CLEAN HARBORS CANADA INC.

2020 ANNUAL LANDFILL

OPERATIONS REPORT

Submitted By: Stan Yuha

Title: Facility Manager

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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 2020, the facility landfilled a total of 105,230.618 tonnes of waste. 60,224.505 tonnes were hazardous waste. Non-hazardous waste landfilled totaled 45,006.113 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 2020.

3.3 General location of waste deposited

In 2020, a total 59783 cubic metres of landfill capacity was consumed. Reshaping of Cell 3C capping resulted in an increase of 3030 cubic metres. The volume of Cell 3D had a volume decrease of 1369 cubic metres of waste. Cell 3E showed an incremental volume increase of 262 cubic metres in 2020. Cell 4 had an incremental volume of 57860 cubic metres placed. Cells 1, 2, 3A and 3B have been capped.

The December 2019 and December 2020 survey reports and December 2020 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 2020, 620 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 sample was available for Cell 2 in the first quarter as the result of a fire (AEP Reference No. 362650) which destroyed the leachate building and the power connection.

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. The Appendix includes any analyses performed as a result of an exceedance of the Action Leakage Rate of the Leak Detection System.

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 2020.

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 sample was available for Cell 2 in the first quarter as the result of a fire (AEP Reference No. 362650) which destroyed the leachate building and the power connection.

Appendix F contains a table showing the Field pH and Electrical Conductivity and the laboratory analytical reports for the parameters in TABLE 4.4-A. It also includes any analyses performed as a result of any exceedances of the Action Leakage Level.

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.

Appendix G contains a table showing the volume of leak detection liquid removed from the leak detection systems of each landfill cell in 2020.

3.9 Final Cover

Final cover was applied to the north slope of Cell 3B in 2020.

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

The third-party compliance audit was conducted in 2018. A copy of that Audit Report is in Appendix H. The next compliance audit will take place in 2021.

5.0 Summary of the Operations of the Waste Stabilization Area

In 2020, 8716.773 tonnes of waste was processed through the Stabilization Facility. This volume was broken down as follows:

1. Solidification only 7611.946 tonnes
2. Encapsulation (with cement) 894.447 tonnes
3. pH adjustment 5.165 tonnes
4. Sulfur treatment 205.215 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. Mechanical problems occurred with the pump on occasion resulting in a temporary suspension of pumping while repairs were made. These were reported in the monthly Wastewater Reports and the 2020 Annual Wastewater Report.

The table below compares of the analytical results to the limits in TABLE 4.3-B. No water was discharged from the tank farm area.

Surface Water Detention Pond B Summary of Batch Analyses - 2020						
Parameter	**Limit**	May 4	May 14	May 19	July 10	Sept 8
pH	6.0 – 9.5	8.29			7.78	8.29
COD, mg/L	50	58	54	50	27	27
Total Dissolved Solids, mg/L	2500	450			510	780
Total Suspended Solids, mg/L	25	1.4			6.3	14
Ammonia, Total Dissolved (as N) mg/L	5	0.29			0.081	0.072
Chloride, mg/L	250	49			17	24
Sodium, mg/L	200	98			140	200
Sulphate, mg/L	500	140			260	450
Oil or other substances	No visible sheen	No visible sheen			No visible sheen	No visible sheen
Rainbow Trout	50% or greater survival	Pass			Pass	Pass

7.0 Summary of the Performance of the Leachate Collection System

The leachate collection systems performed as designed. On January 12, an electrical problem in the building heater caused a fire (AEP Reference No.362650) which destroyed the Cell 2 Leachate building. This resulted in the loss of logbooks and the ability to automatically pump primary leachate and leak detection liquid until the building and power lines were able to be replaced. Pumping capability was restored June 30 and leachate head measurement capability was restored October 30. Cell 3A leachate line plugged off in mid-January. New insulated and heat-traced line was ordered to replace the old line. There were delays due to supply and CoVid issues getting the line installed. The ability to pump to the storage tank was restored in early March. There were occasional down periods for pump replacement and Levelogger or I-Pad problems.

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 2020 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 2020.

8.0 Summary of the Performance of the Leak Detection System

The Leak Detection Systems functioned as designed during 2020. There were no problems with the systems other than the previously mentioned fire (AEP Reference No. 365650) in the Cell 2 Leachate building, the replacement of pumps as needed and Levelogger or I-Pad problems in 2020.

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 storage tank in the basement of the Cell 1 Leachate Building. The Leachate Building, underground storage tank, any surface concrete, aboveground storage tank and berm were removed in 2020 and the area regraded to eliminate drainage issues in the area. A leachate manhole has been connected to the Leak Detection System drainage pipe which will use a submersible pump 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 2020 only 2600 litres of leak detection liquid was removed.

Exceedances of the Action Leakage Rate in Cells 2, 3A, 3B and 3C are discussed in Section 14.

9.0 Response Action Plan Pursuant to 4.4.10

Response Action Plans were required on four (4) occasions in 2020. Copies of the Action Plans for Reference #'s 367436, 367478, 368458 and 368820 are 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 2020. 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 2020. 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. During the heavy summer rains some sloughing occurred in the topsoil on the north face of Cell 2. This was repaired as soon as the weather permitted. 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

14.1 Fire Cell 2 Leachate Building

January 12, 2020, a faulty electric heater caused a fire which destroyed the Cell 2 leachate building. The fire resulted in the loss of hardcopy of leachate and leak detection logbooks,

piping, monitoring devices and checklists. Weather delayed repairs to the systems and there were delays in obtaining the required materials. A copy of the 7-Day letter is included in Appendix Q.

14.2 Cell 3A Leachate Line Plugged

In mid-January, the Cell 3A leachate line plugged off. It was decided that it would be more practical to replace the entire insulated and heat-traced line than to try to dig it up and remove the blockage. The line is a special-order item and took a long time to obtain from the supplier. CoVid protocols also caused delays in the installation and connection of the new piping.

14.3 Cell 3A Action Leakage Rate Exceedance

On June 9, 2020, the ALR was exceeded for Cell 3A. There were no obvious failures of liner systems. This exceedance occurred after a period of heavy rain and it is thought that it was due to surface infiltration from the area around the boots surrounding the leachate pipe and the concrete pad of the leachate building. There did not appear to be any contamination of the leak detections system from the Primary Leachate system. Copies of the 7-Day letter are in Appendix Q and the Response Action Plan is in Appendix J.

14.4 Cell 3B Action Leakage Rate Exceedance

On June 10, 2020, the ALR was exceeded for Cell 3B. There were no obvious failures of the liner systems. This exceedance occurred after a period of heavy rain and it is thought that it was due to surface infiltration from the area around the boots surrounding the leachate pipe and the concrete pad of the leachate building. There did not appear to be any contamination of the leak detections system from the Primary Leachate system. Copies of the 7-Day letter are in Appendix Q and the Response Action Plan is in Appendix J.

14.4 Cell 2 Action Leakage Rate Exceedance

On July 2, 2020, the ALR was exceeded in Cell 2. There were no obvious failures of the liner systems of the capped cell. Heavy rains in the days before the exceedance may have resulted in water around the leachate building entering the leak detection system through the leak detection pipe which is close to the concrete slab or from a failure of the boot around the leachate pipes. There did not appear to be any contamination of the leak detections system from the Primary Leachate system. Copies of the 7-Day letter are in Appendix Q and the Response Action Plan is in Appendix J.

14.5 Cell 3C Action Leakage Rate Exceedance

On July 9, 2020, the ALR was exceeded in Cell 3C. There were no obvious failures of the liner systems. Heavy rains in the days before the exceedance may have resulted in water around the leachate building entering the leak detection system through the leak detection pipe which is close to the concrete slab or from a failure of the boot around the leachate pipes. There did not appear to be any contamination of the leak detections system from the Primary Leachate

system. Copies of the 7-Day letter are in Appendix Q and the Response Action Plan is in Appendix J.

14.6 Unreported Exceedances Cells 2, 3A & 3B

In reviewing the Leak Detection System data during the preparation of the Annual Landfill Operations Report, it was found that several ALR exceedances for each of the cells above were not reported. There was a misunderstanding by the Facility Manager of the procedure regarding reporting of subsequent ALR exceedances in a landfill cell. He understood from the Approvals Engineer that subsequent exceedances in a cell did not need to be reported. A conversation with the Approvals Engineer on February 18, 2021, clarified that if there were days between exceedances when the cells were back in compliance, the new exceedance would be a new non-compliant event and must be reported. This is now clearly understood by the Facility Manager. There were no negative impacts from the unreported exceedances and the causes appear to have been the same as the original reports above. Steps have been taken to solve the water infiltration into the Leak Detection Systems of the landfill cells. A copy of the 7-Day letter is included in Appendix Q.

15.0 Summary of Public Complaints and Approval Holder's Responses

The facility received complaints on two occasions from the public in 2020.

1.0 May 8, 2020 – An odour complaint was made by a resident. No odourous waste had been received that morning. Operators walked the landfill perimeter and could detect no odours. The mechanic working on equipment in the landfill did not notice any odours. AEP Reference Number 366282.

2.0 November 3, 2020 – An odour complaint was received from a resident of Ryley. Wind was from the NNE at the time. The Manager drove into Ryley and the street where the complainant lived and could detect no odours. He asked two individuals working in their yard approximately half a block north of the complainant's residence if they had noticed any odours and they replied that they had not. He also checked with a resident working in her garden regarding any odours and she had not noticed any either. A load of waste had been received with a slight odour earlier that morning but it had been managed in accordance with the facility's Dust and Odour Best Management Practice protocols and covered immediately after being dumped. It did not appear that the odour was due to this load. AEP Reference #373338.

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

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, 3E and all of Cell 4. Other areas are inactive or have final cover placed on them.

18.0 Annual Landfill Closure Report

Section 7.1.6 requires the approval holder to submit a landfill cell closure report as part of the Annual Landfill Operations Report if a landfill cell is closed in the year. During 2020 the north slope of Cell 3A, 3B and 3C which had a temporary synthetic camp in place since 2013 when the rest of those cells were capped with clay, high density polyethylene (HDPE) liner. A Landfill Closure Report was included that described that work in the 2013 Annual Landfill Operations Report. The 2020 project involved removal of the Linear Low Density Polyethylene (LLDPE) cap material, re-grading the clay cover and placement of the final HDPE liner, tying in the HDPE liner to the anchor trenches and to previously installed HDPE liner materials, placing subsoil and topsoil on the new HDPE and revegetating the soil. In addition to this work drainage in the area between the cells was improved by removal of the Cell 1 leachate building, leachate tank and berm. The Landfill Closure Report for the north slope of Cell 3B is in Appendix P.

19.0 Summary of Landfill Contraventions Reported

The 2020 landfill contraventions can be grouped into four categories as shown in the table on the following page.

Summary of Landfill Contraventions

Category	Date	Reference Number
Air Monitoring Equipment Problems	January 2, 2020	362400
Reports not submitted on time	November 20, 2020	373833
Odour Complaint	May 8, 2020	366282
	November 3, 2020	373338
Action Leakage Rate Exceeded	June 9, 2020	367436
	June 10, 2020	367478
	July 2, 2020	368458
	July 9, 2020	368820
	February 19, 2021	376183

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

Clean Harbors Canada, Inc., Ryley Landfill

2020 Annual Waste Management Summary - TABLE 4.6-D
Hazardous Waste Landfilled

	Uniform Waste Code				Quantity (Kg or L)		Stored	Recycled		Disposed (Kg or L)	
Hazardous Recycle or Waste Name	Waste Code	PIN	Class	Management Code	Hazardous	Non-hazardous	On-site	On-site	Off-site	On-site	Off-site
Acid solutions, sludges and residues containing heavy metals	H112	NR**	NR**	D5	5790					5790	
Acid solutions, sludges and residues containing heavy metals	H112	UN1759	8	D5	1250					1250	
Acid solutions, sludges and residues containing heavy metals	H112	UN3098	5.1	D5	3690					3690	
Acid solutions, sludges and residues containing heavy metals	H112	UN3264	8	D5	205					205	
Acid soln, sludge & residue with metals & non-metals	H113	UN3260	8	D5	755					755	
Other inorganic acid wastes	H114	UN1832	8	D5	205					205	
Other inorganic acid wastes	H114	UN3260	8	D5	205					205	
Alk. Soln, sludges and residue with heavy metals	H121	NR**	NR**	D5	157750					157750	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	NR**	NR**	D5	53660					53660	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN1759	8	D5	205					205	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN1823	8	D5	14238					14238	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN1824	8	D5	1425					1425	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN1910	8	D5	18940					18940	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN2881	4.2	D5	2250					2250	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN3253	8	D5	3000					3000	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN3262	8	D5	106951					106951	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	H122	UN3266	8	D5	1985					1985	
Alkaline phosphates	H123	NR**	NR**	D5	13450					13450	
Neutralized Soln, sludges, residues with heavy metals	H131	NR**	NR**	D5	42770					42770	
Wastes containing other reactive anions	H135	NR**	NR**	D5	1067					1067	
Contaminated debris & soil from spills, accidents & leaks	H138	NR**	NR**	D5	2108250					2108250	
Contaminated debris & soil from spills, accidents & leaks	H138	UN3175	4.1	D5	1502390					1502390	
Contaminated debris & soil from spills, accidents & leaks	H138	UN3262	8	D5	9800					9800	
Residues from steel making	H143	NR**	NR**	D5	4330351					4330351	
Residues from steel making	H143	UN3262	8	D5	3988749					3988749	
Waste from the use of paints, pigments & coatings	H145	NR**	NR**	D5	3150					3150	
Waste from the use of paints, pigments & coatings	H145	UN1210	3	D5	840					840	
Waste from the use of paints, pigments & coatings	H145	UN1263	3	D5	3415					3415	
Waste from the use of paints, pigments & coatings	H145	UN1325	4.1	D5	1200					1200	
Waste from the use of paints, pigments & coatings	H145	UN1993	3	D5	1500					1500	
Waste from the use of paints, pigments & coatings	H145	UN3175	4.1	D5	479710					479710	
Waste from the use of paints, pigments & coatings	H145	UN3253	8	D5	307					307	
Other specified inorganic sludges, slurries or solids	H146	NR**	NR**	D5	844286					844286	
Other specified inorganic sludges, slurries or solids	H146	UN1350	4.1	D5	4					4	
Other specified inorganic sludges, slurries or solids	H146	UN3077	9	D5	40					40	
Other specified inorganic sludges, slurries or solids	H146	UN3190	4.2	D5	205					205	
Other specified inorganic sludges, slurries or solids	H146	UN3244	8	D5	2840					2840	
Other specified inorganic sludges, slurries or solids	H146	UN3262	8	D5	1625					1625	
Miscellaneous waste inorganic chemicals	H148	NR**	NR**	D5	204549					204549	
Miscellaneous waste inorganic chemicals	H148	UN1350	4.1	D5	231096					231096	
Miscellaneous waste inorganic chemicals	H148	UN1760	8	D5	410					410	

Clean Harbors Canada, Inc., Ryley Landfill

2020 Annual Waste Management Summary - TABLE 4.6-D
Hazardous Waste Landfilled

	Uniform Waste Code				Quantity (Kg or L)		Stored	Recycled		Disposed (Kg or L)	
Hazardous Recycle or Waste Name	Waste Code	PIN	Class	Management Code	Hazardous	Non-hazardous	On-site	On-site	Off-site	On-site	Off-site
Miscellaneous waste inorganic chemicals	H148	UN1773	8	D5	205					205	
Miscellaneous waste inorganic chemicals	H148	UN2811	6.1	D5	80					80	
Miscellaneous waste inorganic chemicals	H148	UN2967	8	D5	140					140	
Inert inorganic waste	H150	NR**	NR**	D5	32510					32510	
Inert inorganic waste	H150	UN1993	3	D5	40					40	
Inert inorganic waste	H150	UN2212	9	D5	400					400	
Inert inorganic waste	H150	UN2590	9	D5	2815					2815	
Inert inorganic waste	H150	UN3175	4.1	D5	13720					13720	
Inert inorganic waste	H150	UN3262	8	D5	21000					21000	
Batteries	H151	NR**	NR**	D5	2752					2752	
Empty packages, bags & containers	H152	NR**	NR**	D5	10775					10775	
Empty packages, bags & containers	H152	UN1993	3	D5	2170					2170	
Empty packages, bags & containers	H152	UN3077	9	D5	2116					2116	
Empty packages, bags & containers	H152	UN3082	9	D5	20					20	
Spent catalysts	H153	NR**	NR**	D5	6379686					6379686	
Spent catalysts	H153	UN3175	4.1	D5	57445					57445	
Spent catalysts	H153	UN3186	4.2	D5	500					500	
Spent catalysts	H153	UN3190	4.2	D5	747927					747927	
Spent catalysts	H153	UN3260	8	D5	128110					128110	
Desicants - silica gel, activated alumina, molecular sieve	H154	NR**	NR**	D5	37090					37090	
Fluorescent lamps (mercury & sodium)	H155	NR**	NR**	D5	800					800	
Aromatic solvents and residues	H211	NR**	NR**	D5	43800					43800	
Aromatic solvents and residues	H211	UN1263	3	D5	3280					3280	
Aromatic solvents and residues	H211	UN1993	3	D5	1055					1055	
Aliphatic solvents & residues	H212	NR**	NR**	D5	7070					7070	
Aliphatic solvents & residues	H212	UN1224	3	D5	20350					20350	
Aliphatic solvents & residues	H212	UN1230	3	D5	20					20	
Aliphatic solvents & residues	H212	UN1986	3	D5	50					50	
Petroleum distillates	H213	NR**	NR**	D5	50					50	
Petroleum distillates	H213	UN1268	3	D5	1435					1435	
Light fuels	H221	UN1202	3	D5	20					20	
Light fuels	H221	UN1993	3	D5	205					205	
Light fuels	H221	UN3082	9	D5	820					820	
Light fuels	H221	UN3175	4.1	D5	84620					84620	
Halogenated solvents and residues	H241	NR**	NR**	D5	177650					177650	
Halogenated pesticides and herbicides	H242	NR**	NR**	D5	16940					16940	
Waste oils/sludges (petroleum based)	H251	NR**	NR**	D5	972760					972760	
Waste oils/sludges (petroleum based)	H251	UN1993	3	D5	728488					728488	
Waste oils/sludges (petroleum based)	H251	UN3175	4.1	D5	2441980					2441980	
Waste crankcase oils and lubricants	H252	NR**	NR**	D5	9407					9407	
Waste crankcase oils and lubricants	H252	UN3082	9	D5	410					410	

