Results

Sample ID:		Magneson D.3																													
Site Number:		12																													
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	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	8-Oct-2020					
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	Not analyzed	119	48					
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	<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		3.49	2.02					
Total Organic Carbon	mg/L	9	12	13	13	12	13	14	12	16	14	14	17	-	-	-	-	-	-	-	-	-	-		-	-	-				
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	18	20.1	15.1	17.8	19.1	19.5	15.5	17.6	17.3	57		17.9	15.1					
Phenols	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-		-	-	-	-	0.0136	<0.0010	
Total Suspended Solids (TSS)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-				
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	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	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	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	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	<0.00050	<0.00050	<0.00050	<0.00050	
Xylenes (m & p)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylene (o)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes	mg/L	Not required under previous permit													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	
Styrene	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F1 (C6-C10)	mg/L	Not required under previous permit													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F1 - BTEX	mg/L	Not required under previous permit													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F2 - (>C10-C16)	mg/L	Not required under previous permit													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
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	Not analyzed	0.00029	0.0088					
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		0.00194	0.00029					
Barium	mg/L	0.039	0.041	0.039	0.069	0.053	0.058	0.082	0.058	0.079	0.047	0.071	0.066	0.0646	0.0455	0.0687	0.0798	0.0262	0.0425	0.0968	0.0264	0.0913	0.000188		0.0530						
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	0.0530					
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	<0.00010					
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	0.062					
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	<0.000050					
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	<0.0010					
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	<0.00050	<0.00010	<0.0001	<0.000050	<0.000050	0.000087		<0.000050	0.00022					
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		0.0409	0.0011					
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	0.013					
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	<0.000050					
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		0.0028	0.0411					
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	0.00125					
Aluminium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.082	0.011	0.012	0.031	0.039	<0.01	0.0233	0.0023	0.0149		0.0033	<0.000050					
Beryllium	mg/L	Not required under previous permit													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010			
Boron	mg/L	Not required under previous permit													<0.05	<0.050	<0.050	0.058	0.055	0.055	0.053	0.065	0.061		0.071	0.060	0.0146				
Manganese	mg/L	Not required under previous permit													0.002	0.0026	<0.0020	<0.0020	<0.0020	0.0020	<0.0020	0.0020	<0.0020		0.0009	0.00027	0.0211	0.00123	0.000259		
Silver	mg/L	Not required under previous permit													<0.0001	<0.00010	<0.00010	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Tin	mg/L	Not required under previous permit													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050		<0.050	<0.050	<0.050	<0.050	<0.050		
Selenium	mg/L	Not required under previous permit													0.0007	0.00054	<0.00040	<0.00040	<0.00080	<0.00040	<0.00040	<0.00040	0.00042	0.000322	0.000233	0.000304	<0.00010				
Titanium	mg/L	Not required under previous permit													0.001	0.0037	<0.0010	<0.0010	0.0023	0.0025	<0.001	0.00114	<0.00030	0.00144	<0.00030	0.00144	<0.00030	0.00105			
Thallium	mg/L	Not required under previous permit													0.0002	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Uranium	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	-	0.00247	0.00154		
Vanadium	mg/L	Not required under previous permit													0.001	<0.0010	0.0015	0.0034	0.005	0.0127	0.0096	0.00866	0.0164	0.00285	0.00262	<0.0010					
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	95.2						
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	282						
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	13.6						
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	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	947						
Calcium	mg/L	21.8	24.9	21.1	23																										

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	8-Oct-2020				
Chem. O ₂ Demand	mg/L	350	1430	680	1450	5260	E M P T Y	1270	E M P T Y	259	1120	1070	1440	E M P T Y	4810	1220	1550	1560	1580	1190	1300	1930	960	1370	1300				
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	3.13	1.37	0.409	2.85	2.02		
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	62	39.4	43.7	42.6		
Total Organic Carbon	mg/L	168	714	187	813	1690		356		105	271	251	-		-	-	-	-	-	-	-	-	-	-	-	-	-		
Dissolved Organic Carbon	mg/L	Not required under previous permit						ed under prev		527	Not required under previous permit					1430	554	392	756	609	531	507	1930	329	415	295			
Phenols	mg/L	Not required under previous permit						ed under prev		-	Not required under previous permit					-	-	-	-	-	-	-	-	-	-	<0.00	0.0116	0.0013	
Total Suspended Solids (TSS)	mg/L	Not required under previous permit						ed under prev		-	Not required under previous permit					-	-	-	-	-	-	-	-	-	-	-	-	24.4	
BTEX, F1 (C6-C10) and F2 (>C10-C16)																													
Benzene	mg/L	Not required under previous permit						E M P T Y		<0.0005	E M P T Y	<0.0005	<0.0005		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Toluene	mg/L	Not required under previous permit								<0.0005		<0.0005	<0.0005		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Ethylbenzene	mg/L	Not required under previous permit					<0.0005		<0.0005	<0.0005		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Xylenes (m & p)	mg/L	Not required under previous permit					-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Xylene (o)	mg/L	Not required under previous permit					-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Xylenes	mg/L	Not required under previous permit					<0.0005		<0.0005	<0.0005		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Styrene	mg/L	Not required under previous permit					-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
F1 (C ₆ -C ₁₀)	mg/L	Not required under previous permit					<0.1		<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
F1 (C ₆ -C ₁₀) - BTEX	mg/L	Not required under previous permit					<0.1		<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
F2 - (C ₁₀ -C ₁₆)	mg/L	Not required under previous permit					<0.2		<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Dissolved Metals																													
Aluminium	mg/L	Not required under previous permit					ed under prev	<0.2	0.23	0.617	1.09	0.45	0.075	5.79	0.273	0.149	0.145	0.080	0.0915										
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	0.00074							
Arsenic	mg/L	Not required under previous permit					ed under prev	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0327	0.0275	0.0310					
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	0.195							
Beryllium	mg/L	Not required under previous permit					ed under prev	<0.02	<0.010	<0.0020	<0.0010	<0.050	<0.001	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			
Boron	mg/L	Not required under previous permit					ed under prev	<1	0.48	<0.10	0.318	<1.0	0.28	0.270	0.289	0.302	0.267	0.204	0.223										
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	0.00017	0.000114	0.000094	0.000061	0.000064	0.000079	0.000036								
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	0.00373							
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	0.00817							
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	0.0103							
Iron	mg/L	29.100	80.000	14.900	93.800	98.300	113	5.19	5.76	62.7	0.43	4.93	5.83	6.3	2.3	3.64	9.88	3.92	2.86	3.26	1.99	3.63							
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	0.00391							
Lithium	mg/L	Not required under previous permit					ed under prev	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	0.128	0.0902	0.0902					
Manganese	mg/L	Not required under previous permit					ed under prev	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	1.83	1.18	1.18	0.649	0.615	1.15	0.945	1.06	1.39	0.748	0.882						
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	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<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	0.00371							
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	0.0394							
Selenium	mg/L	Not required under previous permit					ed under prev	0.014	<0.040	<0.00080	0.00225	<0.010	0.0016	0.00339	0.00192	0.00218	0.00159	0.00142	0.00184										
Silver	mg/L	Not required under previous permit					ed under prev	<0.002	<0.0020	<0.00020	<0.0050	<0.0010	<0.0001	0.00014	0.000092	0.000075	0.00009	0.00009	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050				
Thallium	mg/L	Not required under previous permit					ed under prev	<1	<0.050	<0.10	<0.050	<0.050	<0.05	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050				
Tin	mg/L	Not required under previous permit					ed under prev	<0.02	0.128	0.0338	0.0989	0.083	0.0437	0.334	0.0677	0.334	0.0677	0.0592	0.0716	0.0444	0.0700								
Titanium	mg/L	Not required under previous permit					ed under prev	0.06	0.0793	0.0072	0.0345	0.055	0.033	0.0481	0.0336	0.0351	0.0277	0.0276	0.0286	0.0276									
Uranium	mg/L	Not required under previous permit					ed under prev	<0.04	0.094	0.0106	0.0284	<0.10	0.053	0.047	0.0421	0.0297	0.0247	0.0232	0.0233										
Vanadium	mg/L	Not required under previous permit					ed under prev	0.067	0.073	0.015	0.261	0.073	0.015	0.261	0.073	0.015	0.261	0.073	0.015	0.261	0.073	0.015	0.261	0.073	0.015	0.261			
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	0.0232	0.0233							
Routine Water																													
Ion Balance	%	104	102	105	107	107	103	102	111	98.1	95	115	91.8	96.1	96.8	101	97.9	114	98.6	101	110	96.9							
Bicarbonate	mg/L	1240	1650	1450	2200	2500	1890	883	1570	1470	2830	2220	1320	2350	3210	1490	1540	1080	1580	1310	1430								
Chloride	mg/L	505	868	674	1420	2530	1640	424	921	605	2040	1190	480	1030	1930	807	744	615	932	894	603	668							
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	64.6							
Conductivity (EC)	uS/cm	3620	4																										

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	8-Oct-2020			
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	380			
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	13.00	0.210			
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	16.9	14.6			
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	100			
Phenols	mg/L	Not required under previous permit											-	-	-	-	-	-	-	-	-	-	-	-	0.0025	0.0071	<0.0010	
Total Suspended Solids (TSS)	mg/L	Not required under previous permit											-	-	-	-	-	-	-	-	-	-	-	-	-	-	73.0	
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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Toluene	mg/L	Not required under previous permit											<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Ethylbenzene	mg/L	Not required under previous permit											<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050		
Xylenes (m & p)	mg/L	Not required under previous permit											-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
Xylene (o)	mg/L	Not required under previous permit											-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	Not required under previous permit											<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	
Styrene	mg/L	Not required under previous permit											-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050
F1 (C ₆ -C ₁₀)	mg/L	Not required under previous permit											<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	Not required under previous permit											<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C ₁₀ -C ₁₆)	mg/L	Not required under previous permit											<0.2	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
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	0.0145			
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	0.00059			
Arsenic	mg/L	Not required under previous permit											-	-	-	-	-	-	-	-	-	-	-	-	-	0.019	0.0155	0.0168
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	0.0317			
Beryllium	mg/L	Not required under previous permit											<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Boron	mg/L	Not required under previous permit											<0.05	<0.050	0.056	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
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	<0.00010	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	0.000019	0.000012	<0.000010			
Chromium	mg/L	<0.005	<0.005	0.007	<0.005	<0.005	0.024	0.019	<0.005	0.047	0.008	0.008	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.00020	0.00043	0.00068	0.00025	0.00055	0.00051			
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	0.00328			
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	0.00426			
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	0.178			
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	<0.00050	0.00020	<0.0001	<0.00010	0.00024	0.00021	0.00011	0.00037	0.00017			
Lithium	mg/L	Not required under previous permit											-	-	-	-	-	-	-	-	-	-	-	-	0.0576	0.0533	0.050	
Manganese	mg/L	Not required under previous permit											0.066	<0.0020	0.0384	0.0024	0.0033	0.0047	0.0375	0.00208	0.0381	0.633	0.00515	0.220	0.218			
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	<0.00010	<0.000050	0.0000118	<0.000050	0.000063	<0.000050				
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	0.00596			
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	0.0181			
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	0.00096			
Silver	mg/L	Not required under previous permit											<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020		
Thallium	mg/L	Not required under previous permit											<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020		
Tin	mg/L	Not required under previous permit											<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020		
Titanium	mg/L	Not required under previous permit											0.05	0.0037	0.0041	0.0015	0.0037	0.0164	<0.001	0.00148	0.00805	0.0116	0.00511	0.00459	0.00431			
Uranium	mg/L	Not required under previous permit											-	-	-	-	-	-	-	-	-	-	-	-	0.00351	0.0023	0.00191	
Vanadium	mg/L	Not required under previous permit											0.009	0.0044	0.0074	0.0294	0.0365	0.0286	0.0162	0.0138	0.0178	0.018	0.0188	0.0269	0.0142			
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	0.0039			
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	99.7			
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	795			
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	207			
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	40.1			
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	2230			
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	45.7			
Potassium	mg/L	40.4	43.2	42.2	32.6																							

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	8-Oct-2020
Chem. O ₂ Demand	mg/L	121	106	127	125	125	88
Ammonia-N	mg/L	0.088	0.056	0.27	<0.050	<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	4.06	4.16	4.05	4.58	4.16	3.27
Total Organic Carbon	mg/L	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	43.1	33	127	43.0	33.1	26.6
Phenols	mg/L	-	-	-	0.0021	0.013	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	-	11.2
BTEX, F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆)							
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<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	<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	<0.10	<0.10	<0.10
F1 (C ₆ -C ₁₀) - BTEX	mg/L	<0.10	<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	<0.10
Dissolved Metals							
Aluminium	mg/L	0.0224	0.0167	<0.0050	0.0151	0.0051	0.0136
Antimony	mg/L	0.00080	0.0007	0.00103	0.00113	0.00086	0.00067
Arsenic	mg/L	-	-	-	0.019	0.0134	0.0139
Barium	mg/L	0.0342	0.0266	0.0375	0.0302	0.0512	0.0370
Beryllium	mg/L	<0.0005	<0.00050	<0.00050	<0.00020	<0.00020	<0.00020
Boron	mg/L	0.306	0.279	0.337	0.301	0.237	0.230
Cadmium	mg/L	<0.000025	<0.000025	<0.000025	0.000018	0.000012	<0.000010
Chromium	mg/L	<0.00050	<0.0005	<0.00050	<0.00020	<0.00020	<0.00020
Cobalt	mg/L	0.00061	0.00086	0.00133	0.00089	0.00075	0.0011
Copper	mg/L	<0.0010	0.0016	<0.0010	0.00103	0.00174	0.00085
Iron	mg/L	<0.050	<0.050	0.063	0.037	0.023	0.082
Lead	mg/L	<0.00025	<0.00025	<0.00025	<0.00010	<0.00010	<0.00010
Lithium	mg/L	-	-	-	0.13	0.0978	0.088
Manganese	mg/L	0.00404	0.00561	0.532	0.00962	0.00599	0.172
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00327	0.00254	0.0016	0.00211	0.00179	0.00128
Nickel	mg/L	0.0072	0.0069	0.0086	0.0067	0.0082	0.0059
Selenium	mg/L	0.00033	0.00037	<0.00025	0.00032	0.00029	0.00027
Silver	mg/L	<0.000050	<0.000050	<0.000050	<0.000020	<0.000020	<0.000020
Thallium	mg/L	<0.000050	<0.000050	<0.000050	<0.00002	<0.000020	<0.000020
Tin	mg/L	<0.00050	<0.00050	<0.00050	<0.00020	<0.00020	<0.00020
Titanium	mg/L	0.0016	<0.0015	<0.0015	0.00146	0.00134	0.00232
Uranium	mg/L	-	-	-	0.00442	0.00507	0.0040
Vanadium	mg/L	0.00450	0.0052	0.0044	0.0042	0.0063	0.0026
Zinc	mg/L	<0.0050	<0.0050	<0.0050	0.0020	<0.0020	<0.0020
Routine Water							
Ion Balance	%	104	106	94.3	98.7	101	101
Bicarbonate	mg/L	593	343	694	538	520	427
Chloride	mg/L	334	235	340	359	286	294
Carbonate	mg/L	30.9	13.1	20	14.5	16.6	11.2
Conductivity (EC)	uS/cm	4080	2790	4020	4070	3120	3050
Calcium	mg/L	54.3	40.2	70.2	41.7	97.9	91.4
Potassium	mg/L	31.3	27.1	29.6	29.8	34.1	26.6
Magnesium	mg/L	55.5	42.5	56.4	58.5	56.6	57.8
Sodium	mg/L	785	528	729	794	558	510
Sulfate	mg/L	990	711	1030	1120	818	772
Phosphorus	mg/L	0.707	0.385	0.963	0.486	0.745	0.582
pH in H ₂ O	pH	8.61	8.56	8.52	8.47	8.52	8.48
TDS (Calculated)	mg/L	2570	1770	2620	2680	2120	1970
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Nitrate and Nitrite (as N)	mg/L	-	-	-	<0.11	<0.101	<0.11
Hardness as CaCO ₃	mg/L	-	-	-	345	478	466
Alkalinity (total as CaCO ₃)	mg/L	-	-	-	465	454	369
Hydroxide	mg/L	-	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	-	0.22	0.35	0.290
Field Data							
pH in H ₂ O	pH	8.68	9.5	8.5	10.9	9.48	8.37
Conductivity (EC)	uS/cm	4120	2730	4300	4140	3.82	3170

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	8-Oct-2020				
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	84				
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	0.200				
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	3.01				
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	22.7	22.5	56.0	25.6	28.1	26.2				
Phenols	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	0.0023	0.0099	<0.0010		
Total Suspended Solids (TSS)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	-	8.0		
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	<0.00050	<0.00050		
Toluene	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	<0.00050			
Ethylbenzene	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				
Xylenes (m & p)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
Xylene (o)	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
Xylenes	mg/L	Not required under previous permit													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071		
Styrene	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
F1 (C6-C10)	mg/L	Not required under previous permit													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F1 (C6-C10) - BTEX	mg/L	Not required under previous permit													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F2 (C10-C16)	mg/L	Not required under previous permit													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10	<0.10	
Dissolved Metals																														
Aluminum	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	0.0039			
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	0.00023	0.00024	0.00027			
Arsenic	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	-	0.00455	0.00586	0.00534
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	0.0504				
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	<0.00010	<0.00010		
Boron	mg/L	Not required under previous permit													0.07	<0.050	0.071	<0.050	<0.050	<0.050	<0.05	0.037	0.058	0.037	0.058	0.037	0.051	0.039	0.020	
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	<0.000050	<0.000050	<0.000050	<0.000050	0.000056	<0.000050				
Chromium	mg/L	0.015	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.010	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010				
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	<0.0020	0.00035	0.0003	0.00078	0.00094	0.00038	0.00050				
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	<0.0010	0.00043	0.00034	0.00101	0.00057	0.00071	0.00037				
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	0.125				
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	<0.00050	0.00013	<0.0001	<0.000050	<0.000050	0.000075	<0.000050	<0.000050	<0.000050				
Lithium	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	0.0329	0.0262		
Manganese	mg/L	Not required under previous permit													0.025	0.137	<0.0020	0.0025	<0.0020	0.248	0.0073	0.00078	0.00062	0.182	0.387	0.00491	0.134			
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	<0.000050	0.000005	<0.000050	<0.000050	<0.000050	<0.000050				
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	0.00047				
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	0.0043	0.00725	0.00521	0.00592	0.00697	0.00493	0.00347					
Selenium	mg/L	Not required under previous permit													0.0015	0.0038	<0.00040	<0.00040	<0.00080	<0.00040	<0.00040	0.000217	0.000194	0.000206	0.000284	0.000205	0.000184			
Silver	mg/L	Not required under previous permit													<0.0001	<0.00040	<0.00010	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Thallium	mg/L	Not required under previous permit													<0.0001	<0.00020	<0.00010	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
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	<0.00010	<0.00010		
Titanium	mg/L	Not required under previous permit													0.002	<0.0012	<0.0010	<0.0010	<0.0010	0.0037	<0.001	0.00081	<0.00030	0.00044	0.00086	0.00069	0.00114			
Uranium	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	0.00225	0.00115	0.000827	
Vanadium	mg/L	Not required under previous permit													0.01	0.0052	0.0024	0.0031	0.0072	0.0038	0.0036	0.00484	0.00328	0.00439	0.00363	0.00324	0.00251			
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	0.0098	<0.0010	<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	98.5				
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	479				
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	150				
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	7.4				
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	1400				
Calcium	mg/L	43.9	43.1	36.1	48.7	47.2	55.8	70.9	63.6	53.2	48.9	4																		

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	8-Oct-2020				
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	83				
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	0.251				
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	<0.05	4.11	4.01	2.52	3.99				
Total Organic Carbon	mg/L	25	28	28	27	31	36	40	37	30	23	24	24	-	-	-	-	-	-	-	-	-	-	-	-	-				
Dissolved Organic Carbon	mg/L													23	31.9	29.7	25	33.6	28.2	26.4	28.2	27	83	27.3	24.2	21.7				
Phenols	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	0.0026	0.0077	<0.0010			
Total Suspended Solids (TSS)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	13.0			
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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	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	<0.00050	<0.00050	<0.00050	<0.00050	
Ethylbenzene	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	<0.00050	<0.00050	<0.00050		
Xylenes (m & p)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
Xylene (o)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
Xylenes	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071		
Styrene	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
F1 (C6-C10)	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F1 (C6-C10) - BTEX	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
F2 (C11-C16)	mg/L	Not required under previous permit												<0.05	<0.25	<0.25	<0.25	<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	0.0022				
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	0.00029				
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	0.00574	0.00471	0.00454		
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	0.0729				
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		
Boron	mg/L	Not required under previous permit												<0.05	0.051	0.051	<0.050	<0.050	<0.050	<0.050	0.037	0.046	0.034	0.037	0.039	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	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000168	<0.000050	<0.000050				
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	<0.0050	<0.0050	<0.0050	<0.0050	0.00011	<0.00010	<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	<0.0020	<0.0020	0.00033	0.00022	0.00065	0.00035	0.00062				
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	<0.0010	<0.0010	0.00021	0.00033	0.00043	0.00027	0.00026				
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	0.041				
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	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.000050	0.000061	<0.000050	<0.000050				
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	0.0279	0.0235	0.0169		
Manganese	mg/L	Not required under previous permit												0.006	0.0341	0.0022	0.0025	0.0037	0.0029	0.0053	0.00179	0.00088	0.276	0.0371	0.00135	0.0111				
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	<0.00010	<0.000050	0.000006	0.000058	<0.000050	<0.000050	<0.000050				
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	<0.0050	0.000688	0.00036	0.000554	0.000512	0.000602	0.000589				
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	<0.0020	0.00025	0.00178	0.00214	0.00035	0.00287	0.00304				
Selenium	mg/L	Not required under previous permit												0.0007	0.00049	<0.00040	<0.00040	<0.00080	<0.00040	<0.00040	0.000194	0.000232	0.00021	0.000206	0.000204	0.000192				
Silver	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Thallium	mg/L	Not required under previous permit												<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010				
Tin	mg/L	Not required under previous permit												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050			
Titanium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00030	<0.00030	0.00078	0.00093	<0.00030		
Uranium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	-	0.00159	0.00116	0.00136	
Vanadium	mg/L	Not required under previous permit												0.004	0.0041	0.0018	<0.0010	0.001	<0.0010	0.0015	0.00172	0.00107	0.00167	0.00163	0.00094	0.00166				
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	<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	107				
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	359				
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	76.8				
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	7.6				
Conductivity (EC)	uS/cm	1270	1230	1100	1270	1320	1520	1850	1950</																					

Table D.20: Chemical Analytical Results

Sample ID:		Balash D.1																											
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	8-Oct-2020			
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	75			
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	0.356			
Total Kjeldahl Nitrogen	mg/L	0.9	0.9	1.5	1.6	1.9	2.8	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	3.20				
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	24.1		
Phenols	mg/L	-																											
Total Suspended Solids (TSS)	mg/L	-													-	-	-	-	-	-	-	-	-	-	-	-	-	34.8	
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	<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	<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	<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	-													<0.0005	<0.00050	<0.00071	<0.00071	<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	<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	<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	<0.10	<0.10	<0.10	<0.10	<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	<0.25	<0.25	<0.25	<0.13	<0.10	<0.10	<0.10	<0.10
Dissolved Metals																													
Aluminum	mg/L	Not required under previous permit													<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	0.0018	0.004	0.0046	0.0052	0.0128		
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	0.00017			
Arsenic	mg/L	Not required under previous permit													-	-	-	-	-	-	-	-	-	-	-	-	0.00218	0.00283	0.00274
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	0.0979			
Beryllium	mg/L	-													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Boron	mg/L	-													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.050	0.039	0.04	0.023	0.033	0.028	<0.010	
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	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000237	0.000063	<0.000050			
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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050			
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	<0.0020	0.00025	0.00012	0.0004	0.00053	0.00031	0.00027			
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	<0.0010	0.00022	0.00027	0.00037	0.00027	0.00026	0.00023			
Iron	mg/L	<0.005	0.771	1.490	0.065	0.765	0.748	0.308	0.818	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	0.739				
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	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000067	0.000071	0.000138				
Lithium	mg/L	-													-	-	-	-	-	-	-	-	-	-	-	0.0237	0.0178	0.017	
Manganese	mg/L	-													<0.001	0.0306	0.003	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.00053	0.00173	0.104	0.0629	0.00851	0.0070	
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	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050			
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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0015	0.000584	0.00068	0.00061	0.00039	0.000304			
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	0.00282			
Selenium	mg/L	-													<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.00040	0.000186	0.000212	0.00019	0.00018	0.000188	0.000245		
Silver	mg/L	-													<0.0001	<0.00010	<0.00010	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Thallium	mg/L	-													<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Tin	mg/L	-													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Titanium	mg/L	-													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00030	0.00074	0.00053	0.00095	0.00216	
Uranium	mg/L	-													-	-	-	-	-	-	-	-	-	-	-	-	0.000372	0.000199	0.000235
Vanadium	mg/L	-													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	0.00059	0.00071	0.00095	0.00087
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	<0.0020	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	105			
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	259			
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	55.5			
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	654			
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.											

Table D.21: Chemical Analytical Results

Sample ID:		Balash D.2																													
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	8-Oct-2020					
Chem. O ₂ Demand	mg/L	60	80	160	110	110	260	Empty	90	110	54	85	64	106	251	97	96	128	116	108	108	81	97	112	93	130					
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	0.072					
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	4.86					
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	35.3			
Phenols	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	-	-	-	0.0018	0.0093	<0.0010		
Total Suspended Solids (TSS)	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	-	-	-	-	-	29.6		
BTEX, F1 (C6-C10) and F2(>C10-C16)																															
Benzene	mg/L	Not required under previous permit							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	<0.00050	<0.00050	<0.00050	
Toluene	mg/L	Not required under previous permit							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	<0.00050	<0.00050	<0.00050	
Ethylbenzene	mg/L	Not required under previous permit							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	<0.00050	<0.00050		
Xylenes (m & p)	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050		
Xylene (o)	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
Xylenes	mg/L	Not required under previous permit							Not required under previous permit							<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071		
Styrene	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	
F1 (C6-C10)	mg/L	Not required under previous permit							Not required under previous permit							<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F1 (C6-C10) - BTEX	mg/L	Not required under previous permit							Not required under previous permit							<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F2 (C10-C16)	mg/L	Not required under previous permit							Not required under previous permit							<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.13	<0.10	<0.10	<0.10	<0.10	
Dissolved Metals																															
Aluminum	mg/L	Not required under previous permit							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	0.0118			
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	0.001	0.0008	<0.0016	<0.00040	<0.00040	<0.00080	0.00044	0.00054	0.00093	0.00031	0.00044	0.00061	0.00024	0.0003					
Arsenic	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	-	-	0.00898	0.00575	0.0064			
Barium	mg/L	0.109	0.011	0.155	0.159	0.105	0.175	0.006	0.008	0.013	0.012	0.094	0.091	0.109	0.103	0.0553	0.111	0.101	0.0732	0.134	0.101	0.107	0.107	0.114	0.0766	0.0595					
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	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010			
Boron	mg/L	Not required under previous permit							Not required under previous permit							<0.05	<0.050	<0.050	0.067	0.077	0.073	0.079	0.077	0.094	<0.020	0.021	0.05	<0.010			
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	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	0.0000074	<0.000050	<0.000010	0.0000199	<0.000050	<0.000050					
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	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00020	0.00014	<0.00010	0.00014					
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	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00156	0.00053	0.00124	0.00158	0.00056	0.00090					
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	0.00061						
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	0.011	0.03	0.037	0.038	0.038	0.138						
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	<0.00050	<0.00050	<0.00010	0.00006	<0.00050	0.00061						
Lithium	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	-	-	0.0595	0.0419	0.0311			
Manganese	mg/L	Not required under previous permit							Not required under previous permit							0.003	0.0538	<0.0020	<0.0020	<0.0020	0.0593	0.0142	0.00143	0.00076	0.0129	0.00528	0.00437	0.0204			
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	<0.00010	<0.0001	<0.0000050	<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	<0.0050	0.0074	0.00303	0.00251	0.00298	0.000719	0.000283						
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	0.00343						
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	<0.00040	0.000359	0.000239	0.00027	0.000366	0.000201	0.000239			
Silver	mg/L	Not required under previous permit							Not required under previous permit							<0.0001	<0.00040	0.00032	<0.00010	<0.0050	<0.00010	<0.0001	0.00001	<0.000010	<0.000020	<0.000010	<0.000010	<0.000010			
Thallium	mg/L	Not required under previous permit							Not required under previous permit							<0.0001	<0.00020	<0.00010	<0.0010	<0.0010	<0.0001	<0.000010	<0.000010	<0.000020	0.000017	<0.000010	<0.000010				
Tin	mg/L	Not required under previous permit							Not required under previous permit							<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.00010	<0.00010	<0.00010	<0.00010			
Titanium	mg/L	Not required under previous permit							Not required under previous permit							0.003	<0.0012	<0.0010	<0.0010	0.0012	<0.0010	0.002	0.00198	<0.00030	0.00132	0.00333	0.00134	0.00587			
Uranium	mg/L	Not required under previous permit							Not required under previous permit							-	-	-	-	-	-	-	-	-	-	-	0.00437	0.0021	0.00127		
Vanadium	mg/L	Not required under previous permit							Not required under previous permit							0.006	0.007	0.002	0.0025	0.0098	0.0019	0.0052	0.00154	0.0016	0.0048	0.00433	0.0018	0.00266			
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	<0.0020	0.0053	<0.0010	0.0014	<0.0020	<0.0010	<0.0010	<0.0010					
Routine Water																															
Ion Balance	%	109	109	109	97	107	92.2	107	103	104	103	101	96.5	106	107	101	97.4	107	106	97.5	105	98.9	105	106	115						
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	472						
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	311						
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	8.3							
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							

Table D.22: Chemical Analytical Results

Sample ID:		Balash D.3																													
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	8-Oct-2020					
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	127					
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	0.059					
Total Kjeldahl Nitrogen	mg/L	4.5	3	5.5	3.4	3.7	8.2	5.4	5.9	9.3	2.9	2.6	6.1	8.08	3.47	3.95	4.36	2.65	3.27	2.48	2.33	3.4	3.57	17.0	4.78						
Total Organic Carbon	mg/L	29	25	34	28	46	61	68	59	55	32	33	33	-	-	-	-	-	-	-	-	-	-	-	-	-					
Dissolved Organic Carbon	mg/L													32	47	34.8	32	38.9	32.3	30.4	33.2	25.3	112	34.2	31.2	44.0					
Phenols	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	0.0012	0.0067	0.0014				
Total Suspended Solids (TSS)	mg/L													-	-	-	-	-	-	-	-	-	-	-	-	27.4					
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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Xylenes (m & p)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	
Xylene (o)	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	
Xylenes	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	
F1 (C ₆ -C ₁₀)	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F1 (C ₆ -C ₁₀) - BTEX	mg/L	Not required under previous permit												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
F2 (C ₁₀ -C ₁₆)	mg/L	Not required under previous permit												<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10	
Dissolved Metals																															
Aluminum	mg/L	Not required under previous permit												0.02	0.062	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	0.0017	0.0114	0.0455	0.0165	0.0065					
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	0.00022					
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	0.00555	0.0057	0.00519			
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	0.0434					
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	<0.00010	<0.00010	<0.00010			
Boron	mg/L	Not required under previous permit												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.041	0.036	0.031	0.033	<0.010					
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	<0.00050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000172	<0.000050	<0.000050					
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	<0.0050	<0.0010	<0.0010	0.00012	0.00014	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	<0.0020	0.00056	0.00027	0.00085	0.00099	0.00101	0.00050					
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	0.00043	0.00052	0.0008	0.00118	0.00101	<0.00020						
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	0.182					
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	<0.00050	<0.00010	<0.0001	<0.000050	<0.000050	0.000068	0.00012	0.000139	<0.000050					
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	0.0158	0.013	0.023			
Manganese	mg/L	Not required under previous permit												0.404	0.0068	0.0143	0.0326	0.0046	<0.0020	0.003	0.00099	0.00054	0.0158	0.0104	0.410	0.00827					
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	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050						
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	0.00373	0.00197	0.00135	0.00183	0.000865	0.000193						
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	0.00188					
Selenium	mg/L	Not required under previous permit												0.0011	0.0021	<0.00040	<0.00040	<0.00080	<0.00040	<0.00040	0.000293	0.000227	0.000252	0.000252	0.000201	0.000168					
Silver	mg/L	Not required under previous permit												<0.0001	<0.00040	<0.00010	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010				
Thallium	mg/L	Not required under previous permit												<0.0001	<0.00020	<0.00010	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010				
Tin	mg/L	Not required under previous permit												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Titanium	mg/L	Not required under previous permit												0.001	<0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00030	0.00067	0.00084	0.00139	0.00118				
Uranium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	-	-	0.00247	0.000959	0.000561			
Vanadium	mg/L	Not required under previous permit												0.003	0.0049	0.0011	<0.0010	0.0026	<0.0010	<0.0010	<0.0010	<0.0010	<0.00030	0.00067	0.00084	0.00139	0.00118				
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	<0.0010					
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	117					
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	408					
Chloride	mg/L	135.0	105.0	183.0	181.0	134.0	189.0	235	200	207	98	83	146	156	156	242	173	241	240	246	204	170	238	222	246	294					
Carbonate	mg/L	17	41	<5	16	<5																									

APPENDIX E

SITE PHOTOGRAPHS



Photo 1: Showing dugout 11 was dry at the time of sampling.



Photo 2: Example of a Dugout (Dugout 4) sampled.



Photo 3: Example of a Dugout (Dugout 8) sampled.

APPENDIX L
Summary of Revisions
to the
Landfill Operations Plan



**CLEAN HARBORS
LANDFILL OPERATIONS PLAN
AND
RYLEY HWRSP FACILITY PLAN**

CLEAN HARBORS CANADA, INC.
RYLEY FACILITY
LANDFILL OPERATIONS PLAN

Clean Harbors Ryley Facility manages its Landfill operations through various SOP's which can be found electronically or in the Facility's SOP binder. The following sections summarize some of the relevant SOP's.

A. Operating Record SOP

The landfill Operating Record shall contain:

- (i) a copy of the facility's Operating Approval or Registration number;
- (ii) as-built records for each constructed landfill cell showing the location and development of excavations, fill areas, final grades and structural components;
- (iii) annual topographic survey records and plans showing the areas where waste has been disposed in the previous year of operation;
- (iv) the most recent version of the design and operating plan for the landfill;
- (v) records of handling of any wastes accepted at the landfill including the amounts accepted and the disposed locations within the landfill;
- (vi) all Annual Reports for the landfill as described in Section 7.5 in the Standards for Landfills in Alberta Guide;
- (vii) nuisance records;
- (viii) The Final Landfill Closure Report as described in section 7.6 in the Standards for Landfills in Alberta Guide;
- (ix) All Post-Closure Annual Reports for the landfill as described in section 7.7 of the Standards for Landfills in Alberta Guide;
- (x) The name and contact information of all persons who discover ant contravention;
- (xi) The names and contact information of all persons who take any remedial actions arising from the contravention of the Act, the regulations, or the approval;
- (xii) A description of the remedial measures taken in respect of a contravention of the Act, the regulations or the approval;

The Landfill Operating Record has many components and is a compilation of many separate documents. All required components are stored electronically, hard copy or both at the facility and are available for review at any time as requested. Clean Harbors operates an electronic waste tracking and recording system called WINWEB. Almost every aspect of the business is tracked, recorded or tied to the WINWEB system in some way or another. This computer program tracks and records not only all the waste that is accepted at the facility but many other items as well such as contraventions and incidents. This system also holds scanned images of all shipping and receiving documents of all the waste accepted and shipped from the facility. It provides cradle to grave tracking along with Certificates of Disposal as requested.

B. Waste Control, run-on and run-off controls and nuisance controls SOP

1. Waste Control

Clean Harbors Canada, Inc. Ryley Facility can accept all categories of waste except those listed in section 4.6.1 of Approval 10348-0-00. The secure landfill can receive solid non-hazardous and hazardous wastes that meet the criteria outlined in Section 13(2) of the *Alberta Waste Control Regulations* and *The Alberta User Guide for Waste Managers*. The regulatory and facility specific criteria are summarized as follows:

RYLEY LANDFILL ACCEPTANCE CRITERIA (APPROVAL 10348-03-00)

- 1.** Waste must have no Free Liquids as defined by the Paint Filter Test (SW 846 - 9095).
- 2.** Waste must have a Flash Point greater than 40°C. Waste streams with a flash point less than 40°C may be accepted. All wastes will be evaluated on a case-by-case basis.
- 3.** Waste must contain less than 1000 mg/kg of halogenated organic compounds as determined using the TCLP extract.
- 4.** Waste must have a pH greater than 2 (pH of 1:1 solid: deionized water mixture).
- 5.** TCLP Extract of the waste must contain the following metals at less than the concentrations shown:

a) Arsenic	500 mg/L	g) nickel	500 mg/L
b) Beryllium	100 mg/L	h) selenium	200 mg/L
c) Cadmium	100 mg/L	i) silver	100 mg/L
d) Chromium (Cr+6)	500 mg/L	j) thallium	200 mg/L
e) Lead	500/mg/L	k) uranium	100 mg/L
f) Mercury	20 mg/L		
- 6.** Solids must contain less than 1000 mg/kg each of benzene, ethyl benzene, methyl ethyl ketone, nitrobenzene, pyridine, toluene, or xylene in TCLP extract.
- 7.** Solids contaminated with acetone, n-butyl alcohol, cyclohexanone, ethyl acetate, ethyl ether, isobutanol, and 2-nitropropane can be landfilled when these solvents are present at levels greater than 1000 mg/kg in TCLP extract only if the waste is non-flammable.

8. Solids contaminated with cresols, or cresylic acid can be landfilled when these solvents are present at levels greater than 1000 mg/kg in TCLP extract only if the waste is non-toxic.
9. Solids contaminated with carbon disulfide or methanol can be landfilled if they are present at levels greater than 1000 mg/kg in TCLP extract only if the waste is non-flammable or non-toxic.
10. Waste must contain less than 50 mg/kg PCBs.

OPERATIONAL CRITERIA

1. Wastes reacting with water to give a temperature rise $>15^{\circ}\text{C}$ - accepted case by case
2. Resistance to penetration must be >3 psi, < 3 psi should go into solidification pit
3. Total cyanide must be <590 mg/kg, Reactive cyanide must be <250 mg/kg
4. Elemental Sulfur concentration must be less than 500 mg/kg
5. Waste must be non-odourous

Waste control is also talked about in section **D**.

2. Surface Water Run-On and Run-Off Control

Water management inside and outside the landfill is important to minimize cost and operational impacts to the landfill operation. The Ryley landfills are built above the surface elevation of the surrounding area and therefore the landfills themselves are not subject to surface run-on problems. The facility itself is built up above the surrounding area to the north and water does not flow on to the site from that direction. Water moving from west to east is directed around the operational areas by means of a drainage ditch that conveys the water to the area southeast of the landfill cells from where it is pumped to follow the natural eastward drainage pattern in the vicinity.

Surface run-off from the roadways, the paved plant site area and areas south of the landfills is collected in a surface water detention pond B, which has two collection ditches flowing into it from the north and from the south. Surface run-off from the lugger pad, container lay-down area and bone yard is collected in surface detention pond A. Water from the detention ponds are sampled, tested and then compared to the discharge criteria in Table 4.3-B of the Operating Approval 10348-03-00. If the analytical results meet the discharge criteria, discharge can commence. In the event that the analytical data does not meet the surface discharge criteria, the Operations Manager and laboratory personnel will evaluate the feasibility of treating the water to achieve the discharge criteria, sending the water for deep-well disposal or other alternative disposal options.

Run-off collected in the landfill or leachate is collected via the leachate collection systems and disposed in Class 1a deepwell. It is important to maintain perimeter

trenches for landfill run-off collection that are deep enough to collect the water that may accumulate from severe or prolonged rainfall events.

3 Nuisance Management

The following sections are summaries of the more detailed procedures described in Appendix C “Fugitive Dust and Odour Best Management Plan.”

a) Litter

Litter will be controlled by the use of cover and compaction and by avoiding the dumping dispersible materials on windy days.

Litter that accumulates on the landfill site and/or adjacent properties will be retrieved.

b) Dust

Water will be applied frequently to control dust. Dispersible hazardous wastes will not be landfilled when wind speeds exceed 30 kilometres per hour. The usual source of water for dust control is the surface water detention pond. Other possible sources identified in the Operating Approval include sump waste from car wash bays, waste from hydro-vac operations, leachate and leak detection liquids. Leachate and leak detection liquids are not generally applied since leachate from older cells typically has odour issues.

c) Odour

Highly odorous wastes such as mercaptan or sulphur-treating wastes will **not** be accepted for disposal at the facility. Cover material will be used to control odours from the waste. Odour suppressant chemicals and fans to disperse these chemicals may be used as an additional means of controlling odours.

Should an odour complaint be received at the facility, the name of the caller, date and time of the complaint and contact information of the caller will be recorded on the form included as part of Appendix C Fugitive Dust and Odour Best Management Plan. The nature of the complaint and the address or location that the complaint originates from will be recorded. The Operations or Facility Manager will be notified, and the complaint will be investigated by sending someone to the area as necessary. The weather conditions, wind speed and direction at the time of the complaint will be recorded. The caller will be contacted by the Operations or Facility Manager to inform them of remedial action taken. The date and time of the return contact will be recorded.

C. Waste Processed Through the Solidification/Stabilization Pit SOP

Waste streams containing free liquids or that have little structural integrity (ie.: greases, bio-treater solids) are processed in the solidification/stabilization pit. In the case of bulk loads, they are dumped into the pit using the grating and for containerized waste the containers are placed or emptied into the pit for handling. These wastes are mixed with peat moss, wood chips and/or dry waste streams to absorb free liquids and or provide some solid content to render them suitable for landfill disposal as per the Waste Control Regulation. The waste streams being processed will be mixed with an excess of the reagent to ensure that all free liquid is bound with the reagent before the material is placed in the landfill.

The Operating Approval allows the facility to process waste streams to remove, reduce or alter a hazardous characteristic, such as pH and self-heating. When these operations are undertaken, it is required that the treatment recipe be documented and that the treated mixture be tested to determine the effectiveness of the treatment before the waste is taken to the landfill face for final disposal. In the event that the waste does not meet the landfill criteria, the waste shall be taken back to the treatment area and reprocessed until the criteria are met or the waste shall be repackaged and sent for disposal in an approved facility. Most stabilized materials need to be allowed to stand in luggers or other containers for several days so the concrete can cure before testing and landfill disposal if approved.

D. Waste Acceptance, handling and disposal of wastes SOP

The following section includes procedures for;

- (i) Waste characterization and classification at source
- (ii) Waste manifest & tracking
- (iii) QA/QC waste acceptance procedures
- (iv) Waste sampling

Each waste stream to be accepted at the Ryley facility must be subjected to a pre-acceptance review prior to onsite receipt or disposal. The pre-acceptance review must include the collection of information about the waste stream from the generator and may include sample analysis. The purpose of the pre-acceptance review is to determine if the waste is acceptable for receipt at the Ryley facility. Each waste stream will have a waste profile completed prior to receipt of the waste at the facility.

Incoming shipments of waste arriving at the facility must be reviewed to determine acceptability for disposal. As part of this review, shipments must be subjected to visual inspection. This is particularly important for wastes that are not sampled. The visual inspection should be used to ensure that facilities manage only acceptable wastes. Waste must be deemed acceptable prior to

disposal at the facility. Visual inspection must verify that each waste conforms to the information on the profile and shipping documentation.

The number and type of containers in the shipment must be consistent with the information on the manifest. The physical state, absence of free liquids, and color of the waste must also be consistent with the documentation. Each container should be checked for proper and accurate safety marks and checked against the documentation including the manifest.

All incoming bulk loads in luggers, roll-offs, or dump units should be visually inspected to ensure consistency with the documentation. The material should specifically be examined for foreign matter and free liquids. Any discrepancies shall be reported to management.

Sampling of incoming loads should be conducted to verify that the characteristics of the shipment are as expected according to the pre-acceptance review information and the information on the shipment's accompanying documentation. Additional testing may be required because of a discrepancy between containers and their documentation or safety marks. Sampling procedures should be determined based on both the nature of the material and the type of containment. Landfill solids may be checked for pH, BTEX, metals, delta T and flash point.

Appropriate documentation must accompany all samples throughout the analysis process. Waste Profile code or identification should accompany the load for acceptance verification. Receiving personnel will complete the following information prior forwarding samples to the lab:

- Sample information including work order number and date;
- Generator information including name;
- Waste description including waste name, specified information on physical state; and
- Container identification, including container number and any other information to identify the container.

The laboratory should complete the information on the Quality Assurance form (paper or electronic) pertaining to the laboratory analysis and coding; no waste processing should commence prior to completion of this information. The lab must sign in with the receipt date and sign out with approval, code and date.

Facility approval beyond laboratory recommendation may be required for off-spec and non-routine wastes.

Wastes, such as asbestos and monolithic materials need not be sampled; visual inspection is sufficient. Acceptance of asbestos may be limited to certain times dependant on condition of the landfill due to weather events.

Samples from multiple containers may be composited only if they are from the same generator, have the same waste code, and are similar in physical appearance. If the composite sample is found to be “off-spec”, each container comprising the composite must be individually sampled.

On-going waste streams that have not exhibited variability can be off-loaded without sampling but should be re-evaluated annually to confirm their composition. In these cases, careful visual inspection will be sufficient to confirm acceptability.

If the wastes do not conform to the assigned profile and they cannot be accepted due to permit limitations, health and safety concerns, or operational limitations, the generator must be notified promptly of the rejection. The waste must be rejected back to the generator, rerouted or brokered to another disposal facility with the consent of the generator. **Waste that is not acceptable for landfill disposal and has been placed in the landfill MUST be removed within 7 days of receipt and reported to AEP in the monthly contravention report and included in the Annual Report on Landfill Operations.**

Other provincial governments may need to be notified of rejected waste shipments if they originated outside the province of Alberta.

Paperwork review and documentation of waste starts when the waste arrives at the site. The driver is directed to stop on the weigh scale and to bring his paperwork into the entry beside the scale office. The paperwork (bill of lading, manifest) is reviewed for completeness and to ensure that the waste is intended for the Clean Harbors’ facility. If the paperwork is determined to be in order, the truck is scaled in. The generator’s name, sales order number, manifest, bill of lading or receiving docket number is written on the scale ticket. Each scale ticket has a unique number that can be associated with a particular load and shipping document. The wind speed and direction is recorded on the shipment receipt log for loads being offloaded immediately. The receiving personnel radio the landfill operators to find out where the driver should proceed to offload. New drivers or drivers who have not been to the site in the past six months are given a brief safety orientation and shown a map of the site before they are sent back to the landfill. Following this they are directed to proceed to the unloading area. Visual inspections of the load may be performed by personnel in the scale area or by landfill personnel. Samples of waste may be taken at the sampling station or by the landfill operators. When the driver returns to the scale after unloading, the scale ticket is punched in to get the net weight of the waste disposed. This weight is entered on the driver’s paperwork and any discrepancies noted. Most shipping sites do not have scales and the shipping weights are usually estimates that can be out significantly.

Waste Manifesting and Tracking

Hazardous wastes and Dangerous Oilfield Wastes must be accompanied by a shipping document completed by the waste generator that includes proper shipping name of the waste, the UN shipping number and packing group as well as the quantity of waste being shipped for disposal. The transporter of these wastes must have a carrier number issued by Alberta Environment and Parks. The shipping document is to be signed by both the Generator (Part A) and the Carrier (Part B) of the waste before the load leaves the generator's facility. Copy 1 of the manifest is sent to AEP and the receiving jurisdiction if leaving Alberta. The Generator keeps Copy 2 for their records. The Carrier takes the remaining 4 copies with him to be given to the receiving facility.

Upon delivery of the waste to the Receiving facility, the receiving personnel review the shipping document. They will complete Section C of the manifest. One copy will be sent to Alberta Environment, the carrier will be given a copy of the completed manifest or shipping document for his records, copy will be retained by the receiving facility and a copy will be returned to the generator.

A copy of the manifest, the weigh ticket and the sales order will be given to the receiving coordinator. The coordinator will enter the sales order number into the Bulk Receiving Screen of the WINWEB system and then proceed to complete the entry of the manifest number and the weight into the system. The manifest will be scanned into the system as part of the electronic record of the load. The landfill location for the load is also entered into the system. Each load is assigned a unique tracking which is associated with the Sales Order and the manifest. Through the use of this tracking number the location or disposition of the waste can be found at any time.

Waste Sampling

Waste generators should submit a MSDS and/or analysis of the waste stream or a representative sample (when required) as part of the pre-acceptance review process. If no analytical information is available, the Ryley laboratory verifies the material profile by analyzing a representative sample and determining the appropriate disposal/processing method. The pre-acceptance review is repeated when the generator notifies the facility that the waste stream or process has changed. In the absence of a representative sample, Customer Service will make all reasonable efforts to obtain as much information about the waste as possible based on generating process, raw material input, generator knowledge and analysis.

Emergency situations may exempt the requirement to provide a sample to the facility.

Pre-acceptance samples should be taken by the generator or by trained Clean Harbors' personnel. The samples should be representative, exhibiting the average properties of the waste. Generator samplings should be done in consultation with the facility. Samples from generators must be placed in acceptable containers which are compatible with the waste and which meet TDGA requirements. Only samples in intact containers will be accepted for analysis. Samples must be labelled adequately to identify the generator and the waste. If it is a waste stream that has been previously processed, the waste profile or waste code should be included. Customer Service will submit the sample to the laboratory for analysis with the appropriate information. The Ryley laboratory will assign a laboratory sample log number to the sample(s) for laboratory sample tracking purposes.

Sample(s) will be analyzed as per the "Solid Waste Acceptance Criteria".

Wastes Requiring Special Handling

The Clean Harbors Ryley facility can receive materials that require special handling procedures. Those that are received on a routine basis are discussed here. These materials may have restricted acceptance dates.

Molecular Sieve and Catalyst Loads

Molecular sieves and catalysts are typically composed of activated alumina or other activated substrates. These materials can generate heat when exposed to moisture or air. Sometimes sufficient heat can be generated to boil off the water contacting the sieve or cause the material to smoulder. These materials have caused fires when in contact with ignitable materials. Molecular Sieves and catalyst wastes are required to be deactivated by the generator prior to receipt at the landfill. The following procedures must be followed when landfilling these materials:

- Spread a layer of the molecular sieve or catalyst on an inert portion of the landfill surface.
- Monitor any water reactivity and temperature rise.
- When any reaction has subsided and temperature is similar to surrounding area, move material to final placement area and cover thoroughly before end of the shift.

E. Detecting, preventing and disposal of unauthorized wastes SOP

These procedures are mentioned in sections **B** and **D** under the Waste Control and Acceptance Procedures.

F. Waste placement SOP

The wastes should be placed in the landfill in lifts of approximately 1 meter in depth. Each lift should be compacted as much as possible during placement depending upon the type and volume of the waste stream. This is done by making multiple passes over the waste with the compactor. The landfills are divided into imaginary grids. The grids are marked using a combination of letters and numbers that mark each grid's height and its east/west and north/south location in the landfill. The markers are placed on the landfill berm around the outside two edges of the landfill having letters on one side and number on the other side. Each individual grid is 10 meters x 10 meters. For example if a load is placed in L3B5R, it would be in landfill 3, in layer B from the bottom (2 meters) and in the grid section where 5 and R intersect.

Typically the facility runs two operating faces simultaneously – one for debris waste streams and the other for soil and loose fill wastes. Each operating face is kept to as small an area as is practical. The facility receives a wide variety of waste types of varying compositions and consistencies. Operationally this means that the working face areas can vary depending upon the waste mix being received on any given day in order that the waste can be properly managed. Wastes with little structural integrity require a wider, shallower operating area than soil or debris waste streams. Each working face shall be identified to the scale office and clerical staff as well as landfill personnel using a grid system that enables the location of waste streams within the landfill.

Liner Protection

Prior to the disposal of waste in a landfill cell, a minimum of 18 inches (0.45 metre) of protective cover material will be placed over the primary synthetic liner at the base of the cell. This material will include 18 inches (0.45 metre) of thickness over the granular material typically used as part of the primary leachate collection system. A minimum of 18 inches (0.45 metre) of protective cover material will be placed on all landfill side slopes before waste is placed near the side slopes. As an additional measure to protect the liner, rigid debris such as pipe, pieces of wood and metal will not be placed in the bottom lift of the landfill or near the side slopes of the landfill cells.

G. Sulphur loads SOP

The facility may occasionally accept limited amounts of sulphur contaminated waste (Sulphur content >0.05% or >500 mg/kg). When Operations management approves receipt of a sulphur waste, the procedure from the *Guidelines for Landfill Disposal of Sulphur Waste and Remediation of Sulphur Containing Soils (Sept 2011)* will be followed when sulphur loads are received at the facility for disposal.

WARNING

SULPHUR MAY REACT IF MIXED WITH OTHER WASTE MATERIAL RESULTING IN A POSSIBLE VAPOR RELEASE OR FIRE. EXTREME CARE MUST BE USED TO SEGREGATE SULPHUR LOADS FROM OTHER MATERIAL.

- Before placing sulphur loads, a barrier of alkaline material, such as limestone, 60 cm deep will be placed on the base area and around the perimeter of the area (if alternate alkaline material is used the depth must be changed to account for the material's calcium carbonate equivalence – AltaSteel EAF dust at 1 metre thickness).
- The sulphur material will then be placed on the alkaline material.
- The sulphur material will be covered with alkaline material.
- Small quantities of sulfur may be blended with alkaline equivalent at the appropriate blend ratio as pre-determined by the Facility Manager or Lab Manager.

H. Bagged asbestos loads SOP

This procedure will be followed when bagged asbestos loads are received at the facility for disposal: Refer to “Guidelines for the Disposal of Asbestos Waste” AB Environment 1989.

- Position the load as close as possible to the work face.
- A landfill employee must supervise deposition of asbestos waste.
- Asbestos waste must be covered with at least 25 centimetres (10 inches) of non-asbestos containing material to prevent direct contact of equipment with the asbestos waste.
- Place cover material in front of and on top of the bags.
- Push the load up the work face, keeping soil between the bags and the dozer blade.

I. Surface spreading of leachate and leak detection liquid SOP

Although it has not been done in recent years, leachate and leak detection liquid (leachate) may be spread on the surface of the landfill cells for dust control and volume reduction through evaporation, if the leachate is not odourous. This option for handling leachate is usually only applicable to landfill cells early in their life. Older cells typically have a significant odour and are not suitable for surface spreading.

If a cell's leachate is suitable for surface spreading for dust control or for evaporation, the leachate may be transferred from the leachate storage tank to the tank truck used for spreading water for dust control. This truck will then slowly

spread the water over the surface of the landfill cells in a manner similar to that used by road construction crews when watering in clay road bases and gravel. It is important not to put so much water on the surface that the landfill surface becomes muddy.

The date, volume and source of leachate used for dust control must be recorded and reported as part of the facility's annual Landfill Operations Report to Alberta Environment and Water. Additionally any air monitoring events that correspond to the dates that leachate was spread must be recorded and reported to Alberta Environment.

J. Odour and fugitive dust response program

This is included in our Fugitive Dust and Odour Best Management Plan in Appendix "C"

K. Fugitive dust and odour best management plan

This is attached as Appendix "C"

L. Run-off & industrial wastewater monitoring and management program

Surface water from the facility is collected in two surface water detention ponds. Precipitation falling on the paved plant area, the landfill access roads and waste container storage areas is collected in the surface water holding ponds. This water must be sampled, analyzed by a commercial laboratory and the results compared to the facility's discharge criteria as specified in Table 4.3-B of Operating Approval 10348-03-00. **The analytical results must be reviewed by 2 of the following people, Facility Manager, Operations Manager or Laboratory Chemist, to confirm that the results meet discharge criteria.** If the analysis meets the specified criteria, discharge to the neighbouring natural drainage area is begun. Surface discharge is accomplished by pumping the water via a suction hose, pump and discharge hose to the natural drainage area east of the landfill cells. While pumping of the first discharge of the year is underway, samples of the water are taken and submitted for bioassay analysis at a third-party testing facility. The bioassay testing consists of the following acute tests:

- Acute Lethality Testing
 - 96-hour static trout bioassay
 - 48-hour static daphnia magna bioassay

Results of all testing of the surface water holding ponds are submitted to Alberta Environment as part of the Monthly Industrial Runoff Report by the end of the month following the month in which the discharge occurred.

Approval 10348-03-00 requires that samples of dugouts and water wells within a 1.6 kilometre radius of the facility be sampled and analyzed for the monitoring parameters listed in Table 4.5-A of the Approval. This work is sub-contracted to an engineering and consulting firm for sampling, analysis and reporting. The final reports are submitted to Clean Harbors for review and submission as the Annual Dugout and Water Well Sampling Program Report to Alberta Environment. The property owner is sent a copy of the analysis for each dugout or water well on his land. The analytical data for dugouts is extremely variable because they are susceptible to major variations in water level and subsequent changes in dissolved water chemistry. No impacts attributable to the operation of the facility have been found since this monitoring program began in 1996.

Run-off controls are also talked about in section **B**.

M. Leachate monitoring and management program

Samples of each landfill cell's primary and secondary leachate are analyzed quarterly for the parameters specified on Table 4.4-A of Operating Approval 10348-03-00 (same parameters as groundwater wells). Primary leachate analyte concentrations are affected significantly by the amounts of precipitation that have fallen on the landfill and the composition of the waste present in each landfill cell. Therefore, there is not necessarily any typical pattern that may be observed in the analytical data. The Operating Approval requires that copies of the leachate analyses be submitted as part of the Annual Report to Alberta Environment.

Management of the leachate involves monitoring its movement through control zones and removing the leachate from the collection areas. The layers of liner create leachate control zones. Submersible pumps remove the leachate from all zones except Cell 1 secondary. The zones are defined as follows:

- Primary zone is between the first layer of waste and the primary (upper) layer HDPE liner.
- Secondary zone is between the primary HDPE liner and the secondary (lower) HDPE liner.

Sumps are designed into the landfill so that leachate will collect in them. Samples of the leachate are taken as required in Table 4.6-D and analyzed for the parameters listed in Table 4.4-A subject to 4.4.8 and 4.4.9.

Clean Harbors must monitor the secondary leachate quantity collected both the active and inactive (closed) cells. This procedure must be revised as new cells are brought into operation and existing cells are closed (capped).

Cell 1 Leachate Management

Primary leachate is removed from Cell 1 via the piping up the southeast side of the cell and pumped into a portable tote which is then sucked out with a vacuum truck. Cell 1 was capped in August 1999 and therefore primary leachate volumes reflect a steady decrease.

Secondary leachate from Cell 1 collects in vertical tube just south-east of the primary riser. Any liquid, which is below the primary liner and above the secondary liner, flows by gravity into the collection tube. The secondary system is equipped with a submersible pump. The pump will transfer the liquid from the below grade tube to a portable tote at ground level.

Readings on the Secondary Leachate System are to be performed each time the secondary is pumped. This reading is to be recorded in the Leachate Log Book and on the Daily Inspection Sheet. **If this reading shows an increase greater than 790 litres per day per acre, IMMEDIATELY notify Operations/Facility Manager.**

Whenever leachate is shipped from the storage tank, the volume must be recorded.

Cells 2, 3A, 3B and 3C Leachate Management

Cells 2, 3A, 3B and 3C are constructed differently from Cell 1. The primary and secondary leachate collects in sumps inside the berms of each cell. The piping for each leachate system is located in a trench that runs up the side of the cell. Submersible pumps, one each for each system, primary and secondary, are lowered down the pipe into the sump to remove the leachate from the cells. Power to the pumps is controlled by switches in the leachate buildings at the top of the berms.

The primary leachate systems have been equipped with a level sensor system that allows the leachate levels to be retrieved using a Levellogger or laptop PC. The primary leachate level must be recorded at least once every three working days and immediately prior to leachate removal (i.e.: pumping to surface storage tanks). **The maximum acceptable leachate head for these cells is 1.0 meters above the primary liner.** Commencing May 1, 2008 the leachate head must be recorded. Effective August 15, 2008 the leachate head in Cells 3A – 3C shall not exceed 1.0 metres in those landfill cells. Notwithstanding the foregoing, the leachate head shall only exceed the maximum acceptable leachate head for a maximum duration of 14 days subsequent to a precipitation event, unless otherwise authorized in writing by AEP.

Cell 3D, 3E and Cell 4 Leachate Management

Cell 3D, 3E and Cell 4 have a Maximum Acceptable Leachate Head level of 0.3 m (30 cm). Notwithstanding the foregoing, the leachate head shall only exceed the maximum acceptable leachate head for a maximum duration of 14 days subsequent to a precipitation event, unless otherwise authorized in writing by AEP.

Primary leachate is pumped directly in to surface storage tanks in each landfill cell for loading into tankers for deepwell disposal. The volume pumped to the storage tanks must be measured or calculated each time leachate is removed from the leachate collection system.

Leak Detection Liquid Management

The secondary leachate pump outlet is routed to a calibrated container to measure the volume pumped each day. The secondary leachate readings are recorded daily in the Leachate Log Book for each cell and reported as part of the daily inspection sheets. **If a reading greater than 790 litres/hectare per day is recorded, the Operations Manager and/or the Facility Manager must be notified immediately.**

Whenever leachate is pumped from the primary or secondary leachate systems, the volume pumped must be recorded. The volume of primary and/or secondary leachate shipped must also be recorded.

N. Leak detection liquid monitoring and management program

This section is covered in section M.

O. Groundwater monitoring program

48 groundwater wells are installed around the facility and the landfill cells. These monitoring wells are sampled once each year. The sampling, analysis and reporting are sub-contracted to an engineering and consulting firm. The final reports are submitted to Clean Harbors for final review and an electronic copy is submitted as the facility's Annual Groundwater Monitoring Report to Alberta Environment. Additional monitoring wells are installed as the landfill cells are constructed.

Groundwater monitoring parameters have been specified in the Operating Approval 10348-03-00, Table 4.9-A. The consultant's reports tabulate each monitoring well's analytical data since the well was installed and first sampled. No environmental impacts from the facility's operations have been detected in the monitoring wells since groundwater monitoring began in 1991. Contents of the

Groundwater Monitoring Report are described in Section 4.9.14 of Approval 10348-03-00.

P. Remediation plan to deal with groundwater deterioration

In the event that groundwater impacts due to the landfill operations are detected, Clean Harbors and its consultants will formulate a remediation plan based on the contaminant and the site conditions at that time. This program will be formulated in conjunction with discussions with AEP.

Q. Soil monitoring program

As per section 4.10.2 of the facilities Approval, soil monitoring at the facility is required twice during the approval term. The first soil monitoring program report was submitted to AEP on January 31, 2020. The second soil monitoring program proposal is due on or before January 31, 2024 and the second soil monitoring program report is due on or before January 31, 2025. The facilities soil monitoring program is developed together with an engineering and consulting firm.

R. Soil management program

On September 18, 2020 Clean Harbors received confirmation of acceptance from AEP of its Soil Management Program Proposal dated January 31, 2020 and Soil Management Program Proposal Deficiency Response Letter dated September 4, 2020. In accordance with Section 4.10.11 of the Approval, Clean Harbors was given authorization to implement the Soil Management Program as described in the aforementioned two documents. A 2020 Soil Management Program report was submitted to AEP on March 29, 2021 and a Sulphate Concentration Isoleths report was submitted to AEP on April 29, 2021. As per the Soil Management Plan Update included in the 2020 Soil Management Program report, remediation and confirmatory sampling of the area around 2020 delineation bore-holes 20-6 and 20-8 and in the graveled area west of the process building, was completed in October 2021. A Soil Management Program Remediation report, including a Soil Management Plan Update, will be provided to the Director for Approval by March 31, 2022.

S. Landfill cell cover system

The facility is primarily an industrial waste landfill and as such much of the waste received is soil, filter cakes and other materials that do not attract nuisance vectors such as birds and rodents. This material is typically not as susceptible to dispersion by the wind and therefore, does not require the same type of cover frequency that may be necessary in a municipal solid waste landfill. Areas that will remain inactive for extended periods of time should be covered with 10 to 15

centimetres of clean material such non-regulated soil, sand or clay. As stated in Sections 4 and 5, cover should be applied immediately to dispersible wastes, odourous waste and materials that require special handling.

T. Scale and equipment maintenance and monitoring program

Scale Maintenance

The weigh scales at the Ryley facility are checked for accuracy semi-annually by a third-party calibration company. Any problems with load cells and cables are repaired as they occur by their trained service personnel. The Scale is also subject to periodic inspections by Weights and Measures Canada.

Equipment Maintenance

All equipment maintenance is recorded and monitored using an electronic maintenance program. This system is linked to each facility and maintenance hub which is accessed through our WinWeb program. Landfill operators are responsible for completing and recording in a logbook daily maintenance checks and notifying the maintenance mechanic of any issues. The facility's maintenance mechanic based on the manufacturer's recommended schedules performs routine maintenance on the landfill equipment and records it in the program. Other larger repairs may be completed by or sent to our larger repair shops in Leduc.

U. Health and site safety program

Clean Harbors believes that its employees' safety and protection of the environment are the two most important priorities that the company has. The Ryley facility has always maintained a high standard of safety and environmental compliance. Its commitment to safety is exemplified by participation in Alberta Human Resources and Employment's Certificate of Recognition program and the use of an external auditor to monitor compliance with the standards. The corporate Health and Safety manager for facility visits the site regularly to conduct inspections, assist with training and the implementation of improved health and safety management practices.

Clean Harbors maintains a Health and Safety SharePoint site that contains corporate Policies and Standards, Guideline, Safe Work Practices and a Forms library that gives employees and managers access to current information. The Ryley facility follows a Health and Safety Manual containing' policies and procedures regarding safety. The manual identifies program responsibilities, hazard identification and communication, personal protective equipment, including respiratory protection, confined space entry guidelines, drum handling guidelines, grounding and bonding guidelines for transfer of flammable liquids. It

also includes the procedures for accident and incident reporting and health and safety committee operation.