Clean Harbors Canada, Inc., Ryley Landfill

2020 Annual Waste Management Summary - TABLE 4.6-D
Hazardous Waste Landfilled

	Uniform Waste Code				Quantity (Kg or L)		Stored	Recycled		Disposed (Kg or L)	
Hazardous Recycle or Waste Name	**Waste Code**	**PIN**	**Class**	**Management Code**	**Hazardous**	**Non-hazardous**	**On-site**	**On-site**	**Off-site**	**On-site**	**Off-site**
Waste crankcase oils and lubricants	H252	UN3175	4.1	D5	3760					3760	
Emulsified oils	H253	NR**	NR**	D5	7995					7995	
Emulsified oils	H253	UN1755	8	D5	205					205	
Filters from oil and gas processing	H256	NR**	NR**	D5	13860					13860	
Filters from oil and gas processing	H256	UN3190	4.2	D5	32550					32550	
Miscellaneous waste organic chemicals	H263	NR**	NR**	D5	11100					11100	
Miscellaneous waste organic chemicals	H263	UN1760	8	D5	6805					6805	
Miscellaneous waste organic chemicals	H263	UN1993	3	D5	2280					2280	
Miscellaneous waste organic chemicals	H263	UN2811	6.1	D5	1					1	
Miscellaneous waste organic chemicals	H263	UN2920	8	D5	125					125	
Miscellaneous waste organic chemicals	H263	UN3077	9	D5	20					20	
Miscellaneous waste organic chemicals	H263	UN3175	4.1	D5	3080					3080	
Miscellaneous waste organic chemicals	H263	UN3267	8	D5	30					30	
Miscellaneous waste organic chemicals	H263	UN3288	6.1	D5	2					2	
Organic acids	H267	UN2967	8	D5	120					120	
Organic acids	H267	UN3260	8	D5	226					226	
Amines	H268	UN3082	9	D5	500					500	
Amines	H268	UN3267	8	D5	119					119	
Other specified organic sludges, slurries and solids	H270	NR**	NR**	D5	9774845					9774845	
Other specified organic sludges, slurries and solids	H270	UN1133	3	D5	784					784	
Other specified organic sludges, slurries and solids	H270	UN3175	4.1	D5	4825139					4825139	
Other specified organic sludges, slurries and solids	H270	UN3190	4.2	D5	362					362	
Other specified organic sludges, slurries and solids	H270	UN3267	8	D5	2620					2620	
Activated carbon	H271	NR**	NR**	D5	3910					3910	
Activated carbon	H271	UN1325	4.1	D5	21710					21710	
Activated carbon	H271	UN1362	4.2	D5	73165					73165	
Activated carbon	H271	UN3088	4.2	D5	21460					21460	
Activated carbon	H271	UN3175	4.1	D5	3160					3160	
Sorbent materials	H274	NR**	NR**	D5	121010					121010	
Sorbent materials	H274	UN1759	8	D5	6430					6430	
Sorbent materials	H274	UN3175	4.1	D5	3000					3000	
Contaminated debris & soil from spills, accidents & leaks	H275	NR**	NR**	D5	18737935					1.9E+07	
Contaminated debris & soil from spills, accidents & leaks	H275	UN3175	4.1	D5	450115					450115	
Contaminated debris & soil from spills, accidents & leaks	H275	UN3244	4.1	D5	63					63	
Contaminated debris & soil from spills, accidents & leaks	H275	UN3259	8	D5	800					800	
TOTAL HAZARDOUS WASTE RECEIVED IN LANDFILL IN 2020										**60224505**	
NR - Wastes former UN3077 & UN3082**											

Clean Harbors Canada, Inc., Ryley Landfill

2020 Annual Waste Management Summary - TABLE 4.6-D
Non-Hazardous Waste Landfilled at Ryley

	Uniform Waste Code				Quantity (Kg or L)		Stored	Recycled		Disposed (Kg or L)	
Non-Hazardous Recycle or Waste Name	Waste Code	PIN	Class	Management Code	Hazardous	Non-hazardous	On-site	On-site	Off-site	On-site	Off-site
Other inorganic acid wastes	N114	N/R	N/A	D5		51660				51660	
Alk. Soln sludge/residue - metals, non-metals, no cyanide	N122	N/R	N/A	D5		40310				40310	
Brines, chlor-alkali sludges and residues	N133	N/R	N/A	D5		126				126	
Produced water and similar brines	N136	N/R	N/A	D5		2930				2930	
Contaminated debris & soil from spills, accidents & leaks	N138	N/R	N/A	D5		934890				934890	
Inorganic wastes from pigment manufacturing	N141	N/R	N/A	D5		790				790	
Residues from steel making	N143	N/R	N/A	D5		4880				4880	
Waste from the use of paints, pigments & coatings	N145	N/R	N/A	D5		224383				224383	
Other specified inorganic sludges, slurries or solids	N146	N/R	N/A	D5		12943756				12943756	
Other specified inorganic sludges, slurries or solids	N146	UN2212	9	D5		47822				47822	
Other specified inorganic sludges, slurries or solids	N146	UN2590	9	D5		14578				14578	
Other specified inorganic sludges, slurries or solids	N146	UN2362	8	D5		4000				4000	
Miscellaneous waste inorganic chemicals	N148	N/R	N/A	D5		102215				102215	
Inert inorganic waste	N150	N/R	N/A	D5		3283832				3283832	
Inert inorganic waste	N150	UN2212	9	D5		47880				47880	
Inert inorganic waste	N150	UN2590	9	D5		203130				203130	
Batteries	N151	N/R	N/A	D5		7107				7107	
Empty packages, bags & containers	N152	N/R	N/A	D5		255960				255960	
Spent catalysts	N153	N/R	N/A	D5		1105219				1105219	
Desicants - silica gel, activated alumina, molecular sieve	N154	N/R	N/A	D5		505379				505379	
Aromatic solvents and residues	N211	N/R	N/A	D5		50				50	
Aliphatic solvents & residues	N212	N/R	N/A	D5		5125				5125	
Petroleum distillates	N213	N/R	N/A	D5		615				615	
Light fuels	N221	N/R	N/A	D5		615				615	
Solidified, de-watered latex wastes	N231	N/R	N/A	D5		23000				23000	
Polymeric resins	N232	N/R	N/A	D5		26215				26215	
Other polymeric wastes	N233	N/R	N/A	D5		68310				68310	
Halogenated pesticides and herbicides	N242	N/R	N/A	D5		743466				743466	
Waste oils/sludges (petroleum based)	N251	N/R	N/A	D5		2659998				2659998	
Waste crankcase oils and lubricants	N252	N/R	N/A	D5		724074				724074	
Emulsified oils	N253	N/R	N/A	D5		600				600	
Oily water/waste oil from waste transfer/processing sites	N254	N/R	N/A	D5		4500				4500	
Water filters	N257	N/R	N/A	D5		45120				45120	
Detergents and soaps	N262	N/R	N/A	D5		12220				12220	
Miscellaneous waste organic chemicals	N263	N/R	N/A	D5		3169767				3169767	
Graphic arts waste	N265	N/R	N/A	D5		2800				2800	
Phenolic waste streams	N266	N/R	N/A	D5		114080				114080	
Organic acids	N267	N/R	N/A	D5		2532				2532	
Amines	N268	N/R	N/A	D5		405				405	
Other specified organic sludges, slurries and solids	N270	N/R	N/A	D5		1008296				1008296	
Activated carbon	N271	N/R	N/A	D5		364200				364200	
Glycol solutions	N273	N/R	N/A	D5		7652				7652	

Clean Harbors Canada, Inc., Ryley Landfill

2020 Annual Waste Management Summary - TABLE 4.6-D
Non-Hazardous Waste Landfilled at Ryley

	Uniform Waste Code				Quantity (Kg or L)		Stored	Recycled		Disposed (Kg or L)	
Non-Hazardous Recycle or Waste Name	Waste Code	PIN	Class	Management Code	Hazardous	Non-hazardous	On-site	On-site	Off-site	On-site	Off-site
Sorbent materials	N274	N/R	N/A	D5		5903897				5903897	
Contaminated debris & soil from spills, accidents & leaks	N275	N/R	N/A	D5		10337729				10337729	
Cooling tower basin sludge	N276	N/R	N/A	D5		615				615	
TOTAL NON-HAZARDOUS WASTE RECEIVED IN LANDFILL IN 2020										**45006728**	

Appendix B

2020 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 6, 2020** Page 1 of 1 File No: **10265-DEC-19**

Re: Volume Calculation for DECEMBER 30, 2019 (i.e. What happened on site from: **July 6/ 2019 to December 30/ 2019**)

Dear Sir:
Following are the volume calculations for the areas that we surveyed on **Dec. 30/2019**.

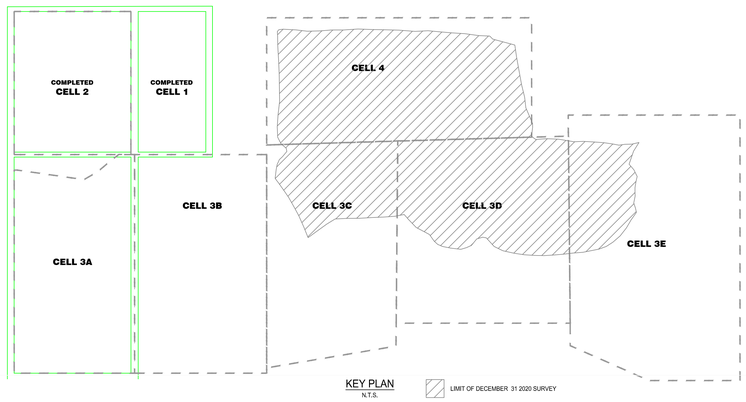
Location	Volume	Total Volume in Cell
Cell 3A/3B	Not Observed	Capped Cells
Cell 3C(5)	Not Observed	310,978 cu/m
Cell 3D(6)	4,432 cu/m (added)	284,146 cu/m
Cell 3E(7)	949 cu/m (added)	363,919 cu/m
Cell 4	52,210 cu/m (added)	54,461 cu/m

Volume reported on July 10, 2019

Cell 3A/Cell 3B – These cells are capped.	---
Cell 3C total volume on Jul 6/19 was:	310,978 cu/m
Cell 3D total volume on Jul 6/19 was:	279,714 cu/m
Cell 3E total volume on Jul 6/19 was:	362,970 cu/m
Cell 4 total volume on Jul 6/19 was:	2,251 cu/m

Maximum Elevation of Cell 3D= 713.48m
Maximum Elevation of Cell 3E= 711.95m
Maximum Elevation of Cell 4= 694.58m

Yours truly,
Challenger Geomatics Ltd.
Andriy Vasynda, ALS, CLS
Project Manager



WELL OBSERVATION COORDINATES				
WELL	NORTHING	EASTING	ELEVATION (TOP OF PIPE)	ELEVATION (GROUND)
19MW38B	995.98	1459.70	687.96	687.02
19MW38A	995.81	1456.10	687.97	687.09
19MW37B	1003.80	1261.99	686.99	685.98
19MW37A	1003.78	1260.72	686.94	686.00

CLEAN HARBORS INC.

SITE SURVEY ELEVATIONS

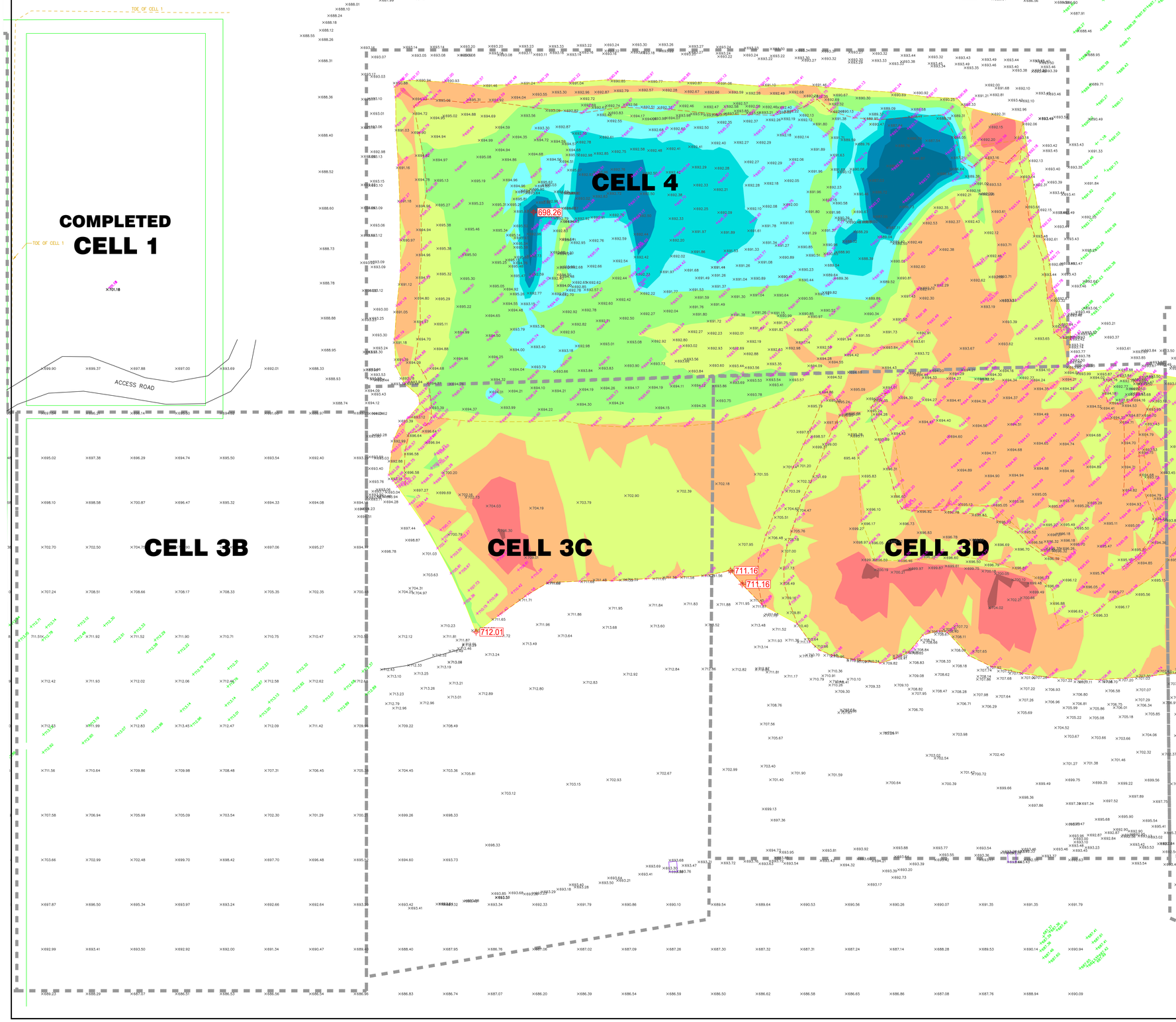
FOR

CELL 3D , 3E & 4

RYLEY, ALBERTA

DRAWN BY: AHB/VLE/JY/DM/RH CHECKED BY: AV	DATE : JANUARY 4, 2021	SCALE : (Metric) 1:500
CHALLENGER Suite 110, 2916 Broadmoor Blvd. Box: (780) 436-9011 Sherwood Park, Alberta T8H 1B5 Fax: (780) 464-0807	JOB No. : 10265	REV. 0

LAST EDITED: Jan 04, 2021 - 1:44:41 pm
DRAWING NAME: 10265-PL-2021-1.dwg



Elevations Table				
Number	CUT/FILL FROM	CUT/FILL TO	Area	Color
1	−3.00	−2.00	72.67	
2	−2.00	−1.00	1449.62	
3	−1.00	0.00	14835.48	
4	0.00	1.00	16416.88	
5	1.00	2.00	6594.43	
6	2.00	3.00	4304.43	
7	3.00	4.00	2324.52	
8	4.00	5.00	893.21	
9	5.00	6.00	546.70	

Parcel Volume Table: Unadjusted

Parcel	Cut cu.m.	Fill cu.m.	Net cu.m.
CELL 3C	1181	2252	1071(F)
CELL 3D	3069	1624	1445(C)
CELL 3E	457	719	262(F)
CELL 4	844	35375	34531(F)

LEGEND

JUNE 30, 2019 (AND PREVIOUS) 689.86

DECEMBER 31, 2020 ELEVATIONS 689.86

JANUARY 23, 2014 ELEVATIONS (LINE WORK PURPOSES) 692.56

OBSERVATION WELL

APPROXIMATE LIMITS OF CELLS (FOR VOLUME CALCULATION PURPOSES)

MAXIMUM ELEVATION CELL 3C = 712.01m
MAXIMUM ELEVATION CELL 3D = 711.16m
MAXIMUM ELEVATION CELL 3E = 712.37m
MAXIMUM ELEVATION CELL 4 = 698.26m

SURVEY AREA EXCLUDED FROM VOLUME CALCULATIONS

Appendix C

Leachate Head Table

Leachate Head Level 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-20	**2019 and**							
2-Jan-20	**data to January**	0.21	0.19	2.11	0.20	0.20	1.69	0.5
3-Jan-20	**12, 2020**	0.20	0.17	2.12	0.19	0.20	1.67	0.1
4-Jan-20	**was destroyed**							
5-Jan-20	**by a fire in the**							
6-Jan-20	**leachate**	0.20	0.18	0.19	0.19	0.19	1.70	
7-Jan-20	**building on**	0.20	0.18	0.19	0.19	0.20	1.70	
8-Jan-20	**January 12,**	0.21	0.19	0.19	0.19	0.20	1.74	0.5
9-Jan-20	**2020**	0.22	0.20	0.18	0.20	0.21	1.72	1
10-Jan-20	**AEP Reference**	0.18	0.18	0.17	0.19	0.21	1.71	0.1
11-Jan-20	**No. 362650**							
12-Jan-20	**Leachate head**							
13-Jan-20	**monitoring**	0.21	0.18	0.19	0.19	0.20	1.76	
14-Jan-20	**capability**	0.21	0.19	0.20	0.20	0.20	1.77	0.1
15-Jan-20	**was not**	0.21	0.32	0.19	0.19	0.20	1.78	
16-Jan-20	**restored until**	0.20	0.18	0.38	0.19	0.20	1.76	2
17-Jan-20	**October 30,**	0.21	0.18	0.87	0.20	0.29	1.77	5
18-Jan-20	**2020.**							
19-Jan-20								
20-Jan-20		0.20	0.17	0.17	0.19	0.48	1.79	
21-Jan-20		0.20	0.18	0.18	0.20	0.21	1.81	
22-Jan-20		0.21	0.18	0.19	0.19	0.27	1.81	0.2
23-Jan-20		0.20	0.18	0.19	0.19	0.35	1.78	0.2
24-Jan-20		0.20	0.18	0.48	0.19	0.20	1.79	
25-Jan-20								
26-Jan-20								
27-Jan-20		0.21	0.18	0.18	0.19	0.21	1.79	
28-Jan-20		0.20	0.18	0.17	0.20	0.21	1.79	0.1
29-Jan-20		0.19	0.17	0.19	0.19	0.21	1.76	
30-Jan-20		0.21	0.18	0.17	0.19	0.21	1.79	0.2