The facility has an Orientation Program form that must be completed for new employees. New personnel are given basic information in their first days of employment. The orientation program ensures that personnel have read the appropriate Standard Operating Procedures (SOP) before being sent onto the site to work with an experienced employee.

The facility's Safety Meetings are used as a forum to maintain employee's compliance with the corporately mandated standard of meeting the OSHA 24/40 Hour Hazardous Waste Operations program (HAZWOPER). A module of this program is reviewed at each Safety Meeting. These modules include topics such as personal protective equipment, hazard communication and WHMIS, confined space entry and lockout/tag-out of energy sources.

In addition to supplying first aid and CPR training for employees, the facility has purchased an Automatic External Defibrillator (AED) as a supplement to the training program

V. Emergency Response Plan

A copy of the facility's Contingency Plan is attached as Appendix A. This includes fire, spills and health concerns.

W. Up-to-date landfill layout with survey records including final cover elevations and contours and facility infrastructure components

Appendix D provides this information.

Y. Ambient Air

The Ambient Air Monitoring Program has been modified to meet the most recent Directive as approved by Alberta Environment and Parks that requires that the facility monitor for the following parameters.

Wind Speed and Direction

Wind speed and direction shall be monitored continuously. The data shall be downloaded monthly and stored on the Group drive for report generation (I:\Ryley\Group\Wind Data\Year\Month).

Particulate Matter (PM₁₀)

Particulate Matter shall be collected once every 12 days for 24 hour period at the Ryley Lift Station. The particulate material collected on the filter shall be

submitted to Innotech Alberta in Vegreville to be analyzed for the following parameters:

- a. Particulate quantity (ug/m³)
- b. **If particulate quantity per filter exceeds 50 ug/m³, then** the filter shall be analyzed for the following parameters:
 1. Water soluble cations - (Na, K, Ca, Mg)
 2. Metals - Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Mercury, Nickel, Silver, Thallium, Tin
 3. Anions - Ammonium, Chloride, Nitrate, Sulphate

Total Hydrocarbons and Volatile Organic Compounds

An air sample is taken once every 12 days for a period of 24 hours using specially prepared sample canister obtained from the Innotech Laboratory in Vegreville. After the sample has been collected the container is returned to the laboratory to be analyzed for Total Non-Methane Organic Compounds (TNMOC or Total Hydrocarbons) by GC-FID and Volatile Organic Compounds (ozone precursor compound list) by GC-MS.

Reporting

Monthly reports will be submitted to Alberta Environment and Parks

An Annual Air Monitoring Report will be submitted to the Director, Alberta Environment, on or before March 31 of each year on the information collected in the previous year.

CLEAN HARBORS CANADA, INC. HWRSP FACILITY PLAN

1. HWRSP Facility Operations

Clean Harbors Ryley Facility manages its Hazardous Waste/ Recyclable Storage and Processing facility (HWRSP) operations through various SOP's which can be found in the Facility's SOP binder. The following sections summarize some of the relevant SOP's.

2. Drum Receiving

For the intention of this document "drum(s)" refers to all containers that may be received in the transfer station buildings. The loading dock is the primary means used for unloading trucks that deliver waste to the facility. Items may also be off-

loaded directly off a truck (i.e. flat deck) if deemed necessary and can be done in a safe manner.

Limits

Maximum Hazardous Waste and Hazardous recyclable volume storage limits for the HWRSP Facility can be found in the Approval 10348-03-00 in Sections 4.6.20 – 23.

Off-loading

Off-loaded drums will be brought primarily into the Process building but may also be placed in the Staging area if there is not sufficient room in Process building. After the load is placed in a building it will be assigned a label with a unique bar-code. Bar-code numbers are tracked through the company's data base system (WINWEB) and can be tracked from cradle to grave. Drums are confirmed to match their waste profile or waste code either visually or through a quick set of simple tests (such as pH paper test). If a drum is found not to match its code or profile it is sampled and submitted to the main lab for code verification. After the drums have been either sampled or verified they can be further processed or moved to the Staging building and stored for future shipping.

3. Drum Processing

The scrubber shall be operable during any processing, transferring or while containers are open in both or either of the Process and Staging buildings as per section 4.2 in the Approval.

Bulking

Drums of liquids that have similar characteristics and that are confirmed to be compatible may be comingled or “bulked” together to save space and money. Flammable liquids and liquids with high heat values may be bulked together following SOP 90RY-101-00. Low heat value and non-flammable or aqueous liquids may also be bulked together following the same SOP. A site vacuum truck is used when bulking drums. After the procedure has been completed the bulked liquid will either be transferred to its corresponding storage tank or straight to a tanker that is waiting to be shipped. The Ryley Facility has 3 storage tanks inside the Process building that store bulk liquids.

- a) T100 – Flammable Liquids (18,000 L)
- b) T200 – Flammable Liquids (18,000 L)

c) T300 – Non-Flammable Liquids (36,000 L)
Each tank is equipped with high levels alarms and level measuring devices.

Lab Pack Processing

Labpacks are processed at the labpack bulking station. Ensuring the scrubber system is operable during processing is mandatory as per the Approval. Typical labpack waste streams that are bulked into drums are acids, bases, flammable liquids, non-flammable liquids and flammable sludges. All labpacks that are processed must be tracked through the WINWEB system.

Landfilling

Drums and containers that arrive at the facility via the transfer station intended for the landfill are typically staged onsite prior to disposal at the landfill. Typically a forklift is used to load a haul truck with the drums and the haul truck is driven to the landfill for final disposal. Clearance must be obtained from the landfill crew prior to the delivery of items for landfill. Drums that are coded as sludge and require solidification prior to final placement must be dumped into the sludge pit as directed by the landfill crew. All drums delivered to the landfill and/or sludge pit must be tracked through the WINWEB system.

Off-spec Drums

If a drum is found to not match its profile (off-spec) then a new code is determined as a result of laboratory testing. The new code and any changes in processing are then communicated to the customer.

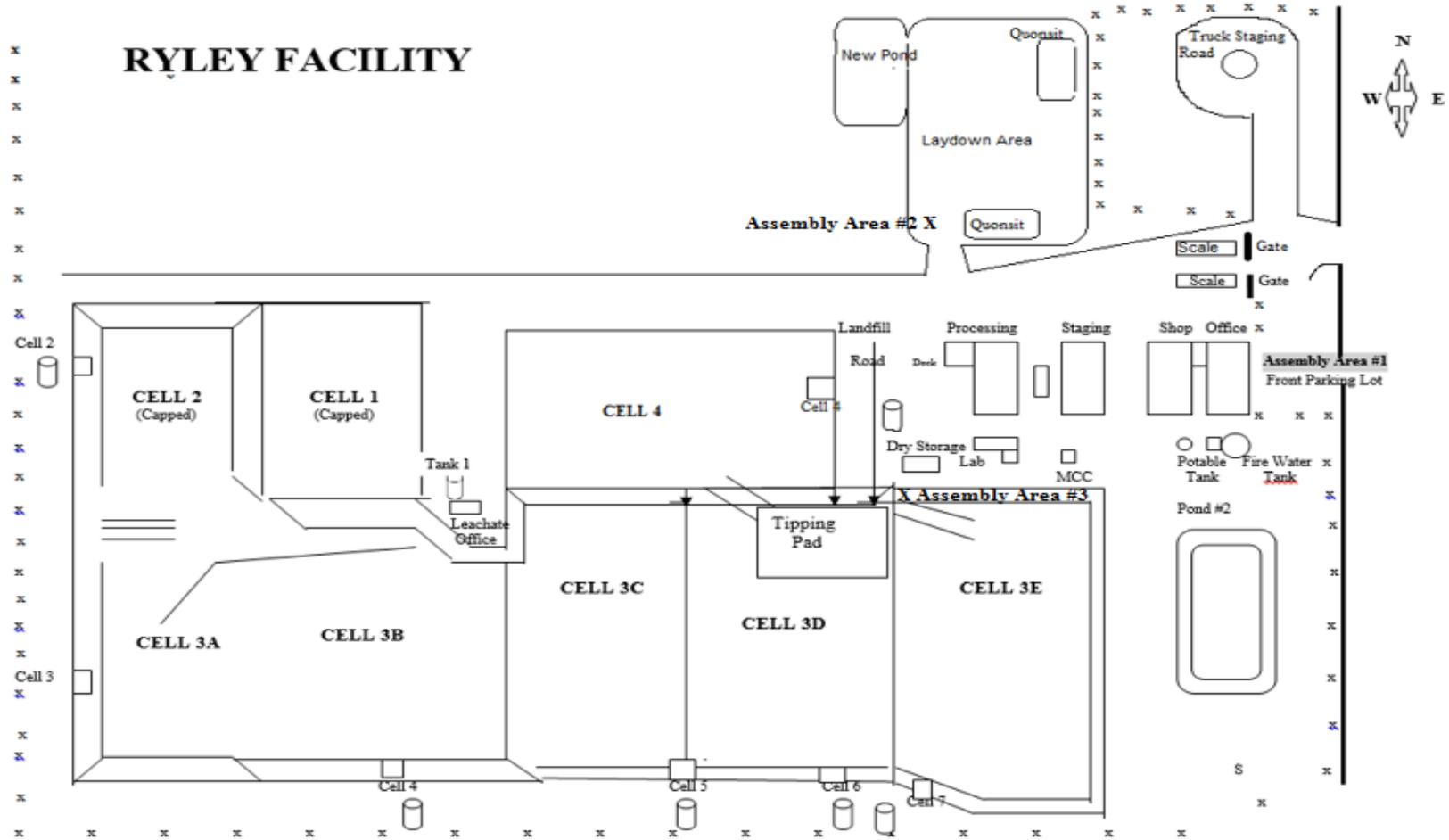
4. WINWEB Data base and Tracking System

The facility incorporates an internal waste tracking and data base network called WINWEB that is designed, built and exclusive to Clean Harbors. Almost every aspect of the business is tracked, recorded or tied to the WINWEB system in some way or another. Clean Harbors utilizes a data and information management system called WINWEB to record and store all information associated with shipments entering the facility including Generator's names, locations and manifest related data. The WINWEB system is currently used by all of Clean Harbors' sites across North America including the Ryley facility. The Company will use this system to track and record arrival and departure dates of all waste.

APPENDIX A

Site Diagram

RYLEY FACILITY



x=x Fenced Area

Not to Scale

**Clean Harbors Canada, Inc.
Ryley, Alberta**

CONTINGENCY PLAN

Contingency: “A future event or circumstance regarded as likely to occur; or as influencing present action; something dependent on another uncertain event or occurrence; uncertainly or occurrence; one thing incident to another.”

The Concise Oxford Dictionary

Last Reviewed: January 2022

TABLE OF CONTENTS

- 1.0** Introduction
 - 1.1** Contingency Plan
 - 1.2** Purpose
 - 1.3** Revision Procedure
- 2.0** Company Operations
- 3.0** Emergency Response
- 4.0** Facility Alarm System Procedure
 - 4.1** Emergency Procedure
 - 4.2** Emergency Phone List
 - 4.3** Facility Alarm System
 - 4.3.1** Testing Procedures
- 5.0** Emergency Situations Classification
 - 5.1** Serious Injury or Death at Facility
 - 5.2** Fire and/or Explosion at Facility
 - 5.3** Leakage and Spills at Facility
 - 5.4** Bomb Threats
 - 5.5** Demonstration and Pickets
 - 5.6** Storms and Tornadoes
- 6.0** Evacuation Plan
- 7.0** Emergency Response Team Areas of Responsibility
 - 7.1** Search and Rescue
 - 7.2** Control of Hazard
 - 7.3** Specific Personnel Requirements
 - 7.4** Communications
- 8.0** Quarantine
- 9.0** Department Wardens
- 10.0** Wrap-up
- 11.0** Training
- 12.0** Response Team Training
- 13.0** Drills
 - 13.1** Parameters
 - 13.2** Drill Log and Evaluation
 - 13.3** Emergency Response Drills
- 14.0** Evaluation
- 15.0** Critique of Evaluation
- 16.0** Emergency Response Protocol
- 17.0** PCB Handling
 - 17.1** PCB Fires
 - 17.2** PPE for PCB Waste Handling

CONTINGENCY PLAN



Approved By: Stan Yuha, Facility Manager

Signature

Approved By: Wayne Codd, Operations Manager

Signature

1.0 Introduction

1.1 Contingency Plan

This Contingency Plan has been written with the intent of providing operating guidelines to deal with any foreseeable emergencies which may arise during the course of operations at the Ryley Facility or during transportation of wastes to or from Ryley.

1.2 Purpose

The purpose of the Contingency Plan is to provide a framework for both general and specific policies and procedures and lines of communication that can be put into motion in the event of an emergency. By implementing and maintaining an effective Contingency Plan, Clean Harbors Canada, Inc. plans to reduce the Corporations exposure to loss by providing for:

- i) The safety and well-being of all employees and others;
- ii) Minimizing damage to the environment;
- iii) Process of recovery and resumption of operations;
- iv) And effective incident reporting chain.

1.3 Revision Procedure

1.3.1 The Contingency Plan policies, frameworks, roles, and responsibilities described, will be reviewed and revised annually and will be the responsibility of the Facility Manager or his delegate. Employees who actually participate in any emergency response are in the best position to determine the safest and most efficient methods.

1.3.2 Revisions to the Plan will be initiated by completing the Revision Request Form (Figure 1). The Revision Request must pass through the stages identified on the form.

1.3.3 The Facility Manager or his delegate has the responsibility for maintaining the currency of the Contingency Plan procedures at Clean Harbors Canada, Inc...(Ryley)

2.0 Company Operations

2.1 Clean Harbors Canada, Inc. (Ryley), owns and operates a Transfer Station, Class 1 Secure Landfill, and Hazardous Waste Transportation and Service Centre.

2.2 Clean Harbors Canada, Inc. (Ryley), offers as a service, the transportation, consolidation, and storage of acceptable specified waste streams.

2.3 Office Location

Clean Harbors Canada,
Inc. 50114 – Range Road
173 Ryley, Alberta T0B
4A0 Ph #780-663-3828
Fax #780-663-3539

3.0 Emergency Response

3.1 In case of emergency, this facility is equipped with an audible emergency alarm system. This system consists of alarm horns located throughout the facility. The horns are positioned in such a manner that they will be heard regardless of an employee's location, or activity. The alarm will be activated from a control panel located in the dispatcher's office. Personnel working in landfill will be notified of an emergency via the radio

3.2 For the purpose of the alarm system, certain areas of the plant have been designated as emergency assembly points. The locations of these points are as follows:

- a) Primary assembly point – NW corner of parking lot in front of office facilities;
- b) Secondary assembly point – green landfill shack;
- c) Tertiary assembly point – move crosswind to a safe distance from the emergency site; this area will be determined by the E.R.T. Coordinator at the time.

4.0 Facility Alarm System Procedure

4.1 Emergency Procedure

In the event of an emergency, the alarm system will be activated, causing the plant emergency horn to sound. After approximately twenty (10) seconds, the horn will cease. Once the alarm has sounded, employees will proceed as follows:

- a) Secure their worksite to ensure that it is not left in a hazardous state;
- b) Insure that all personnel in the area are aware that the alarm has been sounded;
- c) Proceed to the appropriate assembly point and await instructions.

Termination of an emergency will be announced over the loud speaker (All-Clear).

In the event of an emergency, the Facility Manager or designate will initiate the Facility Alarm System.

4.2 Emergency Phone List

Village Office	780-663-3653
Fire Dept	911
RCMP, Tofield	911
Alberta Public Safety Service	1-800-272-9600
(Evacuation and Disaster Services)	
Hospital (Health Center).	780-662-3263
Ambulance, Tofield	911
Poison Center	1-800-332-1414
(If busy, call Calgary)	1-403-270-1414
Canutec	1-613-996-6666
Alberta Environment & Parks	1-800-222-6514
24 Hour Facility Emergency #	1-780-690-0614

4.3 Facility Alarm System

4.3.1 Testing Procedures

Testing of the plant alarm system to ensure operational readiness should take place once monthly before the 15 (fifteenth) day of the month. It will consist of activating the alarm system for approximately 5-10 seconds.

5.0 Emergency Situations Classification

5.0.1 This section will outline the responsibilities and communications network for the following incidents:

- 5.0.1.1** Serious injury/death at facility
- 5.0.1.2** Fire/explosion at facility
- 5.0.1.3** Leaks/spills
- 5.0.1.4** Bomb threats
- 5.0.1.5** Demonstration/pickets at facility

5.0.2 During most of the above listed incidents, the Resource Team will convene to assist and advise the Response Team and Emergency Response Coordinator. The Resource Team will consist of the following personnel:

- i)** Facility Manager (Stan Yuha)
- ii)** The Emergency Response Coordinator position will be filled by the Operations Manager (Wayne Codd)
- iii)** Receiving Coordinator (who will bring office radio to the conference room).

5.0.3 Duties of the Resource Team

- i)** To assemble in the conference room in the Administration Building or alternate, as required.
- ii)** Pick-up visitor's log and driver's sign-in log on the way to conference room.
- iii)** Receive all area head counts and confirm with records.
- iv)** Advise and assist the Emergency Response Team to deal with the incident.
- v)** Advise building wardens as to where the staff should reassemble in the event of adverse weather or changes in conditions.

- vi) To provide assistance to Facility Manager, as required.
- vii) To advise when “all-clear” can be sounded.
- viii) To contact all external agencies for accident investigation.

5.0.4 The incidents involving fire, explosion, bomb threat, and evacuations of the plant outline some of the responsibilities for the Building Wardens, listed below:

- i) Administration/Maintenance Building: Robbi Gooding
Alternate: Leanne Monteith
- ii) Drum Staging & Process Building: Jessica Maynard
Alternate: Thomas Peschel
- iii) Lab Buildings: Todd Webb
Alternate: Thomas Peschel
- iv) Landfill Area: Jerimiah Meyn
Alternate: Bill Fawcett

5.0.5 For all buildings, a Warden shall be named.

5.0.6 The degree to which the outlined procedures are implemented will depend upon the severity of the incident.

5.1 Serious Injury or Death at Facility

The following procedures outline the responsibilities and communications network in the event of a serious injury or death. Serious injury would include broken bones, traumatic amputation, internal bleeding, loss of an eye, third degree burns, paralysis, poisoning, or significant exposure to designated substances.

5.1.1 Senior Employee at the Scene

Should a serious injury occur at the facility, the Senior Employee should:

- i) Sound alarm and inform Dispatch;
- ii) Assess hazards and provide First Aid until relieved;
- iii) Secure and isolate area;
- iv) In the event of a fatality, the body should be covered but not moved.

The senior employee will then secure the accident site until Emergency Response Team arrives and makes notes for a preliminary accident investigation.

5.1.2 Supervisor

The Operations Supervisor should:

- i) Advise Facility Manager of incident and situation;
- ii) Conduct detailed assessment of cause of incident, and damage to material or equipment;
- iii) Determine if additional personnel or equipment is required;
- iv) Act as coordinator between Emergency Response Team and Resource Team;
- v) Log sequence of events as they occur.

5.1.3 The Facility Manager

The Facility Manager should:

- i) Begin Clean Harbors Canada, Inc. (Ryley) incident alert procedures;
- ii) Convene Resource Team;
- iii) Maintain communication with E.R. Coordinator;
- iv) See Figure 2;
- v) In the event of a fatality, the RCMP must be notified. They will then contact the Medical Examiner's Office.

Note: Telephone use is to be restricted during an emergency. All incoming calls are to be forwarded to the Resource Team.

5.2 Fire and/or Explosion at Facility

The following procedures outline the responsibilities and communications network in the event of a fire and/or explosion at the Facility. The activities outlined may be implemented in varying degrees depending upon the nature and extent of the situation. See Figure 3. For location of the fire hydrant, stand pipes and man-gates, See Figure 4 and 5.

Figure 1

**Clean Harbors Canada, Inc
Ryley, Alberta**

Suggested Revision of Operating Policies and Procedures

Location: _____ Section: _____

Suggested Revision: _____

Suggested Date: _____ By: _____

Concurred By: _____

Routing: Operations Manager

Figure 2

CONTINGENCY PLAN

SERIOUS INJURY OR DEATH

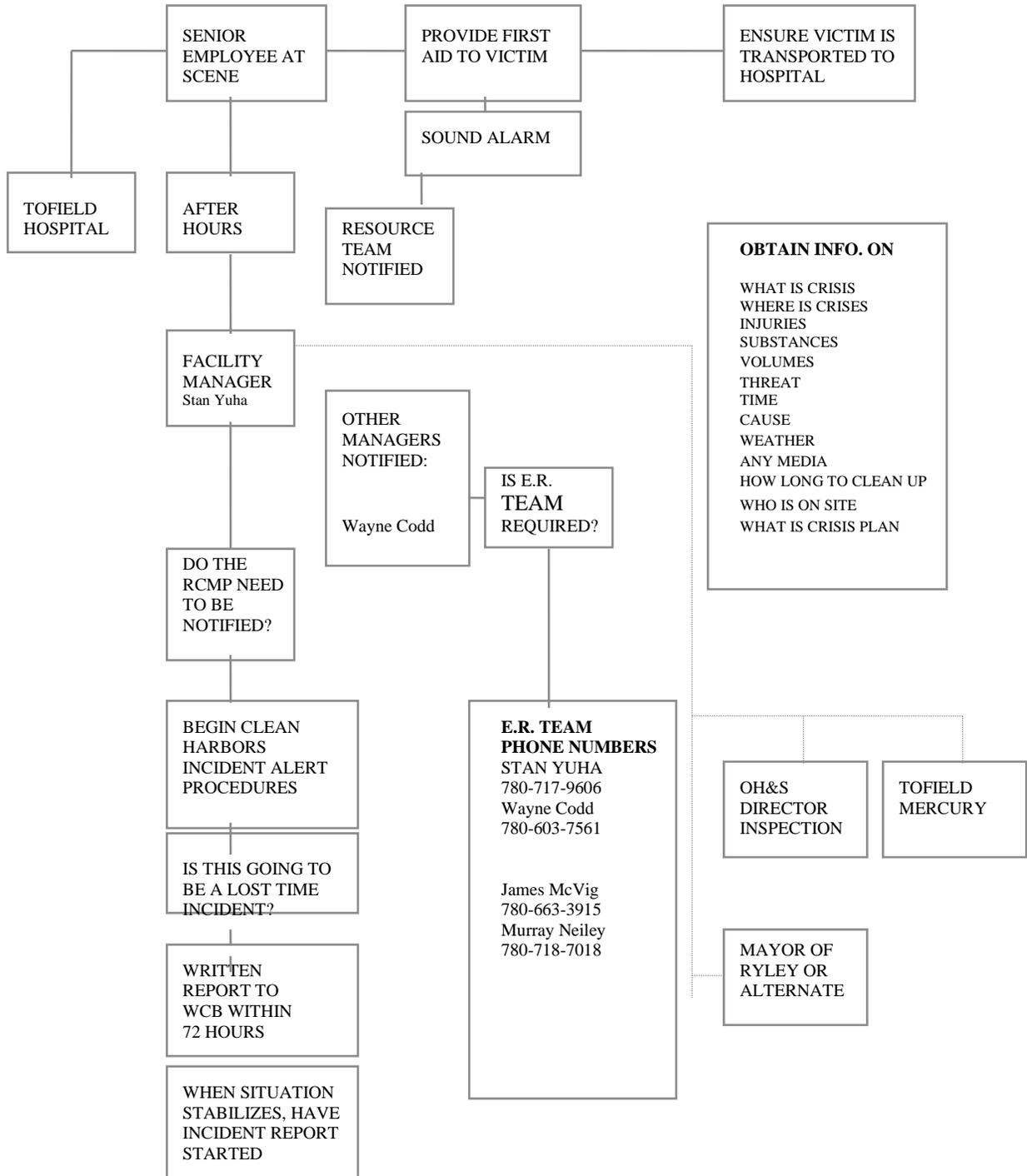


Figure 3

CONTINGENCY PLAN

FIRE AND/OR EXPLOSION

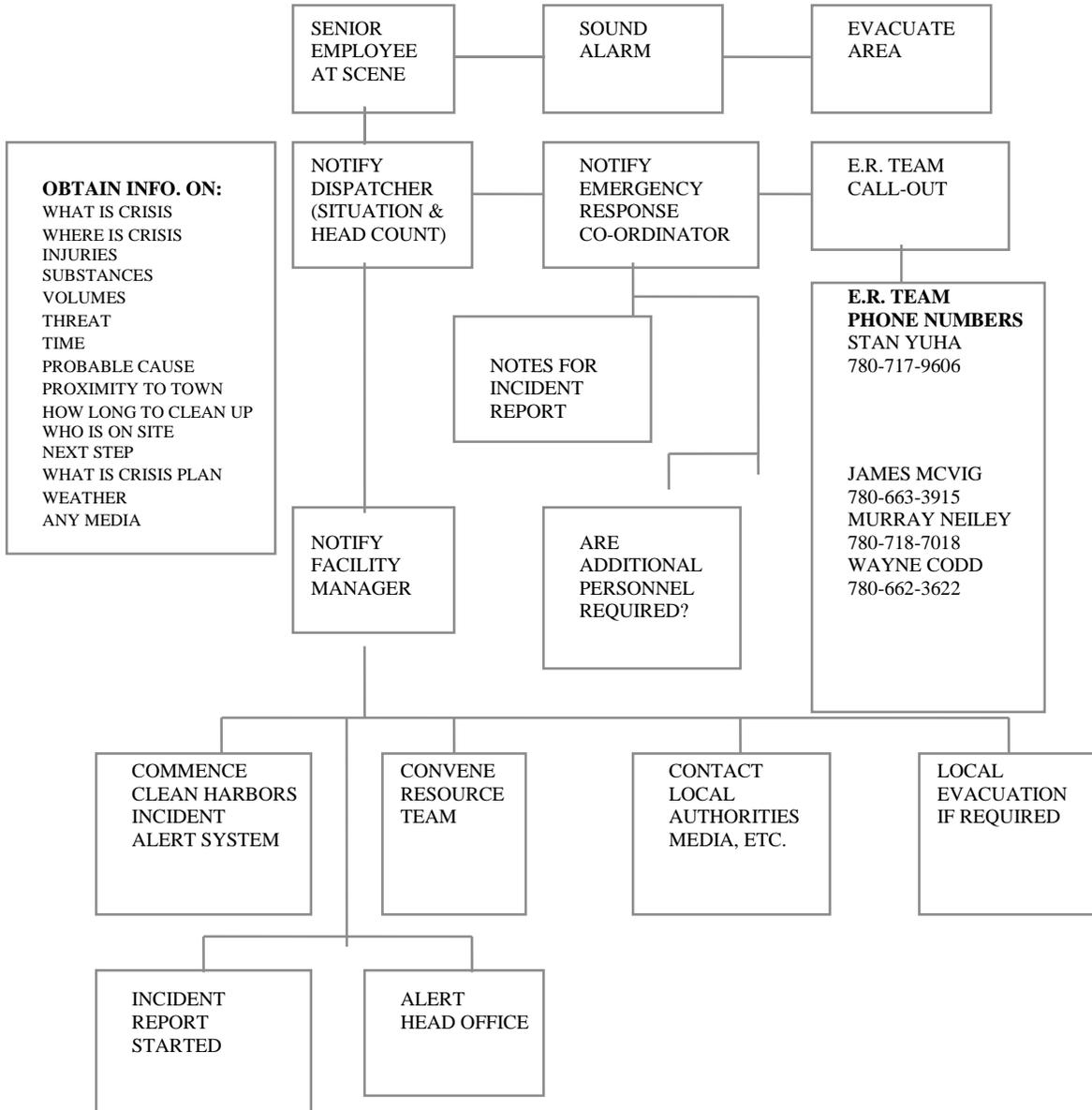
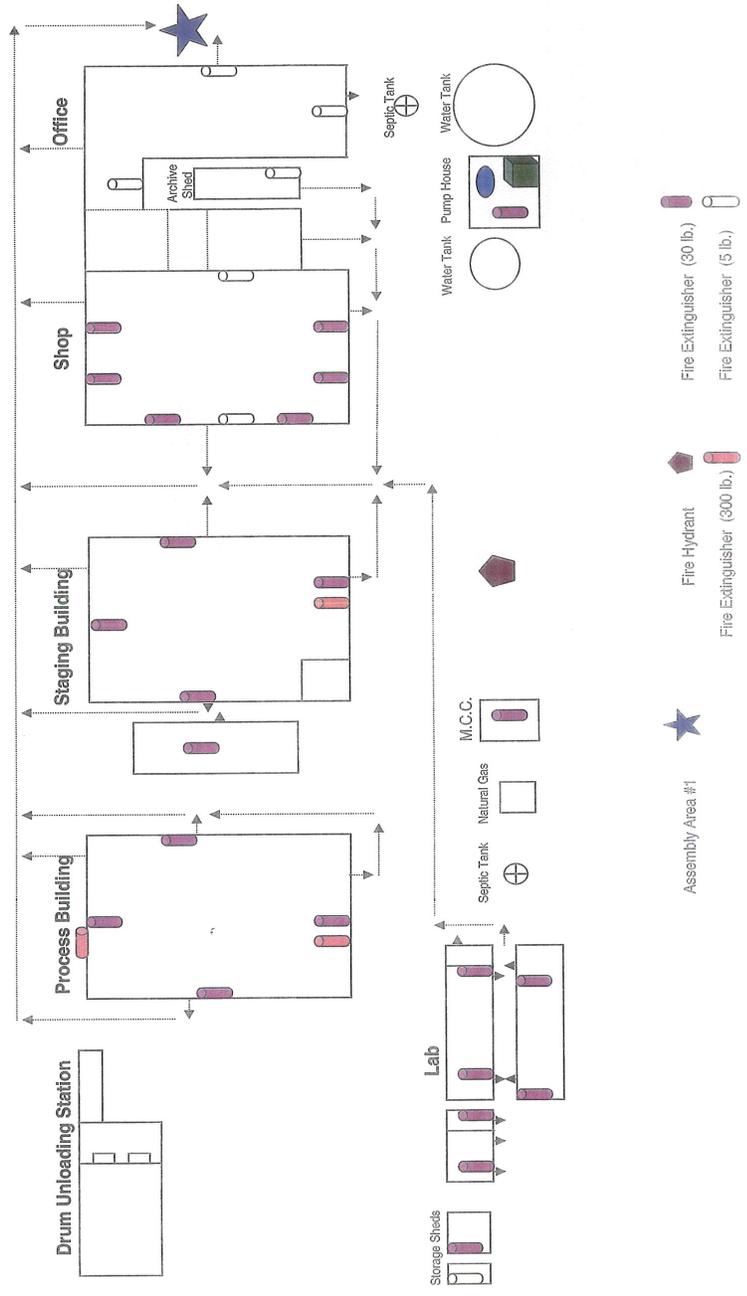


Figure 4

CONTINGENCY PLAN

FIRE HYDRANT AND EXTINGUISHER LOCATIONS

Figure 4
FIRE EXTINGUISHER AND HYDRANT LOCATIONS

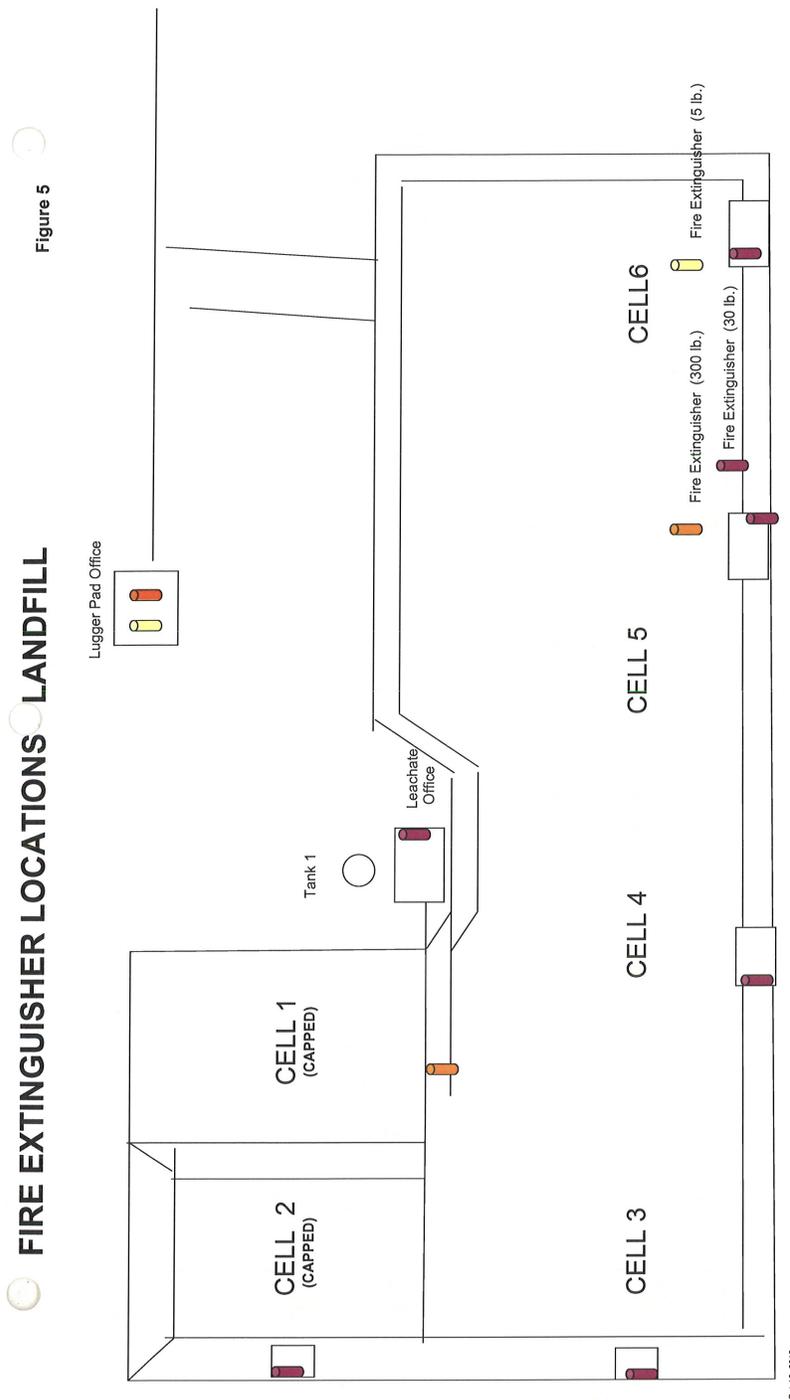


Apr 6, 2011

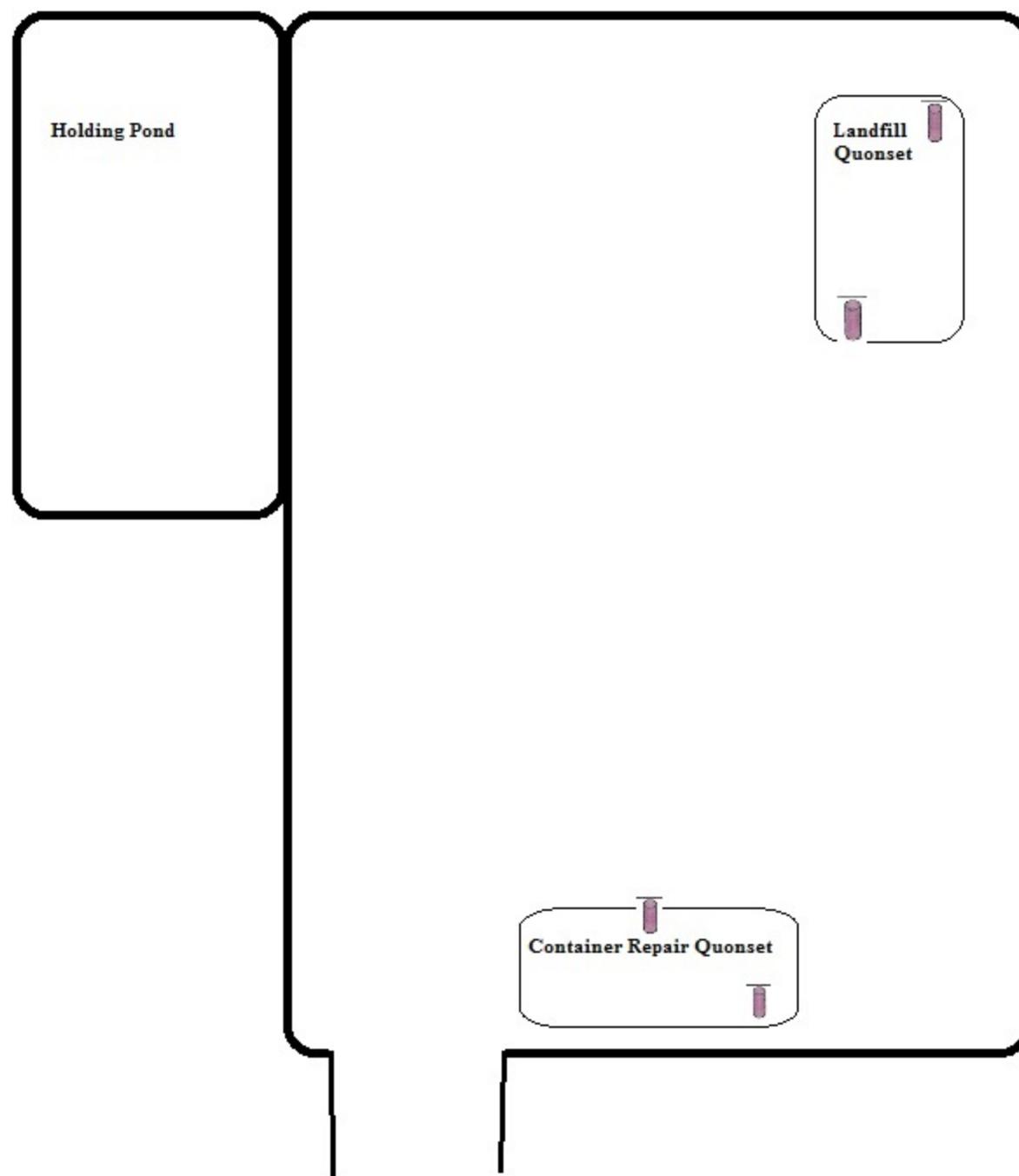
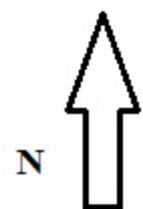
Figure 5

CONTINGENCY PLAN

FIRE HYDRANT AND EXTINGUISHER LOCATIONS



Fire Extinguisher Locations Laydown Area



5.2.1 Senior Employee at Scene

Should a fire or explosion occur at the Facility, the Senior Employee should:

- i) Sound alarm and inform Dispatch
- ii) Assure that all personnel are accounted for and out of danger;
- iii) Secure and isolate area;
- iv) Assess additional manpower needs for firefighting;
- v) Take steps to minimize risk to personnel and loss or damage equipment or material;
- vi) Be prepared for the situation to deteriorate further.

5.2.2 Operations Manager

The Operations Manager should:

- i) Advise Facility Manager of incident and situation;
- ii) Conduct detailed assessment of cause of incident, and damage to material or equipment;
- iii) Determine if additional personnel or equipment is required;
- iv) Act as coordinator between Emergency Response Team and Resource Team;
- v) Log sequence of events as they occur.

5.2.3 Facility Manager

The Facility Manager should:

- i) Convene Resource Team;
- ii) Maintain communication with E.R. Coordinator;
- iii) Begin Clean Harbors Canada, Inc. (Ryley) emergency response procedure;
- iv) Contact local authorities as required (RCMP, etc.).

5.3 Leakage and Spills at Facility

5.3.1 The following procedures outline the responsibilities of personnel and the communication network to be established in the event of a leak or spill at the Facility.

5.3.2 The activities outlined may be implemented in varying degrees depending upon the nature and severity of the incident. See Figure 6.

5.3.3 Definitions

A **leak** is defined as seepage of special waste from a drum or small container or tank (less than 10 liters).

A **small spill** is defined as seepage or spillage of special waste from a drum or small container (more than 10 liters but less than 100 liters).

A **large spill** is defined as a loss of special waste from a drum or drums, or other containers, or from a tank in which the amount lost is greater than 100 liters.

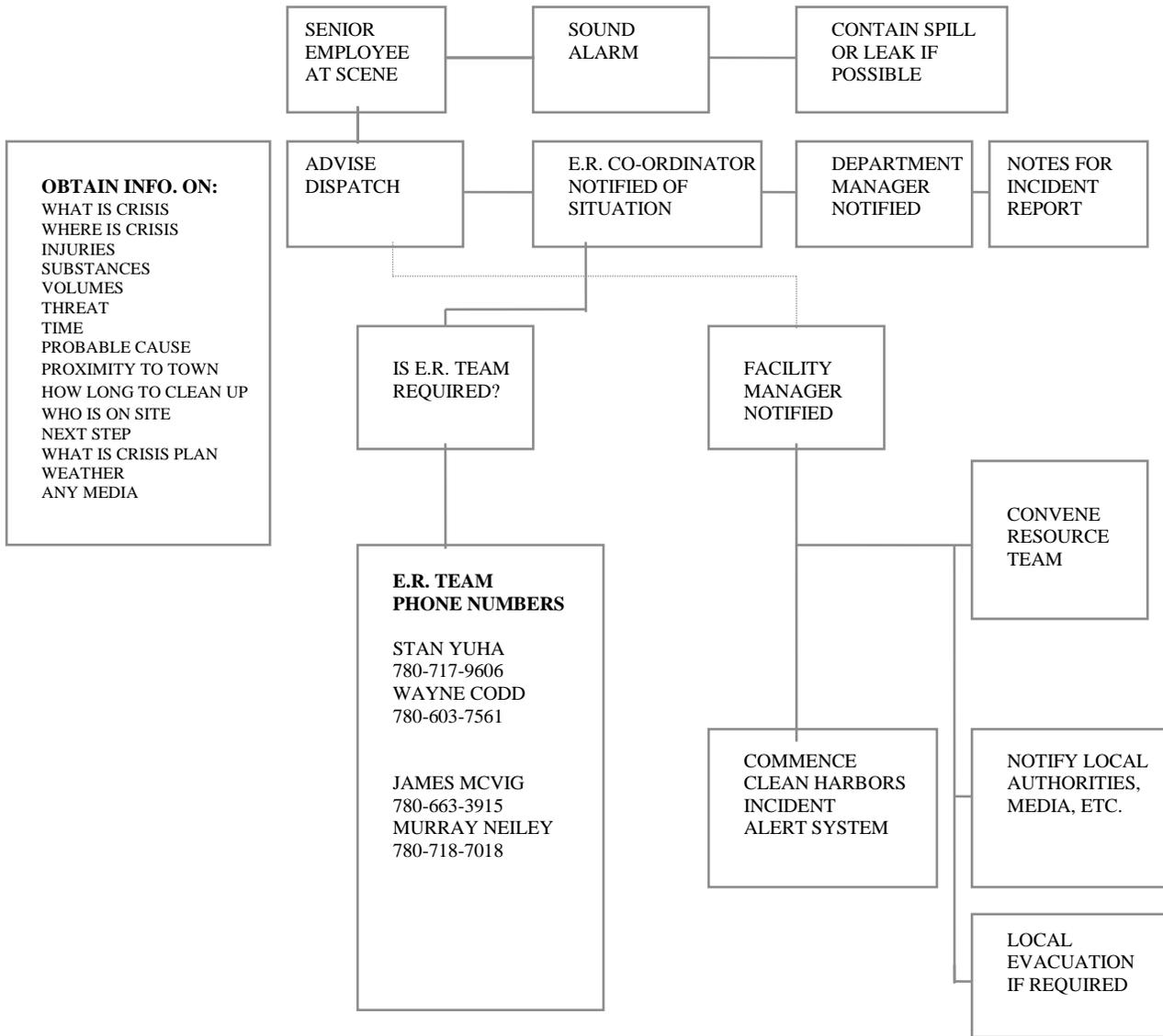
5.3.4 Senior Employee at Scene

The Senior Employee should:

- i) Take measures to contain spill or stop leak, if possible;

CONTINGENCY PLAN

LEAKAGE AND SPILLS



- ii) Identify the components of the waste that has been spilled or is leaking;
- iii) Advise Dispatcher;
- iv) Refer to appropriate WASTE PROFILE SHEET and MATERIAL SAFETY DATA SHEET for information on substance, potential hazards and handling precautions.

5.3.5 Department Supervisor

The Department Supervisor should:

- i) Confirm the identification of the spilled or leaking waste;
- ii) Determine volume of spilled or leaking waste;
- iii) Confirm all necessary immediate response has been initiated;
- iv) Assess need for additional manpower, i.e.: Response Team, contractors;
- v) Advise Facility Manager
- vi) Make notes for incident report.

5.3.6 Facility Manager

The Facility Manager should:

- i) Commence Clean Harbors Canada, Inc. (Ryley) Incident Alert System;
- ii) Convene Resource Team;
- iii) Communicate with E.R. Coordinator during response.

5.4 Bomb Threats

5.4.1 The following procedures outline the responsibilities of personnel and the communications network in the event of a bomb threat at the Facility.

5.4.2 The activities outlined may be implemented in varying degrees depending upon the nature and severity of the incident.

5.4.3 This procedure is designed to combat bomb threats by incorporating the following basic elements:

- i) Obtain as much information as possible from caller;
- ii) Contact Tofield RCMP (911) and other emergency services (Facility Manager);
- iii) Appraise the threat (see Flow Chart for questions). Figure 7;
- iv) Record time, take notes;
- v) Keep caller on the line as long as possible;
- vi) Ask where the bomb is;
- vii) Ask when the bomb will go off;
- viii) Listen for any clues that may be helpful;
- ix) Did the caller have an accent?;
- x) List for background noises and sounds.

5.4.4 Emergency Action

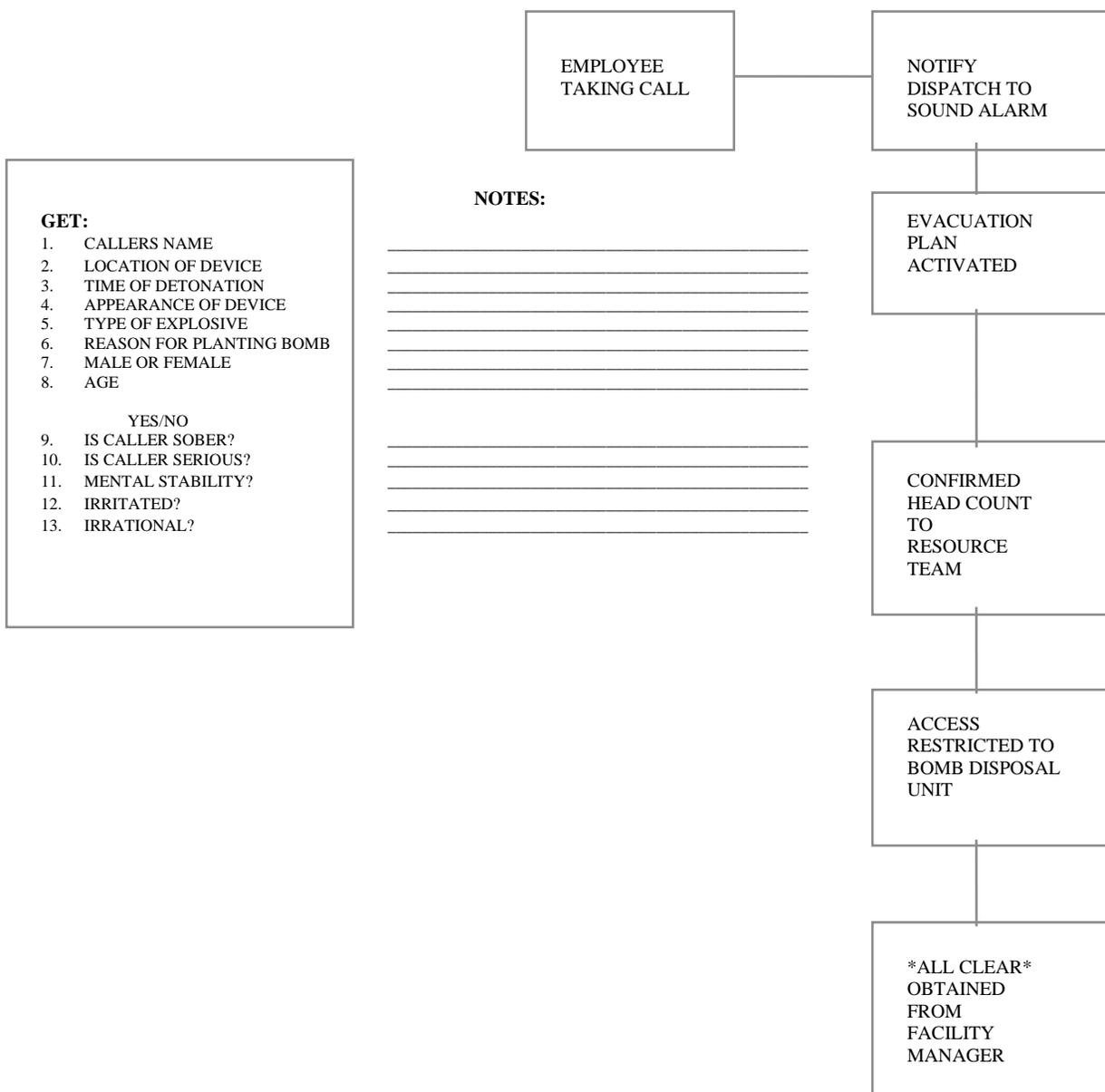
Upon receipt of information, the person answering the phone will advise Dispatch to sound alarm.

The Dispatcher will inform the E.R. Coordinator of the situation and then inform the Facility Manager.

Figure 7

CONTINGENCY PLAN

BOMB THREATS



Once all personnel have been evacuated from all Facility buildings, no one is allowed to re-enter any building for any reason, until given “all-clear” by the responding Bomb Disposal Unit Supervisor in consultation with the Facility Manager.

5.5 Demonstration and Pickets

The possibility exists that the Facility will be a target of demonstrators and pickets. During any such incident, the physical security of the plant assumes a greater importance than under normal conditions.

5.5.1 Advance Warning

Any employee learning that a demonstration is to occur will inform his Department Supervisor or the Facility Manager as soon as possible.

5.5.2 Facility Manager

Once the Facility Manager becomes aware that a demonstration will occur, he will:

- i) Initiate Incident Alert System as required;
- ii) Advise the Tofield RCMP (911) and request assistance;
- iii) Assess the need for additional Facility security;
- iv) Review physical protection of essential services and supplies (water, gas, electrical and phone);
- v) Advise all personnel against antagonistic or threatening behavior;
- vi) Move personal vehicles into secure area if possible;
- vii) Ensure that no shipments will be received until further notice and process operations suspended and secured;
- viii) Discuss with Resource Team;
- ix) See Figure 8.

DO NOT CONFRONT PICKETERS, PLAY A PASSIVE ROLL

5.6 Storms and Tornadoes

Notification: Upon receipt of a severe weather alert via radio, the Dispatcher will notify the Operation's Manager via portable radio and the rest of the plant via the P.A. System.

Severe Weather Warning and Severe Thunderstorms Imply the Possibility of Tornadoes

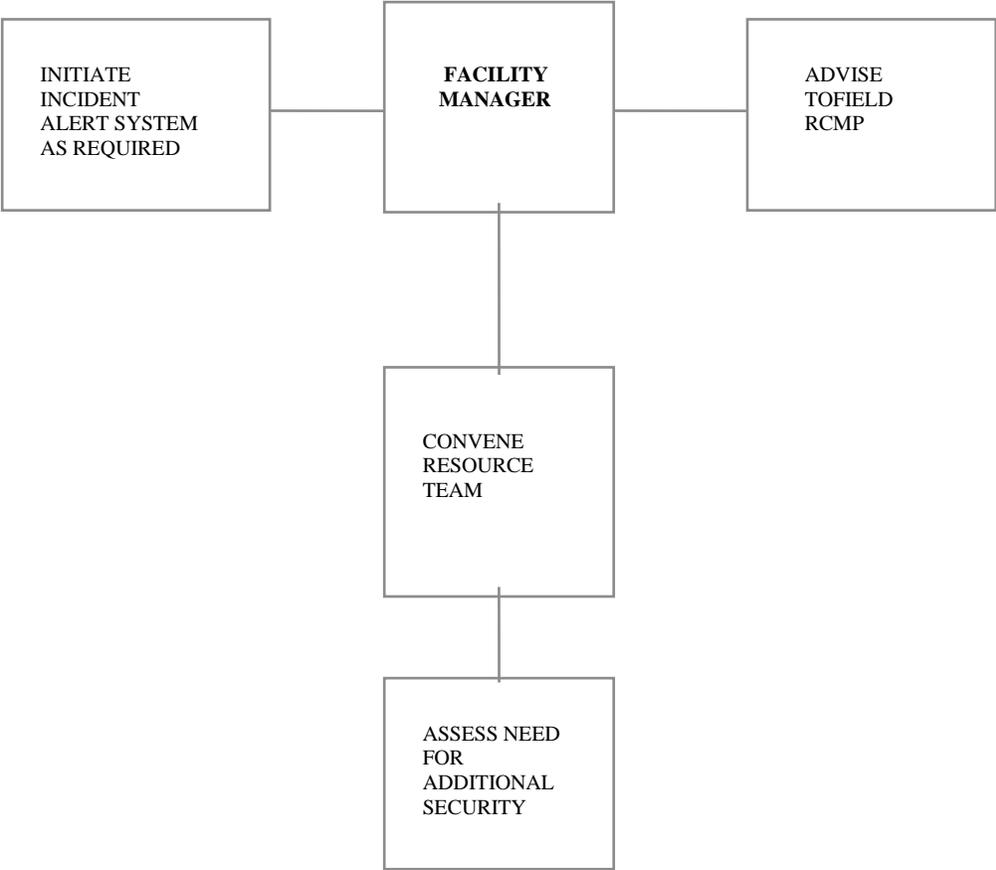
5.6.1 Direct Response

- i) The Emergency Response Coordinator should watch for approaching storm and keep the Plant updated on storm's path via the Dispatcher;
- ii) If a tornado is sighted, inform all staff over the radio and a 911 call will be placed immediately;
- iii) Alert Emergency Response Team to be ready to respond to the aftermath of a severe thunderstorm/tornado;
- iv) Take cover if necessary. See Safety Hints 5.6.3, 5.6.4, 5.6.5, and 5.6.6.

Figure 8

CONTINGENCY PLAN

DEMONSTRATIONS AND PICKETS



Watch Procedure for Tornadoes

- i) Upon receiving a "Tornado Watch" via radio or Weather Alert System, the Dispatcher will notify the Coordinator via the portable radio; the Plant Employees via P.A. System; and Landfill via the mobile radio;
- ii) The Coordinator needs to watch the sky for approaching severe weather, which implies possibility of a tornado;
- iii) The Dispatcher will keep the Coordinator updated by listening to the radio;
- iv) Based on area conditions around the Plant site, the Coordinator will send a spotter to a watch point. The Coordinator will select the watch point and spotter. The spotter must have a clear view in the direction in which the possible tornado is most apt to come from, and stay relatively close to the Plant. This person will stay in continuous contact with the Coordinator via the mobile and/or portable radio.
- v) Upon spotting a tornado, the spotter will notify the Coordinator immediately and proceed to move out of the path himself.
- vi) When the Coordinator and Dispatcher hear that there is a tornado approaching the site, the Dispatcher will announce over the P.A. System for everyone to take cover and also notify Landfill via mobile radio. The Coordinator will notify everyone wearing a portable radio.
- vii) Shut Main Breakers in MCC and Maintenance Shop. After power shutdown radios will work on channel 2 only.
- viii) At this time all Operations will be shut down and the Operators will take cover in the closest safe place.
- ix) Everyone will stay in the safe area until the Coordinator gives the "all clear" via radio, then they will report to their supervisor for a head count;
- x) The Coordinator is responsible for activating any Emergency Response Teams required to respond to the aftermath of a tornado.
- xi) Restoration of power will be determined after the evaluation of any damage.

5.6.2 Safety Hints (Tornado)

- i) Stay away from windows, doors and outside walls;
- ii) Protect your head;
- iii) Shelter under a stairway, sturdy table or in a closet;
- iv) Stay near the center of a building or the side away from the storm;
- v) Avoid large unsupported roof areas like the Vehicle Maintenance Building. If caught in such a building, head for the lowest floor, an inside hallway, small room or get under something sturdy;
- vi) If caught outside or in the tornado path, move away at a right angle. Example: flat in a ditch, depression or ravine;

- vii) DO NOT remain in a small vehicle or light truck, it may over turn;
- viii) If no shelter can be found, hang onto a small tree or shrub.

5.6.3 Safety Hints (Thunderstorm)

- i) Downpours accompanying thunderstorms can cause flash floods, so do not shelter where you may be trapped by rising water.

5.6.4 Safety Hints (Lightning)

- i) Don't make yourself into a lightning rod or stand near a possible lightning conductor;
- ii) Don't project yourself above the surrounding terrain.
- iii) Stay indoors and away from electrical appliances;
- iv) Avoid using phones or showers;
- v) Don't stand under trees or near tall objects;
- vi) In open country drop to your knees, bend forward so that your head is lower than your back, put your hands on your thighs, but don't let your head touch the ground. Don't lie flat on the ground.
- vii) Stay away from open water and metal objects such as clotheslines; wire fences, rails, golf carts, bicycles and farm machinery;
- viii) Don't carry such things as umbrellas, golf clubs, fishing rods, etc.
- ix) Remember that people who are struck by lightning receive severe shocks and may be burned, but they can be handled safely. Victims who appear dead may be revived. Artificial resuscitation is a good start point after help is activated.
- x) Refer to the Facility's Severe Weather Action Plan for more details.

5.6.5 Safety-Hints (Hailstorm)

- i) Large hail often accompanies severe thunderstorms. If caught outdoors, crouch to create as small as an area as possible and protect your head and neck.

5.6.6 All Clear

- i) The Emergency Response Coordinator will announce the "All Clear" via portable radio.
- ii) The Dispatcher will relay this information via the Plant P.A. System.

6.0 Evacuation Plan

- 6.1** In the event that a local evacuation is required, coordination with local authorities will be required. Call 911 and ask for Police and Fire and answer all the questions of the 911 dispatcher to the best of your ability. Once Police and Fire arrive they will obtain as much information as possible to assist their evacuation plans. They will initiate and coordinate any evacuation if needed.

7.0 Emergency Response Team Areas of Responsibility

- 7.0.1** In the event of an emergency team (E.R.T.) call out, the areas of responsibility must be established to avoid duplication of effort, confusion and delay in action.
- 7.0.2** Upon arrival at the scene, the E.R.T. captain should begin the site assessment and control of two (2) priorities, which are as follows:
- a) Search and rescue (SAR); immediately call Fire & EMS (911)
 - b) Control of hazard (CH).

7.1 Search and Rescue

- 7.1.1** A three-(3) man team should immediately begin to co-ordinate a SAR effort. The ERT Captain can contact the E.R. Coordinator to confirm and determine whether or not all personnel have been accounted for. Specific items to be determined by the SAR leader are:
- a) Extent of hazard;
 - b) Specific hazards not readily noticeable;
 - c) Probable/possible locations of any personnel not accounted for;
 - d) Equipment required initiating response;
 - e) Probable cause;
 - f) Any other pertinent information.

- 7.1.2** The remaining members can begin to assemble personal equipment deemed necessary to affect a rescue. When the SAR captain has finished his assessment, he can brief the other members as to what specialized equipment or procedures will be required to commence rescue operations. While the other team members are assembling the required gear, the captain can brief the E.R.T. Coordinator, then begin to organize his own personal gear into position.

7.2 Control of Hazard

- 7.2.1** The E.R.T. members not involved in SAR should begin an immediate control of hazard response. The CH team should begin an immediate site assessment to determine the appropriate response action. The E.R.T. Captain can request through the E.R. Coordinator, information from computerized MSDS files, which may help to determine;
- a) Extent of hazard;
 - b) Specific hazards not readily noticeable;
 - c) Equipment required initiating response;
 - d) Probable cause;
 - e) Any other pertinent information.

7.2.2 The CH team leader can then brief the other CH team members to what specialized equipment or procedures will be required to initiate the response. While the other members are assembling the required gear, the captain can brief the E.R.T. Coordinator, then begin to assemble his own gear into position.

7.3 Specific Personnel Requirements

7.3.1 The E.R.T. Coordinator should ideally be someone from management (Operations). This position is to act as a liaison between the E.R.T. Captain and the Resource Team. The Resource Team will be composed of the Facility Manager, the Transportation Supervisor, and the Lab Supervisor, and will liaise with off-site resources such as Ryley Fire Department, RCMP, Ambulance and Hospital and the media.

7.3.2 The E.R.T. Captain is responsible for the command and control of the team while on call-out. He should keep the E.R.T. Coordinator briefed of the situation and of any developments as they occur, within reason.

7.3.3 One of the CH team members should be a chemical technician with knowledge of the properties and characteristics of substances being dealt with. The other CH team member should be a driver/operator. The remaining members of the team can be made up of personnel that have received the prerequisite training.

7.3.4 The E.R.T. Coordinator can brief other plant personnel and designate assistance if deemed necessary by the E.R.T. Captain. (i.e.: firefighting, etc.).

7.4 Communications

7.4.1 During an E.R.T. call-out, all communications should follow the same path as the organization chart. During call-out, personnel, by human nature, will respond adversely to stress, which will be present. By following prescribed guidelines for communication, errors or omissions can be reduced, allowing for a faster, more effective response to be achieved.

7.4.2 Ideally, communications should be secured to prevent the unauthorized release of information to those not having the “need to know”. All information relative to the response should be made available to the Resource Team, who can then determine which information can be given wider circulation.

7.4.3 A possible series of codes to indicate given situations should be established for use with radio communications to keep information secure. (See Figure 9).

8.0 Quarantine

- 8.1** When an E.R.T. response is initiated, and it has been determined where the problem has occurred, all documentation relative to that shipment should be quarantined to provide an accurate record of material. By keeping an accurate record of material, it will be possible to determine how much, if any, material is lost during the response. (ie. by fire, leak, or evaporation, etc.).
- 8.2** Other documents to be put under quarantine should also include the following:
- a)** Visitor lists;
 - b)** Contractor lists.

9.0 Department Wardens

- 9.1** A designated warden for each department will provide a head count of each department to the Resource Team. The normal Resource Team station will be the Administration building Conference room, and the alternate station will be the Lab Office.

10.0 Wrap-up

- 10.1** When the response has been completed, the E.R.T. members will:
- a)** Decontaminate, clean, store, and replenish gear as required;
 - b)** Make notes of aspects of response that they were directly involved in;
 - c)** Make notes of any aspects of the response that they witnessed;
 - d)** Make notes of any deficiencies, errors, or omissions in the procedures, equipment, etc.
- 10.2** All notes should be given to the E.R.T. Captain so that a brief report can be written (1 hour) and submitted to the E.R.T. Coordinator. An in-depth report should then be written (24 hour) covering all aspects of the response.
- 10.3** During Step A, team members should be discouraged from discussing the response, in order that a clear progression of events can be maintained by each member. These can then be cross-referenced to the E.R.T. Coordinator's log of events to obtain a precise record of the response. Response members should then meet to discuss the incident in order to diffuse stress.
- 10.4** A follow-up meeting should be held (1 week) to address any concerns, and allows for input regarding changes or additions to policy, procedure, etc. Arrangements for critical incident stress debriefing can be determined as required.

11.0 Training

- 11.1** Training requirements at the Ryley Facility have been set such that response team employees will receive as a minimum, the following courses:
- a)** Fire extinguisher training;
 - b)** First aid;
 - c)** CPR;
 - d)** WHMIS;
 - e)** TDG.

12.0 Response Team Training

12.1 In addition to the general plant training, the Response Team may also receive, but not limited to the following additional training:

- a) Fire-fighting;
- b) Emergency response;
- c) Confined spaces entry and rescue.

12.2 Training will be provided to members such that a level of competence, that meets industry standards, is achieved.

13.0 Drills

13.1 The E.R.T. will perform practice drills of varying difficulty and scope. These drills will be defined as follows:

- a) **Minor** – a leaking drum or flange;
- b) **Moderate** – split container, vehicle accident (including injuries), small fire; moderate emergencies are such that they have a very real potential of becoming major if not acted upon quickly.
- c) **Major** – a large spill involving a large tank, difficult terrain, fire, toxic chemicals, or men down.

- **Note** – A major drill may incorporate a moderate drill and a moderate drill may incorporate a minor drill.

13.2 Drill Log and Evaluation

A record shall be kept indicating when emergency response drills are performed, the scope of the drill (minor, moderate, or major) and the effectiveness of the drill.

CONTINGENCY PLAN

Radio Secure Transmission Codes

INJURY/DEATH

Green	- minor injury	- treatable on site
Yellow	- moderate injury	- treatable off site - not requiring hospitalization
Red	- major injury	- treatable off site - requiring hospitalization
Black	- fatality	- do not move unless threatened by fire

FIRE/EXPLOSION

Orange	- fire	- any fire on site shall be considered serious, regardless of size
White	- explosion	- may be a result of fire or may cause fire to spread

These codes may be given in random to explain sequence of event.

LEAKS/SPILLS

Brown	- loss of containment of waste.
-------	---------------------------------

13.3 Emergency Response Drills

13.3.1 The following scenarios listed for each category of emergency (minor, moderate, and major) will have a sub-category of injury, fire, and spill.

13.3.2 Minor emergency scenarios:

- a) Leaking drum of glycol in drum storage building;
- b) Small fire in wastepaper basket;
- c) Person slips on ice; suspected sprained ankle.

Minor emergencies are such that they should be able to be responded to by any plant personnel. The E.R.T Captain and the E.R.T. Coordinator should be made aware of the situation as soon as possible, in the event that the situation deteriorates further. Minor emergencies pose little or no threat to personnel, property or environment.

13.3.3 Moderate emergency scenarios:

- a) Tanker parked in yard has leaked approximately 200 gallons of used motor oil;
- b) Fire in vehicle engine compartment;
- c) Person struck by vehicle backing up; suspected broken leg and concussion.

Moderate emergencies are such that they should be responded to by the E.R.T., as special equipment or procedures may be required to affect a response. Moderate emergencies pose a possible threat to personnel, property and/or environment.