Leachate Head Level 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**	
31-Jan-20		0.21	0.18	0.17	0.19	0.21	1.80	
1-Feb-20								
2-Feb-20								
3-Feb-20		0.21	0.19	0.18	0.20	0.21	1.77	0.2
4-Feb-20		0.19	0.18	0.17	0.19	0.20	0.51	
5-Feb-20		0.20	0.18	0.19	0.19	0.21	0.79	0.3
6-Feb-20		0.22	0.19	0.20	0.20	0.21	0.73	2
7-Feb-20		0.20	0.18	0.19	0.19	0.21	0.96	
8-Feb-20								
9-Feb-20								
10-Feb-20		0.21	0.19	0.20	0.20	0.21	0.68	1
11-Feb-20		0.27	0.18	0.19	0.19	0.21	0.43	1
12-Feb-20		0.28	0.18	0.19	0.20	0.21	0.21	0.1
13-Feb-20		0.27	0.17	0.18	0.19	0.21	0.12	
14-Feb-20		0.39	0.18	0.19	0.19	0.21	0.09	0.2
15-Feb-20								
16-Feb-20								
17-Feb-20								
18-Feb-20		0.21	0.18	0.19	0.20	0.23	0.00	0.1
19-Feb-20		0.21	0.17	0.18	0.20	0.20	0.00	
20-Feb-20		0.37	0.18	0.18	0.19	0.20	0.00	
21-Feb-20		0.37	0.17	0.18	0.19	0.20	0.01	
22-Feb-20								
23-Feb-20								
24-Feb-20		0.36	0.22	0.21	0.21	0.20	0.00	
25-Feb-20		0.22	0.18	0.19	0.19	0.20	0.00	
26-Feb-20		0.32	0.18	0.19	0.19	0.20	0.00	
27-Feb-20		0.37	0.18	0.19	0.19	0.20	0.00	
28-Feb-20		0.37	0.18	0.18	0.19	0.20	0.00	
29-Feb-20								

Leachate Head Level 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-Mar-20								
2-Mar-20		0.21	0.18	0.19	0.19	0.19	0.00	15
3-Mar-20		0.21	0.18	0.19	0.20	0.20	0.00	
4-Mar-20		0.21	0.18	0.19	0.19	0.19	0.00	
5-Mar-20		0.20	0.18	0.19	0.19	0.20	0.00	
6-Mar-20		0.21	0.19	0.20	0.19	0.19	0.00	
7-Mar-20								
8-Mar-20								
9-Mar-20		0.21	0.18	0.19	0.19	0.19	0.00	15
10-Mar-20		0.19	0.18	0.19	0.19	0.22	0.00	
11-Mar-20		0.21	0.18	0.20	0.19	0.19	0.00	
12-Mar-20		0.20	0.18	0.19	0.19	0.18	0.00	0.2
13-Mar-20		0.22	0.20	0.21	0.21	0.20	0.05	
14-Mar-20								
15-Mar-20								
16-Mar-20		0.20	0.18	0.18	0.19	0.19	0.00	
17-Mar-20		0.22	0.18	0.18	0.19	0.19	0.02	
18-Mar-20		0.20	0.18	0.19	0.19	0.19	0.04	
19-Mar-20		0.21	0.19	0.20	0.20	0.19	0.02	
20-Mar-20		0.19	0.18	0.19	0.19	0.19	0.00	
21-Mar-20								
22-Mar-20								
23-Mar-20		0.20	0.18	0.19	0.19	0.19	0.00	
24-Mar-20		0.20	0.18	0.19	0.19	0.19	0.01	0.3
25-Mar-20		0.21	0.19	0.20	0.20	0.19	0.01	0.5
26-Mar-20		0.19	0.17	0.19	0.19	0.19	0.00	
27-Mar-20		0.20	0.18	0.19	0.19	0.19	0.00	
28-Mar-20								
29-Mar-20								

Leachate Head Level 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)		Precipitation (mm)
Maximum Acceptable Leachate Head	**1.0**	**1.0**	**1.0**	**1.0**	**0.30**	**0.3**	**0.30**	
30-Mar-19		0.21	0.19	0.20	0.20	0.19	0.19	0.3
31-Mar-19		0.21	0.19	0.20	0.20	0.19	0.25	8
1-Apr-19		0.21	0.19	0.20	0.20	0.19	0.32	
2-Apr-19		0.20	0.18	0.19	0.19	0.19	0.40	
3-Apr-19		0.20	0.18	0.19	0.19	0.19	0.51	
4-Apr-19								
5-Apr-19								
6-Apr-19		0.20	0.22	0.19	0.19	0.19	0.88	1
7-Apr-19		0.21	0.19	0.20	0.20	0.19	0.21	
8-Apr-19		0.21	0.19	0.20	0.20	0.19	0.10	
9-Apr-19		0.19	0.16	0.18	0.19	0.18	0.08	
10-Apr-19								
11-Apr-19								
12-Apr-19								
13-Apr-19		0.20	0.18	0.19	0.19	0.19	0.05	
14-Apr-19		0.20	0.18	0.19	0.19	0.19	0.05	
15-Apr-19		0.21	0.24	0.20	0.20	0.19	0.05	
16-Apr-19		0.19	0.17	0.19	0.19	0.18	0.03	
17-Apr-19		0.32	0.18	0.19	0.19	0.18	0.04	
18-Apr-19								
19-Apr-19								
20-Apr-19		0.23	0.18	0.19	0.19	0.19	0.03	
21-Apr-19		0.27	0.18	0.19	0.19	0.19	0.02	
22-Apr-19		0.20	0.18	0.19	0.19	0.19	0.02	
23-Apr-19		0.20	0.18	0.18	0.19	0.18	0.01	
24-Apr-19		0.20	0.18	0.12	0.19	0.19	0.01	
25-Apr-19								
26-Apr-19								
27-Apr-19		0.19	0.17	0.18	0.19	0.18	0.00	
28-Apr-20		0.20	0.18	0.19	0.19	0.18	0.00	1

Leachate Head Level 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**	
29-Apr-20		0.20	0.18	0.19	0.19	0.18	0.00	
30-Apr-20		0.01	0.00	0.00	0.00	0.19	0.00	
1-May-20		0.20	0.19	0.19	0.19	0.18	0.00	1
2-May-20								
3-May-20								
4-May-20		0.20	0.17	0.17	0.19	0.18	0.00	20
5-May-20		0.20	0.18	0.19	0.19	0.18	0.00	
6-May-20		0.20	0.18	0.19	0.19	0.19	0.00	
7-May-20		0.21	0.18	0.19	0.19	0.18	0.00	
8-May-20		0.21	0.18	0.17	0.19	0.18	0.01	5
9-May-20								
10-May-20								
11-May-20		0.19	0.17	0.19	0.19	0.18	0.00	3
12-May-20		0.20	0.18	0.19	0.20	0.19	0.00	
13-May-20		0.21	0.18	0.19	0.20	0.19	0.00	
14-May-20		0.21	0.19	0.20	0.20	0.18	0.02	
15-May-20		0.20	0.18	0.19	0.19	0.18	0.00	
16-May-20								
17-May-20								
18-May-20								
19-May-20		0.20	0.18	0.19	0.19	0.18	0.00	
20-May-20		0.20	0.18	0.19	0.19	0.18	0.00	
21-May-20		0.18	0.18	0.21	0.20	0.18	0.01	13
22-May-20		0.21	0.18	0.21	0.19	0.18	0.13	25
23-May-20								
24-May-20								
25-May-20		0.20	0.18	0.19	0.19	0.18	0.35	
26-May-20		0.20	0.18	0.19	0.19	0.19	0.22	
27-May-20		0.21	0.18	0.19	0.19	0.17	0.21	5
28-May-20		0.20	0.18	0.19	0.20	0.18	0.00	

Leachate Head Level 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**	
29-May-20		0.21	0.19	0.20	0.20	0.18	0.00	1
30-May-20								
31-May-20								
1-Jun-20		0.21	0.18	0.19	0.19	0.18	0.00	30
2-Jun-20		0.20	0.18	0.19	0.19	0.18	0.02	
3-Jun-20		0.21	0.19	0.20	0.20	0.18	0.05	8
4-Jun-20		0.21	0.19	0.07	0.33	0.19	0.03	2
5-Jun-20		0.20	0.18	0.19	0.19	0.24	0.13	1
6-Jun-20								
7-Jun-20								
8-Jun-20		0.20	0.18	1.10	0.19	0.56	0.25	50
9-Jun-20		0.20	0.18	0.30	0.19	0.39	0.16	3
10-Jun-20		0.20	0.18	0.19	0.19	0.39	0.44	2
11-Jun-20		0.21	0.19	0.18	0.20	0.27	0.48	
12-Jun-20		0.20	0.18	0.54	0.19	0.18	0.20	
13-Jun-20								
14-Jun-20								
15-Jun-20		0.25	0.17	0.17	0.19	0.61	0.39	20
16-Jun-20		0.21	0.10	0.21	0.20	0.53	0.48	1
17-Jun-20		0.20	0.18	0.25	0.24	0.48	0.43	
18-Jun-20		0.20	0.18	0.17	0.60	0.18	0.36	10
19-Jun-20		0.20	0.18	0.47	1.06	0.25	0.71	
20-Jun-20								
21-Jun-20								
22-Jun-20		0.21	0.24	0.18	2.08	0.18	0.35	
23-Jun-20		0.20	0.29	0.17	2.31	0.18	0.34	
24-Jun-20		0.21	0.18	0.19	0.69	0.18	0.37	1
25-Jun-20		0.21	0.18	0.20	0.19	0.19	0.63	
26-Jun-20		0.20	0.18	0.19	0.19	0.29	0.20	
27-Jun-20								

Leachate Head Level 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**	
28-Jun-20								
29-Jun-20		0.21	0.18	0.19	0.19	0.18	0.04	3
30-Jun-20		0.20	0.18	0.20	0.18	0.18	0.00	4
1-Jul-20								
2-Jul-20		0.21	0.19	0.20	0.19	0.18	0.16	30
3-Jul-20		0.21	0.19	0.19	0.19	0.18	0.11	3
4-Jul-20								
5-Jul-20								
6-Jul-20		0.20	0.18	0.19	0.19	0.18	0.00	2
7-Jul-20		0.21	0.18	0.28	0.19	0.18	0.00	4
8-Jul-20		0.20	0.18	0.23	0.18	0.18	0.31	55
9-Jul-20		0.20	0.18	0.77	0.19	0.18	0.82	5
10-Jul-20		0.21	0.19	1.47	0.19	0.18	1.06	7
11-Jul-20								
12-Jul-20								
13-Jul-20		0.20	0.18	1.77	0.19	0.19	1.60	
14-Jul-20		0.20	0.18	1.82	0.18	0.18	1.50	
15-Jul-20		0.20	0.18	1.84	0.80	0.18	1.53	
16-Jul-20		0.20	0.18	*	0.18	0.26	1.50	
17-Jul-20		0.20	0.18	*	0.18	0.18	1.61	12
18-Jul-20								
19-Jul-20								
20-Jul-20		0.20	0.18	*	0.18	0.18	1.66	
21-Jul-20		0.18	0.18	*	0.18	0.18	1.71	
22-Jul-20		0.20	0.18	*	0.18	0.18	1.51	1
23-Jul-20		0.21	0.18	*	0.18	0.18	1.13	3
24-Jul-20		0.21	0.19	*	0.19	0.19	0.12	2
25-Jul-20								
26-Jul-20								
27-Jul-20		0.19	0.18	1.62	0.18	0.18	1.04	

Leachate Head Level 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**	
28-Jul-20		0.20	0.18	1.72	0.18	0.18	0.70	
29-Jul-20		0.21	0.19	1.79	0.18	0.19	0.45	
30-Jul-20		0.09	0.07	1.74	0.07	0.12	0.06	
31-Jul-20		0.12	0.10	0.09	0.10	0.12	0.00	
1-Aug-20								
2-Aug-20								
3-Aug-20								
4-Aug-20		0.20	0.18	0.60	0.18	0.58	0.79	4
5-Aug-20		0.20	0.18	1.17	0.18	0.65	0.38	
6-Aug-20		0.20	0.11	1.45	0.19	0.75	0.16	
7-Aug-20		0.21	0.19	*	0.19	1.19	0.10	4
8-Aug-20								
9-Aug-20								
10-Aug-20		0.18	0.18	0.23	0.19	1.82	0.14	
11-Aug-20		0.20	0.18	0.20	0.19	2.01	0.10	
12-Aug-20		0.21	0.18	0.23	0.18	2.21	0.08	25
13-Aug-20		0.20	0.18	1.32	0.18	2.30	0.43	
14-Aug-20		0.20	0.18	1.58	0.19	2.44	0.74	
15-Aug-20								
16-Aug-20								
17-Aug-20		0.20	0.18	1.84	0.19	2.81	1.06	
18-Aug-20		0.19	0.18	0.28	0.18	2.94	1.39	
19-Aug-20		0.20	0.18	0.29	0.18	3.11	1.59	
20-Aug-20		0.20	0.19	1.09	0.22	3.23	0.80	
21-Aug-20		0.21	0.19	0.29	0.00	3.44	0.52	63
22-Aug-20								
23-Aug-20								
24-Aug-20		0.21	0.18	1.60	1.55	2.67	0.22	
25-Aug-20		0.20	0.18	0.39	1.91	2.99	0.27	2
26-Aug-20		0.20	0.17	0.38	2.22	2.23	0.79	5

Leachate Head Level 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**	
27-Aug-20		0.20	0.16	0.20	0.20	2.17	0.31	1
28-Aug-20		0.20	0.17	0.26	0.18	1.85	0.15	
29-Aug-20								
30-Aug-20								
31-Aug-20		0.20	0.17	0.21	0.19	0.98	1.00	
1-Sep-20		0.22	0.19	0.20	0.19	0.49	0.66	
2-Sep-20		0.21	0.18	0.18	0.18	0.40	0.35	3
3-Sep-20		0.20	0.18	0.19	0.18	0.33	0.08	
4-Sep-20		0.20	0.18	0.27	0.18	0.40	0.00	
5-Sep-20								
6-Sep-20								
7-Sep-20								
8-Sep-20		0.20	0.18	0.28	0.18	0.12	0.01	1
9-Sep-20		0.20	0.19	0.24	0.21	0.13	0.03	
10-Sep-20		0.19	0.17	0.18	0.18	0.13	0.02	
11-Sep-20		0.20	0.18	0.19	0.18	0.12	0.20	
12-Sep-20								
13-Sep-20								
14-Sep-20		0.20	0.18	0.98	0.18	0.13	0.02	
15-Sep-20		0.20	0.18	0.32	0.18	0.14	0.00	
16-Sep-20		0.19	0.17	0.25	0.17	0.13	0.04	
17-Sep-20		0.20	0.18	0.22	0.18	0.14	0.10	
18-Sep-20		0.19	0.18	0.20	0.17	0.14	0.11	
19-Sep-20								
20-Sep-20								
21-Sep-20		0.20	0.18	0.19	0.18	0.15	0.00	
22-Sep-20		0.20	0.18	0.19	0.18	0.15	0.04	
23-Sep-20		0.19	0.19	0.19	0.18	0.15	0.00	
24-Sep-20		0.21	0.18	0.19	0.18	0.15	0.02	
25-Sep-20		0.19	0.18	0.18	0.17	0.15	0.05	

Leachate Head Level 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**	
26-Sep-20								
27-Sep-20								
28-Sep-20		0.20	0.18	0.19	0.18	0.16	0.00	
29-Sep-20		0.20	0.18	0.18	0.17	0.15	0.00	1
30-Sep-20		0.20	0.18	0.18	0.17	0.16	0.00	
1-Oct-20		0.19	0.17	0.21	0.18	0.17	0.00	
2-Oct-20		0.21	0.19	0.25	0.08	0.17	0.00	
3-Oct-20								
4-Oct-20								
5-Oct-20		0.20	0.18	0.18	0.18	0.17	0.00	1
6-Oct-20		0.20	0.18	0.19	0.17	0.17	0.00	1
7-Oct-20		0.21	0.19	0.20	0.18	0.18	0.00	
8-Oct-20		0.19	0.18	0.18	0.17	0.17	0.00	
9-Oct-20		0.20	0.18	0.17	0.17	0.18	0.00	
10-Oct-20								
11-Oct-20								
12-Oct-20								
13-Oct-20		0.19	0.17	0.18	0.19	0.18	0.00	
14-Oct-20		0.21	0.19	0.20	0.20	0.18	0.00	
15-Oct-20		0.21	0.19	0.19	0.20	0.19	0.02	
16-Oct-20		0.19	0.19	0.18	0.19	0.18	0.00	1
17-Oct-20								
18-Oct-20								
19-Oct-20		0.20	0.18	0.20	0.20	0.19	0.03	1
20-Oct-20		0.20	0.18	0.19	0.19	0.18	0.07	1
21-Oct-20		0.22	0.21	0.10	0.19	0.18	0.10	
22-Oct-20		0.21	0.19	0.19	0.20	0.19	0.09	1
23-Oct-20		0.21	0.19	0.20	0.20	0.20	0.12	1
24-Oct-20								
25-Oct-20								

Leachate Head Level 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**	
26-Oct-20		0.21	0.19	0.20	0.20	0.19	0.22	
27-Oct-20		0.21	0.19	0.20	0.20	0.19	0.22	
28-Oct-20		0.21	0.19	0.19	0.20	0.19	0.23	
29-Oct-20		0.21	0.19	0.21	0.19	0.18	0.27	
30-Oct-20	0.23	0.19	0.17	0.22	0.19	0.19	0.20	
31-Oct-20								
1-Nov-20								
2-Nov-20	0.25	0.19	0.20	1.02	0.19	0.19	0.27	
3-Nov-20	0.28	0.20	0.18	1.18	0.19	0.19	0.30	
4-Nov-20	0.30	0.21	0.19	1.23	0.20	0.19	0.29	1
5-Nov-20	0.28	0.20	0.18	0.39	0.19	0.19	0.70	
6-Nov-20	0.28	0.21	0.19	0.29	0.20	0.19	0.26	3
7-Nov-20								
8-Nov-20								
9-Nov-20	0.86	0.19	0.18	0.22	0.19	0.19	0.19	10
10-Nov-20	0.27	0.21	0.18	0.25	0.20	0.19	0.20	3
11-Nov-20	0.29	0.20	0.18	0.23	0.19	0.20	0.17	2
12-Nov-20	0.28	0.19	0.17	0.22	0.23	0.28	0.09	0.1
13-Nov-20	0.29	0.19	0.18	0.20	0.19	0.34	0.16	
14-Nov-20								
15-Nov-20								
16-Nov-20	0.30	0.19	0.18	0.26	0.19	0.44	0.14	1
17-Nov-20	0.32	0.19	0.18	0.54	0.18	0.55	0.32	
18-Nov-20	0.35	0.19	0.20	1.04	0.20	0.60	0.30	
19-Nov-20	0.32	0.22	0.19	1.08	0.19	0.66	0.36	4
20-Nov-20	0.30	0.20	0.19	1.16	0.20	0.72	0.42	1
21-Nov-20								
22-Nov-20								
23-Nov-20	0.31	0.20	0.18	1.47	0.19	1.26	0.73	
24-Nov-20	0.31	0.21	0.17	1.58	0.19	1.40	0.81	1

Leachate Head Level Table

Date	Cell 2 Head Level (m)	Cell 3A Head Level (m)	Cell 3B Head Level (m)	Cell 3C Head Level (m)	0.19	Cell 3E Head Level (m)	Cell 4 Head Level (m)	Precipitation (mm)
Maximum Acceptable Leachate Head	**1.0**	**1.0**	**1.0**	**1.0**	**0.20**	**0.3**	**0.30**	
25-Nov-20	0.34	0.22	0.18	1.73	0.20	1.58	0.95	1
26-Nov-20	0.35	0.20	0.18	1.75	0.19	1.62	1.00	
27-Nov-20	0.33	0.21	0.18	1.80	0.19	1.76	1.08	
28-Nov-20								
29-Nov-20								
30-Nov-20	0.30	0.18	0.16	1.96	0.19	2.12	1.25	
1-Dec-20	0.36	0.21	0.18	0.34	0.19	1.11	1.28	
2-Dec-20	0.34	0.20	0.19	0.30	0.20	1.35	1.09	
3-Dec-20	0.34	0.20	0.18	0.29	0.19	1.61	0.99	
4-Dec-20	0.60	0.22	0.19	0.82	0.20	1.35	1.02	
5-Dec-20								
6-Dec-20								
7-Dec-20	0.72	0.20	0.17	1.56	0.19	0.61	0.53	
8-Dec-20	1.22	0.21	0.18	0.37	0.19	0.59	0.47	1
9-Dec-20	1.66	0.22	0.19	0.30	0.20	0.5	0.32	0

Appendix D

Primary Leachate Analyses

		Clean Harbors Canada, Inc. - Approval 10348-02					
	2020Annual Report						
			Section 1.5 Primary Leachate				
		Field pH & Electrical Conductivity Measurements					
	Qtr 1				Qtr 2		
			Conductivity				Conductivity
	Date	pH	(uS/cm)		Date	pH	(uS/cm)
Cell 1	2020-03-10	7.5	13240	Cell 1	2020-04-27	7.1	993
Cell 2		Not Sampled		Cell 2	2020-06-30	8.4	43220
Cell 3A	2020-03-09	7.4	27610	Cell 3A	2020-04-27	7.4	29750
Cell 3B	2020-03-09	9.3	42740	Cell 3B	2020-04-27	9.6	44880
Cell 3C	2020-03-09	8.6	15190	Cell 3C	2020-04-27	8.6	13470
Cell 3D	2020-03-09	7.8	20240	Cell 3D	2020-04-27	7.8	20970
Cell 3E	2020-03-09	8.1	14440	Cell 3E	2020-04-27	8.2	15290
Cell 4	2020-03-09	7.1	8979	Cell 4	2020-04-27	7.0	18690
	Qtr 3				Qtr 4		
			Conductivity				Conductivity
	Date	pH	(uS/cm)		Date	pH	(uS/cm)
Cell 1	2020-09-11	7.6	5079	Cell 1		Not Sampled	
Cell 2	2020-09-15	8.4	39250	Cell 2	2020-11-30	7.0	15530
Cell 3A	2020-09-14	7.5	27480	Cell 3A	2020-11-30	7.4	31680
Cell 3B	2020-09-14	9.4	40180	Cell 3B	2020-11-30	9.7	42010
Cell 3C	2020-09-14	8.9	14150	Cell 3C	2020-11-30	8.2	12380
Cell 3D	2020-09-14	8.0	18670	Cell 3D	2020-11-30	7.9	20460
Cell 3E	2020-09-14	8.1	14020	Cell 3E	2020-11-30	8.4	19010

Appendix D

Primary Leachate Analyses

Quarter 1

Your P.O. #: 206454RY
Your Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your C.O.C. #: 603408-01-01

Attention: STAN YUHA

CLEAN HARBORS
P.O. BOX 390
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/03/17
Report #: R2859103
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C017797
Received: 2020/03/10, 12:00

Sample Matrix: Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	1	N/A	2020/03/11	AB SOP-00005	SM 23 2320 B m
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	6	N/A	2020/03/12	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID (1)	7	N/A	2020/03/11	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	7	N/A	2020/03/12		Auto Calc
Cadmium - low level CCME - Dissolved (1)	7	N/A	2020/03/13		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	1	N/A	2020/03/13	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
Chloride/Sulphate by Auto Colourimetry (1)	4	N/A	2020/03/15	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
Chloride/Sulphate by Auto Colourimetry (1)	2	N/A	2020/03/16	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
COD by Colorimeter (1)	7	N/A	2020/03/12	AB SOP-00016	SM 23 5220D m
Dissolved Hexavalent Chromium (1)	7	N/A	2020/03/16	AB SOP-00063	SM 23 3500-Cr B m
Carbon (DOC) (1, 3)	7	N/A	2020/03/13	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	7	N/A	2020/03/11	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 4)	5	2020/03/11	2020/03/11	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 4)	2	2020/03/11	2020/03/12	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Mercury (Total) by CV (2)	7	2020/03/14	2020/03/14	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 5)	3	N/A	2020/03/12	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Dissolved (1, 5)	4	N/A	2020/03/16	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	7	2020/03/13	2020/03/13	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Dissolved (1, 5)	7	N/A	2020/03/12	AB SOP-00043	EPA 6020b R2 m
Ammonia-N (Total) (1)	5	N/A	2020/03/14	AB SOP-00007	SM 23 4500 NH3 A G m
Ammonia-N (Total) (1)	2	N/A	2020/03/17	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrogen (Nitrite - Nitrate) by IC (1)	7	N/A	2020/03/11	AB SOP-00023	SM 23 4110 B m
pH @25°C (1, 6)	7	N/A	2020/03/11	AB SOP-00005	SM 23 4500-H+B m
Phenols (4-AAP) (1)	5	N/A	2020/03/12	AB SOP-00088	EPA 9066 R0 m
Phenols (4-AAP) (1)	2	N/A	2020/03/13	AB SOP-00088	EPA 9066 R0 m
Total Dissolved Solids (Filt. Residue) (1)	7	2020/03/12	2020/03/12	AB SOP-00065	SM 23 2540 C m

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Your P.O. #: 206454RY
Your Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your C.O.C. #: 603408-01-01

Attention: STAN YUHA

CLEAN HARBORS
P.O. BOX 390
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/03/17
Report #: R2859103
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C017797
Received: 2020/03/10, 12:00

Sample Matrix: Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Kjeldahl Nitrogen (1)	6	2020/03/12	2020/03/12	AB SOP-00008	EPA 351.1 R1978 m
Total Kjeldahl Nitrogen (1)	1	2020/03/12	2020/03/17	AB SOP-00008	EPA 351.1 R1978 m
Total Suspended Solids (NFR) (1)	7	2020/03/13	2020/03/13	AB SOP-00061	SM 23 2540 D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by BV Labs Calgary Environmental
(2) This test was performed by BV Labs Vancouver
(3) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Silica gel clean up employed.
(5) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(6) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

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Your P.O. #: 206454RY
Your Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your C.O.C. #: 603408-01-01

Attention: STAN YUHA

CLEAN HARBORS
P.O. BOX 390
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/03/17
Report #: R2859103
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C017797
Received: 2020/03/10, 12:00

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
17 Mar 2020 17:45:35

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bvlabs.com
Phone# (780) 577-7100
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BV Labs Job #: C017797
Report Date: 2020/03/17

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		XN2895	XN2896	XN2897	XN2898		
Sampling Date		2020/03/10	2020/03/09	2020/03/09	2020/03/09		
COC Number		603408-01-01	603408-01-01	603408-01-01	603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 1**	**PRIMARY LEACHATE CELL 3A**	**PRIMARY LEACHATE CELL 3B**	**PRIMARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/L	0.22	1.3	1.2	0.72	0.10	9793179
Volatiles							
Benzene	ug/L	29	300	12	23	0.40	9794436
Toluene	ug/L	8.9	52	11	340	0.40	9794436
Ethylbenzene	ug/L	0.55	4.0	1.1	120	0.40	9794436
m & p-Xylene	ug/L	1.3	9.6	3.1	450	0.80	9794436
o-Xylene	ug/L	0.81	6.0	2.5	180	0.40	9794436
Xylenes (Total)	ug/L	2.1	16	5.6	630	0.89	9792801
F1 (C6-C10) - BTEX	ug/L	210	<100	1600	790	100	9792801
F1 (C6-C10)	ug/L	250	440	1600	1900	100	9794436
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	99	99	95	93		9794436
4-Bromofluorobenzene (sur.)	%	99	103	104	107		9794436
D4-1,2-Dichloroethane (sur.)	%	104	103	104	97		9794436
O-TERPHENYL (sur.)	%	125	116	124	120		9793179
RDL = Reportable Detection Limit							

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BV Labs Job #: C017797
Report Date: 2020/03/17

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		XN2899	XN2900	XN2901		
Sampling Date		2020/03/09	2020/03/09	2020/03/09		
COC Number		603408-01-01	603408-01-01	603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 3D**	**PRIMARY LEACHATE CELL 3E**	**PRIMARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	0.57	19	1.5	0.10	9793179
Volatiles						
Benzene	ug/L	22	23	9.8	0.40	9794436
Toluene	ug/L	31	4.4	6.1	0.40	9794436
Ethylbenzene	ug/L	2.7	1.6	<0.40	0.40	9794436
m & p-Xylene	ug/L	8.2	5.8	0.92	0.80	9794436
o-Xylene	ug/L	5.1	6.2	0.85 (1)	0.40	9794436
Xylenes (Total)	ug/L	13	12	1.8	0.89	9792801
F1 (C6-C10) - BTEX	ug/L	370	180	220	100	9792801
F1 (C6-C10)	ug/L	440	220	240	100	9794436
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	95	96	96		9794436
4-Bromofluorobenzene (sur.)	%	105	100	106		9794436
D4-1,2-Dichloroethane (sur.)	%	102	101	103		9794436
O-TERPHENYL (sur.)	%	140	125	121		9793179

RDL = Reportable Detection Limit
(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

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BV Labs Job #: C017797
Report Date: 2020/03/17

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		XN2895	XN2896			XN2897		
Sampling Date		2020/03/10	2020/03/09			2020/03/09		
COC Number		603408-01-01	603408-01-01			603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 1**	**PRIMARY LEACHATE CELL 3A**	**RDL**	**QC Batch**	**PRIMARY LEACHATE CELL 3B**	**RDL**	**QC Batch**
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	0.42	<0.40	0.40	9792885	14	0.40	9792885
Elements								
Dissolved Aluminum (Al)	mg/L	0.38	<0.060	0.060	9794959	<0.060	0.060	9794959
Dissolved Antimony (Sb)	mg/L	<0.012	<0.012	0.012	9794959	0.013	0.012	9794959
Dissolved Arsenic (As)	mg/L	0.040	0.31	0.0040	9794959	0.12	0.0040	9794959
Dissolved Barium (Ba)	mg/L	0.35	1.8	0.20	9795614	0.59	0.10	9798101
Dissolved Boron (B)	mg/L	15	35	0.40	9795614	180 (1)	1.0	9798101
Dissolved Calcium (Ca)	mg/L	300	260	6.0	9795614	17	3.0	9798101
Dissolved Cobalt (Co)	mg/L	0.077	0.0077	0.0060	9794959	0.022	0.0060	9794959
Dissolved Copper (Cu)	mg/L	<0.0040	<0.0040	0.0040	9794959	0.18	0.0040	9794959
Dissolved Lead (Pb)	mg/L	<0.0040	<0.0040	0.0040	9794959	0.0080	0.0040	9794959
Dissolved Magnesium (Mg)	mg/L	220	390	4.0	9795614	65	2.0	9798101
Dissolved Manganese (Mn)	mg/L	20	1.4	0.080	9795614	0.86	0.040	9798101
Dissolved Molybdenum (Mo)	mg/L	1.4	0.24	0.0040	9794959	45	0.0040	9794959
Dissolved Nickel (Ni)	mg/L	7.2	0.46	0.010	9794959	1.4	0.010	9794959
Dissolved Phosphorus (P)	mg/L	17	6.6	2.0	9795614	10	1.0	9798101
Dissolved Potassium (K)	mg/L	270	750	6.0	9795614	3100	3.0	9798101
Dissolved Selenium (Se)	mg/L	<0.0040	0.013	0.0040	9794959	0.095	0.0040	9794959
Dissolved Silver (Ag)	mg/L	<0.0020	<0.0020	0.0020	9794959	<0.0020	0.0020	9794959
Dissolved Sodium (Na)	mg/L	2200	4500	10	9795614	8800 (1)	25	9798101
Dissolved Thallium (Tl)	mg/L	<0.0040	<0.0040	0.0040	9794959	<0.0040	0.0040	9794959
Dissolved Tin (Sn)	mg/L	<0.020	<0.020	0.020	9794959	0.022	0.020	9794959
Dissolved Uranium (U)	mg/L	0.0043	<0.0020	0.0020	9794959	<0.0020	0.0020	9794959
Dissolved Zinc (Zn)	mg/L	0.11	<0.060	0.060	9794959	<0.060	0.060	9794959

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Bureau Veritas Laboratories Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

BV Labs Job #: C017797
Report Date: 2020/03/17

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		XN2898		XN2899	XN2900		
Sampling Date		2020/03/09		2020/03/09	2020/03/09		
COC Number		603408-01-01		603408-01-01	603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 3C**	**RDL**	**PRIMARY LEACHATE CELL 3D**	**PRIMARY LEACHATE CELL 3E**	**RDL**	**QC Batch**
Low Level Elements							
Dissolved Cadmium (Cd)	ug/L	0.49	0.40	1.4	0.87	0.40	9792885
Elements							
Dissolved Aluminum (Al)	mg/L	<0.060	0.060	<0.060	<0.060	0.060	9794959
Dissolved Antimony (Sb)	mg/L	<0.012	0.012	<0.012	<0.012	0.012	9794959
Dissolved Arsenic (As)	mg/L	0.032	0.0040	0.023	0.023	0.0040	9794959
Dissolved Barium (Ba)	mg/L	0.10	0.10	0.57	0.17	0.10	9798101
Dissolved Boron (B)	mg/L	66 (1)	1.0	39	7.7	0.20	9798101
Dissolved Calcium (Ca)	mg/L	44	3.0	280	99	3.0	9798101
Dissolved Cobalt (Co)	mg/L	<0.0060	0.0060	0.0074	<0.0060	0.0060	9794959
Dissolved Copper (Cu)	mg/L	0.0052	0.0040	0.011	0.014	0.0040	9794959
Dissolved Lead (Pb)	mg/L	<0.0040	0.0040	<0.0040	<0.0040	0.0040	9794959
Dissolved Magnesium (Mg)	mg/L	110	2.0	260	240	2.0	9798101
Dissolved Manganese (Mn)	mg/L	0.41	0.040	2.8	0.86	0.040	9798101
Dissolved Molybdenum (Mo)	mg/L	1.2	0.0040	3.8	2.9	0.0040	9794959
Dissolved Nickel (Ni)	mg/L	0.66	0.010	4.8	0.67	0.010	9794959
Dissolved Phosphorus (P)	mg/L	1.6	1.0	1.6	<1.0	1.0	9798101
Dissolved Potassium (K)	mg/L	450	3.0	580	260	3.0	9798101
Dissolved Selenium (Se)	mg/L	0.078	0.0040	0.026	0.012	0.0040	9794959
Dissolved Silver (Ag)	mg/L	<0.0020	0.0020	<0.0020	<0.0020	0.0020	9794959
Dissolved Sodium (Na)	mg/L	2500	5.0	3600	2400	5.0	9798101
Dissolved Thallium (Tl)	mg/L	<0.0040	0.0040	<0.0040	<0.0040	0.0040	9794959
Dissolved Tin (Sn)	mg/L	<0.020	0.020	<0.020	<0.020	0.020	9794959
Dissolved Uranium (U)	mg/L	0.0064	0.0020	0.0041	0.014	0.0020	9794959
Dissolved Zinc (Zn)	mg/L	<0.060	0.060	<0.060	<0.060	0.060	9794959

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C017797
Report Date: 2020/03/17

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		XN2901		
Sampling Date		2020/03/09		
COC Number		603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	<0.40	0.40	9792885
Elements				
Dissolved Aluminum (Al)	mg/L	<0.060	0.060	9794959
Dissolved Antimony (Sb)	mg/L	<0.012	0.012	9794959
Dissolved Arsenic (As)	mg/L	0.0076	0.0040	9794959
Dissolved Barium (Ba)	mg/L	0.32	0.010	9795614
Dissolved Boron (B)	mg/L	1.3	0.020	9795614
Dissolved Calcium (Ca)	mg/L	580 (1)	1.5	9795614
Dissolved Cobalt (Co)	mg/L	0.0091	0.0060	9794959
Dissolved Copper (Cu)	mg/L	<0.0040	0.0040	9794959
Dissolved Lead (Pb)	mg/L	<0.0040	0.0040	9794959
Dissolved Magnesium (Mg)	mg/L	190	0.20	9795614
Dissolved Manganese (Mn)	mg/L	12	0.0040	9795614
Dissolved Molybdenum (Mo)	mg/L	0.20	0.0040	9794959
Dissolved Nickel (Ni)	mg/L	0.074	0.010	9794959
Dissolved Phosphorus (P)	mg/L	0.33	0.10	9795614
Dissolved Potassium (K)	mg/L	18	0.30	9795614
Dissolved Selenium (Se)	mg/L	<0.0040	0.0040	9794959
Dissolved Silver (Ag)	mg/L	<0.0020	0.0020	9794959
Dissolved Sodium (Na)	mg/L	1200 (1)	2.5	9795614
Dissolved Thallium (Tl)	mg/L	<0.0040	0.0040	9794959
Dissolved Tin (Sn)	mg/L	<0.020	0.020	9794959
Dissolved Uranium (U)	mg/L	0.014	0.0020	9794959
Dissolved Zinc (Zn)	mg/L	0.10	0.060	9794959