13.3.4 Major emergency scenarios:

- a) Leak in tank farm; unknown quantity of caustic liquid on ground;
- b) Reactive fire in labpack processing area;
- c) Man down in leachate system pit area; unconscious, unknown injuries.

Major emergencies are such that they must be responded to by the E.R.T. as quickly as possible. Major emergencies constitute a definite and immediate threat to personnel, property and/or the environment.

14.0 Evaluation

14.1 A process of determining the effectiveness of the response must be laid out prior to the institution of an E.R.T. program, in order that a fair and objective evaluation can be made. By assessing each response in a similar manner, standards can be achieved and maintained at desired levels.

14.2 The evaluation should be broad in scope in order that no aspect of the response is overlooked, yet able to pinpoint areas of weakness in procedure or policy that deter from the required objective.

14.3 The following areas should be the basis of an evaluation to an emergency response:

- a) Actual response times:
 - how quickly after the incident was the alarm sounded;
 - how long did evacuation plans take to complete;
 - how long before an accurate account of personnel on site was completed;

- how long before form-up of E.R.T.;
 - how long before site assessment by E.R.T. Captain;
 - how long before E.R.T. Coordinator was briefed by E.R.T. Captain.
- b) Operational procedures:**
- are operational procedures streamlined enough to provide an effective response yet broad enough in scope to encompass all aspects of the response?
- c) Technical procedures:**
- most procedures (i.e. use of specialized equipment) will be set out according to the manufacturer's operations manual.
- These procedures can be tailored to Ryley's own requirements as required and refined during training.
- d) Communications:**
- review communications network to determine any areas that require change or improvement.
- e) Personnel:**
- determine any areas where training of personnel can be improved. Constructive criticism of personnel performance to determine where improvements can be made.
- f) Equipment:**
- review equipment performance to determine effectiveness;
 - maintain a catalogue of equipment, which may improve or streamline ability to complete required tasks.
- g) Miscellaneous:**
- any other aspects of the response that need to be addressed.

15.0 Critique of Evaluation

A critique of each evaluation should be done to determine if all aspects were dealt with accordingly. The critique should be done in a manner that ensures that criticism is kept on a constructive level.

16.0 Emergency Response Protocol

The proper emergency response requires preparation. The purpose of this document is to provide guidance for the medical management of exposure situations. Clearly, training and experience must augment portions of this protocol.

The recommended protocol is:

- a)** Rescue, when necessary, employing proper equipment and methods.
- b)** Attention to emergency health problems – breathing, cardiac functions, bleeding, shock.
- c)** Obtain as much exposure history as possible (a sample is attached).
- d)** Transfer the victim to the medical facility designated by suitable and appropriate conveyance.

- e) Call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the EMR physician. EMR will contact the medical facility and request specific testing which may be appropriate. EMR physicians will monitor the care of the victim. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- f) Call EMR, being prepared to provide:
 - i) Any known information about the nature of the exposure;
 - ii) As much of the exposure history as was feasible to determine in the time allowed;
 - iii) Name and phone number of the medical facility to which the victim(s) has/have been taken.
 - iv) Names of the exposed individuals.
 - v) Name and phone number of an informed site officer who will be responsible for further investigations.

As environmental data is gathered and the exposure scenario becomes more clearly defined, this information should be forwarded to the EMR Medical Director or Assistant Medical Director.

EMR will compile the results of all data and provide a summary report of the incident. A copy of this report should be placed in each victim's medical file in addition to being distributed to appropriately designated company officials.

Each individual worker will receive a letter describing the incident but deleting any personal or individual comments. A personalized letter describing the individual findings/results will accompany this generalized summary. A copy of the personal letter will be filed in the continuing medical file maintained by EMR.

Potential Exposure Report

Name: _____ Date of Exposure: _____

Social Security No: _____ Age: _____ Sex: _____

Client Contact: _____ Phone #: _____ Co: _____

I. Exposing Agent

What was individual doing? _____

How long did individual work in area before signs/symptoms developed? _____

Was protective gear being used? If yes, what was the PPE? _____

Was there skin contact? _____

Was the exposing agent inhaled? _____

Were other persons exposed? If yes, did they experience symptoms? _____

II. Signs and Symptoms (check off appropriate symptoms)

Immediately With Exposure:

Burning of eyes, nose, or throat

Tearing

Headache

Cough

Shortness of breath

Chest tightness/pressure

Nausea/vomiting

Dizziness

Weakness

Delayed Symptoms:

Weakness

Nausea/vomiting

Shortness of breath

Cough

Loss of appetite

Abdominal pain

Headache

Numbness/tingling

III. Present Status of Symptoms (check off appropriate symptoms)

Burning eyes, nose, or throat

Tearing

Headache

Cough

Shortness of breath

Chest tightness/pressure

Cyanosis

Nausea/vomiting

Dizziness

Weakness

Loss of appetite

Abdominal pain

Numbness/tingling

Have symptoms: (please check off appropriate response and give duration of symptoms)

Improved _____ Worsened _____ Remained Unchanged _____

IV. Treatment of Symptoms (check off appropriate response)

None _____

Self-medicated _____

Physician Treated _____

17.0 PCB Handling

17.1 PCB Fires

The Ryley facility's Process and Staging buildings are supplied with all necessary equipment to handle PCB fires. It should be noted that should a fire occur in one of the above-mentioned buildings, the building exhaust fans will not start as per the fire system interlock. The exhaust fans are for fume removal only, should it be required.

The foam fire suppression sprinkler system is more than capable of containing PCB fires as per the Alberta Fire Code –1997.

17.2 PPE for PCB Waste Handling

Routine precautions should be observed when handling liquids containing PCB's. The protective clothing to be worn will vary with individual circumstances, such as concentration, quantity of PCBs and whether in solid or liquid form. Where workers may come in direct contact with askarel (pure PCBs), protective clothing impervious to PCBs should be worn. Gloves, boots, disposal coveralls, bib-type aprons, and eye protection (face shields or chemical safety goggles) should be worn as necessary. Materials used to protect against dermal exposure are compared in the following Table 1.

TABLE 1

Materials used for Protection from Dermal Exposure to Undiluted PCBs

Highly Recommended (provides protection for over one hour)	Recommended (provides protection for 1 hour)	Limited use or <u>Not Recommended</u> (provides protection for less than 1 hour)
Butyl Rubber Neoprene Nitrile Rubber Polyvinyl Alcohol Viton Saranex Teflon	Chlorinated Polyethylene	Styrene Butadiene Rubber Natural Rubber

Where PCBs are in closed containers such as capacitors, transformers, tanks or drums, or are entrapped in solid substances or equipment, and there is not direct contact with PCBs, special clothing and apparatus may not be necessary, e.g., if a lift truck operator is moving a drum or a palletted piece of PCB equipment.

As a general rule, the handling of hot liquids should be avoided. If the temperature of the liquid is above 55°C, a full-face, self-contained breathing apparatus should be worn for other than brief periods of exposure.

EMERGENCY PHONE NUMBERS
OUR LICENCE NUMBER: 10348-02-00

AEP (Spill & Contravention Reporting)	1-800-222-6514
AMBULANCE – Tofield	911
RCMP – Tofield.	911
FIRE – Ryley.	911
FIRE – Tofield	911
POISON CENTRE	1-800-332-1414
CHUBB SECURITY	1-888-353-7989
	1-780-423-3281
	1-780-421-4841
AFTER HOURS EMERGENCY #	1-780-690-0614
VILLAGE OF RYLEY	780-663-3653
COUNTY OF BEAVER	780- 663-3730
Rick Elles – (Director of Disaster Services) cell	1-780 910-3562
AEP - EMERGENCY #	1-800-222-6514
AEP - Non-Emergency	1-800-272-9600
Ryan Taylor (Health & Safety Mgr)	1-435-393-1050
Brian Fraser (Compliance Manager)	1-780-288-2797
Mike Parker (V.P Environmental Compliance)	1-519-312-8522
Cliff's Towing – (Edmonton)	1-780-451-5555
Plumber – B & M – (Tofield)	780-662-2454
Electrician – D-2 Electric	1-780-672-8700
Backhoe & Heavy Equipment – Jerry's Backhoe – (Tofield)	780- 662-3408
Transportation Department – Mobile Numbers	
Tyler Esak.	1-780-777-6906
Leanne Monteith.	1-780-235-5374
On-Call Personnel – Mobile Stan Yuha	1-780-717-9606
	Wayne Codd 1-780-603-7561

RESPONSE TEAM HOME NUMBERS

Stan Yuha	780-662-3889
Wayne Codd	780-662-3622
James McVig.	780-663-3915
Murray Neiley.	780-718-7018



EMERGENCY RESPONSE PLAN

Approved By: Stan Yuha, Facility Manager

Signature

Approved By: Wayne Codd, Operations Manager

Signature

1.0 Emergency Response Procedure

1.1 Purpose of Procedure

To establish a pre-determined plan of action for facility staff and visitors during emergency situations at the facility. Such emergency procedures should be designed to protect personnel, property and the environment.

1.2 Introduction

The nature of the Ryley facility is such that emergency situations could arise from the operations of waste management. Emergency situations could include fire, spills, and uncontrolled reactions of incompatible wastes and/or reagents, personal injury accidents, severe weather scenarios and other unforeseen situations.

The Ryley facility is equipped with an alarm horn which when sounded will initiate the following emergency actions of plant staff and visitors.

The objective of these emergency procedures is to manage the emergency around the following points:

- a) Sound an audible alarm to initiate appropriate actions.
- b) Account for all staff and visitors by gathering all persons except our response team in a pre-determined assembly area.
- c) Confirm the location and safety of individuals by means of a head count and to initiate a search for those persons unaccounted for.
- d) Set up a communications system to facilitate crisis management.
- e) Secure the facility, control and rectify the emergency and initiate further Incident Alert Procedures.
- f) Ensure all visitors or contractors on site have an assigned sponsor to sign them in.
- g) Define role of third party Emergency Response Teams if required by facility. (Local Fire Departments, Ambulance & RCMP)

1.3 Steps to Follow During an Emergency

- a) Emergencies will normally be reported by plant staff via telephone, radio communication or face to face reports. Once reported, the alarm switch in the Dispatch office should be activated. Announce alarm over radio as well.
- b) Once the alarm has been sounded, a brief P.A. announcement giving the nature and location of the emergency will be made. After the P.A. announcement is made, the same announcement will be made over the two-way radio system.
- c) Upon hearing the alarm all personnel, including contractors, will secure their job and report immediately to the appropriate assembly area.
- d) Upon hearing the alarm, the Response Team will congregate at the Fire Pump House to plan any needed response. The Operations Manager or his delegate will coordinate the Response Team.
- e) Upon hearing the alarm, facility personnel, contractors and visitors will congregate at the designated assembly area. In cases of inclement weather, and at the conclusion of a satisfactory head count, plant personnel in the main assembly area may be directed to enter the administrative building for the remainder of the emergency.
- f) Upon hearing the alarm, the Fire Warden or Designate will deliver the sign-in register to the conference room along with a two-way radio and cell phone. The supervisor will then secure the front gate and conduct the head count. After performing the head count, the Fire Warden will join the Resource Team in the conference room.
- g) Upon hearing the alarm, the Facility Manager or designate and the Fire Warden will meet in the conference room and make up the Resource Team.
- h) Upon hearing the alarm, the Receptionist will forward all incoming calls to the answering service and proceed to the appropriate assembly area for a head count.
- i) The Resource Team will initiate the incident alert system as required, supply support for the Emergency Response Coordinator (the Operations Manager or his delegate).
- j) Upon hearing the alarm, the Emergency Response Coordinator will determine the location and nature of the emergency and coordinate the Emergency Response Team's response as necessary.
- k) Upon hearing the alarm, it will be the responsibility of each Manager and Supervisor to account for his or her staff for the purpose of the head count.
- l) Upon hearing the alarm, each sponsor of a visitor or contractor is responsible to account for his or her visitor or contractor.
- m) Unless directed (otherwise), all personnel should report to the normal assembly areas. Each situation may require that an alternate assembly area be used; this alternate area will be announced on the P.A. system and radio system. Any permits issued prior to the alarm are void and new permits will have to be made out for all contractors or operations requiring them.
- n) At the conclusion of the emergency, on advice from the Emergency Coordinator, the Resource Team will sound the "All Clear".

1.4 Roles of Third Party Response Teams

- a)** In the event that the facility's Emergency Response Team needs assistance from a third party Emergency Response Team, this request is to be made by the Response Team Coordinator to the Resource Team who will in turn contact the required services.
- b)** Once the third party Emergency Response Team(s) arrive, they will stop outside the fence/gate and await further instruction from the Emergency Response Coordinator.
- c)** The Clean Harbors Response Coordinator will remain Incident Scene Commander or a joint command will be formed.

APPENDIX C

Fugitive Dust and Odour Best Management Plan

**FUGITIVE DUST & ODOUR
BEST MANAGEMENT
PLAN**

**TABLE OF
CONTENTS**

1.0 INTRODUCTION..... 4

2.0 FACILITY & PROCESS
DESCSCRIPTION..... 4

3.0 SOURCES OF FUGITIVE DUST & ODOUR..... 5

 3.1 PAVED ROADS..... 5

 3.2 UNPAVED ROADS 5

 3.3 STORAGE PILES..... 6

 3.4 CONTAINER LAYDOWN AREAS 6

 3.5 LEACHATE.....6

 3.6 LANDFILL..... 6

 3.7 SOLIDIFICATION AND STABILIZATION PIT.....7

4.0 CONTROL METHODOLOGY AND FREQUENCY..... 7

 4.1 PAVED ROADS..... 7

 4.2 UNPAVED ROADS.....8

 4.3 STORAGE PILES..... 8

 4.4 CONTAINER LAYDOWN AREAS..... 8

 4.5 LANDFILL..... 9

5.0 INSPECTION AND MAINTENANCE PROCEDURES..... 9

6.0 TRAINING OF STAFF 9

7.0 CONTINUINGIMPROVEMENTS..... 10

8.0 ENVIRONMENTAL MANAGEMENT PROGRAM11

APPENDICES

APPENDIX A INTERNAL COMPLAINT REPORT
APPENDIX B EXTERNAL COMPLAINT REPORT

MATERIAL SAFETY DATA SHEETS

Dust Lynx H56
Ecosorb 606
Calcium Chloride
Portland Cement

1.0 INTRODUCTION

The following report details the Fugitive Dust and Odour Best Management Plan (BMP) prepared for Clean Harbors Canada, Inc. Ryley Facility, located 2 km north of Highway 14 on the west side of Secondary Road 854, Alberta. The purpose of this BMP is to identify the sources of fugitive dust & odour emissions within the Facility, and to provide details about the management programs that are used to control these emissions.

The objectives of this BMP are to:

- Provide an overview of the processes at the Facility and identify potential sources of fugitive dust;
- Assess the human health risks posed by the fugitive dust through a review of the size range and composition of the dust particles;
- Discuss dust control measures and implementation frequency for each of the identified sources;
- Discuss odour control measures and implementation frequency for each of the identified sources;
- Outline maintenance and inspection procedures;
- Illustrate how ongoing compliance is ensured through the use of a monitoring and record-keeping program; and
- Detail the employee training program for fugitive dust control procedures.

2.0 FACILITY & PROCESS DESCRIPTION

Clean Harbors Ryley facility is a hazardous waste transfer station as well as a secure landfill located 2 km north of Highway 14 on the west side of Secondary Road 854, in east central Alberta. A Site Location Plan is provided on Figure 1.

This facility is permitted to accept all hazardous wastes with the exception of explosives, radioactive wastes and infectious wastes. Although the Ryley facility is permitted to solidify and stabilize hazardous waste on its site, it cannot import hazardous waste for landfill disposal. It can import non-hazardous waste for landfill disposal.

Ryley Facility consists of vehicle maintenance building, drum staging and processing buildings, air emissions control building and the secure landfills. The apron around the buildings and the main roadway to the landfill is paved. Truck traffic to the landfill occurs on paved road up to the graveled landfill access road into the landfill and onto a tipping pad constructed of rig mats.

3.0 SOURCE OF FUGITIVE DUST & ODOUR

The sources of fugitive dust and odour that have been identified for the facility activities are included in the following table, recognizing that some of these areas contribute to both dust and odour:

DUST	ODOUR
Paved Roads	Landfill
Unpaved Roads	Mixing pits
Storage Piles	Leachate
Container lay-down areas	Transfer operations

3.1 PAVED ROADS

The paved roads used by the Facility are indicated on the site plan as Figure 2. The roads are used by heavy transport vehicles (transport trucks and landfill vehicles) to transport solid hazardous waste to the landfill; by operations personnel in pick-up trucks, back-hoes, forklifts, yard trucks and vans.

The paved roads may be a source of Particulate Matter (PM) and PM₁₀ emissions, from the accumulation of dust on the road surface deposited by vehicular traffic. Vehicle speed, vehicle weight, moisture content, and silt content are all critical factors in the amount of fugitive dust emitted from paved roads. The particle distribution of the dust tends to have a greater percentage of fines than unpaved roads, but there is significantly less dust on paved roads. PM₁₀ is the respirable fraction of particulate and can have an impact on human health. The metals content of this dust is negligible. The emissions of PM₁₀ from the paved roads are controlled and the off-site concentrations are expected to be below levels of human health concern.

3.2 UNPAVED ROADS

The unpaved roads used by the Facility are indicated on Figure 2. The roads in the landfill area are used by landfill vehicles as part of solid waste disposal activities and by excavation vehicles for earth moving activities. The unpaved yards in the staging/laydown areas are used by vehicles laying down luggers and roll-offs for temporary storage and for staging trailers and containers for transportation activities.

Chapter 11.19 of the USEPA AP-42 document identifies unpaved haul roads as a source of PM and PM₁₀ emissions, in the form of fugitive dust. Vehicle speed, vehicle weight, moisture content, and silt content are all critical factors in the amount of fugitive dust emitted from unpaved roads. Particle sizing and composition will vary at the Facility, but emissions of trace metals will be negligible. PM₁₀ is the respirable fraction of

particulate and can have an impact on human health. The emissions of PM₁₀ from the unpaved roads are controlled and the off- site concentrations are expected to be below levels of human health concern.

3.3 STORAGE PILES

The site may stockpile clay materials, sub-soil and top soil that is removed in the course of cell construction and removed from open areas on-site. Material is stored in piles in the area south of landfill Cells 3A and 3B. The consistency of this product is clay and soil.

The fugitive dust emissions from this area are therefore generally not respirable and do not pose any human health risks.

3.4 CONTAINER LAYDOWN AREAS

Container lay-down areas are used by the various operations at the facility for temporary storage of luggers and roll-off containers prior to and after processing or landfill activity. These areas are monitored by supervisory staff on a daily basis. They are west of the surface water pond and north of Landfill Cells 3C and 3D shown on Figure 2. A small portion of this area is paved but most of it is unpaved. The contours of the surface are sloped to provide storm water run-off control to contained areas on the site.

3.5 LEACHATE

All precipitation that enters any working landfill cell and comes into contact with waste is handled as landfill leachate. The leachate is collected using pumps and pipes and transferred to the leachate storage tanks. The landfill leachate can contain dissolved salts, dissolved organics, and trace concentrations of heavy metals and ammonia. The leachate storage tanks have a total storage capacity of 570,000 liters. The leachate is pumped from the leachate storage tanks to tanker trucks and shipped off-site for deep well disposal.

3.6 LANDFILL

A portion of the solid waste received for landfill disposal contains volatile organic compounds (VOCs) that depending upon environmental factors such as wind speed and temperature will volatilize from the exposed surface of the waste. A key factor that affects the rate of volatilization is the size of the exposed waste face. These emissions could lead to off-site odours or unacceptable ambient air quality.

The release of VOC to the atmosphere from the waste is not a constant phenomenon. A freshly placed load of waste will have the highest rate of VOC release when initially placed. As the surface of the waste becomes depleted in VOC (due to the volatilization loss) the overall rates of VOC release decreases markedly. This is because the remaining VOC contained within the waste mass must diffuse out to the surface from within the solid matrix. Thus the rate of diffusion within the solid waste mass becomes the rate- limiting factor to the VOC emission rate.

3.7 SOLIDIFICATION AND STABILIZATION PIT

The facility has two solidification and stabilization pits located in landfill Cell 3D. The facility receives wet waste that requires solidification to pass the paint filter test and/or operational requirements and wet or dry wastes that require stabilization to meet landfill disposal criteria. Many of these waste streams are received from interceptor sumps and tank cleanout operations. These types of wastes have the potential to contain organic chemicals/hydrocarbons that may have some odour. The facility will process these wastes and to transport them promptly to the disposal area where they will be covered to minimize their exposure to the atmosphere.

The most common drying agents are peat moss and wood chips. Fugitive emissions from these stockpiles do not pose any human health risks. They also act as odour mitigation reagents by acting as a bio-filter.

Stabilization is generally accomplished using Portland cement. Portland cement is a fine particulate. This process is only conducted when the wind speed is low to minimize any airborne particulate creation. To further control dust emissions the cement is added in super sacs to a mixture of the waste being stabilized and water. The super sacs are opened with the bucket of the excavator when in contact with the water-waste mixture. The waste, water and reagent are mixed slowly with the excavator to minimize any dust emission.

When mixing is complete, the damp stabilized material is transferred to lugger bins to cure before testing to ensure that the material is suitable for landfill disposal. There are no fugitive dust emissions from the operation at this point.

4.0 CONTROL METHODOLOGY AND FREQUENCY

Reducing the potential for fugitive dust generation is an ongoing commitment, especially during the hot and dry summer months. This section provides an overview of the procedures in place at the Facility to limit emissions of fugitive dust from potential sources.

4.1 PAVED ROADS

Treatment measures include washing the road with water, spraying water to reduce dust emissions and sweeping the roadways with a sweeper attachment for the facility's skidsteer. If fugitive dust emissions become a concern during cold, dry winter conditions, sweeping may be employed instead of washing in order to avoid safety concerns as a result of ice formation on the roadways. Sweeping can be contracted on a situational basis with the Town of Tofield.

- 4.1.1 Paved roads, aprons, and the area from front gate to Secondary 854 line is watered during dry periods to keep down road dust.

- 4.1.2 A sweeper operates regularly in the same areas to remove as much dust as possible from paved roads throughout the facility with special emphasis on the paved landfill access areas.
- 4.1.3 All facility roads have a speed limit of 20 km/hr, intended to keep down dust as well as for safety reasons. Drivers, including yard drivers, found to be exceeding the speed limit will be disciplined.

4.2 UNPAVED ROADS

The majority of unpaved roads at the Facility are treated with a commercial dust suppressant that renders the road close to paved quality. The MSDS for this product is included in Appendix A. The product is applied as needed from the early spring to late fall. The treated roads are maintained through the application of water once the coating has initially cured.

The unpaved roads that are not eligible for treatment with the commercial dust suppressant are watered to control the emissions of fugitive dust on a daily basis, as needed, using a watering truck. Emissions are further controlled by a posted speed limit of 20 km/hr.

- 4.2.1 Unpaved operations areas at the landfill are regularly watered to keep down dust. The 20 km/hr. speed limit is enforced in unpaved areas as well to keep down dust and for safety reasons.
- 4.2.2 The Contractors conducting earth-moving operations will supply road-watering equipment and will keep their area of operation watered regularly to keep down road dust.
- 4.2.3 A dust suppressant will be applied to exposed waste in the landfill area during dry periods.
- 4.2.4 The Landfill facility will ensure that a soil stabilizer or vegetative cover is applied to the exterior of the perimeter berm as well as areas on the site that have been capped.
- 4.2.5 During dry spells the transportation staging areas and the laydown yards will be watered down regularly.

4.3 STORAGE PILES

The Facility may have uncovered storage piles of clay and excess top soil, used to cover the waste face and eventually to cap the landfill. Continuous unloading and loading may occur in this area during capping and other operations. During dry conditions water can be sprayed directly onto the piles if immediate fugitive dust mitigation is

required. Piles may be seeded to grass if they are going to be inactive for longer periods of time.

4.4 CONTAINER LAYDOWN AREAS

The Ryley facility operates under a specific site procedure attached in the appendix of this Plan that outlines the specific requirements for the site employees to follow to mitigate odours from the lay down areas. The main preventative measure is to ensure that all containers remain properly tarped/covered this requires that routine inspections are conducted on these areas. Water is used as a dust control measure in these areas. The containers in these areas are kept covered to reduce the potential of releasing odours at the facility.

4.5 LANDFILL

The following general measures are implemented at the landfill to minimize VOC emissions from the landfill and to reduce the potential for off-site odours:

- The waste is pre-screened at the laboratory to identify potentially odorous waste streams and appropriate handling and packaging procedures are recommended to the waste generator and shipper;
- The waste on-receipt at the landfill is transferred in bulk to the landfill working face to minimize its disturbance;
- The area of exposed waste including the working face of the landfill is minimized to the extent possible to reduce the exposed surface area of the waste; and,
- Odorous wastes are covered with non-odorous low porosity waste materials to the extent possible. This is done in accordance with existing procedures for odour control.
- As a precautionary measure the company has purchased 3 portable mister fans that can be transported to an area where additional control may be necessary. These units can be placed in predominately downwind locations in order to suppress the airborne odours. The product used for this application is EcoSorb 606.
- A portable sprayer that can be towed by an ATV is available to spray the odour suppressing chemical directly on the waste surface. The product used for this application is EcoSorb 606.
- Straw may also be used as a means to control dust and odours. Round straw bales can be spread over the landfill using a bale buster.

5.0 INSPECTION AND MAINTENANCE PROCEDURES

- Daily inspections are conducted by the Landfill Supervisors at the Facility to monitor the effectiveness of dust control practices. The treated roads are reviewed as part of these daily inspections, and further treatment requirements are identified at that time.
- Landfill personnel are instructed to watch for dust generation and to be aware of odor sources. If they see dust blowing or notice the presence of odours, they are to notify their supervisor and take immediate action to stop the dust and/or suppress the odour.
- All employees are instructed to report any occurrence of visibly blowing dust from anywhere in the facility. The management staff of the area takes immediate action to mitigate the situation.

6.0 TRAINING OF STAFF

As part of maintaining best management practices for controlling and preventing fugitive dust emissions, an initial training program will be provided for all applicable Facility staff. The training will cover the control techniques in place for managing fugitive emissions and how to maintain them; how to conduct a fugitive dust observation check and fill out the associated paperwork; what to do in the case of an unexpected fugitive dust release; and, who to notify of any concerns or problems pertaining to fugitive dust. Refresher training will be provided as necessary, based on changes to the fugitive dust emission control techniques.

7.0 CONTINUING IMPROVEMENTS

As part of implementing a successful fugitive dust and odour best management plan, it is important to be aware of areas where fugitive dust and odour emissions can be reduced further. The Facility is endeavoring to improve their capacity for controlling fugitive dust emissions, and several areas in particular have been identified as potential future improvements, as follows;

- Opportunities to reduce the size of storage piles and the retention time of materials in the piles are a continual improvement process; and
- Staging areas/laydown areas may be paved in the future to reduce wind-blown dust from these areas.
- If the waste area is going to be inactive for an extended period of time it should be covered with a minimum of 20 centimeters of intermediate cover to prevent odours or waste movement.

TITLE: Environmental Management Program			
Facility: Ryley Facility	Prepared by: Don White	SOP Number: 90RY-206-00	Page 1 of 7
	Title: Compliance Manager	Issue Date: August 2019	
Reviewed By: Stan Yuha	Title: General Manager	Next Review Date: August 2024	
Reviewed By:	Title: Operations Manager		

1.0 Objective

Clean Harbors' Ryley Facility is dedicated to protecting the environment and therefore has developed this Standard Operating Procedure to establish an Environmental Management Program. The purpose of the Environmental Management Program is to identify and prevent potential Environmental impacts on site or off site. The Environmental Management Program identifies the controls in place, including checklists and reports, to manage odours and dust.

2.0 Site Specific Terms

- Bale Buster – unit pulled behind a farm tractor which breaks down straw bales and blows the straw onto the ground surface.
- EcoSorb 606 – deodorizing chemical that can be diluted and misted through a fan dispersion system or sprayed through an agricultural sprayer unit (MSDS attached).
- Dust Lynx – dust suppression chemical that mixes with water and is placed using a water truck or other pumping unit (MSDS attached).

3.0 Responsibilities

General Manager

The General Manager is responsible for ensuring all reasonable measures are taken to minimize the impact of this facility on the environment, the employees and the community. The General Manager is responsible for addressing concerns from members of the community and for alerting Alberta Environment's Environmental Response line promptly should there be any emission issues.

Supervisors

The Supervisors will ensure that all inspections are done as scheduled and controls are functioning properly. The Supervisors are responsible for ensuring all employees are aware of the components of the Environmental Management Program and the equipment involved.

Employees

Employees will ensure that Environmental Control equipment is used when appropriate and that any environmental concerns are brought to the attention of the Supervisor. If an employee is unsure of any part of this Standard Operating Procedure, he/she will go to the Supervisor for clarification.

4.0 Prerequisites

The following prerequisites must be completed prior to performing this procedure.

Health and Safety

- Any incidents, including near misses, are to be reported immediately to the supervisor.

Environmental

- If an incident occurs, report it immediately to your supervisor, and implement the facility's Emergency Preparedness Plan, if applicable.
- Spills are to be cleaned up immediately.

Documented Training

- SOP training, refreshed every three years.
- Task specific training.

5.0 Procedure

5.1 ODOUR CONTROL

5.1.1 *Odour Action Plan*

This plan re-emphasizes previous practices that have demonstrated success and incorporates improvements elaborated below:

5.1.1.1 Identification of Odorous Materials

The onsite laboratory staff, as part of the company's waste profiling procedure, will screen all potential waste streams. All wastes will be assessed for potential odours based on the following criteria:

1. Knowledge of the generating process (i.e. chemical production, refining wastes, etc.).
2. Assessment of the concentration of the contaminants concerned (i.e. does the waste contain known odorous components – such as naphthalene, reduced sulphur species).
3. Visit to the site (project work only) to better determine odour potential if appropriate.
4. Develop and access better analytical methods and protocols for the quantification of odour levels.
5. Establish a data bank of known odour causing wastes or compounds.

5.1.1.2 Odorous Materials Shipment and Receipt

Once an odorous waste stream has been identified as a potential candidate for disposal at the Ryley Facility, a team approach will be used to assess requirements for shipment, receipt and onsite management.

Members of this team may include Operations, Landfill, Laboratory, Technical Services staff and Management. This team will establish the full management cycle of the waste transaction including, but not limited to the following:

1. Container selection (i.e. roll-off, tanker, etc.)
2. Special packaging requirements (i.e. plastic roll-off box liners)
3. Sampling protocols upon arrival
4. Arrival times
5. Cell placement, tanker off-loading procedures

6. Daily receiving volumes
7. Special operational procedures.

5.1.1.3 Onsite Management of Odorous Materials

All odorous wastes transported to the site will be received in suitable containers. This includes tankers, roll-offs, dump trailers and lugger boxes and drums. Atmospheric exposure of odorous materials will be restricted by adherence to the requirement to tarp roll-off boxes, lugger and dump trailers and closing all hatches on tankers; except when sampling, for short duration's while off-loading, and during tanker cleaning operations.

Landfill

The preferred way to receive and manage odorous wastes at the Landfill is in lined roll-off or lugger boxes. The waste will be transported into the Landfill cell in the lined container and placed in the cell. Every effort will be made to ensure that the integrity of the liner is maintained. Once the odorous material has been placed in the cell, non-odorous wastes or some other suitable non-odorous cover material will cover it. This same principle will be followed for wastes that come in via end dump units.

5.1.2 Operator Odour Checks

All employees will report any odours to his or her immediate supervisor upon detection and complete an Internal Complaint Form, Appendix A. In addition, operators expected to check their area to identify any sources of odour.

The operator shall include the following in this check:

- All hatches on storage are closed;
- All vent systems are monitored to ensure that there are no significant odours being emitted;
- Lids are on pails when not in use;
- Sumps are maintained as low as possible;
- Odorous tramp material is cleaned up; and
- Scrubber system is checked to ensure it is within operating parameters.

An odour is considered to have a potential for off-site impact if it can be detected 3 meters downwind. This inspection is documented by completion of the checklist for the area.

5.1.3 Controlling Odorous Solid Waste

The Landfill Supervisor will have responsibility for the detection of odours that may specifically originate from Landfill activities. It will be the responsibility of the Landfill Supervisor to check for odours intermittently throughout the day. A final check will be carried out at the end of the day's receiving. If an odour problem is detected, remedial action will be taken as soon as possible. Odours may emanate from the landfill operating face, landfill leachate and the solidification/stabilization pit.

Odour control procedures for the landfill are outlined below:

- a) All waste streams being considered for disposal are screened by the laboratory for odour levels. Wastes possessing odours that cannot be managed are not accepted into the plant site.
- b) Incoming loads are monitored for odour levels as part of the receiving procedure. Wastes with strong odours may be rejected if this procedure and mitigative efforts are ineffective.
- c) Landfilled wastes with noticeable odours are covered with non-odorous wastes or other material, such as odour absorbing reagent, as soon as practical.