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C017797
Report Date: 2020/03/17

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XN2895			XN2896		
Sampling Date		2020/03/10			2020/03/09		
COC Number		603408-01-01			603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 1**	**RDL**	**QC Batch**	**PRIMARY LEACHATE CELL 3A**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	1720 (1)	50	9795374	4900 (1)	50	9795374
Misc. Inorganics							
Conductivity	uS/cm	13000	2.0	9794465	27000	2.0	9794472
Dissolved Organic Carbon (C)	mg/L	560 (2)	13	9796495	540 (2)	13	9796495
pH	pH	7.64	N/A	9794464	7.71	N/A	9794471
Total Dissolved Solids	mg/L	>8000 (3)	10	9794934	16000 (4)	25	9794934
Total Suspended Solids	mg/L	12	1.0	9797105	77	1.0	9797105
Anions							
Bicarbonate (HCO3)	mg/L	4300	10	9794463	5900	10	9794467
Carbonate (CO3)	mg/L	55	10	9794463	<10	10	9794467
Dissolved Chloride (Cl)	mg/L	1700 (5)	10	9798141	6300 (1)	50	9798141
Dissolved Sulphate (SO4)	mg/L	1000 (5)	10	9798141	160 (5)	10	9798141
Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	0.016 (1)	0.0020	9799150	0.0013	0.00099	9799150
Nutrients							
Total Ammonia (N)	mg/L	290 (1)	7.5	9797827	650 (1)	7.5	9797826
Total Total Kjeldahl Nitrogen	mg/L	48 (1)	25	9794929	680 (1)	25	9798137
Dissolved Nitrite (N)	mg/L	<0.50 (6)	0.50	9794328	<0.20 (2)	0.20	9794383
Dissolved Nitrate (N)	mg/L	3.5 (6)	0.50	9794328	<0.20 (2)	0.20	9794383
Misc. Organics							
Phenols	mg/L	0.12 (2)	0.030	9795406	5.9 (1)	0.30	9796507

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limits raised due to sample matrix.
(3) Sample exceeds calibration range.
(4) Detection limit raised based on sample volume used for analysis.
(5) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
(6) Detection limits raised due to matrix interference.

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BV Labs Job #: C017797
Report Date: 2020/03/17

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XN2897			XN2898		
Sampling Date		2020/03/09			2020/03/09		
COC Number		603408-01-01			603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 3B**	**RDL**	**QC Batch**	**PRIMARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	16200 (1)	200	9795374	1790 (1)	50	9795374
Misc. Inorganics							
Conductivity	uS/cm	43000	2.0	9794465	15000	2.0	9794465
Dissolved Organic Carbon (C)	mg/L	2600 (1)	25	9796495	380 (2)	25	9796495
pH	pH	9.16	N/A	9794464	8.49	N/A	9794464
Total Dissolved Solids	mg/L	>20000 (3)	25	9794934	7900	10	9794934
Total Suspended Solids	mg/L	15	1.0	9797105	3.7	1.0	9797105
Anions							
Bicarbonate (HCO3)	mg/L	7000	10	9794463	3300	10	9794463
Carbonate (CO3)	mg/L	2800	10	9794463	530	10	9794463
Dissolved Chloride (Cl)	mg/L	8600 (1)	50	9798141	3000 (1)	20	9798141
Dissolved Sulphate (SO4)	mg/L	1500 (4)	10	9798141	640 (1)	5.0	9798141
Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.0099 (4)	0.0099	9799150	0.020	0.00099	9799150
Nutrients							
Total Ammonia (N)	mg/L	1700 (1)	15	9797827	670 (1)	6.0	9799790
Total Total Kjeldahl Nitrogen	mg/L	260 (1)	130	9794929	74 (1)	25	9794929
Dissolved Nitrite (N)	mg/L	<0.20 (2)	0.20	9794383	<0.20 (5)	0.20	9794328
Dissolved Nitrate (N)	mg/L	<0.20 (2)	0.20	9794383	<0.20 (5)	0.20	9794328
Misc. Organics							
Phenols	mg/L	25 (2)	0.75	9795406	1.8 (2)	0.15	9795406

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limits raised due to sample matrix.
(3) Detection limit raised based on sample volume used for analysis.
Sample exceeds calibration range.
(4) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
(5) Detection limits raised due to matrix interference.

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BV Labs Job #: C017797
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CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XN2899			XN2900		
Sampling Date		2020/03/09			2020/03/09		
COC Number		603408-01-01			603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 3D**	**RDL**	**QC Batch**	**PRIMARY LEACHATE CELL 3E**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	3190 (1)	100	9795374	1450	10	9795374
Misc. Inorganics							
Conductivity	uS/cm	20000	2.0	9794465	15000	2.0	9794465
Dissolved Organic Carbon (C)	mg/L	870 (2)	25	9796495	140 (2)	13	9796495
pH	pH	7.88	N/A	9794464	8.11	N/A	9794464
Total Dissolved Solids	mg/L	12000 (3)	17	9794934	7200 (3)	17	9794934
Total Suspended Solids	mg/L	9.7	1.0	9797105	37	1.0	9797105
Anions							
Bicarbonate (HCO3)	mg/L	3700	10	9794463	4200	10	9794463
Carbonate (CO3)	mg/L	<10	10	9794463	190	10	9794463
Dissolved Chloride (Cl)	mg/L	5400 (1)	50	9798141	2500 (1)	20	9796446
Dissolved Sulphate (SO4)	mg/L	320 (1)	2.0	9798141	640 (1)	5.0	9796446
Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	0.044	0.00099	9799150	0.0011	0.00099	9799150
Nutrients							
Total Ammonia (N)	mg/L	470 (1)	7.5	9797826	600 (1)	7.5	9797826
Total Total Kjeldahl Nitrogen	mg/L	50 (1)	25	9794929	63 (1)	25	9794929
Dissolved Nitrite (N)	mg/L	<0.10 (4)	0.10	9794328	<0.20 (4)	0.20	9794328
Dissolved Nitrate (N)	mg/L	<0.10 (4)	0.10	9794328	<0.20 (4)	0.20	9794328
Misc. Organics							
Phenols	mg/L	5.8 (2)	0.15	9795406	0.11 (2)	0.038	9795406

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limits raised due to sample matrix.
(3) Detection limit raised based on sample volume used for analysis.
(4) Detection limits raised due to matrix interference.

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BV Labs Job #: C017797
Report Date: 2020/03/17

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XN2901		
Sampling Date		2020/03/09		
COC Number		603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Demand Parameters				
Chemical Oxygen Demand	mg/L	1090	10	9795374
Misc. Inorganics				
Conductivity	uS/cm	9200	2.0	9794465
Dissolved Organic Carbon (C)	mg/L	280 (1)	5.0	9796495
pH	pH	7.48	N/A	9794464
Total Dissolved Solids	mg/L	6000	10	9794934
Total Suspended Solids	mg/L	27	1.0	9797105
Anions				
Bicarbonate (HCO3)	mg/L	1200	1.0	9794463
Carbonate (CO3)	mg/L	<1.0	1.0	9794463
Dissolved Chloride (Cl)	mg/L	2300 (1)	20	9798141
Dissolved Sulphate (SO4)	mg/L	720 (1)	5.0	9798141
Metals				
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.00099	0.00099	9799150
Nutrients				
Total Ammonia (N)	mg/L	31 (1)	0.38	9799790
Total Total Kjeldahl Nitrogen	mg/L	44 (1)	2.5	9794929
Dissolved Nitrite (N)	mg/L	0.055 (2)	0.050	9794328
Dissolved Nitrate (N)	mg/L	0.36 (2)	0.050	9794328
Misc. Organics				
Phenols	mg/L	0.68 (1)	0.0075	9796507

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

(2) Detection limits raised due to matrix interference.

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BV Labs Job #: C017797
Report Date: 2020/03/17

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		XN2895	XN2896	XN2897	XN2898		
Sampling Date		2020/03/10	2020/03/09	2020/03/09	2020/03/09		
COC Number		603408-01-01	603408-01-01	603408-01-01	603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 1**	**PRIMARY LEACHATE CELL 3A**	**PRIMARY LEACHATE CELL 3B**	**PRIMARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Elements							
Total Mercury (Hg)	ug/L	<0.19 (1)	<0.19 (1)	<0.19 (1)	<0.19 (1)	0.19	9797824

RDL = Reportable Detection Limit
(1) Detection limit raised based on sample volume used and sample matrix

BV Labs ID		XN2899	XN2900	XN2901		
Sampling Date		2020/03/09	2020/03/09	2020/03/09		
COC Number		603408-01-01	603408-01-01	603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 3D**	**PRIMARY LEACHATE CELL 3E**	**PRIMARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Elements						
Total Mercury (Hg)	ug/L	<0.19 (1)	<0.19 (1)	<0.19 (1)	0.19	9797824

RDL = Reportable Detection Limit
(1) Detection limit raised based on sample volume used and sample matrix

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BV Labs Job #: C017797
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CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		XN2895	XN2896	XN2897	XN2898		
Sampling Date		2020/03/10	2020/03/09	2020/03/09	2020/03/09		
COC Number		603408-01-01	603408-01-01	603408-01-01	603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 1**	**PRIMARY LEACHATE CELL 3A**	**PRIMARY LEACHATE CELL 3B**	**PRIMARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Elements							
Total Chromium (Cr)	mg/L	0.30	<0.20	0.50	<0.20	0.20	9797053
Total Phosphorus (P)	mg/L	17	6.2	8.9	<2.0	2.0	9797053
RDL = Reportable Detection Limit							

BV Labs ID		XN2899	XN2900	XN2901		
Sampling Date		2020/03/09	2020/03/09	2020/03/09		
COC Number		603408-01-01	603408-01-01	603408-01-01		
	UNITS	**PRIMARY LEACHATE CELL 3D**	**PRIMARY LEACHATE CELL 3E**	**PRIMARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Elements						
Total Chromium (Cr)	mg/L	<0.20	<0.20	<0.20	0.20	9797053
Total Phosphorus (P)	mg/L	<2.0	<2.0	<2.0	2.0	9797053
RDL = Reportable Detection Limit						

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.0°C
Package 2	0.7°C

Ammonia is greater than Total Kjeldahl Nitrogen due to sample matrix.

Sample XN2898 [PRIMARY LEACHATE CELL 3C] : Dissolved Chromium < Dissolved Hexavalent Chromium. High Hexavalent result is likely due to matrix interference.

Sample XN2899 [PRIMARY LEACHATE CELL 3D] : Dissolved Chromium < Dissolved Hexavalent Chromium. High Hexavalent result is likely due to matrix interference.

Sample XN2900 [PRIMARY LEACHATE CELL 3E] : Dissolved Chromium < Dissolved Hexavalent Chromium. High Hexavalent result is likely due to matrix interference.

REGULATED METALS (CCME/AT1) - DISSOLVED Comments

Sample XN2895 [PRIMARY LEACHATE CELL 1] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XN2895 [PRIMARY LEACHATE CELL 1] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2896 [PRIMARY LEACHATE CELL 3A] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XN2896 [PRIMARY LEACHATE CELL 3A] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2897 [PRIMARY LEACHATE CELL 3B] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XN2897 [PRIMARY LEACHATE CELL 3B] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2898 [PRIMARY LEACHATE CELL 3C] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XN2898 [PRIMARY LEACHATE CELL 3C] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2899 [PRIMARY LEACHATE CELL 3D] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XN2899 [PRIMARY LEACHATE CELL 3D] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2900 [PRIMARY LEACHATE CELL 3E] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XN2900 [PRIMARY LEACHATE CELL 3E] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2901 [PRIMARY LEACHATE CELL 4] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.

RESULTS OF CHEMICAL ANALYSES OF WATER Comments

Sample XN2895 [PRIMARY LEACHATE CELL 1] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample XN2896 [PRIMARY LEACHATE CELL 3A] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample XN2897 [PRIMARY LEACHATE CELL 3B] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample XN2898 [PRIMARY LEACHATE CELL 3C] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample XN2899 [PRIMARY LEACHATE CELL 3D] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample XN2900 [PRIMARY LEACHATE CELL 3E] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to dilution to bring analyte within the calibrated range.

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments

Sample XN2895 [PRIMARY LEACHATE CELL 1] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2896 [PRIMARY LEACHATE CELL 3A] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2897 [PRIMARY LEACHATE CELL 3B] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2898 [PRIMARY LEACHATE CELL 3C] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2899 [PRIMARY LEACHATE CELL 3D] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2900 [PRIMARY LEACHATE CELL 3E] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2901 [PRIMARY LEACHATE CELL 4] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

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BV Labs Job #: C017797
Report Date: 2020/03/17

QUALITY ASSURANCE REPORT

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9793179	O-TERPHENYL (sur.)	2020/03/11	120	60 - 140	121	60 - 140	123	%				
9794436	1,4-Difluorobenzene (sur.)	2020/03/11	102	50 - 140	102	50 - 140	101	%				
9794436	4-Bromofluorobenzene (sur.)	2020/03/11	99	50 - 140	100	50 - 140	98	%				
9794436	D4-1,2-Dichloroethane (sur.)	2020/03/11	100	50 - 140	101	50 - 140	105	%				
9793179	F2 (C10-C16 Hydrocarbons)	2020/03/11	100	60 - 140	101	60 - 140	<0.10	mg/L	NC	30		
9794328	Dissolved Nitrate (N)	2020/03/11	119	80 - 120	101	80 - 120	<0.010	mg/L	0.31	20		
9794328	Dissolved Nitrite (N)	2020/03/11	76 (1)	80 - 120	97	80 - 120	<0.010	mg/L	NC	20		
9794383	Dissolved Nitrate (N)	2020/03/11	NC	80 - 120	103	80 - 120	<0.010	mg/L	0.064	20		
9794383	Dissolved Nitrite (N)	2020/03/11	NC	80 - 120	97	80 - 120	<0.010	mg/L	0.24	20		
9794436	Benzene	2020/03/11	106	50 - 140	107	60 - 130	<0.40	ug/L	NC	30		
9794436	Ethylbenzene	2020/03/11	108	50 - 140	108	60 - 130	<0.40	ug/L	NC	30		
9794436	F1 (C6-C10)	2020/03/11	87	60 - 140	93	60 - 140	<100	ug/L	NC	30		
9794436	m & p-Xylene	2020/03/11	109	50 - 140	108	60 - 130	<0.80	ug/L	NC	30		
9794436	o-Xylene	2020/03/11	106	50 - 140	106	60 - 130	<0.40	ug/L	NC	30		
9794436	Toluene	2020/03/11	103	50 - 140	103	60 - 130	<0.40	ug/L	NC	30		
9794463	Bicarbonate (HCO3)	2020/03/11					<1.0	mg/L	0.21	20		
9794463	Carbonate (CO3)	2020/03/11					<1.0	mg/L	NC	20		
9794464	pH	2020/03/11			100	97 - 103			0.21	N/A		
9794465	Conductivity	2020/03/11			100	90 - 110	<2.0	uS/cm	NC	10		
9794467	Bicarbonate (HCO3)	2020/03/11					<1.0	mg/L	0.054	20		
9794467	Carbonate (CO3)	2020/03/11					<1.0	mg/L	NC	20		
9794471	pH	2020/03/11			99	97 - 103			1.5	N/A		
9794472	Conductivity	2020/03/11			100	90 - 110	<2.0	uS/cm	0.62	10		
9794929	Total Total Kjeldahl Nitrogen	2020/03/12	NC	80 - 120	100	80 - 120	<0.050	mg/L	6.3 (2)	20	108	80 - 120
9794934	Total Dissolved Solids	2020/03/12	98	80 - 120	94	80 - 120	<10	mg/L	NC	20		
9794959	Dissolved Aluminum (Al)	2020/03/12	85	80 - 120	94	80 - 120	<0.0030	mg/L	NC	20		
9794959	Dissolved Antimony (Sb)	2020/03/12	84	80 - 120	94	80 - 120	<0.00060	mg/L	NC	20		
9794959	Dissolved Arsenic (As)	2020/03/12	87	80 - 120	94	80 - 120	<0.00020	mg/L	3.4	20		
9794959	Dissolved Cobalt (Co)	2020/03/12	87	80 - 120	103	80 - 120	<0.00030	mg/L	NC	20		
9794959	Dissolved Copper (Cu)	2020/03/12	86	80 - 120	105	80 - 120	<0.00020	mg/L	NC	20		
9794959	Dissolved Lead (Pb)	2020/03/12	86	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20		

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BV Labs Job #: C017797
Report Date: 2020/03/17

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9794959	Dissolved Molybdenum (Mo)	2020/03/12	93	80 - 120	101	80 - 120	<0.00020	mg/L	15	20		
9794959	Dissolved Nickel (Ni)	2020/03/12	87	80 - 120	103	80 - 120	<0.00050	mg/L	NC	20		
9794959	Dissolved Selenium (Se)	2020/03/12	87	80 - 120	101	80 - 120	<0.00020	mg/L	NC	20		
9794959	Dissolved Silver (Ag)	2020/03/12	80	80 - 120	100	80 - 120	<0.00010	mg/L	NC	20		
9794959	Dissolved Thallium (Tl)	2020/03/12	87	80 - 120	99	80 - 120	<0.00020	mg/L	NC	20		
9794959	Dissolved Tin (Sn)	2020/03/12	90	80 - 120	97	80 - 120	<0.0010	mg/L	NC	20		
9794959	Dissolved Uranium (U)	2020/03/12	96	80 - 120	109	80 - 120	<0.00010	mg/L	3.8	20		
9794959	Dissolved Zinc (Zn)	2020/03/12	82	80 - 120	102	80 - 120	<0.0030	mg/L	NC	20		
9795374	Chemical Oxygen Demand	2020/03/12	110	80 - 120	100	80 - 120	<10	mg/L	5.2	20		
9795406	Phenols	2020/03/12	59 (1)	80 - 120	90	80 - 120	<0.0015	mg/L	6.9	20		
9795614	Dissolved Barium (Ba)	2020/03/12	96	80 - 120	96	80 - 120	<0.010	mg/L				
9795614	Dissolved Boron (B)	2020/03/12	100	80 - 120	96	80 - 120	<0.020	mg/L				
9795614	Dissolved Calcium (Ca)	2020/03/12	98	80 - 120	96	80 - 120	<0.30	mg/L	NC	20		
9795614	Dissolved Magnesium (Mg)	2020/03/12	100	80 - 120	99	80 - 120	<0.20	mg/L	NC	20		
9795614	Dissolved Manganese (Mn)	2020/03/12	101	80 - 120	97	80 - 120	<0.0040	mg/L				
9795614	Dissolved Phosphorus (P)	2020/03/12	101	80 - 120	96	80 - 120	<0.10	mg/L				
9795614	Dissolved Potassium (K)	2020/03/12	100	80 - 120	99	80 - 120	<0.30	mg/L				
9795614	Dissolved Sodium (Na)	2020/03/12	98	80 - 120	97	80 - 120	<0.50	mg/L				
9796446	Dissolved Chloride (Cl)	2020/03/12	104	80 - 120	104	80 - 120	<1.0	mg/L	7.6	20		
9796446	Dissolved Sulphate (SO4)	2020/03/12	NC	80 - 120	111	80 - 120	<1.0	mg/L	4.8	20		
9796495	Dissolved Organic Carbon (C)	2020/03/13	95	80 - 120	97	80 - 120	<0.50	mg/L	6.0	20		
9796507	Phenols	2020/03/13	89	80 - 120	97	80 - 120	<0.0015	mg/L	NC	20		
9797053	Total Chromium (Cr)	2020/03/13	97	80 - 120	97	80 - 120	<0.010	mg/L	NC	20		
9797053	Total Phosphorus (P)	2020/03/13	100	80 - 120	98	80 - 120	<0.10	mg/L	0.31	20		
9797105	Total Suspended Solids	2020/03/13	94	80 - 120	97	80 - 120	<1.0	mg/L	NC	20		
9797824	Total Mercury (Hg)	2020/03/14	67 (1)	80 - 120	80	80 - 120	<0.0019	ug/L	NC	20		
9797826	Total Ammonia (N)	2020/03/14	96	80 - 120	101	80 - 120	<0.015	mg/L	NC	20		
9797827	Total Ammonia (N)	2020/03/14	NC	80 - 120	101	80 - 120	<0.015	mg/L	2.1 (2)	20		
9798101	Dissolved Barium (Ba)	2020/03/16	98	80 - 120	102	80 - 120	<0.010	mg/L	1.3	20		
9798101	Dissolved Boron (B)	2020/03/16	102	80 - 120	100	80 - 120	<0.020	mg/L	0.62	20		
9798101	Dissolved Calcium (Ca)	2020/03/16	97	80 - 120	97	80 - 120	<0.30	mg/L	0.65	20		

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BV Labs Job #: C017797
Report Date: 2020/03/17

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9798101	Dissolved Magnesium (Mg)	2020/03/16	101	80 - 120	101	80 - 120	<0.20	mg/L	0.72	20		
9798101	Dissolved Manganese (Mn)	2020/03/16	106	80 - 120	102	80 - 120	<0.0040	mg/L	1.5	20		
9798101	Dissolved Phosphorus (P)	2020/03/16	104	80 - 120	98	80 - 120	<0.10	mg/L	1.4	20		
9798101	Dissolved Potassium (K)	2020/03/16	102	80 - 120	99	80 - 120	<0.30	mg/L	0.37	20		
9798101	Dissolved Sodium (Na)	2020/03/16	NC	80 - 120	99	80 - 120	<0.50	mg/L	0.79	20		
9798137	Total Total Kjeldahl Nitrogen	2020/03/17	101	80 - 120	93	80 - 120	<0.050	mg/L	2.2	20	105	80 - 120
9798141	Dissolved Chloride (Cl)	2020/03/15	103	80 - 120	102	80 - 120	<1.0	mg/L	6.6	20		
9798141	Dissolved Sulphate (SO4)	2020/03/15	NC	80 - 120	101	80 - 120	<1.0	mg/L	5.8	20		
9799150	Dissolved Hex. Chromium (Cr 6+)	2020/03/16	91	80 - 120	99	80 - 120	<0.00099	mg/L	10	20		
9799790	Total Ammonia (N)	2020/03/17	86	80 - 120	105	80 - 120	<0.015	mg/L	4.6	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C017797
Report Date: 2020/03/17

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 1
Your P.O. #: 206454RY
Sampler Initials: MN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Andy Lu, Ph.D., P.Chem., Scientific Specialist

Janet Gao, B.Sc., QP, Supervisor, Organics

Luba Shymushovska, B.Sc., QP, Senior Analyst, Organics

Harry (Peng) Liang, Senior Analyst

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Appendix D

Primary Leachate Analyses

Quarter 2

Your P.O. #: 207708RY
Your Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your C.O.C. #: 607716-03-01

Attention: Todd Webb

CLEAN HARBORS
P.O. BOX 390
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/05/06
Report #: R2876110
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C028384
Received: 2020/04/28, 09:00

Sample Matrix: Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	1	N/A	2020/04/29	AB SOP-00005	SM 23 2320 B m
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	6	N/A	2020/04/30	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID (1)	1	N/A	2020/04/30	AB SOP-00039	CCME CWS/EPA 8260d m
BTEX/F1 in Water by HS GC/MS/FID (1)	6	N/A	2020/05/01	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	7	N/A	2020/05/01		Auto Calc
Cadmium - low level CCME - Dissolved (1)	7	N/A	2020/05/01		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	6	N/A	2020/05/02	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
Chloride/Sulphate by Auto Colourimetry (1)	1	N/A	2020/05/03	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
COD by Colorimeter (1)	1	N/A	2020/04/30	AB SOP-00016	SM 23 5220D m
COD by Colorimeter (1)	4	N/A	2020/05/02	AB SOP-00016	SM 23 5220D m
COD by Colorimeter (1)	2	N/A	2020/05/04	AB SOP-00016	SM 23 5220D m
Dissolved Hexavalent Chromium (1)	6	N/A	2020/05/05	AB SOP-00063	SM 23 3500-Cr B m
Dissolved Hexavalent Chromium (1)	1	N/A	2020/05/06	AB SOP-00063	SM 23 3500-Cr B m
Carbon (DOC) (1, 2)	7	N/A	2020/04/30	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	2	N/A	2020/04/29	AB SOP-00005	SM 23 2510 B m
Conductivity @25C (1)	5	N/A	2020/05/03	AB SOP-00004	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 3)	7	2020/04/29	2020/04/30	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Mercury (Total) by CV (1)	7	2020/05/05	2020/05/05	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 4)	7	N/A	2020/04/29	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	7	2020/05/01	2020/05/04	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Dissolved (1, 4)	6	N/A	2020/04/30	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Dissolved (1, 4)	1	N/A	2020/05/01	AB SOP-00043	EPA 6020b R2 m
Ammonia-N (Total) (1)	6	N/A	2020/04/30	AB SOP-00007	SM 23 4500 NH3 A G m
Ammonia-N (Total) (1)	1	N/A	2020/05/01	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrogen (Nitrite - Nitrate) by IC (1)	1	N/A	2020/04/29	AB SOP-00023	SM 23 4110 B m
Nitrogen (Nitrite - Nitrate) by IC (1)	6	N/A	2020/05/01	AB SOP-00023	SM 23 4110 B m
pH @25°C (1, 5)	2	N/A	2020/04/29	AB SOP-00005	SM 23 4500-H+B m
Phenols (4-AAP) (1)	7	N/A	2020/04/29	AB SOP-00088	EPA 9066 R0 m

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Your P.O. #: 207708RY
Your Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your C.O.C. #: 607716-03-01

Attention: Todd Webb

CLEAN HARBORS
P.O. BOX 390
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/05/06
Report #: R2876110
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C028384
Received: 2020/04/28, 09:00

Sample Matrix: Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
pH @25C (1, 5)	5	N/A	2020/05/01	AB SOP-00006	SM 23 4500 H+B m
Total Dissolved Solids (Filt. Residue) (1)	7	2020/05/01	2020/05/01	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen (1)	4	2020/05/01	2020/05/01	AB SOP-00008	EPA 351.1 R1978 m
Total Kjeldahl Nitrogen (1)	2	2020/05/01	2020/05/02	AB SOP-00008	EPA 351.1 R1978 m
Total Kjeldahl Nitrogen (1)	1	2020/05/04	2020/05/05	AB SOP-00008	EPA 351.1 R1978 m
Total Suspended Solids (NFR) (1)	7	2020/05/02	2020/05/02	AB SOP-00061	SM 23 2540 D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by BV Labs Calgary Environmental
(2) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(3) Silica gel clean up employed.
(4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

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Your P.O. #: 207708RY
Your Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your C.O.C. #: 607716-03-01

Attention: Todd Webb

CLEAN HARBORS
P.O. BOX 390
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/05/06
Report #: R2876110
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C028384
Received: 2020/04/28, 09:00

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AUTHORIZED REPORT
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Bureau Veritas Laboratories
06 May 2020 14:46:05

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Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bvlabs.com
Phone# (780) 577-7100
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BV Labs Job #: C028384
Report Date: 2020/05/06

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		XR8801	XR8802	XR8803	XR8804		
Sampling Date		2020/04/27	2020/04/27	2020/04/27	2020/04/27		
COC Number		607716-03-01	607716-03-01	607716-03-01	607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 1**	**PRIMARY LEACHATE CELL 3A**	**PRIMARY LEACHATE CELL 3B**	**PRIMARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	2.5	1.9	2.4	0.10	9832624
Volatiles							
Benzene	ug/L	4.1	240	17	18	0.40	9834540
Toluene	ug/L	4.0	39	19	200	0.40	9834540
Ethylbenzene	ug/L	0.53	3.9	2.0	75	0.40	9834540
m & p-Xylene	ug/L	1.1	11	5.7	290	0.80	9834540
o-Xylene	ug/L	0.68	6.8	4.0	120	0.40	9834540
Xylenes (Total)	ug/L	1.8	18	9.7	410	0.89	9833891
F1 (C6-C10) - BTEX	ug/L	<100	310	1600	810	100	9833891
F1 (C6-C10)	ug/L	<100	610	1600	1500	100	9834540
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	100	94	101	106		9834540
4-Bromofluorobenzene (sur.)	%	99	103	102	101		9834540
D4-1,2-Dichloroethane (sur.)	%	102	104	103	103		9834540
O-TERPHENYL (sur.)	%	108	110	112	109		9832624
RDL = Reportable Detection Limit							

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BV Labs Job #: C028384
Report Date: 2020/05/06

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		XR8805	XR8806	XR8807		
Sampling Date		2020/04/27	2020/04/27	2020/04/27		
COC Number		607716-03-01	607716-03-01	607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 3D**	**PRIMARY LEACHATE CELL 3E**	**PRIMARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	0.81	24	26	0.10	9832624
Volatiles						
Benzene	ug/L	15	25	56	0.40	9834540
Toluene	ug/L	21	6.0	98	0.40	9834540
Ethylbenzene	ug/L	2.0	1.9	5.5	0.40	9834540
m & p-Xylene	ug/L	5.9	5.7	17	0.80	9834540
o-Xylene	ug/L	3.8	5.1	8.1	0.40	9834540
Xylenes (Total)	ug/L	9.7	11	25	0.89	9833891
F1 (C6-C10) - BTEX	ug/L	420	620	1700	100	9833891
F1 (C6-C10)	ug/L	470	660	1900	100	9834540
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	101	101	104		9834540
4-Bromofluorobenzene (sur.)	%	102	102	101		9834540
D4-1,2-Dichloroethane (sur.)	%	99	101	130		9834540
O-TERPHENYL (sur.)	%	110	114	107		9832624
RDL = Reportable Detection Limit						

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BV Labs Job #: C028384
Report Date: 2020/05/06

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		XR8801		XR8802		XR8803		
Sampling Date		2020/04/27		2020/04/27		2020/04/27		
COC Number		607716-03-01		607716-03-01		607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 1**	**RDL**	**PRIMARY LEACHATE CELL 3A**	**RDL**	**PRIMARY LEACHATE CELL 3B**	**RDL**	**QC Batch**
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	0.10	0.020	<0.40	0.40	8.5	0.40	9833900
Elements								
Dissolved Aluminum (Al)	mg/L	0.012	0.0030	0.091	0.060	<0.060	0.060	9836601
Dissolved Antimony (Sb)	mg/L	0.0011	0.00060	<0.012	0.012	0.020	0.012	9836601
Dissolved Arsenic (As)	mg/L	0.0024	0.00020	0.32	0.0040	0.15	0.0040	9836601
Dissolved Barium (Ba)	mg/L	0.13	0.010	1.8	0.10	0.56	0.10	9835270
Dissolved Boron (B)	mg/L	0.34	0.020	39	0.20	170 (1)	1.0	9835270
Dissolved Calcium (Ca)	mg/L	96	0.30	250	3.0	17	3.0	9835270
Dissolved Cobalt (Co)	mg/L	0.00057	0.00030	0.0085	0.0060	0.029	0.0060	9836601
Dissolved Copper (Cu)	mg/L	0.0031	0.00020	<0.0040	0.0040	0.14	0.0040	9836601
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	<0.0040	0.0040	0.016	0.0040	9836601
Dissolved Magnesium (Mg)	mg/L	31	0.20	380	2.0	48	2.0	9835270
Dissolved Manganese (Mn)	mg/L	0.20	0.0040	1.4	0.040	0.80	0.040	9835270
Dissolved Molybdenum (Mo)	mg/L	0.20	0.00020	0.27	0.0040	66	0.0040	9836601
Dissolved Nickel (Ni)	mg/L	0.026	0.00050	0.47	0.010	1.6	0.010	9836601
Dissolved Phosphorus (P)	mg/L	0.30	0.10	7.2	1.0	11	1.0	9835270
Dissolved Potassium (K)	mg/L	14	0.30	840	3.0	3300	3.0	9835270
Dissolved Selenium (Se)	mg/L	0.0035	0.00020	0.021	0.0040	0.16	0.0040	9836601
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.0020	0.0020	<0.0020	0.0020	9836601
Dissolved Sodium (Na)	mg/L	93	0.50	4700	5.0	8700 (1)	25	9835270
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.0040	0.0040	<0.0040	0.0040	9836601
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.020	0.020	<0.020	0.020	9836601
Dissolved Uranium (U)	mg/L	0.0079	0.00010	<0.0020	0.0020	<0.0020	0.0020	9836601
Dissolved Zinc (Zn)	mg/L	0.020	0.0030	<0.060	0.060	0.068	0.060	9836601

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C028384
Report Date: 2020/05/06

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		XR8804		XR8805		XR8806		
Sampling Date		2020/04/27		2020/04/27		2020/04/27		
COC Number		607716-03-01		607716-03-01		607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 3C**	**RDL**	**PRIMARY LEACHATE CELL 3D**	**RDL**	**PRIMARY LEACHATE CELL 3E**	**RDL**	**QC Batch**
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	<0.40	0.40	0.39	0.20	<0.40	0.40	9833900
Elements								
Dissolved Aluminum (Al)	mg/L	0.064	0.060	<0.030	0.030	<0.060	0.060	9836601
Dissolved Antimony (Sb)	mg/L	<0.012	0.012	<0.0060	0.0060	<0.012	0.012	9836601
Dissolved Arsenic (As)	mg/L	0.025	0.0040	0.016	0.0020	0.012	0.0040	9836601
Dissolved Barium (Ba)	mg/L	<0.10	0.10	0.53	0.10	0.21	0.10	9835270
Dissolved Boron (B)	mg/L	51 (1)	1.0	44	0.20	6.9	0.20	9835270
Dissolved Calcium (Ca)	mg/L	49	3.0	250	3.0	77	3.0	9835270
Dissolved Cobalt (Co)	mg/L	<0.0060	0.0060	0.0053	0.0030	<0.0060	0.0060	9836601
Dissolved Copper (Cu)	mg/L	0.022	0.0040	0.0075	0.0020	0.0074	0.0040	9836601
Dissolved Lead (Pb)	mg/L	<0.0040	0.0040	<0.0020	0.0020	<0.0040	0.0040	9836601
Dissolved Magnesium (Mg)	mg/L	100	2.0	230	2.0	220	2.0	9835270
Dissolved Manganese (Mn)	mg/L	0.38	0.040	2.3	0.040	0.71	0.040	9835270
Dissolved Molybdenum (Mo)	mg/L	1.9	0.0040	2.4	0.0020	0.87	0.0040	9836601
Dissolved Nickel (Ni)	mg/L	0.50	0.010	4.3	0.0050	0.69	0.010	9836601
Dissolved Phosphorus (P)	mg/L	1.3	1.0	1.3	1.0	<1.0	1.0	9835270
Dissolved Potassium (K)	mg/L	350	3.0	530	3.0	250	3.0	9835270
Dissolved Selenium (Se)	mg/L	0.031	0.0040	0.013	0.0020	0.010	0.0040	9836601
Dissolved Silver (Ag)	mg/L	<0.0020	0.0020	<0.0010	0.0010	<0.0020	0.0020	9836601
Dissolved Sodium (Na)	mg/L	2000	5.0	3300	5.0	2300	5.0	9835270
Dissolved Thallium (Tl)	mg/L	<0.0040	0.0040	<0.0020	0.0020	<0.0040	0.0040	9836601
Dissolved Tin (Sn)	mg/L	<0.020	0.020	<0.010	0.010	<0.020	0.020	9836601
Dissolved Uranium (U)	mg/L	0.0062	0.0020	0.0039	0.0010	0.010	0.0020	9836601
Dissolved Zinc (Zn)	mg/L	<0.060	0.060	<0.030	0.030	<0.060	0.060	9836601

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C028384
Report Date: 2020/05/06