- d) Leachate is removed from the landfill cells daily as a part of normal landfill operations.
- e) The size of the landfill's working face is minimized as best as is practical.
- f) Vehicles containing waste are kept closed or covered until ready to dump and during sampling.
- g) Special packaging provisions are employed as needed (drums, bags, etc.).
- h) Wastes offloaded for solidification/stabilization processing are dumped directly in the mix pit.
- k) Wastes mixed in the solidification/stabilization area are subject to conditions a) through c) above.
- l) On deposition of waste or mixing, if a persistent, noxious or strong odour is encountered that may have an external impact, the operator shall report the odour to the landfill supervisor and immediately apply corrective measures to reduce or eliminate the odours. These corrective measures can be found in section 5.1.6.1 of this procedure (they involve covering the waste and/or adding reagents to mask or reduce the chemical characteristics that contribute to odours).
- m) The facility receives waste from transfer stations and original generators. If a waste is received from either of these sources and a persistent noxious odour is detected, treatment will occur – however, if these best efforts are not successful, alternative measures will be employed to minimize offsite impacts of successive shipments. These measures include;
 - Odour treatment at an alternative location (possibly the generator's site),
 - Restrict/retard acceptance of odourous waste for processing at the site.

When an odour is detected by an employee, or when an odour complaint is received from a neighbor or the MOE, corrective action suitable for the source of the odour is initiated and the complaint and corrective action is documented (see Appendices A and B for forms).

Documentation related to each odour complaint, investigation or corrective action is distributed to the General Managers, as well as the Compliance Manager. These individuals review each incident to ensure that appropriate actions are taken to control off-site odour impacts.

5.1.4 Scrubber/Carbon Absorber

Vapours may occur during the storage and processing of organic wastes in the Processing and Staging Building. The facility has a scrubber system that removes air from these buildings and passes it through a sodium hydroxide/sodium sulfite reducing solution and then through a carbon absorbers to remove acidic gases and organic vapours.

1. The scrubber pH is monitored daily and must remain above a pH of 8.0. This value is reported on the Operator's Daily Inspection entered into WINWEB.
2. The carbon absorber exhaust is monitored weekly for Total Petroleum Hydrocarbons. This value is entered into the WINWEB Inspection report. If the level of Total Petroleum Hydrocarbon exceeds 50 ppm, the carbon must be changed out.

5.1.5 Site Inspection

Similar to the Landfill Operations, the Transfer Station Operations group also monitors for odors and dust on a continuous basis. If either is detected, they will initiate the appropriate corrective actions as well as notify their Supervisor. The Supervisor will then forward the notification onto the Operations or General Manager. If any odours are detected steps will be taken to eliminate the odour and an "Internal Odour Complaint Form" (See Appendix A) will be completed.

5.1.6 Mitigation Steps

5.1.6.1 Mitigation of Landfill Odours

The following is a list of steps to mitigate landfill related odours that may stem from the landfill face, mixing pit or the receiving cells:

- a) Immediate cover with non-odorous soil or material
- b) The addition of materials that exhibit odour-suppressing properties. These materials may consist of straw or a direct application of Ecosorb.
- f) Handling potentially problematic waste streams or projects during those colder months, where lower temperatures result in lower effusion of odorous compounds from the waste mass into the atmosphere.
- g) Working waste in smaller batches, thus lowering the surface area of the exposed material to the atmosphere.
- h) Certain waste streams or projects that produce known odours may necessitate specific handling procedures to mitigate odours.
- i) Adhering to the steps outlined in 5.1.3

5.1.7 Dealing With the Public

In many cases Clean Harbors' personnel come into contact with the public. It is imperative to adhere to the following guidelines:

- a) Initiate completion of "External Odour Complaint Form" (See Appendix B).
- b) Always do a windsock check and record the wind direction and speed from the Scale Office before leaving the site.
- c) Do a physical surrounding patrol of the area.

When the Manager or designated representative meets or communicates with the neighbor:

- a) Be empathetic, honest, and sincere. Be prepared for the following frequently asked questions:
 1. Are you having problems?
 2. Why did it smell so bad before? It smells okay now.
 3. Just what is it I smell?
 4. Why does it smell?
- b) Your priorities should be to ask questions and to listen, in order to better understand the neighbour's concerns and determine the characteristics of the odour in question.
- c) Don't belittle the company, fellow employees or neighbours.
- d) Do not speculate as to the source or degree of concern.
- e) Indicate the extent of your commitment/responsibility to identify/eliminate the offending odour, as it relates to the site. The actions outlined in the SOP may be referenced.
- f) Indicate what steps will be taken to correct the concern (see above sections).
- g) Ask if the neighbour wishes a follow-up check/communication with the Shift Supervisor or Management.
- h) Investigate the source and carry out appropriate abatement actions if the source is determined to be on-site.

When the Manager returns to the site:

- a) Speak to the supervisors if necessary (if source may be from their area).
- b) Document all findings as well as a record of your communication with the neighbour.
- c) Complete the "External Odour Complaint Form" (See Appendix C).
- d) Report back to the neighbours if so requested.

5.1.8 Reporting

All reporting must be done promptly. Internal or external complaints detected by CH employees must be documented forthwith. External odour complaints (reported by non-CH employees) must be reported to Alberta Environment within two hours of receiving the complaint.

Follow these guidelines when completing reports:

- a) Fill out all information possible
- b) Complete the form legibly (others will be reading it).
- c) Be clear and concise when explaining or describing odours, but do not speculate.
- d) Note the wind direction and wind speed immediately after receiving the complaint and during the time of the complaint if different from the time of the call.
- e) Determine whether the plume direction is similar to that of the ground level winds.
- f) Note if the complainant is downwind.
- g) Identify any odours present up wind or downwind of our site.
- h) Include any other information that may be pertinent (i.e. graphs, maps, etc.)

5.2 DUST ABATEMENT

5.2.1 Road and Un-Paved Operating Areas

- Roads and unpaved operating areas at the Landfill will be regularly watered to keep down road dust.
- A road sweeper will operate as needed to remove as much dust as possible from paved roads throughout the facility.

5.2.2 Earth Moving Contractors

- The Contractors conducting earth-moving operations will supply road-watering equipment and will keep their area of operation watered regularly to keep down road dust.

5.2.2 Dust Reduction from Active Waste Face, Final Cap and Berm

- A suitable dust suppressant will be applied to exposed waste in the area of the landfill as needed. This may include but not limited to; straw, water and a suitable dust control liquid such as Dust Lynx.
- The facility will ensure that a vegetative cover is applied to the exterior of the perimeter berm as well as areas on the site that have a final cap.

5.2.3 Dust Reduction from Staging Areas and Container Storage Areas

- During dry periods the Transportation Staging Areas and Container Storage Areas will have water or dust suppressant applied as needed to keep dust from blowing from these unpaved areas.

5.2.4 Traffic on Facility Roads

- All facility roads have a speed limit of 20 km/hr intended to keep down dust as well as for safety reasons.
- Drivers, including yard drivers, found to be exceeding the speed limit will be disciplined.

5.2.5 Visible Emissions

- If an incident occurs, report it immediately to the Shift Supervisor. Supervisors must advise the General Manager of each reported emission.

6.0 Consequences of Deviations

In addition to the process interruptions which can occur, the following additional consequences of deviations could result:

- Injuries and/or fatalities
- Property damage
- Regulatory violations and/or fines
- Damaged public relations and/or customer relations
- Disciplinary actions up to and including termination

7.0 Appendices

- Appendix A Internal Odour Complaint Form
- Appendix B External Odour Complaint Form

APPENDIX A

INTERNAL COMPLAINT REPORT

Date:

Time:

Name of Person Making the Complaint:

Work Location:

Nature of the Complaint (describe):

Odour:

Smoke:

Water:

Noise:

Other:

Wind Direction:

Coming out of:

Results of Investigation:

Action Taken:

Supervisor:

Operations Manager:

General Manager:

Distribution:

General Manager
Supervisor

Operations Manager
Chemist

Complaint File

Health & Safety Manager
Landfill Supervisor

APPENDIX B

MSDS SHEETS

Material Safety Data Sheet
 May be used to comply with
 OSHA's Hazard Communication Standard,
 29 CFR 1910.1200. Standard must be
 consulted for specific requirements

U.S. Department of Labor
 Occupational Safety and Health Administration
 (Non-Mandatory Form)
 Form Approved
 OMB No. 1218-0072

IDENTITY (As Used on Label and List) Ecosorb 606	Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.
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SECTION I

Manufacturer's Name OMI Industries	Emergency Telephone Number (800) 662-6367
Address (Number, Street, City, State and Zip Code) One Corporate Dr., Suite 100 Long Grove, IL 60047	Telephone Number for Information (847) 304-9111
	Date Prepared 01-05-11

SECTION II - Hazardous Ingredients/Identity Information

Hazardous Components (Specify Chemical Identity: Common Name(s))	N/A	Other Limits	%
	OSHA PEL	ACGIH TLV	Recommended

Product is a proprietary blend of essential oils, surfactant, and water. All constituents are not considered hazardous according to the Federal Hazard Communication Standard (29 CFR 1910.1200)

HMIS Classification: Health 0; Flammability 0, Reactivity 0, Protective Equipment B

Product has been tested for toxicity according to United States Environmental Protection Agency Guidelines
 Acute Oral Toxicity Study per EPA OPPTS 870.1100- Not toxic by oral ingestion
 Acute Dermal Toxicity Study per EPA OPPTS 870.1200 - Not toxic by dermal absorption
 Acute Inhalation Toxicity Study per EPA OPPTS 870.1300- Not toxic by inhalation exposure
 Acute Eye Irritation Study per EPA OPPTS 870.2400 - Product not an eye irritant
 Acute Skin Irritation Study per EPA OPPTS 870.2500 - Product is not skin irritant
 Dermal Sensitization Study per EPA OPPTS 870.2600- Product is not a skin sensitizer

**All Ingredients can be found listed on the following chemical substance inventories:
 United States TSCA, Canadian DSL, European EINECS and Australian AICS**

SECTION III - Physical/Chemical Characteristics

Boiling Point ~212° F	Specific Gravity (H2O) = 1) 0.99
Percent Volatile <1.5	Melting Point 32° F
	pH ~6.3
Solubility in Water Soluble	
Appearance and Odor Milky white/opaque white, slight citrus or floral odor	

SECTION IV - Fire and Explosion Hazard Data

Flash Point (Method Used) None	Flammable Limits LEL N/A	UEL N/A
Extinguishing Media Does not burn		
Special Fire Fighting Procedures None	Unusual Fire and Explosion Hazards None	

SECTION V - Reactivity Data

Stability	Stable
Incompatibility (Materials to Avoid)	Strong oxidizing agents
Hazardous Decomposition or By-products	None known
Hazardous Polymerization	Will not occur

SECTION VI - Health Hazard Data

Route(s) of Entry	Inhalation? Yes	Eyes Yes	Ingestion? No
Health Hazards (Acute and Chronic)	Eye contact may cause mild irritation - Wash 15 minutes with water Seek medical attention if symptoms persist		
Carcinogenicity:	NTP? No	IARC Monographs? No	OSHA Regulated? No
Signs and Symptoms of Exposure	None		
Medical Conditions Generally Aggravated by Exposure	None known		
Emergency and First Aid Procedures	Eyes - wash with water 15 minutes Ingestion - drink several glasses of water, see physician if symptoms persist		

SECTION VII - Precautions for Safe Handling and Use

Steps to be Taken in Case Material is Released or Spilled	Flush to drain with large quantities of water
Waste Disposal Method	Flush with water to drain
Precautions to Be Taken in Handling and Storing	Storage of product below 32 deg and above 85 degrees may cause layering
Other Precautions	Wash with soap and water if exposed

SECTION VIII - Control Measures

Respiratory Protection (Specify Type)	None required
Ventilation	Good ventilation
Eye Protection	Goggles recommended
Gloves/Other Protective Clothing or Equipment	Gloves recommended
Work/Hygienic Practices	Wash with soap and water before eating or smoking

Material Safety Data Sheet

Dust Lynx H56



1. Identification of the Product and the Company

Product Name: Dust Lynx H56

Chemical Family: Polymer – Glycerol blend

Material Uses: Dust Lynx H56 is used for dust control on roadways and parking lots.

Supplier: Clearflow Enviro Systems Group Inc.
#140, 134 Pembina Road
Sherwood Park, AB T8H 0M2
Ph. 780-410-1403
Fx. 780-410-1406
www.clearflowgroup.com

**In Case of
Emergency:** 780-410-1403

2. Composition / Information on Ingredients

There are no ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

3. Hazard Identification

Potential Acute Health Effects

Inhalation: Inhalation not likely. Mists may cause upper tract irritation.

Ingestion: Can irritate the mouth, throat and stomach.

Skin: May cause mild irritation.

Eyes: May cause mild irritation.

Carcinogenicity: No information was located.

Reproductive Toxicity: No information was located.

Mutagenicity: No information was located.

4. First Aid Measures

Inhalation: Remove victim to fresh air. If symptoms persist, get medical attention.

Skin contact: Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse. Get medical attention if irritation develops or persists.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes. Seek medical attention immediately if irritation develops or persists.

Ingestion: If material is ingested, immediately contact a physician or poison control center. Do not induce vomiting.

5. Fire-Fighting Measures

Flammable Class:	The product is not flammable.		
Extinguishing Media:	Use an extinguishing media suitable for the surrounding fire (dry powder, CO ₂).		
Special Exposure Hazards:	This product presents no unusual hazards in a fire situation.		
Protection Against Fire:	Do not enter fire area without proper protective equipment, including respiratory protection.		
NFPA Ratings for this product are:	HEALTH 2	FLAMMABILITY 0	INSTABILITY 0
HMS Ratings for this product are:	HEALTH 2	FLAMMABILITY 0	REACTIVITY 0

6. Accidental Release Measures

Personal precautions:	Wear suitable protective clothing and gloves. Avoid contact with the eyes and skin.
Environmental Precautions:	Prevent entry to sewers and public waters.
Procedure for Clean-up:	Dike for recovery or absorb with appropriate material. Recover the cleaning water for disposal.

7. Handling and Storage

General:	Avoid contact with the eyes and skin.
Handling:	Wear suitable protective clothing. Wash hands and other exposed areas with mild soap and water before eat, drink or smoke and when leaving work. Handle in accordance with good industrial hygiene and safety procedures.
Storage:	Store in a dry, well-ventilated area.

8. Exposure Controls / Personal Protection

Personal Protection

Respiratory:	No special respiratory protection equipment is recommended under normal conditions of use with adequate ventilation.
Hands:	Wear gloves in case of repeated or prolonged contact.
Eyes:	Even though no eye contact is expected under reasonable conditions of use, appropriate eye protection should be worn when handling this material (safety glasses with side shields).
Skin	Wear suitable protective clothing.
Ingestion:	When using, do not eat, drink or smoke.

9. Physical and Chemical Properties

Physical State:	Viscous liquid
Color:	Brown
pH:	9-11 (1% solution)
Specific Gravity:	1.1-1.2 (@20°C)
Boiling/Condensing Point:	>100°C (212°F)
Vapour Pressure:	<0.01 mm Hg (0.00 kPa)
Evaporation Rate:	<0.01
Flash Point:	>100°C (212°F) (open cup)

15. Regulatory Information

EC Labelling:	Non-dangerous under transport regulations.
S Phrase(s):	None.
R Phrase(s):	None.
Domestic Substances List:	Yes.
Non-Domestic Substances List (NDSL):	Yes.
Toxic Substances Control Act:	Yes.
WHMIS Classification:	D2B.

16. Other Information

Recommended Uses and Restrictions:

See product technical data sheet for detailed information.

Additional Information: This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

Prepared By: Clearflow Enviro Systems Group, Inc.

Date of Issue: 05/13/2013

Disclaimer: NOTICE TO READER:
Clearflow, expressly disclaims all express or implied warranties of merchantability and fitness for a particular purpose, with respect to the product or information provided herein, and shall under no circumstances be liable for incidental or consequential damages.

Do not use ingredient information and/or ingredient percentages in this MSDS as a product specification. For product specification information refer to a Product Specification Sheet and/or a Certificate of Analysis. These can be obtained from Clearflow Enviro Systems Group.

All information appearing herein is based upon data obtained from the manufacturer and/or recognized technical sources. While the information is believed to be accurate, Clearflow makes no representations as to its accuracy or sufficiency. Conditions of use are beyond Clearflow's control and therefore users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes and they assume all risks of their use, handling, and disposal of the product, or from the publication or use of, or reliance upon, information contained herein. This information relates only to the product designated herein, and does not relate to its use in combination with any other material or in any other process.

END OF MSDS

MSDS - MATERIAL SAFETY DATA SHEET

CALCIUM CHLORIDE, LIQUID

CAS NUMBER: 10043-52-4

1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION:

TRADE NAME (COMMON NAME): Liquid Calcium Chloride

SYNONYMS: Calcium Chloride Aqueous Solution

CaCl²

CaCl² Aqueous Solution

Calcium (II) Chloride

Calcium (II) Chloride Aqueous Solution

Calcium Dichloride

Calcium Dichloride Aqueous Solution

MANUFACTURER/SUPPLIER:

Lady Carmen Trucking Ltd.

P.O. Box 398

Brooks, Alberta

T1R 1B4

EMERGENCY TELEPHONE NUMBERS:

Plant Operator: Glenn Stinn - (403) 793-4397

Plant Owner: Carmen Dussault - (403) 793-7846

PRODUCT USE: Road Dust Control

Road Base Stabilization

Drilling Mud Lubricant

Heavy Equipment Tire Ballast

MSDS PREPARATION: Envirotech Services (403) 362-2651, (403) 362-9567 cell

CURRENT ISSUE DATE: June 6, 2011

2. COMPOSITION/INGREDIENTS:

28-30% Calcium Chloride Aqueous Solution

Calcium Chloride: CAS# 10043-52-4

LD50 Oral Rat 1000mg/kg

LC50/96 Hour Fish >100mg/L

Water: CAS# 7732-18-5

CaCl² Brine MSDS - 2011

3. HAZARDS IDENTIFICATION:

LOW TOXICITY - MAY CAUSE IRRITATION TO SKIN, EYES, RESPIRATORY AND GASTROINTESTINAL TRACTS, HARMFUL IF SWALLOWED OR INHALED.

ROUTES OF ENTRY/POTENTIAL ACUTE EXPOSURE HEALTH EFFECTS:

SKIN CONTACT: May cause skin irritation. Prolonged contact may cause superficial burns. Contact with abraded or broken skin may cause severe necrosis.

EYES: May irritate or burn eyes, possible corneal injury.

INHALATION: Mist inhalation may irritate nose, throat and lungs, may cause nose bleeds.

INGESTION: Low toxicity, may irritate gastrointestinal tract - cause nausea and vomiting.

CHRONIC EXPOSURE EFFECTS: None identified.

4. FIRST AID MEASURES:

SKIN CONTACT: Wipe off excess solution from skin and flush with water.

EYES: Immediately flush with water including behind eyelids and continue for at least 15 minutes. Obtain medical attention.

INHALATION: Remove to fresh air. Obtain medical attention.

INGESTION: Low toxicity if ingested in small quantity. For large quantity if conscious immediately ingest 2-4 glasses of water or milk and obtain medical attention.

NOTE TO PHYSICIAN: Oral ingestion may cause serum acidosis.

5. FIRE FIGHTING MEASURES:

NON FLAMMABLE & NON COMBUSTIBLE.

FIRE: Not considered a fire hazard.

EXPLOSION: Not considered an explosion hazard.

FIRE CONTROL: Isolate area and use appropriate means to extinguish surrounding fire.

SPECIAL INFORMATION: At high temperatures calcium chloride may produce toxic or irritating fumes. Fire fighters should wear full protective clothing and equipment.

6. ACCIDENTAL RELEASE MEASURES:

ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT (SECTION 8). SPILLED BRINE MAY CREATE A SLIPPING HAZARD.

SMALL SPILLS: Isolate area, eliminate source and contain spilled material if possible, recover free liquid with absorbant, mop or other appropriate means and collect for disposal. Dilute residues with water, recover liquid with absorbant. Repeat as necessary.

LARGE SPILLS: Isolate area, eliminate source and contain with impermeable or absorbent barrier. Recover free liquid and treat residues as for small spills. Prevent spills from entering sewers or waterways.

7. HANDLING & STORAGE:

VENTILATION: Natural ventilation is adequate for exterior areas. Local exhaust should be used in confined storage, packaging and unloading areas, over open processing equipment and where mist is produced.

HANDLING: Avoid contact with eyes, skin or clothing and use appropriate personal protective equipment. Avoid inhaling mist or vapours. Use good personal hygiene and housekeeping.

STORAGE: Store in secure corrosion resistant container. Do not use zinc or galvanized metal containers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION:

RESPIRATORY PROTECTION: For mist and/or vapour exposure wear NIOSH/MSHA approved respirator. Respirator should be constructed of corrosion resistant materials.

EYES & FACE: For mist exposure and general handling wear chemical safety glasses and a hard hat. Contact lenses should not be worn.

HANDS: Chemical resistant gloves.

BODY: Coveralls and/or long sleeve shirt and trousers. Chemical resistant safety boots with non-slip soles.

EXPOSURE RESPONSE: Readily accessible eye-wash station and shower recommended.

9. PHYSICAL & CHEMICAL PROPERTIES:

PHYSICAL STATE: Clear to slightly turbid brownish liquid.

ODOUR: Slight acid odour.

CALCIUM CHLORIDE: CaCl_2 , Molecular Weight 110.99

SOLUBILITY IN WATER: Solid 74.5gm/100ml @ 20°C, brine 100% miscible.

SPECIFIC GRAVITY @ 20°C: 20% Solution 1.19, 30% Solution 1.30, 40% Solution 1.44.

VAPOUR PRESSURE @ 20°C: 20% Solution 16mm Hg, 30% Solution 11mm Hg, 40% Solution 7.3mm Hg.

VAPOUR DENSITY: N/A (water vapour only).

EVAPORATION RATE: N/A (water vapour only).

BOILING POINT: 20% Solution +105°C, 30% Solution +110°C, 40% Solution +118°C.

FREEZING POINT: 20% Solution -20°C, 30% Solution -47°C, 40% Solution +16°C.

pH: Neutral or slightly alkaline.

COEFFICIENT OF WATER/OIL DISTRIBUTION: N/A

10. STABILITY & REACTIVITY:

STABILITY: Product is stable.

INCOMPATIBILITY (MATERIALS TO AVOID):

- Reacts violently with boron trifluoride (BF_3) or a mixture of boron trioxide & calcium oxide ($\text{B}_2\text{O}_3 + \text{CaCO}_3$).
- Water-reactive materials (eg. Sodium) cause an exothermic reaction.
- Methyl vinyl ether can start a runaway polymerization reaction.
- Zinc metal (galvanized coatings) react to generate potentially explosive hydrogen.
- Metals in general and aluminum, aluminum alloys and yellow brass in particular are corroded by calcium chloride.

HAZARDOUS DECOMPOSITION PRODUCTS: Chlorine gas is generated when heated to decomposition.

11. TOXICOLOGICAL INFORMATION:

RAT ORAL LD50: 1000mg/kg (anhydrous).

IRRITANCY: May cause irritation.

SENSITIZATION: May cause irritation.

CARCINOGENICITY: None known.

REPRODUCTIVE TOXICITY: None known.

TERATOGENICITY: None known.

MUTAGENICITY: None known.

TOXICOLOGICALLY SYNERGISTIC PRODUCTS: None known.

12. ECOLOGICAL INFORMATION:

NOT KNOWN TO BIODEGRADE OR BIOACCUMULATE.

AQUATIC TOXICITY: LC50/96 is over 100 mg/L.

13. DISPOSAL CONSIDERATIONS:

Disposal Methods must comply with Provincial, State, Federal and Local disposal or discharge laws.

In limited quantities and if permitted by applicable disposal regulations dilute with water and flush to sewer with additional water. May require disposal at an approved waste facility.

14. TRANSPORT INFORMATION:

Not a dangerous good, not regulated.

15. REGULATORY INFORMATION:

CALCIUM CHLORIDE WHMIS CLASSIFICATION: D2B - Toxic material causing other toxic effects (Eye & Skin irritant).

16. OTHER INFORMATION:

NFPA 704 CLASSIFICATION: Health - 1
Flammability - 0
Reactivity - 0
Specific Hazard - None

The data contained herein is believed to be accurate and reliable. No warranty is expressed or implied and Lady Carmen Trucking Ltd. and Envirotech Services assume no responsibility regarding the accuracy or completeness of the data provided or its application.

REFERENCES:

"Calcium Chloride Handbook" - Dow Chemical Company, August, 2003
"MSDS Calcium Chloride, Liquid" - General Chemical, Parsippany, NJ, May, 2001

Material Safety Data Sheet

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name(s): Lafarge Portland Cement (cement)

Product Identifiers: Cement, Portland Cement, Hydraulic Cement, Oil Well Cement, Trinity® White Cement, Antique White Cement, Portland Limestone Cement, Portland Cement Type I, IA, IE, II, I/II, IIA, II L.A., III, IIIA, IV, IVA, V, VA, 10, 20, 30, 40, 50, GU, GUL, MS, MH, HE, LH, HS, OWH, OWG Cement, OW Class G HSR

Manufacturer: Lafarge North America Inc.
12018 Sunrise Valley Dr, Suite 500
Reston, VA 20191

Information Telephone Number: 703-480-3600 (9am to 5pm EST)

Emergency Telephone Number: 1-800-451-8346 (3E Hotline)

Product Use: Cement is used as a binder in concrete and mortars that are widely used in construction. Cement is distributed in bags, totes and bulk shipment.

Note: This MSDS covers many types of Portland cement. Individual composition of hazardous constituents will vary between types of Portland cement.

Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percent (By Weight)	CAS Number	OSHA PEL -TWA (mg/m ³)	ACGIH TLV-TWA (mg/m ³)	LD ₅₀ (mouse, intraperitoneal)	LC ₅₀
Portland Cement*	100	65997-15-1	15 (T); 5 (R)	1 (R)	NA	NA
Calcium Sulfate*	2-10	13397-24-5	15 (T); 5 (R)	10 (T)	NA	NA
Calcium Carbonate*	0-15	1317-65-3	15 (T); 5 (R)	3 (R), 10 (T)	NA	NA
Calcium Oxide	0-5	1305-78-8	5 (T)	2 (T)	3059 mg/kg	NA
Magnesium Oxide	0-4	1309-48-4	15 (T)	10 (T)	NA	NA
Crystalline Silica	0-0.2	14808-60-7	[(10) / (%SiO ₂ +2)] (R); [(30) / (%SiO ₂ +2)] (T)	0.025 (R)	NA	NA

Note: Exposure limits for components noted with an * contain no asbestos and <1% crystalline silica

Cement is made from materials mined from the earth and is processed using energy provided by fuels. Trace amounts of chemicals may be detected during chemical analysis. For example, cement may contain trace amounts of calcium oxide (also known as free lime or quick lime), free magnesium oxide, potassium and sodium sulfate compounds, chromium compounds, nickel compounds, and other trace compounds.

Section 3: HAZARD IDENTIFICATION

	WARNING	
<p>Corrosive - Causes severe burns. Toxic - Harmful by inhalation. (Contains crystalline silica)</p> <p>Use proper engineering controls, work practices, and personal protective equipment to prevent exposure to wet or dry product.</p> <p>Read MSDS for details.</p>		

Section 3: HAZARD IDENTIFICATION (continued)

Emergency Overview: Cement is a solid, grey, off white, or white odorless powder. It is not combustible or explosive. A single, short-term exposure to the dry powder presents little or no hazard. Exposure of sufficient duration to wet cement, or to dry cement on moist areas of the body, can cause serious, potentially irreversible tissue (skin, eye, respiratory tract) damage due to chemical (caustic) burns, including third degree burns.

Potential Health Effects:

Eye Contact: Airborne dust may cause immediate or delayed irritation or inflammation. Eye contact with large amounts of dry powder or with wet cement can cause moderate eye irritation, chemical burns and blindness. Eye exposures require immediate first aid and medical attention to prevent significant damage to the eye.

Skin Contact: Cement may cause dry skin, discomfort, irritation, severe burns, and dermatitis.

Burns: Exposure of sufficient duration to wet cement, or to dry cement on moist areas of the body, can cause serious, potentially irreversible damage to skin, eye, respiratory and digestive tracts due to chemical (caustic) burns, including third degree burns. A skin exposure may be hazardous even if there is no pain or discomfort.

Dermatitis: Cement is capable of causing dermatitis by irritation and allergy. Skin affected by dermatitis may include symptoms such as, redness, itching, rash, scaling, and cracking.

Irritant dermatitis is caused by the physical properties of cement including alkalinity and abrasion.

Allergic contact dermatitis is caused by sensitization to hexavalent chromium (chromate) present in cement. The reaction can range from a mild rash to severe skin ulcers. Persons already sensitized may react to the first contact with cement. Others may develop allergic dermatitis after years of repeated contact with cement.

Inhalation (acute): Breathing dust may cause nose, throat or lung irritation, including choking, depending on the degree of exposure. Inhalation of high levels of dust can cause chemical burns to the nose, throat and lungs.

Inhalation (chronic): Risk of injury depends on duration and level of exposure.

Silicosis: This product contains crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica from this product can cause silicosis, a seriously disabling and fatal lung disease. See Note to Physicians in Section 4 for further information.

Carcinogenicity: Cement is not listed as a carcinogen by IARC or NTP; however, cement contains trace amounts of crystalline silica and hexavalent chromium which are classified by IARC and NTP as known human carcinogens.

Autoimmune Disease: Some studies show that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders such as scleroderma (thickening of the skin), systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys.

Tuberculosis: Silicosis increases the risk of tuberculosis.

Renal Disease: Some studies show an increased incidence of chronic kidney disease and end-stage renal disease in workers exposed to respirable crystalline silica.

Section 3: HAZARD IDENTIFICATION (continued)

Ingestion: Do not ingest cement. Although ingestion of small quantities of cement is not known to be harmful, large quantities can cause chemical burns in the mouth, throat, stomach, and digestive tract.

Medical Conditions Aggravated by Exposure: Individuals with lung disease (e.g. bronchitis, emphysema, COPD, pulmonary disease) or sensitivity to hexavalent chromium can be aggravated by exposure.

Section 4: FIRST AID MEASURES

Eye Contact: Rinse eyes thoroughly with water for at least 15 minutes, including under lids, to remove all particles. Seek medical attention for abrasions and burns.

Skin Contact: Wash with cool water and a pH neutral soap or a mild skin detergent. Seek medical attention for rash, burns, irritation, dermatitis, and prolonged unprotected exposures to wet cement, cement mixtures or liquids from wet cement.

Inhalation: Move person to fresh air. Seek medical attention for discomfort or if coughing or other symptoms do not subside.

Ingestion: Do not induce vomiting. If conscious, have person drink plenty of water. Seek medical attention or contact poison control center immediately.

Note to Physician: The three types of silicosis include:

- Simple chronic silicosis – which results from long-term exposure (more than 20 years) to low amounts of respirable crystalline silica. Nodules of chronic inflammation and scarring provoked by the respirable crystalline silica form in the lungs and chest lymph nodes. This disease may feature breathlessness and may resemble chronic obstructive pulmonary disease (COPD).
- Accelerated silicosis – occurs after exposure to larger amounts of respirable crystalline silica over a shorter period of time (5-15 years). Inflammation, scarring, and symptoms progress faster in accelerated silicosis than in simple silicosis.
- Acute silicosis – results from short-term exposure to very large amounts of respirable crystalline silica. The lungs become very inflamed and may fill with fluid, causing severe shortness of breath and low blood oxygen levels.

Progressive massive fibrosis may occur in simple or accelerated silicosis, but is more common in the accelerated form. Progressive massive fibrosis results from severe scarring and leads to the destruction of normal lung structures.

Section 5: FIREFIGHTING MEASURES

Flashpoint & Method:	Non-combustible	Firefighting Equipment:	Cement poses no fire-related hazard. A SCBA is recommended to limit exposures to combustion products when fighting any fire.
General Hazard:	Avoid breathing dust. Wet cement is caustic.		
Extinguishing Media:	Use extinguishing media appropriate for surrounding fire.	Combustion Products:	None.

Section 15: REGULATORY INFORMATION (continued)

RCRA: If discarded in its purchased form, this product would not be a hazardous waste either by listing or characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

TSCA: Portland cement and crystalline silica are exempt from reporting under the inventory update rule.

California Proposition 65: Crystalline silica (airborne particulates of respirable size) and Chromium (hexavalent compounds) are substances known by the State of California to cause cancer.

WHMIS/DSL: Products containing crystalline silica and calcium carbonate are classified as D2A, E and are subject to WHMIS requirements.



Section 16: OTHER INFORMATION

Abbreviations:

>	Greater than	NA	Not Applicable
ACGIH	American Conference of Governmental Industrial Hygienists	NFPA	National Fire Protection Association
CAS No	Chemical Abstract Service number	NIOSH	National Institute for Occupational Safety and Health
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	NTP	National Toxicology Program
		OSHA	Occupational Safety and Health Administration
CFR	Code for Federal Regulations	PEL	Permissible Exposure Limit
CL	Ceiling Limit	pH	Negative log of hydrogen ion
DOT	U.S. Department of Transportation	PPE	Personal Protective Equipment
EST	Eastern Standard Time	R	Respirable Particulate
HEPA	High-Efficiency Particulate Air	RCRA	Resource Conservation and Recovery Act
HMIS	Hazardous Materials Identification System	SARA	Superfund Amendments and Reauthorization Act
		T	Total Particulate
IARC	International Agency for Research on Cancer	TDG	Transportation of Dangerous Goods
LC ₅₀	Lethal Concentration	TLV	Threshold Limit Value
LD ₅₀	Lethal Dose	TWA	Time Weighted Average (8 hour)
mg/m ³	Milligrams per cubic meter	WHMIS	Workplace Hazardous Materials Information System
MSHA	Mine Safety and Health Administration		

This MSDS (Sections 1-16) was revised on March 1, 2011.