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		XR8807		
Sampling Date		2020/04/27		
COC Number		607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	0.79	0.040	9833900
Elements				
Dissolved Aluminum (Al)	mg/L	0.031	0.0060	9836601
Dissolved Antimony (Sb)	mg/L	0.0090	0.0012	9836601
Dissolved Arsenic (As)	mg/L	0.0062	0.00040	9836601
Dissolved Barium (Ba)	mg/L	0.14	0.010	9835270
Dissolved Boron (B)	mg/L	6.1 (1)	0.20	9835270
Dissolved Calcium (Ca)	mg/L	880 (1)	3.0	9835270
Dissolved Cobalt (Co)	mg/L	0.031	0.00060	9836601
Dissolved Copper (Cu)	mg/L	0.062	0.00040	9836601
Dissolved Lead (Pb)	mg/L	0.00076	0.00040	9836601
Dissolved Magnesium (Mg)	mg/L	240	0.20	9835270
Dissolved Manganese (Mn)	mg/L	11	0.0040	9835270
Dissolved Molybdenum (Mo)	mg/L	5.7	0.00040	9836601
Dissolved Nickel (Ni)	mg/L	0.22	0.0010	9836601
Dissolved Phosphorus (P)	mg/L	1.6	0.10	9835270
Dissolved Potassium (K)	mg/L	120	0.30	9835270
Dissolved Selenium (Se)	mg/L	0.017	0.00040	9836601
Dissolved Silver (Ag)	mg/L	<0.00020	0.00020	9836601
Dissolved Sodium (Na)	mg/L	2800 (1)	5.0	9835270
Dissolved Thallium (Tl)	mg/L	<0.00040	0.00040	9836601
Dissolved Tin (Sn)	mg/L	<0.0020	0.0020	9836601
Dissolved Uranium (U)	mg/L	0.028	0.00020	9836601
Dissolved Zinc (Zn)	mg/L	0.14	0.0060	9836601

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C028384
Report Date: 2020/05/06

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XR8801			XR8802		
Sampling Date		2020/04/27			2020/04/27		
COC Number		607716-03-01			607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 1**	**RDL**	**QC Batch**	**PRIMARY LEACHATE CELL 3A**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	46	10	9836078	3780 (1)	50	9838347
Misc. Inorganics							
Conductivity	uS/cm	960	2.0	9835512	35000	1.0	9838959
Dissolved Organic Carbon (C)	mg/L	14 (2)	5.0	9835590	810 (1)	25	9835590
pH	pH	7.75	N/A	9835504	7.44	N/A	9837859
Total Dissolved Solids	mg/L	630	10	9837314	17000 (3)	25	9837314
Total Suspended Solids	mg/L	11	1.0	9838378	12	1.0	9838378
Anions							
Bicarbonate (HCO3)	mg/L	260	1.0	9835499	7100	10	9835585
Carbonate (CO3)	mg/L	<1.0	1.0	9835499	<10	10	9835585
Dissolved Chloride (Cl)	mg/L	29	1.0	9838264	7800 (2)	100	9838518
Dissolved Sulphate (SO4)	mg/L	250 (1)	5.0	9838264	170 (2)	100	9838518
Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.00099	0.00099	9841434	<0.00099	0.00099	9841435
Nutrients							
Total Ammonia (N)	mg/L	0.23	0.015	9837122	720 (1)	7.5	9837149
Total Total Kjeldahl Nitrogen	mg/L	1.6	0.050	9839014	810 (1)	25	9837941
Dissolved Nitrite (N)	mg/L	0.034	0.010	9835324	<0.25 (2)	0.25	9838099
Dissolved Nitrate (N)	mg/L	0.24	0.010	9835324	<0.25 (2)	0.25	9838099
Misc. Organics							
Phenols	mg/L	0.0028	0.0015	9834523	7.7 (2)	0.30	9834523

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limits raised due to sample matrix.
(3) Detection limit raised based on sample volume used for analysis.

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BV Labs Job #: C028384
Report Date: 2020/05/06

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XR8803			XR8804		
Sampling Date		2020/04/27			2020/04/27		
COC Number		607716-03-01			607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 3B**	**RDL**	**QC Batch**	**PRIMARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	16600 (1)	500	9839238	1470	10	9838347
Misc. Inorganics							
Conductivity	uS/cm	51000	1.0	9838959	13000	2.0	9835512
Dissolved Organic Carbon (C)	mg/L	4800 (1)	250	9835590	290 (1)	50	9835590
pH	pH	9.28	N/A	9837859	8.43	N/A	9835504
Total Dissolved Solids	mg/L	>20000 (2)	25	9837315	6800 (3)	25	9837315
Total Suspended Solids	mg/L	7.1	1.0	9838378	16	1.0	9838378
Anions							
Bicarbonate (HCO3)	mg/L	7000	10	9835585	3000	10	9835499
Carbonate (CO3)	mg/L	3300	10	9835585	340	10	9835499
Dissolved Chloride (Cl)	mg/L	11000 (4)	100	9838518	2300 (4)	100	9838518
Dissolved Sulphate (SO4)	mg/L	1900 (4)	100	9838518	690 (4)	100	9838518
Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.099 (4)	0.099	9841434	<0.099 (4)	0.099	9841434
Nutrients							
Total Ammonia (N)	mg/L	1700 (1)	15	9837149	500 (1)	7.5	9837149
Total Total Kjeldahl Nitrogen	mg/L	2700 (1)	100	9837941	540 (1)	25	9837941
Dissolved Nitrite (N)	mg/L	<0.25 (4)	0.25	9838099	<0.25 (4)	0.25	9838099
Dissolved Nitrate (N)	mg/L	<0.25 (4)	0.25	9838099	<0.25 (4)	0.25	9838099
Misc. Organics							
Phenols	mg/L	24 (4)	0.75	9834523	0.91 (4)	0.030	9834523

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limit raised based on sample volume used for analysis.
Sample exceeds calibration range.
(3) Detection limit raised based on sample volume used for analysis.
(4) Detection limits raised due to sample matrix.

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BV Labs Job #: C028384
Report Date: 2020/05/06

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XR8805			XR8806		
Sampling Date		2020/04/27			2020/04/27		
COC Number		607716-03-01			607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 3D**	**RDL**	**QC Batch**	**PRIMARY LEACHATE CELL 3E**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	3710 (1)	50	9838347	1100 (1)	100	9839238
Misc. Inorganics							
Conductivity	uS/cm	25000	1.0	9838959	18000	1.0	9838959
Dissolved Organic Carbon (C)	mg/L	840 (1)	50	9835590	190 (1)	50	9835590
pH	pH	7.70	N/A	9837859	8.06	N/A	9837859
Total Dissolved Solids	mg/L	12000 (2)	25	9837315	7500 (2)	17	9837315
Total Suspended Solids	mg/L	10	1.0	9838378	56	1.0	9838378
Anions							
Bicarbonate (HCO3)	mg/L	4400	10	9835585	4800	10	9835585
Carbonate (CO3)	mg/L	<10	10	9835585	110	10	9835585
Dissolved Chloride (Cl)	mg/L	5400 (3)	100	9838518	2700 (3)	100	9838518
Dissolved Sulphate (SO4)	mg/L	300 (3)	100	9838518	530 (3)	100	9838518
Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.00099	0.00099	9841435	0.0016	0.00099	9841435
Nutrients							
Total Ammonia (N)	mg/L	410 (1)	7.5	9837149	530 (1)	7.5	9837149
Total Total Kjeldahl Nitrogen	mg/L	470 (1)	25	9837941	580 (1)	25	9837941
Dissolved Nitrite (N)	mg/L	<0.25 (3)	0.25	9838099	<0.50 (4)	0.50	9838099
Dissolved Nitrate (N)	mg/L	<0.25 (3)	0.25	9838099	<0.50 (4)	0.50	9838099
Misc. Organics							
Phenols	mg/L	6.5 (3)	0.15	9834523	0.11 (3)	0.015	9834523

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limit raised based on sample volume used for analysis.
(3) Detection limits raised due to sample matrix.
(4) Detection limits raised due to matrix interference.

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BV Labs Job #: C028384
Report Date: 2020/05/06

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XR8807		
Sampling Date		2020/04/27		
COC Number		607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Demand Parameters				
Chemical Oxygen Demand	mg/L	6270 (1)	100	9838347
Misc. Inorganics				
Conductivity	uS/cm	22000	1.0	9838959
Dissolved Organic Carbon (C)	mg/L	560 (1)	50	9835590
pH	pH	7.01	N/A	9837859
Total Dissolved Solids	mg/L	13000 (2)	17	9837315
Total Suspended Solids	mg/L	15	1.0	9838378
Anions				
Bicarbonate (HCO3)	mg/L	1600	10	9835585
Carbonate (CO3)	mg/L	<10	10	9835585
Dissolved Chloride (Cl)	mg/L	4600 (1)	50	9838518
Dissolved Sulphate (SO4)	mg/L	890 (3)	10	9838518
Metals				
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.00099	0.00099	9841434
Nutrients				
Total Ammonia (N)	mg/L	110	1.5	9837149
Total Total Kjeldahl Nitrogen	mg/L	200 (1)	25	9837941
Dissolved Nitrite (N)	mg/L	<0.50 (4)	0.50	9838099
Dissolved Nitrate (N)	mg/L	<0.50 (4)	0.50	9838099
Misc. Organics				
Phenols	mg/L	1.1 (1)	0.075	9834523

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limit raised based on sample volume used for analysis.
(3) Detection limits raised due to sample matrix.
(4) Detection limits raised due to matrix interference.

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BV Labs Job #: C028384
Report Date: 2020/05/06

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		XR8801		XR8802	XR8803		
Sampling Date		2020/04/27		2020/04/27	2020/04/27		
COC Number		607716-03-01		607716-03-01	607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 1**	**RDL**	**PRIMARY LEACHATE CELL 3A**	**PRIMARY LEACHATE CELL 3B**	**RDL**	**QC Batch**
Elements							
Total Mercury (Hg)	ug/L	0.058 (1)	0.019	<0.19 (1)	<0.19 (1)	0.19	9841065

RDL = Reportable Detection Limit
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

BV Labs ID		XR8804		XR8805	XR8806		
Sampling Date		2020/04/27		2020/04/27	2020/04/27		
COC Number		607716-03-01		607716-03-01	607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 3C**	**RDL**	**PRIMARY LEACHATE CELL 3D**	**PRIMARY LEACHATE CELL 3E**	**RDL**	**QC Batch**
Elements							
Total Mercury (Hg)	ug/L	<0.019 (1)	0.019	<0.19 (1)	<0.19 (1)	0.19	9841065

RDL = Reportable Detection Limit
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

BV Labs ID		XR8807		
Sampling Date		2020/04/27		
COC Number		607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Elements				
Total Mercury (Hg)	ug/L	0.024 (1)	0.019	9841065

RDL = Reportable Detection Limit
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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BV Labs Job #: C028384
Report Date: 2020/05/06

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		XR8801	XR8802	XR8803	XR8804		
Sampling Date		2020/04/27	2020/04/27	2020/04/27	2020/04/27		
COC Number		607716-03-01	607716-03-01	607716-03-01	607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 1**	**PRIMARY LEACHATE CELL 3A**	**PRIMARY LEACHATE CELL 3B**	**PRIMARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Elements							
Total Chromium (Cr)	mg/L	<0.010	0.19	0.42	<0.010	0.010	9839545
Total Phosphorus (P)	mg/L	0.31	6.6	11	1.3	0.10	9839545
RDL = Reportable Detection Limit							

BV Labs ID		XR8805	XR8806	XR8807		
Sampling Date		2020/04/27	2020/04/27	2020/04/27		
COC Number		607716-03-01	607716-03-01	607716-03-01		
	UNITS	**PRIMARY LEACHATE CELL 3D**	**PRIMARY LEACHATE CELL 3E**	**PRIMARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Elements						
Total Chromium (Cr)	mg/L	0.018	<0.010	<0.010	0.010	9839545
Total Phosphorus (P)	mg/L	1.7	0.94	1.6	0.10	9839545
RDL = Reportable Detection Limit						

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.0°C

Sample XR8802 [PRIMARY LEACHATE CELL 3A] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

Sample XR8803 [PRIMARY LEACHATE CELL 3B] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

Sample XR8804 [PRIMARY LEACHATE CELL 3C] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

Sample XR8805 [PRIMARY LEACHATE CELL 3D] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

Sample XR8806 [PRIMARY LEACHATE CELL 3E] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes. Dissolved Chromium < Dissolved Hexavalent Chromium. High Hexavalent result is likely due to matrix interference.

Sample XR8807 [PRIMARY LEACHATE CELL 4] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

REGULATED METALS (CCME/AT1) - DISSOLVED Comments

Sample XR8802 [PRIMARY LEACHATE CELL 3A] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XR8802 [PRIMARY LEACHATE CELL 3A] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XR8803 [PRIMARY LEACHATE CELL 3B] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XR8803 [PRIMARY LEACHATE CELL 3B] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XR8804 [PRIMARY LEACHATE CELL 3C] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XR8804 [PRIMARY LEACHATE CELL 3C] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XR8805 [PRIMARY LEACHATE CELL 3D] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XR8805 [PRIMARY LEACHATE CELL 3D] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XR8806 [PRIMARY LEACHATE CELL 3E] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XR8806 [PRIMARY LEACHATE CELL 3E] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XR8807 [PRIMARY LEACHATE CELL 4] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.

RESULTS OF CHEMICAL ANALYSES OF WATER Comments

Sample XR8802 [PRIMARY LEACHATE CELL 3A] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample XR8803 [PRIMARY LEACHATE CELL 3B] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample XR8804 [PRIMARY LEACHATE CELL 3C] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample XR8805 [PRIMARY LEACHATE CELL 3D] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample XR8806 [PRIMARY LEACHATE CELL 3E] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample XR8807 [PRIMARY LEACHATE CELL 4] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to sample matrix.

Results relate only to the items tested.

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BV Labs Job #: C028384
Report Date: 2020/05/06

QUALITY ASSURANCE REPORT

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9832624	O-TERPHENYL (sur.)	2020/04/29	114	60 - 140	114	60 - 140	95	%				
9834540	1,4-Difluorobenzene (sur.)	2020/04/30	99	50 - 140	101	50 - 140	100	%				
9834540	4-Bromofluorobenzene (sur.)	2020/04/30	112	50 - 140	100	50 - 140	99	%				
9834540	D4-1,2-Dichloroethane (sur.)	2020/04/30	108	50 - 140	102	50 - 140	101	%				
9832624	F2 (C10-C16 Hydrocarbons)	2020/04/29	110	60 - 140	105	60 - 140	<0.10	mg/L	NC	30		
9834523	Phenols	2020/04/29	94	80 - 120	102	80 - 120	<0.0015	mg/L	7.0	20		
9834540	Benzene	2020/04/30	113	50 - 140	112	60 - 130	<0.40	ug/L	NC	30		
9834540	Ethylbenzene	2020/04/30	107	50 - 140	108	60 - 130	<0.40	ug/L	NC	30		
9834540	F1 (C6-C10)	2020/04/30	105	60 - 140	105	60 - 140	<100	ug/L	NC	30		
9834540	m & p-Xylene	2020/04/30	107	50 - 140	107	60 - 130	<0.80	ug/L	NC	30		
9834540	o-Xylene	2020/04/30	103	50 - 140	105	60 - 130	<0.40	ug/L	NC	30		
9834540	Toluene	2020/04/30	106	50 - 140	107	60 - 130	<0.40	ug/L	NC	30		
9835270	Dissolved Barium (Ba)	2020/04/29	97	80 - 120	103	80 - 120	<0.010	mg/L				
9835270	Dissolved Boron (B)	2020/04/29	95	80 - 120	102	80 - 120	<0.020	mg/L				
9835270	Dissolved Calcium (Ca)	2020/04/29	95	80 - 120	102	80 - 120	<0.30	mg/L				
9835270	Dissolved Magnesium (Mg)	2020/04/29	94	80 - 120	105	80 - 120	<0.20	mg/L				
9835270	Dissolved Manganese (Mn)	2020/04/29	97	80 - 120	103	80 - 120	<0.0040	mg/L	0.56	20		
9835270	Dissolved Phosphorus (P)	2020/04/29	106	80 - 120	103	80 - 120	<0.10	mg/L				
9835270	Dissolved Potassium (K)	2020/04/29	97	80 - 120	100	80 - 120	<0.30	mg/L				
9835270	Dissolved Sodium (Na)	2020/04/29	NC	80 - 120	100	80 - 120	<0.50	mg/L				
9835324	Dissolved Nitrate (N)	2020/04/29	107	80 - 120	102	80 - 120	<0.010	mg/L	13	20		
9835324	Dissolved Nitrite (N)	2020/04/29	103	80 - 120	98	80 - 120	<0.010	mg/L	NC	20		
9835499	Bicarbonate (HCO3)	2020/04/29					<1.0	mg/L	1.4	20		
9835499	Carbonate (CO3)	2020/04/29					<1.0	mg/L	NC	20		
9835504	pH	2020/04/29			100	97 - 103			1.5	N/A		
9835512	Conductivity	2020/04/29			100	90 - 110	<2.0	uS/cm	0.25	10		
9835585	Bicarbonate (HCO3)	2020/04/30					<1.0	mg/L	0.39	20		
9835585	Carbonate (CO3)	2020/04/30					<1.0	mg/L	NC	20		
9835590	Dissolved Organic Carbon (C)	2020/04/30	NC	80 - 120	88	80 - 120	<0.50	mg/L	6.2	20		
9836078	Chemical Oxygen Demand	2020/04/30	104	80 - 120	102	80 - 120	<10	mg/L	6.9	20		
9836601	Dissolved Aluminum (Al)	2020/04/30	NC	80 - 120	102	80 - 120	<0.0030	mg/L	0.88	20		

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BV Labs Job #: C028384
Report Date: 2020/05/06