An electronic version of this MSDS is available at: www.lafarge-na.com under the Sustainability section.

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APPENDIX D

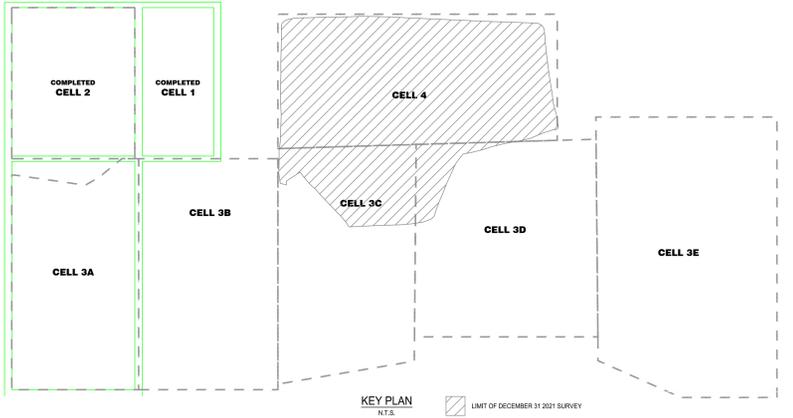
Survey Records and Final Cover Elevations and Contours

SITE SURVEY ELEVATIONS
FOR
CELL 3C, 3D & 4

RYLEY, ALBERTA

DRAWN BY: HBA/2019/01/04	DATE: JANUARY 4, 2022	SCALE: (Metric)
CHECKED BY: AH		1:500
	JOB No.: 10265	REV. 0

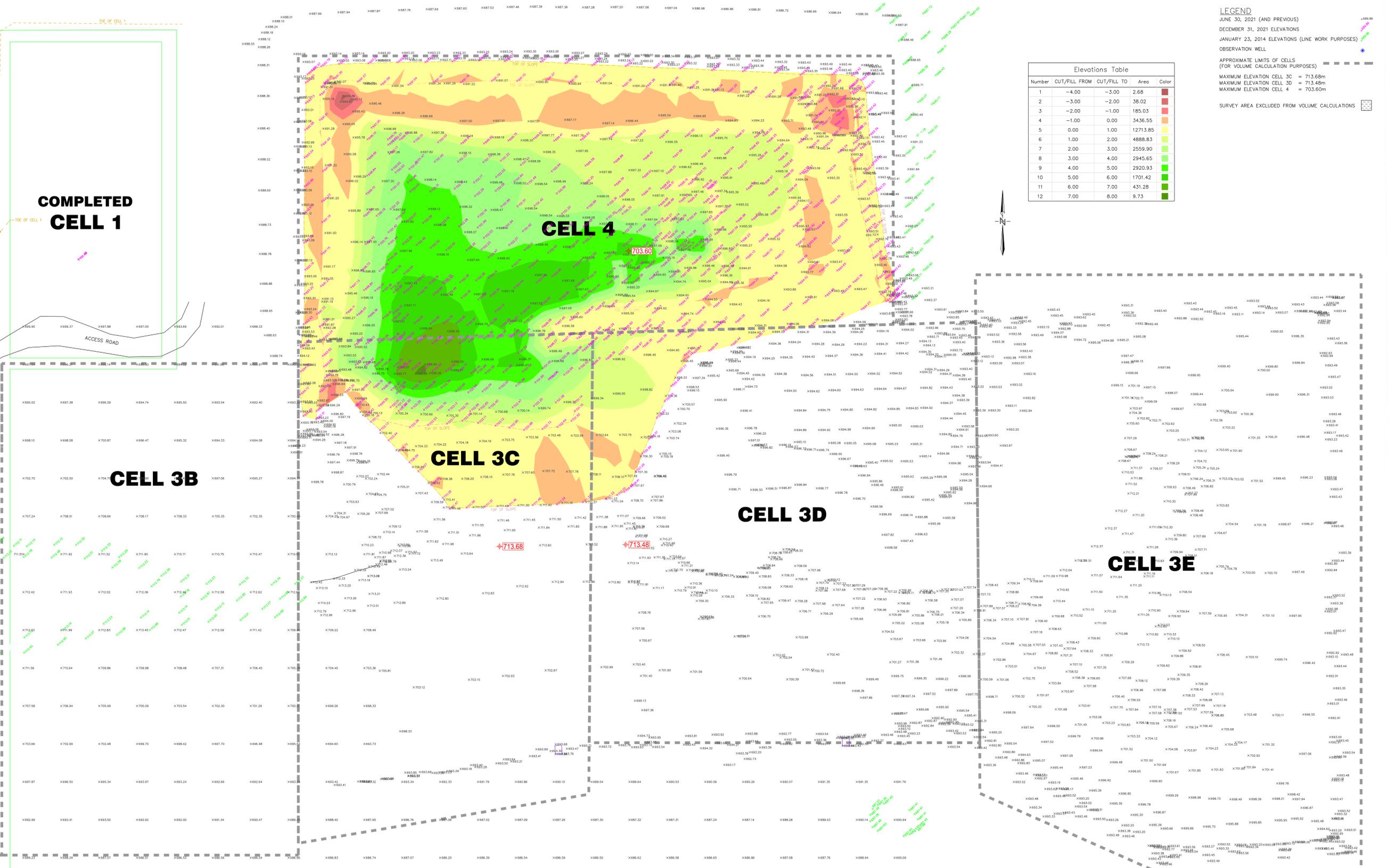
WELL OBSERVATION COORDINATES				
WELL	NORTHING	EASTING	ELEVATION (TOP OF PIPE)	ELEVATION (GROUND)
19MW38B	995.96	1459.70	687.96	687.02
19MW38A	995.91	1456.10	687.97	687.09
19MW37B	1003.00	1261.99	686.59	685.59
19MW37A	1003.78	1260.72	686.94	686.00



Parcel Volume Table - Unadjusted			
Parcel	Cut Cu.M.	Fill Cu.M.	Net Cu.M.
CELL 3C	113	11937	11824(F)
CELL 3D	13	1335	1322(F)
CELL 4	906	39925	39019(F)

LEGEND
 JUNE 30, 2021 (AND PREVIOUS)
 DECEMBER 31, 2021 ELEVATIONS
 JANUARY 23, 2021 ELEVATIONS (LINE WORK PURPOSES)
 OBSERVATION WELL
 APPROXIMATE LIMITS OF CELLS (FOR VOLUME CALCULATION PURPOSES)
 MAXIMUM ELEVATION CELL 3C = 713.68m
 MAXIMUM ELEVATION CELL 3D = 713.48m
 MAXIMUM ELEVATION CELL 4 = 703.60m
 SURVEY AREA EXCLUDED FROM VOLUME CALCULATIONS

Elevations Table				
Number	CUT/FILL FROM	CUT/FILL TO	Area	Color
1	-4.00	-3.00	2.68	Red
2	-3.00	-2.00	38.02	Orange
3	-2.00	-1.00	185.03	Yellow-Orange
4	-1.00	0.00	3436.55	Yellow
5	0.00	1.00	12713.85	Light Green
6	1.00	2.00	4888.83	Green
7	2.00	3.00	2559.90	Dark Green
8	3.00	4.00	2945.65	Very Dark Green
9	4.00	5.00	2920.93	Black
10	5.00	6.00	1701.42	Black
11	6.00	7.00	431.28	Black
12	7.00	8.00	9.73	Black





To: Stan Yuha, Facility Manager **Date:** January 11, 2022
c: Michael E. Parker, Vice President **Memo No.:** 1
Canadian Environmental Compliance
From: Michelle Jelinski, P.Eng. **File:** 704-SWM.SWOP04391-01
Sean Buckles, M.Sc., P.Eng.
Subject: Remaining Airspace – December 31, 2021
Clean Harbors Facility, Ryley, Alberta

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was requested to complete the remaining airspace calculations for the Clean Harbors Facility located near Ryley, Alberta. These calculations are based on the topographic waste survey completed by Challenger Geomatics Ltd. (Challenger) on December 31, 2021 and the data provided by Clean Harbors on January 4, 2022.

2.0 AIRSPACE MODELLING

Using AutoCAD Civil 3D software, Tetra Tech completed airspace modelling based on the December 31 survey data provided by Challenger, and design top of waste elevations previously completed by Tetra Tech. As of December 31, 2021, the remaining airspace in Area 1 (Cell 3E) is estimated at 8,159 m³; the remaining airspace in Area 2 (Cell 4 and the north portion of Cell 3C and Cell 3D) is estimated at 156,253 m³; and the remaining airspace in the tipping pad area is estimated at 183,412 m³.

The total estimated remaining airspace at the Clean Harbors Ryley Facility as of December 31, 2021 is 347,824 m³.

This information is presented in Table 1 below and in the attached drawings C100 and C101.

Table 1: Airspace Modelling Summary

Area	Remaining Airspace Volume	Notes
Area 1 (Cell 3E)	8,159 m ³	No change from December 2020 survey
Area 2 (Cell 4 and north portion of Cell 3C and Cell 3D)	156,253 m ³	A difference of approximately 92,000 m ³ since December 2020 survey
Tipping Pad Area	183,412 m ³	No change from December 2020 survey
Total	347,824 m³	

3.0 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 document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.

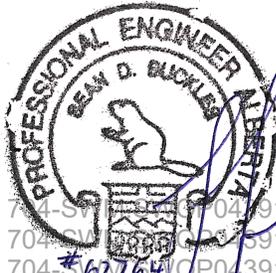
4.0 CLOSURE

We trust this technical memo meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

Michelle Jelinski
704-SWM.SWOP04391-01
704-SWM.SWOP04391-01
704-SWM.SWOP04391-01
704-SWM.SWOP04391-01

Prepared by:
Michelle Jelinski, P.Eng.
Project Engineer – Team Lead
Solid Waste Management Practice
Direct Line: 587.460.3449
Michelle.Jelinski@tetrattech.com


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704-SWM.SWOP04391-01
704-SWM.SWOP04391-01
2022-01-12

Reviewed by:
Sean Buckles, M.Sc., P.Eng.
Senior Project Engineer – Team Lead
Solid Waste Management Practice
Direct Line: 403.723.6876
Sean.Buckles@tetrattech.com

/sy

PERMIT TO PRACTICE TETRA TECH CANADA INC.	
RM SIGNATURE: _____	<i>[Signature]</i>
RM APEGA ID #: _____	62764
DATE: _____	2022-01-12
PERMIT NUMBER: P013774	
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)	

Enclosure: Limitations on the Use of this Document
 December 2021 Waste Survey Drawings C100 and C101

LIMITATIONS ON USE OF THIS DOCUMENT

GEOENVIRONMENTAL

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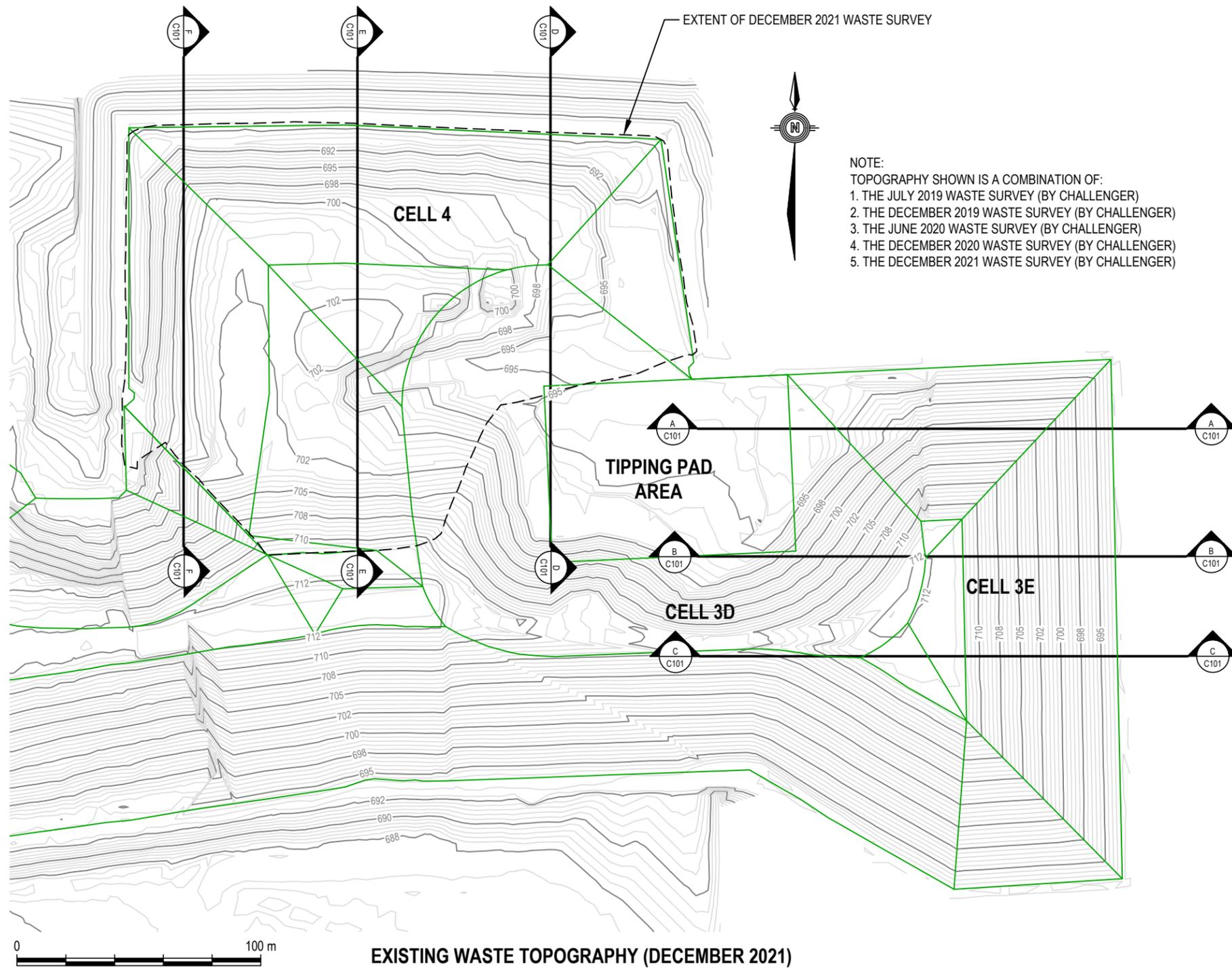
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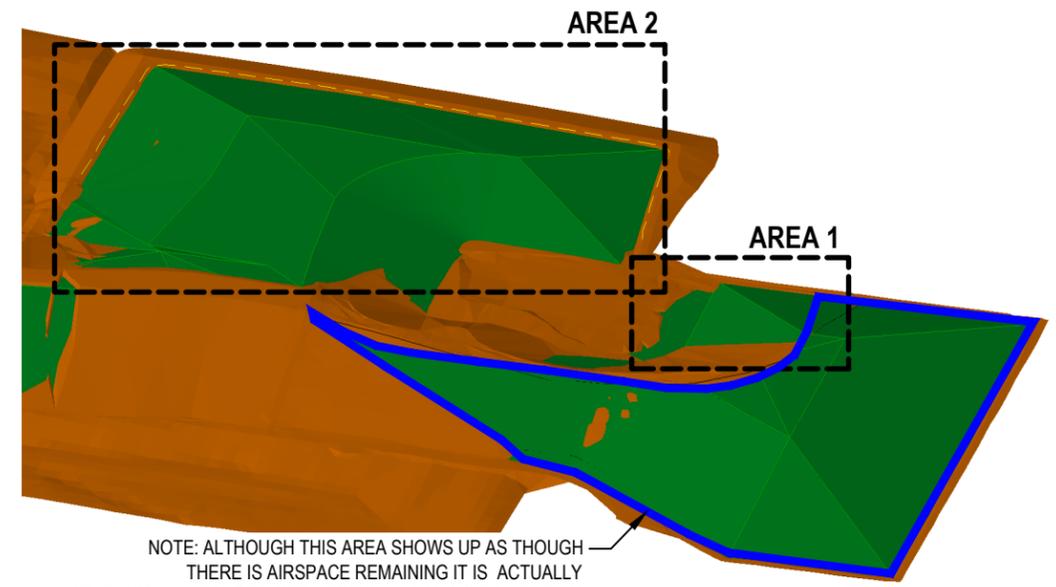
1.7 NOTIFICATION OF AUTHORITIES

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.

Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Clean Harbors Ryley\PROJECT\Waste Survey\December 2021\SWM\SWOP04391-01-Waste Survey Dec 2021.dwg [C:100] January 11, 2022 - 2:04:54 pm (BY: GAMMIE, DON)



NOTE:
 TOPOGRAPHY SHOWN IS A COMBINATION OF:
 1. THE JULY 2019 WASTE SURVEY (BY CHALLENGER)
 2. THE DECEMBER 2019 WASTE SURVEY (BY CHALLENGER)
 3. THE JUNE 2020 WASTE SURVEY (BY CHALLENGER)
 4. THE DECEMBER 2020 WASTE SURVEY (BY CHALLENGER)
 5. THE DECEMBER 2021 WASTE SURVEY (BY CHALLENGER)



DESIGN TOP OF WASTE (green) VS. COMBINED WASTE SURVEY (orange)

AREA 1 REMAINING AIRSPACE.....	8,159 m ³
AREA 2 REMAINING AIRSPACE.....	156,253 m ³
REMAINING AIRSPACE IN TIPPING PAD BOWL.....	183,412 m ³
REMAINING AIRSPACE TOTAL.....	347,824 m ³

EXISTING WASTE TOPOGRAPHY (DECEMBER 2021)

STATUS
ISSUED FOR USE

NUM	DATE	APR	DESCRIPTION
REVISIONS			
B	JAN 11/22	SB	ISSUED FOR USE
A	JAN 5/22	SB	ISSUED FOR REVIEW
NUM	DATE	APR	DESCRIPTION
DRAWING STATUS			

**PERMIT TO PRACTICE
TETRA TECH CANADA INC.**

RM SIGNATURE: _____

RM APEGA ID #: _____ 62764

DATE: _____ 2022-01-12

PERMIT NUMBER: P013774
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

PERMIT

PROFESSIONAL SEAL

CLIENT

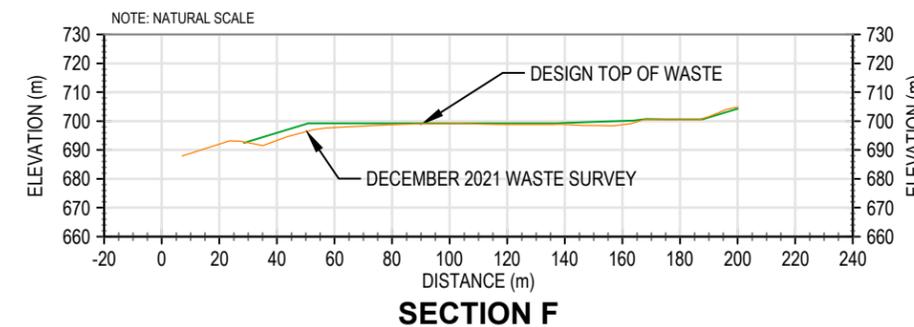
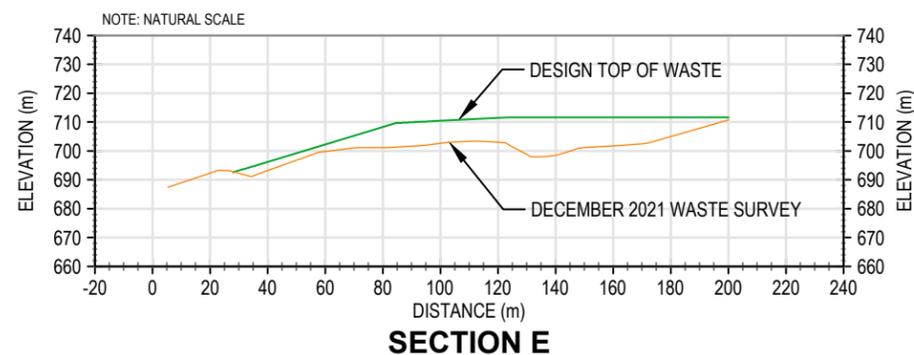
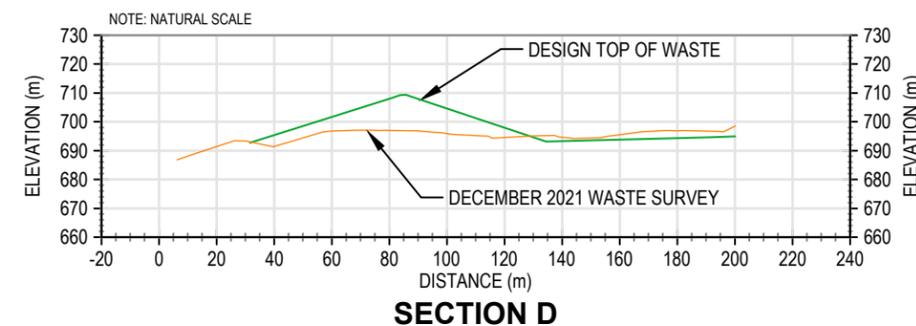
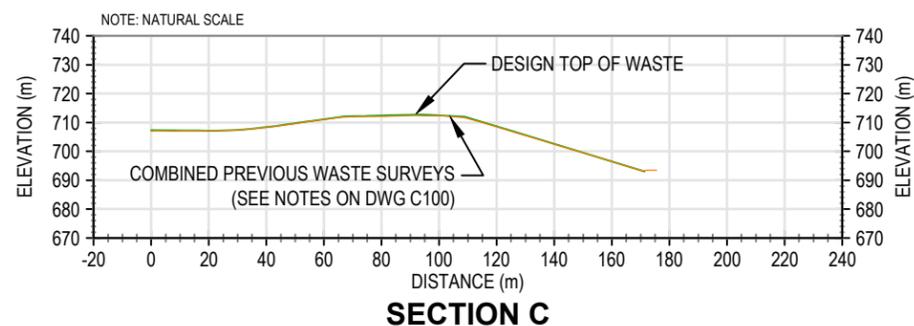
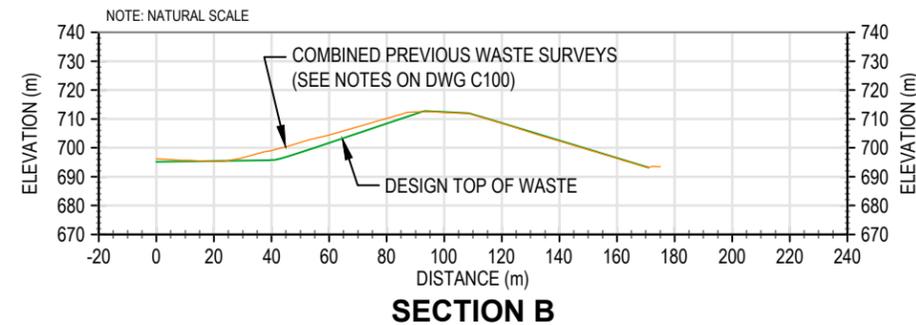
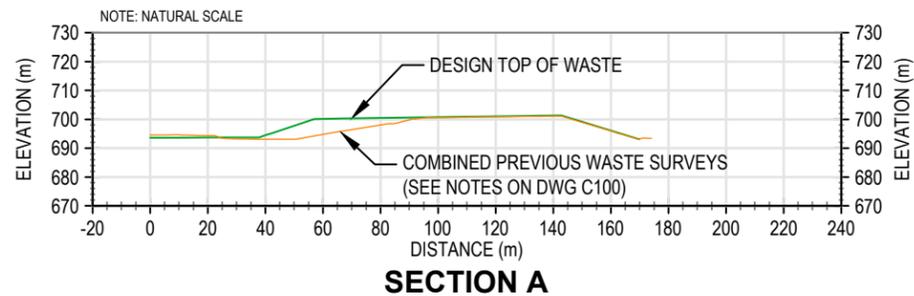



**CLEAN HARBORS
DECEMBER 2021 WASTE SURVEY**

**PLAN
WASTE SURVEY DECEMBER 2021**

PROJECT No. SWM.SWOP04391-01	OFFICE EDM	DES -	CKD MJ	REV -	DRAWING C100
DATE: January 11, 2022	SHEET No. 1 of 2	DWN DRG	APP SB	STATUS B	

Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Clean Harbors Ryley\PROJECT\Waste Survey\December 2021\SWOP04391-01-Waste Survey Dec 2021.dwg [C:101] January 11, 2022 - 2:01:53 pm (BY: GAMMIE, DON)



STATUS
ISSUED FOR USE

NUM	DATE	APR	DESCRIPTION
REVISIONS			
B	JAN 11/22	SB	ISSUED FOR USE
A	JAN 5/22	SB	ISSUED FOR REVIEW
NUM	DATE	APR	DESCRIPTION
DRAWING STATUS			

**PERMIT TO PRACTICE
TETRA TECH CANADA INC.**

RM SIGNATURE: _____

RM APEGA ID #: _____ 62764

DATE: _____ 2022-01-12

PERMIT NUMBER: P013774
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

PERMIT

PROFESSIONAL SEAL

CLIENT



**CLEAN HARBORS
DECEMBER 2021 WASTE SURVEY**

**CROSS-SECTIONS A - F
WASTE SURVEY DECEMBER 2021**

PROJECT No. SWM.SWOP04391-01	OFFICE EDM	DES -	CKD MJ	REV -	DRAWING C101
DATE: January 11, 2022	SHEET No. 2 of 2	DWN DRG	APP SB	STATUS B	

APPENDIX M

Inspection Form Examples



RY - DAILY WASTE CELLS INSPECTION LOG

Form Code: 706

Compliance Header	
Inspector Name	
Area of Inspection	
Inspection Date and Time	
Instructions 1	
Note condition of inspection items. If item does not apply to an area, mark N/A. Describe the problems and remedial actions in the space provided under each inspection item.	
Cell 1	
Leachate building and tank	
Secondary water pumped (litres)	
Cell 1 cap condition (grass, erosion)	
Cell 2	
Leachate building and tank	
Secondary water pumped (litres)	
Cell 2 cap condition (grass, erosion)	
Cell 3A (Cell 3)	
Leachate building and tank	
Secondary water pumped (litres)	
Cell 3 cap condition (grass, erosion)	
Cell 3B (Cell 4)	
Leachate building and tank	
Secondary water pumped (litres)	
Cell 4 cap condition (grass, erosion)	
Cell 3C (Cell 5)	
Leachate building and tank	
Secondary water pumped (litres)	
Cell 5 cap condition (grass, erosion)	

Cell 3D (Cell 6)	
Leachate building and tank	
Secondary water pumped (litres)	
Cell 6 cap condition (grass, erosion)	
Cell 3E (Cell 7)	
Leachate building and tank	
Secondary water pumped (litres)	
Cell 7 cap condition (grass, erosion)	
Cell 4 (Cell 8)	
Leachate building and tank	
Secondary water pumped (litres)	
Cell 4 cap condition (grass and erosion)	
Pond 2	
Type in pond level (Below first mark; Between marks; Above top mark; Pumping)	
Pond 2 compliance	
Pond 3	
Type in pond level (Below first mark; Between marks; Above top mark; Pumping)	
Pond 3 compliance	
Dispersible waste must not be landfilled when wind exceeds 30 KM/HR	
Wind Direction (Wind direction is the direction the wind is coming from.)	
Average wind speed (km/hr)	
Precipitation (inches)	
Appearance/ cleanliness: Cell entrance, roads, buildings, bone yard, security	
Lugger pad	
Compliance Footer	
Inspector Signature	
Attach Photo	
Inspection Overall Assessment	



RY - DAILY WASTE CELLS
INSPECTION LOG

Response Id:
8151734

Compliance Header	
Inspector Name	094544 - Chelsey Price Robertson (PRICERC1)
Area of Inspection	Ryley
Inspection Date and Time	07/05/2021 12:09 PM
Instructions 1	
Note condition of inspection items. If item does not apply to an area, mark N/A. Describe the problems and remedial actions in the space provided under each inspection item.	
Cell 1	
Leachate building and tank	Pass,Pass,Pass,Pass,Pass,Pass,Pass,Pass
Secondary water pumped (litres)	0
Cell 1 cap condition (grass, erosion)	Pass
Cell 2	
Leachate building and tank	Pass,Pass,Pass,Pass,Pass,Pass,Pass
Secondary water pumped (litres)	0
Cell 2 cap condition (grass, erosion)	Pass
Cell 3A (Cell 3)	
Leachate building and tank	Pass,Pass,Pass,Pass,Pass,Pass
Secondary water pumped (litres)	177
Cell 3 cap condition (grass, erosion)	Pass
Cell 3B (Cell 4)	
Leachate building and tank	Pass,Pass,Pass,Pass,Pass
Secondary water pumped (litres)	20
Cell 4 cap condition (grass, erosion)	Pass
Cell 3C (Cell 5)	
Leachate building and tank	Pass,Pass,Pass,Pass
Secondary water pumped (litres)	0
Cell 5 cap condition (grass, erosion)	Pass
Cell 3D (Cell 6)	
Leachate building and tank	Pass,Pass,Pass

Secondary water pumped (litres)	27
Cell 6 cap condition (grass, erosion)	Pass
Cell 3E (Cell 7)	
Leachate building and tank	Pass,Pass
Secondary water pumped (litres)	30
Cell 7 cap condition (grass, erosion)	Pass
Cell 4 (Cell 8)	
Leachate building and tank	Pass
Secondary water pumped (litres)	539
Cell 4 cap condition (grass and erosion)	Pass
Pond 2	
Type in pond level (Below first mark; Between marks; Above top mark; Pumping)	Between levels
Pond 2 compliance	Pass
Pond 3	
Type in pond level (Below first mark; Between marks; Above top mark; Pumping)	Between levels
Pond 3 compliance	Pass
Dispersible waste must not be landfilled when wind exceeds 30 KM/HR	
Average wind speed (km/hr)	14
Wind Direction (Wind direction is the direction the wind is coming from.)	N
Precipitation (inches)	0
Appearance/ cleanliness: Cell entrance, roads, buildings, bone yard, security	Pass
Lugger pad	Pass
Compliance Footer	
Inspector Signature	
Inspection Overall Assessment	Inspection Passed



R/Y Transfer Station Daily Inspection

Form Code: 863

Compliance Header	
Inspector Name	
Area of Inspection	
Inspection Date and Time	
Instructions1	
Inspections must be conducted daily when the facility is in operation. Note condition of inspection items. All unsatisfactory findings must be explained below. Include any repairs, changes or other remedial actions required.	
Fire pumphouse	
Engine fuel (%)	
Fire tank level (%)	
Fire tank temp. (°C)	
Potable tank (%)	
Potable tank temp. (°C)	
Fire pumphouse compliance	
Scrubber building	
Caustic tank pH > 8.0	
Weekly exhaust PPM	
Scrubber building compliance	
Inspection items1	
MCC building	
Staging building	
Process building	
Yard	
Compliance Footer	
Inspector Signature	
Attach Photo	

Inspection Overall Assessment	
-------------------------------	--



RY Transfer Station Daily
Inspection

Response Id:
8391287

Compliance Header	
Inspector Name	027455 - James McVig (MCVIGJ1)
Area of Inspection	Ryley
Inspection Date and Time	08/23/2021 5:30 PM
Instructions1	
Inspections must be conducted daily when the facility is in operation. Note condition of inspection items. All unsatisfactory findings must be explained below. Include any repairs, changes or other remedial actions required.	
Fire pumphouse	
Engine fuel (%)	70
Fire tank level (%)	95
Fire tank temp. (°C)	17
Potable tank (%)	65
Potable tank temp. (°C)	17
Fire pumphouse compliance	Pass
Scrubber building	
Caustic tank pH > 8.0	9.11
Weekly exhaust PPM	N/A
Scrubber building compliance	Pass
Inspection items1	
MCC building	Pass
Staging building	Pass
Process building	Pass
Yard	Pass
Compliance Footer	
Inspector Signature	
Inspection Overall Assessment	Inspection Passed

APPENDIX N

Financial Security Calculations

Closure and Post-Closure Cost Calculations 2021

CLOSURE COST ESTIMATES										
ITEM	QUANTITY	COST/UNIT	CELL 1	CELL 2	CELL 3A	CELL 3B	CELL 3C	Cell 3D	Cell 3E	Cell 4
CLOSURE COSTS, LANDFILL CELLS										
Cell area (m2)			6880	13530	21250	21250	25465	24434	31078	37000
Capping Status			Capped	Capped	Capped	Capped	50% Capped	Clay Cap 50%	Clay Cap 75%	
Surface prep'n/m2		\$ 3.75	\$ -	\$ -	\$ -	\$ -	\$ 47,746.88	\$ 45,813.75	\$ 29,135.63	\$ 138,750.00
Clay req'd/m2 @ 0.6 m thickness(m3) *	0.6	\$ 10.20	\$ -	\$ -	\$ -	\$ -	\$ 77,922.90	\$ 74,768.04	\$ 47,549.34	\$ 226,440.00
Supply & install HDPE liner/m2 (black) *		\$ 9.25	\$ -	\$ -	\$ -	\$ -	\$ 117,775.63	\$ 226,014.50	\$ 287,471.50	\$ 342,250.00
Supply & install Geotextile/m2 **		\$ 1.87	\$ -	\$ -	\$ -	\$ -	\$ 23,809.78	\$ 45,691.58	\$ 58,115.86	\$ 69,190.00
QA/QC (18% of total of first 4 items) ***	18%		\$ -	\$ -	\$ -	\$ -	\$ 24,052.97	\$ 70,611.82	\$ 76,009.02	\$ 139,793.40
Sub-soil @ 0.45 m thickness (m3) **	0.45	\$ 3.60	\$ -	\$ -	\$ -	\$ -	\$ 20,626.65	\$ 39,583.08	\$ 50,346.36	\$ 59,940.00
Native soil cover @ 0.15 m thickness (m3) **	0.15	\$ 1.20	\$ -	\$ -	\$ -	\$ -	\$ 2,291.85	\$ 4,398.12	\$ 5,594.04	\$ 6,660.00
Fertilizer & hydroseeding - cost/m2 **		\$ 0.54	\$ -	\$ -	\$ -	\$ -	\$ 6,875.55	\$ 13,194.36	\$ 16,782.12	\$ 19,980.00
Subtotal Closure Costs			\$ -	\$ -	\$ -	\$ -	\$ 321,102.19	\$ 520,075.25	\$ 571,003.86	\$ 1,003,003.40
Engineering ***	6%		\$ -	\$ -	\$ -	\$ -	\$ 19,266.13	\$ 31,204.51	\$ 34,260.23	\$ 60,180.20
Contingency	15%		\$ -	\$ -	\$ -	\$ -	\$ 51,055.25	\$ 82,691.96	\$ 90,789.61	\$ 159,477.54
Total Closure Costs			\$ -	\$ -	\$ -	\$ -	\$ 391,423.57	\$ 633,971.73	\$ 696,053.71	\$ 1,222,661.14
* Cost estimates based on 2014 Cell 3E construction RFQ										
** Cost estimates based on 2014 Cell 3 Capping PO										
*** Cost estimates based on 2013 Capping Engineering & QA-QC PO										
CELL CLOSURE COST										
\$2,944,110.15										
STORMWATER RETENTION POND CLOSURE										
ITEM	QUANTITY	COST/UNIT	POND 1	POND 2	POND 3*					
Pond Volume (m3)				7600	0					
Pond Area (m2)				5000	0					
			Closed							
Clay fill (m3)		\$10.20	\$0.00	\$77,520.00	\$0.00					
Sub-soil @ 0.45 m thickness (m3)		\$ 3.60	\$0.00	\$18,000.00	\$0.00					
Native soil cover @ 0.15 m thickness (m3)		\$ 1.20	\$0.00	\$6,000.00	\$0.00					
Fertilizer & seeding - cost/m2		\$ 0.54	\$ -	\$ 2,700.00	\$ -					
* Closure of Pond 3 is included in the Closure Costs for the Equipment Storage and Laydown Area, below.										
STORMWATER RETENTION POND CLOSURE (POND 2 ONLY)										
\$104,220.00										
CLOSURE COSTS, TRANSFER STATION										
DISPOSAL COST FOR INVENTORY REMOVAL*		\$423,042.75								
TRANSPORTATION COST FOR INVENTORY DISPOSAL**		\$191,945.00								
MOBILIZATION***		\$5,000.00								
UTILITY LOCATES/CONFIRM UTILITY DISCONNECT***		10,000.00								
TANK CLEANING***		155,086.20								
REMOVE TANKS ***		\$ 12,137.00	Leachate Tank T5100 removed and disposed							
REMOVE SECONDARY CONTAINMENT***		\$ 23,083.00								
BUILDING DEMOLITION & REMOVAL***		\$ 134,211.00								
BUILDING FOUNDATION REMOVAL***		\$ 302,071.00								
PROCESS EQUIPMENT REMOVAL***		\$ 3,500.00								
REMOVE MISCELLANEOUS ITEMS, ASPHALT, FENCING ETC***		\$ 111,273.00								
DEMobilization***		\$ 5,000.00								

Waste disposal cost

Financial Security Calculations for CHES Ryley Facility									
Waste Disposal Costs									
Cost to empty tanks				Disposal Facility					
Tank	Volume (L)	Waste type	USA Incineration	Disposal Cost	Transport/kg	Transport cost			
T100	18500	Flammable liquid	\$0.53 per kg	\$9,805.00	\$0.33	\$6,105.00			
T200	18500	Flammable liquid	\$0.53 per kg	\$9,805.00	\$0.33	\$6,105.00			
T300	32,000	Aqueous incinerable	\$0.70 per kg	\$22,400.00	\$0.33	\$10,560.00			
Seller's Oilfield Ltd.									
T5100	Tank Removed	60000	Leachate	\$0.000 per kg	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
T5200		60000	Leachate	\$0.025 per kg	\$1,500.00	\$0.03	\$1,800.00	\$0.03	\$1,800.00
T5400		60000	Leachate	\$0.025 per kg	\$1,500.00	\$0.03	\$1,800.00	\$0.03	\$1,800.00
T5500		60000	Leachate	\$0.025 per kg	\$1,500.00	\$0.03	\$1,800.00	\$0.03	\$1,800.00
T5600		120000	Leachate	\$0.025 per kg	\$3,000.00	\$0.03	\$3,600.00	\$0.03	\$3,600.00
T5700		120000	Leachate	\$0.025 per kg	\$3,000.00	\$0.03	\$3,600.00	\$0.03	\$3,600.00
T5800		150000	Leachate	\$0.025 per kg	\$3,750.00	\$0.03	\$4,500.00	\$0.03	\$4,500.00
Total (tanks)					\$56,260.00				\$39,870.00
Drummed waste		Avg mnthly qty,	Drum equiv	Recycle Systems			Transport/Drum		
Class 2		1025	5 aerosols	\$125.00 per drum	\$625.00	\$160.00	\$800.00		
USA Incineration									
Class 3		219350	1070 Flammable liquid	\$65.00 per drum	\$69,550.00	\$60.00	\$64,200.00		
Class 4		15375	75 Flammable solid	\$302.00 per drum	\$22,650.00	\$60.00	\$4,500.00		
Class 5.1		2050	10 Oxidizers	\$200.00 per drum	\$2,000.00	\$60.00	\$600.00		
Class 6		70725	345 Toxics	\$367.00 per drum	\$126,615.00	\$60.00	\$20,700.00		
Class 8		20500	100 Corrosives	\$190.00 per drum	\$19,000.00	\$60.00	\$6,000.00		
NR (reg by AB Env)		70725	345	\$150.00 per drum	\$51,750.00	\$60.00	\$20,700.00		
Not Regulated		111725	545	\$125.00 per drum	\$68,125.00	\$60.00	\$32,700.00		
PCB	Swan Hills	1025	5	\$6.31 per kg	\$6,467.75	\$375.00	\$1,875.00		
Total (drums)		512500	2500		\$366,782.75				\$152,075.00
				Total Cost	\$423,042.75				\$191,945.00
				(tanks & drums)					

RIDER NO. 4

To be attached to and form part of

AB Environmental Protection Act Bond, Approval No. 10348-01-00

BOND NO.: M220739
BOND AMOUNT: \$11,424,611.74 CAD
BROKER: HUB INTERNATIONAL HKMB LIMITED
SURETY: CHUBB INSURANCE COMPANY OF CANADA
PRINCIPAL: CLEAN HARBORS CANADA, INC.
OBLIGEE: HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF ALBERTA AS REPRESENTED BY THE DIRECTOR CENTRAL REGION ALBERTA ENVIRONMENT
INCEPTION DATE: SEPTEMBER 6, 2016

It is hereby stated and agreed that the bond amount has been amended

FROM: Eleven Million, Four Hundred Twenty-Four Thousand, Six Hundred Eleven—74/100 (\$11,424,611.74)
TO: Nine Million, Seven Hundred Forty-Four Thousand, Two Hundred Sixty—45/100 (\$9,744,260.45)
 And

It is hereby stated and agreed that the Obligee name is changed:

FROM: HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF ALBERTA AS REPRESENTED BY THE DIRECTOR CENTRAL REGION ALBERTA ENVIRONMENT
TO: HER MAJESTY THE QUEEN IN RIGHT OF ALBERTA AS REPRESENTED BY THE MINISTER OF ENVIRONMENT AND PARKS
 ATTN: DIRECTOR, SOUTH REGION
 5TH FLOOR, 9915 108 STREET, EDMONTON AB, T5K 2G8
 And

It is hereby stated and agreed that the Bond has been renewed for the term of:

September 6, 2021-September 6, 2022

This certificate is subject to the same terms, conditions and exclusions of the original contract and written amendments thereto. Continuation of a bond is further subject to the condition that the maximum aggregate liability of the company shall not be cumulative and shall in no event exceed the amount shown above.

NOTHING HEREIN CONTAINED shall alter, vary or extend any provisions or conditions of this bond other than as stated above.

Dated this 16th day of August, 2021

CLEAN HARBORS CANADA, INC.

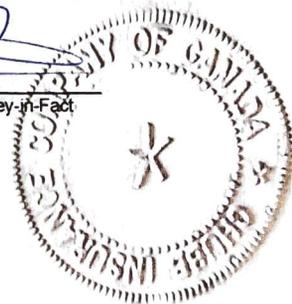
CHUBB INSURANCE COMPANY OF CANADA

Principal



Mark Pupo, Attorney-in-Fact

Witness as to Principal



APPENDIX O

Site Development Plan



To: Stan Yuha, Facility Manager **Date:** January 11, 2022
c: Michael E. Parker, Vice President **Memo No.:** 1
 Canadian Environmental Compliance
From: Michelle Jelinski, P.Eng. **File:** 704-SWM.SWOP04391-01
 Sean Buckles, M.Sc., P.Eng.
Subject: Remaining Airspace – December 31, 2021
 Clean Harbors Facility, Ryley, Alberta

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was requested to complete the remaining airspace calculations for the Clean Harbors Facility located near Ryley, Alberta. These calculations are based on the topographic waste survey completed by Challenger Geomatics Ltd. (Challenger) on December 31, 2021 and the data provided by Clean Harbors on January 4, 2022.

2.0 AIRSPACE MODELLING

Using AutoCAD Civil 3D software, Tetra Tech completed airspace modelling based on the December 31 survey data provided by Challenger, and design top of waste elevations previously completed by Tetra Tech. As of December 31, 2021, the remaining airspace in Area 1 (Cell 3E) is estimated at 8,159 m³; the remaining airspace in Area 2 (Cell 4 and the north portion of Cell 3C and Cell 3D) is estimated at 156,253 m³; and the remaining airspace in the tipping pad area is estimated at 183,412 m³.

The total estimated remaining airspace at the Clean Harbors Ryley Facility as of December 31, 2021 is 347,824 m³.

This information is presented in Table 1 below and in the attached drawings C100 and C101.

Table 1: Airspace Modelling Summary

Area	Remaining Airspace Volume	Notes
Area 1 (Cell 3E)	8,159 m ³	No change from December 2020 survey
Area 2 (Cell 4 and north portion of Cell 3C and Cell 3D)	156,253 m ³	A difference of approximately 92,000 m ³ since December 2020 survey
Tipping Pad Area	183,412 m ³	No change from December 2020 survey
Total	347,824 m³	

3.0 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 document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.

4.0 CLOSURE

We trust this technical memo meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

Michelle Jelinski
704-SWM.SWOP04391-01
704-SWM.SWOP04391-01
704-SWM.SWOP04391-01
704-SWM.SWOP04391-01

Prepared by:
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Sean Buckles, M.Sc., P.Eng.
Senior Project Engineer – Team Lead
Solid Waste Management Practice
Direct Line: 403.723.6876
Sean.Buckles@tetrattech.com

/sy

PERMIT TO PRACTICE TETRA TECH CANADA INC.	
RM SIGNATURE: _____	<i>[Signature]</i>
RM APEGA ID #: _____	62764
DATE: _____	2022-01-12
PERMIT NUMBER: P013774	
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)	

Enclosure: Limitations on the Use of this Document
 December 2021 Waste Survey Drawings C100 and C101

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.

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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.

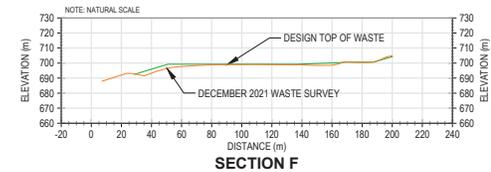
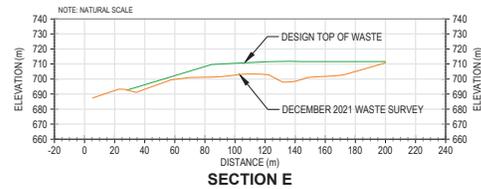
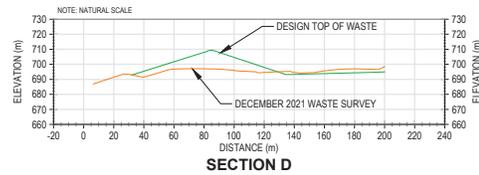
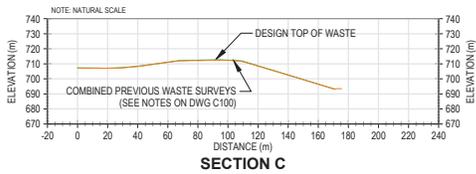
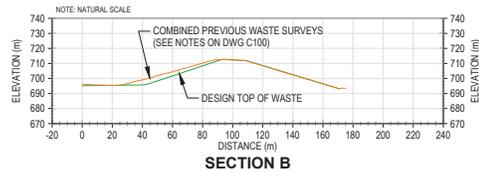
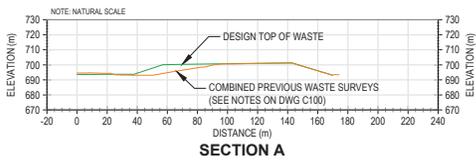
The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined 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.

C:\Engineering\Projects\Clean Harbors\Projects\Waste Survey\December 2021\SWP04391-01\Main Survey\Dec 2021.dwg [C:01] January 11, 2022 - 2:15:33pm BY: GAMME.DXM



STATUS: ISSUED FOR USE

NUM	DATE	APR	DESCRIPTION
REVISIONS			
B	JAN 11/22	SB	ISSUED FOR USE
A	JAN 5/22	SB	ISSUED FOR REVIEW
NUM	DATE	APR	DESCRIPTION
DRAWING STATUS			

PERMIT TO PRACTICE
TETRA TECH CANADA INC.

RM SIGNATURE: _____
 RM APEGA ID #: 62764

DATE: 2022-01-12
PERMIT NUMBER: P013774
 The Association of Professional Engineers and Geoscientists of Alberta (APEGA)



PROFESSIONAL SEAL

CLIENT



CLEAN HARBORS
DECEMBER 2021 WASTE SURVEY

CROSS-SECTIONS A - F
WASTE SURVEY DECEMBER 2021

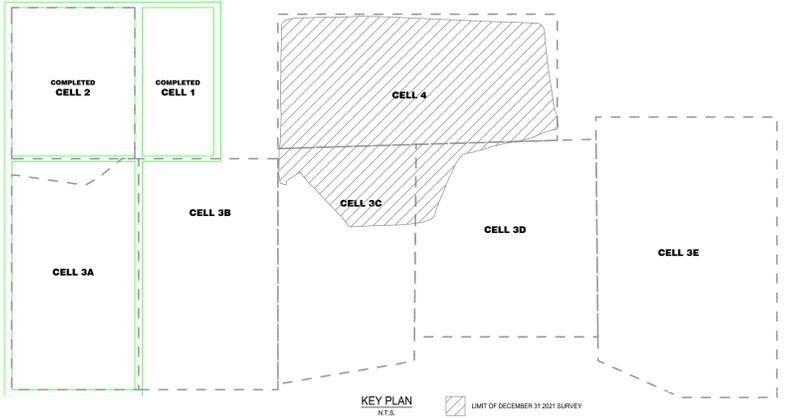
PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
SWM.SWP04391-01	EDM	-	MJ	-	C101
DATE:	SHEET No.	DWN	APP	STATUS	
January 11, 2022	2 of 2	DRG	SB	B	

SITE SURVEY ELEVATIONS
FOR
CELL 3C, 3D & 4

RYLEY, ALBERTA

DRAWN BY: HWA/2019/06/04	DATE: JANUARY 4, 2022	SCALE: (Metric)
CHECKED BY: AH		1:500
	JOB No.: 10265	REV. 0

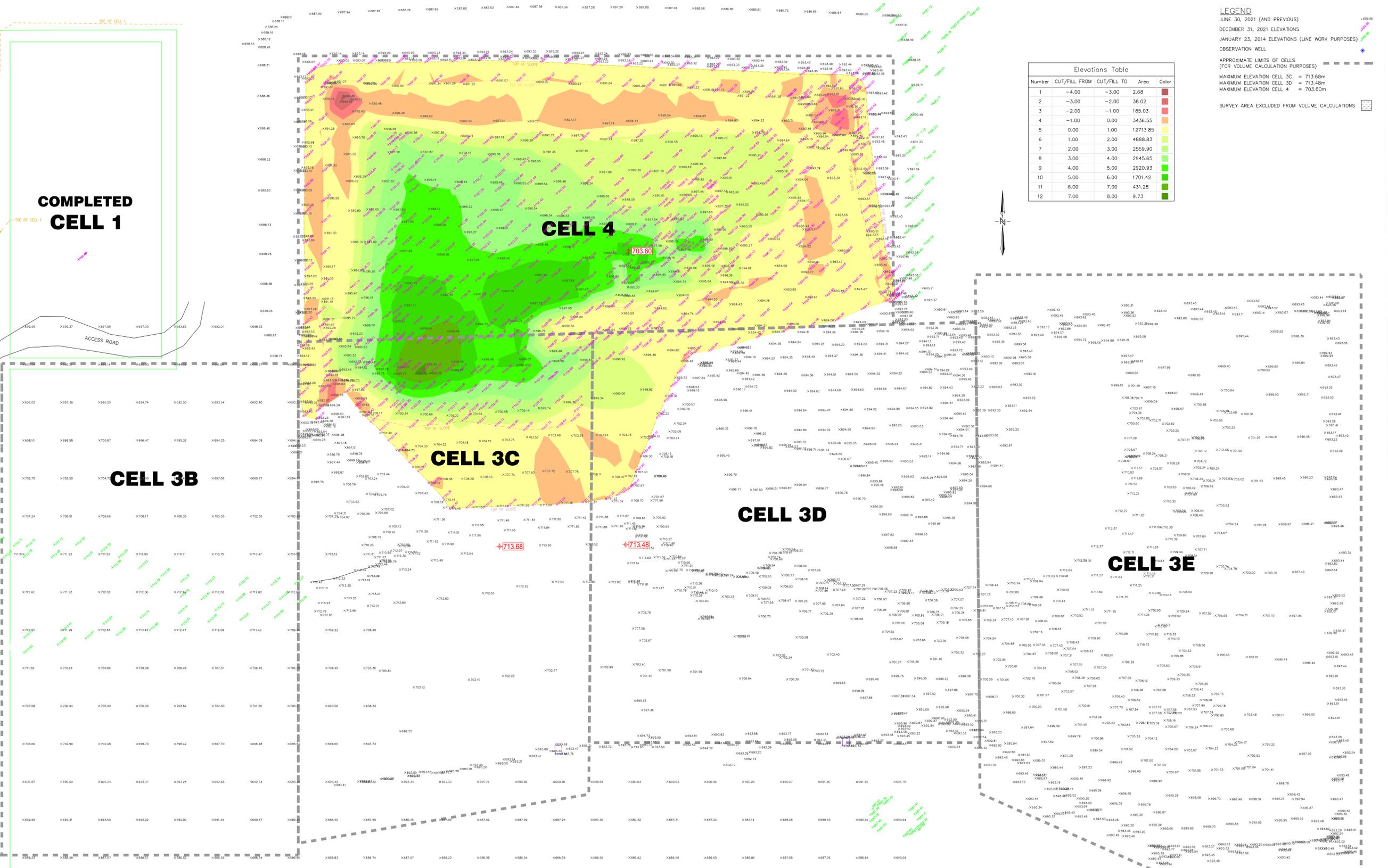
WELL OBSERVATION COORDINATES				
WELL	NORTHING	EASTING	ELEVATION (TOP OF PIPE)	ELEVATION (GROUND)
19MW38B	995.96	1459.70	687.96	687.02
19MW38A	995.91	1456.10	687.97	687.09
19MW37B	1003.00	1261.59	686.59	685.59
19MW37A	1003.78	1260.72	686.94	686.00



Parcel Volume Table - Unadjusted			
Parcel	Cut Cu.M.	Fill Cu.M.	Net Cu.M.
CELL 3C	113	11937	11824(F)
CELL 3D	13	1335	1322(F)
CELL 4	906	39925	39019(F)

LEGEND
 JUNE 30, 2021 (AND PREVIOUS)
 DECEMBER 31, 2021 ELEVATIONS
 JANUARY 23, 2021 ELEVATIONS (LINE WORK PURPOSES)
 OBSERVATION WELL
 APPROXIMATE LIMITS OF CELLS (FOR VOLUME CALCULATION PURPOSES)
 MAXIMUM ELEVATION CELL 3C = 713.68m
 MAXIMUM ELEVATION CELL 3D = 713.48m
 MAXIMUM ELEVATION CELL 4 = 703.60m
 SURVEY AREA EXCLUDED FROM VOLUME CALCULATIONS

Elevations Table				
Number	CUT/FILL FROM	CUT/FILL TO	Area	Color
1	-4.00	-3.00	2.68	Red
2	-3.00	-2.00	38.02	Orange
3	-2.00	-1.00	185.03	Yellow-Orange
4	-1.00	0.00	3436.55	Yellow
5	0.00	1.00	12713.85	Light Green
6	1.00	2.00	4888.83	Green
7	2.00	3.00	2559.90	Dark Green
8	3.00	4.00	2945.65	Very Dark Green
9	4.00	5.00	2920.93	Black
10	5.00	6.00	1701.42	Black
11	6.00	7.00	431.28	Black
12	7.00	8.00	9.73	Black



APPENDIX P

Annual Landfill Cell Closure Report

Annual Landfill Cell Closure Report

No landfill cells were closed in 2021.

Appendix Q
Contravention Reports
(7-Day Letters)



January 25, 2021

Environmental Response Centre
Alberta Environment and Parks
111, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta T6B 2X3

To Whom It May Concern:

Re: Reference Number 375305
Clean Harbors Approval No. 10348-03-00

Clean Harbors Canada, Inc. (Clean Harbors) operates the Ryley Hazardous Waste Landfill and Transfer Facility located in SE 09-050-17 W4M near Ryley, Alberta.

On the morning of January 19th, 2021 at 11:09 am, the contents of a small pail self-ignited in the landfill. A landfill Operator noticed the very small fire and immediately extinguished it using a fire extinguisher. Landfill staff are trained to keep a close watch on the landfill and noticed the small fire at its onset and responded immediately.

The fire was contained to an orange 20-liter plastic pail that had the Home Depot logo on it. Upon investigation we determined the pail contained bottles of individual lab chemicals in it. We collected the remaining bottles and removed them from the landfill.

At a minimum, every bulk load that arrives at the facility is visually inspected by our trained operators. The bulk load containing the pail would have been a large end dump containing greater than 10 tonnes of waste. Due the small size of the pail compared to the size of the load it was in, the pail was hidden and therefore not caught during the offloading into the dumping pit. The load was then excavated from the dumping pit into a rock truck and moved into the landfill.

Because of where the small fire was located, we were able to determine the waste in that location was delivered by one of only a couple possible customers. We will be sending a letter to all the suspect customers letting them know what happened and reminding them to ensure their shipments match their waste profiles and that we will be further scrutinizing loads as they arrive prior to landfill. If we are able to identify the exact generator of the material, we will be contacting them with further conditions.



If you have any further questions, do not hesitate to contact Stan Yuha at (780) 663-2509.

Sincerely,

A handwritten signature in blue ink that reads "Stan Yuha". The signature is written in a cursive style with a large initial 'S'.

Stan Yuha
Facility General Manager
Clean Harbors Canada Inc.
P.O. Box 390
Ryley, AB
T0B 4A0



February 25, 2021

Environmental Response Centre
Alberta Environment and Parks
111, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta T6B 2X3

To Whom It May Concern:

Re: Reference Number 376351
Clean Harbors Approval No. 10348-03-00

On February 22nd, 2021 Clean Harbors received an odor and garbage complaint from a Beaver County resident.

The resident called the Clean Harbors Emergency Operations Center (EOC) based at our corporate office in Norwell, Massachusetts at 4:41 pm. The complaint was for “a sour gas emanating from the landfill, as well as trash coming onto their property.” The caller indicated “plastic bags (garbage) was coming onto their property, located at NE-10-049-17 West-4 where their horses are normally kept.” Upon further investigation by the Facility Manager, the location given is owned by Claystone Waste Ltd. The correct location where the horses are kept is 3 & 4 SW10-049-17 W4. This location is south east of the Clean Harbors landfill. It was also determined the caller does not own this property as was stated and is only using it to pasture his horses.

After receiving the complaint, the EOC sent an email to the Facility Manager at 5:05 pm informing him of the complaint. Since this was an after-business hour email it was not noticed by the manager until the morning of Feb. 23rd. Upon reading the email, the Manager was able to determine the wind was blowing in the direction of that property on the afternoon of the 22nd. Upon investigation it was determined that the odor may have originated from a load received earlier that day that was processed and handled as per our Dust & Odor Best Practice Guideline. The wind was not blowing towards the Village of Ryley or any other residents therefore the load was received and covered immediately.

As far as the garbage aspect, it is uncommon for garbage to escape the landfill at the Clean Harbors Landfill. At the perimeter of the property there is a 6 foot chain link fence which has 3 barbed wires on top which extends the height to about 7 feet which would capture the garbage if it were to escape the landfill. Although it is unlikely for the garbage to originate from the landfill the Manager assigned personnel to pick up any garbage in the ditches along the roadway south east of the facility. It should be noted the origin of the garbage is more likely to have come from the garbage trucks that haul municipal garbage to the municipal landfill across the road from Clean Harbors, now known as Claystone Waste Ltd. The Manager asked permission for his personnel



to access the property where the horses were kept in order to pick any garbage that may have blown into the property, however was denied access.

We have been utilizing good cover on a regular basis and in my opinion the landfill is in good shape with minimal debris showing. We continue to follow our Odor and Dust Policy and track any received loads of concern. If any odors are detected and conditions are favorable, the material is buried and covered immediately. If the wind is blowing towards Ryley and the load is rejected.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

A handwritten signature in blue ink that reads "Stan Yuha". The signature is written in a cursive, flowing style.

Stan Yuha
General Manager



July 12, 2021

Environmental Response Centre
Alberta Environment and Parks
111, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta T6B 2X3

To Whom It May Concern:

Re: Reference Number 380842
Clean Harbors Approval No. 10348-03-00

On Monday, July 5th, 2021 Clean Harbors received an odor complaint from a Ryley resident. The resident called and left a message on my cell phone at 3:17 pm. I was on holidays and did not retrieve the message until Tuesday 6th in the afternoon. I immediately informed my Compliance Manager who investigated the potential source of the odor. He and the Operations Manager along with the landfill personnel reviewed all the loads that were received on the 5th and nothing had any strong, noticeable odors or was out of the ordinary. The wind was determined to be out of the north that day, blowing toward Ryley. We are unsure of the origin of the odor. Our Compliance Manager returned the complainants call but was only able to leave him a message.

We have been utilizing good cover on a regular basis and in my opinion the landfill is in good shape. We continue to track any received loads of concern and if any odors are detected, the material is buried and covered immediately. If the wind is blowing towards Ryley and the load is rejected.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

A handwritten signature in blue ink that reads "Stan Yuha".

Stan Yuha
General Manager



July 20, 2021

Environmental Response Centre
Alberta Environment and Parks
111, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta T6B 2X3

To Whom It May Concern:

Re: Reference Number 381259
Clean Harbors Approval No. 10348-03-00

On Thursday, July 15th, 2021 Clean Harbors received an odor complaint from a Ryley resident. The resident called at 2:28 pm and said he had noticed an odor that would come and go but did not describe the odor. The wind was determined to be out of the north that day however no odorous loads were reported by our landfill operators. I immediately drove the south perimeter of our landfills but could not detect any odor. I then immediately drove into Ryley along the street where the resident lives. I noticed a man and woman sitting in their yard two blocks north of where the complainant lives, directly between his house and our landfill. I asked them if they had noticed any odors that afternoon and they replied they had not, and for the record they've never noticed any odors from the landfill. I thanked them for their time. I drove past his house and through town and could not detect any odors.

The source of the odor was undetermined. The complainant was the same individual who called to complain of an odor on July 5th which was also unsubstantiated. Reference # 380842.

We have been utilizing good cover on a regular basis and in my opinion the landfill is in good shape. We continue to track any received loads of concern and if any odors are detected, the material is buried and covered immediately. If the wind is blowing towards Ryley and the load is rejected.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

A handwritten signature in blue ink that reads "Stan Yuha".

Stan Yuha



General Manager



August 4, 2021

Environmental Response Centre
Alberta Environment and Parks
111, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta T6B 2X3

To Whom It May Concern:

Re: Reference Number 381915
Clean Harbors Approval No. 10348-03-00

On Friday, July 30th, 2021 Clean Harbors received an odor complaint from a Ryley resident. The resident called at 8:50 am and said he had noticed an odor that would come and go but did not describe the odor.

The wind was determined to be 0.5 m/s (calm) out of the north. The two loads we had received that morning, neither were reported as having any odor by our landfill operators. I immediately drove into Ryley along the street where the resident lives and past his house and through town and could not detect any odors.

Initially we were not able to determine the source of the odor however later that day while I was talking with our landfill operators, one of them said they were pumping secondary leachate from cell 4 right when the complaint came in. Cell 4 leachate is known to have an odor. The secondary leachate is typically pumped in the mornings. We believe a possible source of the odor could have been from the leachate tank vent line while the leachate was being pumped. The pumping process only takes a couple minutes and that would explain why the odor goes away quickly. The primary leachate is set up on a timer system and pumps every few hours. This would also explain previous odor complaints that were reported as lasting a few minutes and then going away.

To mitigate future occurrences, the facility will commit to installing an odor scrubber system onto cell 4 leachate tank. If it is effective, we will install scrubber units onto each of the leachate tanks. The date of the install will be determined by how quickly we can get a suitable unit from a vendor and have it installed.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.



Sincerely,

A handwritten signature in blue ink that reads "Stan Yuha".

Stan Yuha
General Manager



Sept. 27, 2021

Environmental Response Centre
Alberta Environment
111, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta T6B 2X3

To Whom It May Concern:

Re: Reference Number 383965

On September 27th I received notification from our Consultant Engineers that we were unable to meet the monthly requirement of reporting 90% wind data for the month of August 2021, failing at 89%.

The data recording instrument had stopped working and confirmation by the General Manager confirmed at the time that it was not a power issue but a true instrument failure. He tried numerous times to reset the instrument to no avail. It would not even turn on. However, a couple days later when the instrument was plugged back in and turned on to demonstrate it didn't work – to the total surprise of everyone, it started working perfectly again. It is a mystery why the instrument had stopped working in the first place and even more of a mystery why it started to work again. This issue has never been experienced before and will be marked as an anomaly.

There were no environmental impacts associated with the failure to record the wind data.

If you have any questions, do not hesitate to contact me at (780) 663-2509.

Yours truly,

A handwritten signature in blue ink that reads "Stan Yuha".

Stan Yuha
Facility GM
Clean Harbors Canada, Inc.



Jan. 12, 2022

Environmental Response Centre
Alberta Environment
111, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta T6B 2X3

To Whom It May Concern:

Re: Reference Number 386952

On January 10th, 2022, I received notification from our Consultant Engineers that there was irregular data in the Dec. 2021 monthly wind data download. It appears the translator, which also records the data, was reading the wind speed and wind average correctly, however the wind direction had remained at 357 degrees since Dec. 14th. The Facility confirmed the anemometer itself was working normally. The Facility Manager then reset the translator by unplugging and plugging it back in and it started working normally again. This has never happened before and unfortunately, we have no explanation as to why the instrument appeared to have a technical glitch while recording the wind direction parameter while simultaneously properly recording the other parameters. We will continue to monitor the instrument closely to ensure no other instances occur.

This equipment malfunction has also affected the first 10 days' worth of data in the month of January and we will also include a copy of this letter in our January Air Monitoring report.

This event is in contravention of Section 4.2.14 of our Approval, as part of our requirement to meet the Air Monitoring Directive. There were no environmental impacts associated with the unusual failure of the wind data instrument.

If you have any questions, do not hesitate to contact me at (780) 663-2509.

Yours truly,

A handwritten signature in blue ink that reads "Stan Yuha".

Stan Yuha
Facility GM
Clean Harbors Canada, Inc.