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9836601	Dissolved Antimony (Sb)	2020/04/30	90	80 - 120	103	80 - 120	<0.00060	mg/L	NC	20		
9836601	Dissolved Arsenic (As)	2020/04/30	89	80 - 120	103	80 - 120	<0.00020	mg/L	14	20		
9836601	Dissolved Cobalt (Co)	2020/04/30	90	80 - 120	100	80 - 120	<0.00030	mg/L	0.39	20		
9836601	Dissolved Copper (Cu)	2020/04/30	87	80 - 120	99	80 - 120	<0.00020	mg/L	0.93	20		
9836601	Dissolved Lead (Pb)	2020/04/30	88	80 - 120	99	80 - 120	<0.00020	mg/L	NC	20		
9836601	Dissolved Molybdenum (Mo)	2020/04/30	92	80 - 120	102	80 - 120	<0.00020	mg/L	13	20		
9836601	Dissolved Nickel (Ni)	2020/04/30	88	80 - 120	102	80 - 120	<0.00050	mg/L	4.1	20		
9836601	Dissolved Selenium (Se)	2020/04/30	93	80 - 120	103	80 - 120	<0.00020	mg/L	NC	20		
9836601	Dissolved Silver (Ag)	2020/04/30	82	80 - 120	99	80 - 120	<0.00010	mg/L	NC	20		
9836601	Dissolved Thallium (Tl)	2020/04/30	87	80 - 120	99	80 - 120	<0.00020	mg/L	NC	20		
9836601	Dissolved Tin (Sn)	2020/04/30	93	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
9836601	Dissolved Uranium (U)	2020/04/30	89	80 - 120	99	80 - 120	<0.00010	mg/L	17	20		
9836601	Dissolved Zinc (Zn)	2020/04/30	84	80 - 120	100	80 - 120	<0.0030	mg/L	9.8	20		
9837122	Total Ammonia (N)	2020/05/01	95	80 - 120	100	80 - 120	<0.015	mg/L	2.1	20		
9837149	Total Ammonia (N)	2020/04/30	123 (1)	80 - 120	101	80 - 120	<0.015	mg/L	0.28	20		
9837314	Total Dissolved Solids	2020/05/01	NC	80 - 120	94	80 - 120	<10	mg/L	0.99	20		
9837315	Total Dissolved Solids	2020/05/01	90	80 - 120	98	80 - 120	<10	mg/L	1.4	20		
9837859	pH	2020/05/01			99	97 - 103			0.93	N/A		
9837941	Total Total Kjeldahl Nitrogen	2020/05/01	NC	80 - 120	98	80 - 120	<0.050	mg/L	0.43	20	86	80 - 120
9838099	Dissolved Nitrate (N)	2020/05/01	104	80 - 120	101	80 - 120	<0.010	mg/L	0.021	20		
9838099	Dissolved Nitrite (N)	2020/05/01	102	80 - 120	99	80 - 120	<0.010	mg/L	NC	20		
9838264	Dissolved Chloride (Cl)	2020/05/02	NC	80 - 120	110	80 - 120	<1.0	mg/L	10 (2)	20		
9838264	Dissolved Sulphate (SO4)	2020/05/02	NC	80 - 120	110	80 - 120	<1.0	mg/L				
9838347	Chemical Oxygen Demand	2020/05/02	104	80 - 120	104	80 - 120	<10	mg/L	10	20		
9838378	Total Suspended Solids	2020/05/02	99	80 - 120	90	80 - 120	<1.0	mg/L	6.1	20		
9838518	Dissolved Chloride (Cl)	2020/05/02	NC	80 - 120	108	80 - 120	<1.0	mg/L	1.4	20		
9838518	Dissolved Sulphate (SO4)	2020/05/02	NC	80 - 120	93	80 - 120	<1.0	mg/L	1.2 (2)	20		
9838959	Conductivity	2020/05/03			100	90 - 110	<1.0	uS/cm	0.040	20		
9839014	Total Total Kjeldahl Nitrogen	2020/05/05	NC	80 - 120	101	80 - 120	<0.050	mg/L	0.56	20	99	80 - 120
9839238	Chemical Oxygen Demand	2020/05/04	NC	80 - 120	102	80 - 120	<10	mg/L	0.92	20		
9839545	Total Chromium (Cr)	2020/05/04	96	80 - 120	102	80 - 120	<0.010	mg/L				

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BV Labs Job #: C028384
Report Date: 2020/05/06

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9839545	Total Phosphorus (P)	2020/05/04	103	80 - 120	101	80 - 120	<0.10	mg/L	8.3	20		
9841065	Total Mercury (Hg)	2020/05/05	96	80 - 120	99	80 - 120	<0.0019	ug/L	NC	20		
9841434	Dissolved Hex. Chromium (Cr 6+)	2020/05/05	3.4 (1)	80 - 120	106	80 - 120	<0.00099	mg/L	NC	20		
9841435	Dissolved Hex. Chromium (Cr 6+)	2020/05/05	95	80 - 120	104	80 - 120	<0.00099	mg/L	1.1	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C028384
Report Date: 2020/05/06

CLEAN HARBORS
Client Project #: 4.4-A; PRIMARY LEACHATE QTR 2
Your P.O. #: 207708RY
Sampler Initials: MN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Harry (Peng) Liang, Senior Analyst

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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Bureau Veritas Laboratories Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Your P.O. #: 209256RY
Your Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your C.O.C. #: 1 OF 1

Attention: STAN YUHA

CLEAN HARBORS
P.O. BOX 390
50114 Range Rd 173
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/07/08
Report #: R2900309
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C045482
Received: 2020/07/02, 06:00

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	N/A	2020/07/03	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	1	N/A	2020/07/05	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	1	N/A	2020/07/06		Auto Calc
Cadmium - low level CCME - Dissolved	1	N/A	2020/07/05		Auto Calc
Chloride/Sulphate by Auto Colourimetry	1	N/A	2020/07/07	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
COD by Colorimeter	1	N/A	2020/07/06	AB SOP-00016	SM 23 5220D m
Dissolved Hexavalent Chromium	1	N/A	2020/07/07	AB SOP-00063	SM 23 3500-Cr B m
Carbon (DOC) (1)	1	N/A	2020/07/07	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	1	N/A	2020/07/03	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (2)	1	2020/07/06	2020/07/07	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Mercury (Total) by CV	1	2020/07/07	2020/07/07	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	1	N/A	2020/07/06	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	1	2020/07/07	2020/07/07	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Dissolved (3)	1	N/A	2020/07/05	AB SOP-00043	EPA 6020b R2 m
Ammonia-N (Total)	1	N/A	2020/07/08	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate and Nitrite	1	N/A	2020/07/06		Auto Calc
Nitrate + Nitrite-N (calculated)	1	N/A	2020/07/06		Auto Calc
Nitrogen (Nitrite - Nitrate) by IC	1	N/A	2020/07/04	AB SOP-00023	SM 23 4110 B m
pH @25°C (4)	1	N/A	2020/07/03	AB SOP-00005	SM 23 4500-H+B m
Phenols (4-AAP)	1	N/A	2020/07/03	AB SOP-00088	EPA 9066 R0 m
Total Dissolved Solids (Filt. Residue)	1	2020/07/06	2020/07/06	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen	1	2020/07/06	2020/07/07	AB SOP-00008	EPA 351.1 R1978 m
Total Suspended Solids (NFR)	1	2020/07/06	2020/07/06	AB SOP-00061	SM 23 2540 D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using

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Your P.O. #: 209256RY
Your Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your C.O.C. #: 1 OF 1

Attention: STAN YUHA

CLEAN HARBORS
P.O. BOX 390
50114 Range Rd 173
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/07/08
Report #: R2900309
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C045482
Received: 2020/07/02, 06:00

accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
08 Jul 2020 16:45:59

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bvlabs.com
Phone# (403) 291-3077
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BV Labs Job #: C045482
Report Date: 2020/07/08

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your P.O. #: 209256RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YA1771		
Sampling Date		2020/06/30 09:00		
COC Number		1 OF 1		
	UNITS	**PRIMARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Calculated Parameters				
Dissolved Nitrate (NO3)	mg/L	<0.44	0.44	9908493
Nitrate plus Nitrite (N)	mg/L	<0.14	0.14	9908502
Dissolved Nitrite (NO2)	mg/L	<0.33	0.33	9908493
Demand Parameters				
Chemical Oxygen Demand	mg/L	10900	200	9911179
Misc. Inorganics				
Conductivity	uS/cm	41000	2.0	9909925
Dissolved Organic Carbon (C)	mg/L	3100 (1)	500	9911385
pH	pH	8.54	N/A	9909919
Total Dissolved Solids	mg/L	>20000 (2)	25	9910885
Total Suspended Solids	mg/L	7.8	1.0	9911834
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	6.5	0.20	9908413
Anions				
Bicarbonate (HCO3)	mg/L	16000	10	9909916
Carbonate (CO3)	mg/L	970	10	9909916
Dissolved Chloride (Cl)	mg/L	6600 (3)	50	9912792
Dissolved Sulphate (SO4)	mg/L	1300 (4)	10	9912792
Metals				
Dissolved Hex. Chromium (Cr 6+)	mg/L	0.092 (4)	0.0099	9912836
Nutrients				
Total Ammonia (N)	mg/L	910 (3)	15	9914126
Total Total Kjeldahl Nitrogen	mg/L	920 (4)	25	9911425

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to sample matrix.
(2) Detection limit raised based on sample volume used for analysis.
Sample exceeds operating range of this method.
(3) Detection limits raised due to dilution to bring analyte within the calibrated range.
(4) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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BV Labs Job #: C045482
Report Date: 2020/07/08

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your P.O. #: 209256RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YA1771		
Sampling Date		2020/06/30 09:00		
COC Number		1 OF 1		
	UNITS	**PRIMARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Dissolved Nitrite (N)	mg/L	<0.10 (1)	0.10	9910487
Dissolved Nitrate (N)	mg/L	<0.10 (1)	0.10	9910487
Misc. Organics				
Phenols	mg/L	7.2 (1)	0.15	9909750

RDL = Reportable Detection Limit
(1) Detection limits raised due to sample matrix.

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BV Labs Job #: C045482
Report Date: 2020/07/08

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your P.O. #: 209256RY
Sampler Initials: MN

PETROLEUM HYDROCARBONS (CCME)

BV Labs ID		YA1771		
Sampling Date		2020/06/30 09:00		
COC Number		1 OF 1		
	UNITS	**PRIMARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/L	1.6	0.10	9909299
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	112		9909299
RDL = Reportable Detection Limit				

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BV Labs Job #: C045482
Report Date: 2020/07/08

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your P.O. #: 209256RY
Sampler Initials: MN

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		YA1771		
Sampling Date		2020/06/30 09:00		
COC Number		1 OF 1		
	UNITS	**PRIMARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Elements				
Total Mercury (Hg)	ug/L	<0.19 (1)	0.19	9912878

RDL = Reportable Detection Limit
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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BV Labs Job #: C045482
Report Date: 2020/07/08

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your P.O. #: 209256RY
Sampler Initials: MN

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		YA1771		
Sampling Date		2020/06/30 09:00		
COC Number		1 OF 1		
	UNITS	**PRIMARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Elements				
Dissolved Aluminum (Al)	mg/L	0.17	0.030	9910429
Dissolved Antimony (Sb)	mg/L	0.12	0.0060	9910429
Dissolved Arsenic (As)	mg/L	0.11	0.0020	9910429
Dissolved Barium (Ba)	mg/L	<1.0	1.0	9911511
Dissolved Boron (B)	mg/L	65	2.0	9911511
Dissolved Calcium (Ca)	mg/L	<30	30	9911511
Total Chromium (Cr)	mg/L	<1.0	1.0	9913038
Dissolved Cobalt (Co)	mg/L	0.0064	0.0030	9910429
Dissolved Copper (Cu)	mg/L	0.013	0.0020	9910429
Dissolved Lead (Pb)	mg/L	<0.0020	0.0020	9910429
Dissolved Magnesium (Mg)	mg/L	290	20	9911511
Dissolved Manganese (Mn)	mg/L	0.85	0.40	9911511
Dissolved Molybdenum (Mo)	mg/L	44	0.0020	9910429
Dissolved Nickel (Ni)	mg/L	0.23	0.0050	9910429
Dissolved Phosphorus (P)	mg/L	<10	10	9911511
Total Phosphorus (P)	mg/L	<10	10	9913038
Dissolved Potassium (K)	mg/L	1400	30	9911511
Dissolved Selenium (Se)	mg/L	0.28	0.0020	9910429
Dissolved Silver (Ag)	mg/L	<0.0010	0.0010	9910429
Dissolved Sodium (Na)	mg/L	9200	50	9911511
Dissolved Thallium (Tl)	mg/L	<0.0020	0.0020	9910429
Dissolved Tin (Sn)	mg/L	<0.010	0.010	9910429
Dissolved Uranium (U)	mg/L	0.0013	0.0010	9910429
Dissolved Zinc (Zn)	mg/L	0.033	0.030	9910429
RDL = Reportable Detection Limit				

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BV Labs Job #: C045482
Report Date: 2020/07/08

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your P.O. #: 209256RY
Sampler Initials: MN

VOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		YA1771		
Sampling Date		2020/06/30 09:00		
COC Number		1 OF 1		
	UNITS	**PRIMARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Volatiles				
Benzene	ug/L	74	0.40	9909921
Toluene	ug/L	6.2	0.40	9909921
Ethylbenzene	ug/L	0.53	0.40	9909921
m & p-Xylene	ug/L	2.0	0.80	9909921
o-Xylene	ug/L	2.2	0.40	9909921
Xylenes (Total)	ug/L	4.2	0.89	9908523
F1 (C6-C10) - BTEX	ug/L	510	100	9908523
F1 (C6-C10)	ug/L	590	100	9909921
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	99		9909921
4-Bromofluorobenzene (sur.)	%	104		9909921
D4-1,2-Dichloroethane (sur.)	%	92		9909921
RDL = Reportable Detection Limit				

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BV Labs Job #: C045482
Report Date: 2020/07/08

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your P.O. #: 209256RY
Sampler Initials: MN

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.3°C

Sample YA1771 [PRIMARY LEACHATE CELL 2] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments

Sample YA1771 [PRIMARY LEACHATE CELL 2] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample YA1771 [PRIMARY LEACHATE CELL 2] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YA1771 [PRIMARY LEACHATE CELL 2] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

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BV Labs Job #: C045482
Report Date: 2020/07/08

QUALITY ASSURANCE REPORT

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your P.O. #: 209256RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9909299	O-TERPHENYL (sur.)	2020/07/07	107	60 - 140	99	60 - 140	102	%				
9909921	1,4-Difluorobenzene (sur.)	2020/07/05	104	50 - 140	104	50 - 140	104	%				
9909921	4-Bromofluorobenzene (sur.)	2020/07/05	99	50 - 140	100	50 - 140	102	%				
9909921	D4-1,2-Dichloroethane (sur.)	2020/07/05	121	50 - 140	121	50 - 140	113	%				
9909299	F2 (C10-C16 Hydrocarbons)	2020/07/07	99	60 - 140	93	60 - 140	<0.10	mg/L	4.7	30		
9909750	Phenols	2020/07/03	98	80 - 120	98	80 - 120	<0.0015	mg/L	NC	20		
9909916	Bicarbonate (HCO3)	2020/07/03					<1.0	mg/L	9.0	20		
9909916	Carbonate (CO3)	2020/07/03					<1.0	mg/L	NC	20		
9909919	pH	2020/07/03			100	97 - 103			1.9	N/A		
9909921	Benzene	2020/07/05	94	50 - 140	93	60 - 130	<0.40	ug/L	NC	30		
9909921	Ethylbenzene	2020/07/05	84	50 - 140	83	60 - 130	<0.40	ug/L	NC	30		
9909921	F1 (C6-C10)	2020/07/05	83	60 - 140	89	60 - 140	<100	ug/L	NC	30		
9909921	m & p-Xylene	2020/07/05	80	50 - 140	79	60 - 130	<0.80	ug/L	NC	30		
9909921	o-Xylene	2020/07/05	79	50 - 140	78	60 - 130	<0.40	ug/L	NC	30		
9909921	Toluene	2020/07/05	86	50 - 140	85	60 - 130	<0.40	ug/L	NC	30		
9909925	Conductivity	2020/07/03			97	90 - 110	<2.0	uS/cm	0.44	10		
9910429	Dissolved Aluminum (Al)	2020/07/04	107	80 - 120	105	80 - 120	<0.0030	mg/L	NC	20		
9910429	Dissolved Antimony (Sb)	2020/07/04	106	80 - 120	104	80 - 120	<0.00060	mg/L	NC	20		
9910429	Dissolved Arsenic (As)	2020/07/04	95	80 - 120	96	80 - 120	<0.00020	mg/L	11	20		
9910429	Dissolved Cobalt (Co)	2020/07/04	94	80 - 120	96	80 - 120	<0.00030	mg/L	15	20		
9910429	Dissolved Copper (Cu)	2020/07/04	95	80 - 120	96	80 - 120	<0.00020	mg/L	10	20		
9910429	Dissolved Lead (Pb)	2020/07/04	98	80 - 120	97	80 - 120	<0.00020	mg/L	NC	20		
9910429	Dissolved Molybdenum (Mo)	2020/07/04	106	80 - 120	100	80 - 120	<0.00020	mg/L	7.4	20		
9910429	Dissolved Nickel (Ni)	2020/07/04	92	80 - 120	94	80 - 120	<0.00050	mg/L	NC	20		
9910429	Dissolved Selenium (Se)	2020/07/04	97	80 - 120	97	80 - 120	<0.00020	mg/L	NC	20		
9910429	Dissolved Silver (Ag)	2020/07/04	99	80 - 120	95	80 - 120	<0.00010	mg/L	NC	20		
9910429	Dissolved Thallium (Tl)	2020/07/04	97	80 - 120	95	80 - 120	<0.00020	mg/L	NC	20		
9910429	Dissolved Tin (Sn)	2020/07/04	107	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20		
9910429	Dissolved Uranium (U)	2020/07/04	99	80 - 120	95	80 - 120	<0.00010	mg/L	14	20		
9910429	Dissolved Zinc (Zn)	2020/07/04	99	80 - 120	100	80 - 120	<0.0030	mg/L	15	20		
9910487	Dissolved Nitrate (N)	2020/07/04	103	80 - 120	102	80 - 120	<0.010	mg/L	0.92	20		

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BV Labs Job #: C045482
Report Date: 2020/07/08

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your P.O. #: 209256RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9910487	Dissolved Nitrite (N)	2020/07/04	103	80 - 120	103	80 - 120	<0.010	mg/L	NC	20		
9910885	Total Dissolved Solids	2020/07/06	NC	80 - 120	95	80 - 120	<10	mg/L	2.3	20		
9911179	Chemical Oxygen Demand	2020/07/06	97	80 - 120	103	80 - 120	<10	mg/L	NC	20		
9911385	Dissolved Organic Carbon (C)	2020/07/07	100	80 - 120	106	80 - 120	<0.50	mg/L	2.9	20		
9911425	Total Total Kjeldahl Nitrogen	2020/07/07	NC	80 - 120	100	80 - 120	<0.050	mg/L	4.3	20	98	80 - 120
9911511	Dissolved Barium (Ba)	2020/07/06	95	80 - 120	97	80 - 120	<0.010	mg/L				
9911511	Dissolved Boron (B)	2020/07/06	97	80 - 120	98	80 - 120	<0.020	mg/L				
9911511	Dissolved Calcium (Ca)	2020/07/06	96	80 - 120	97	80 - 120	<0.30	mg/L	NC	20		
9911511	Dissolved Magnesium (Mg)	2020/07/06	100	80 - 120	101	80 - 120	<0.20	mg/L	NC	20		
9911511	Dissolved Manganese (Mn)	2020/07/06	97	80 - 120	99	80 - 120	<0.0040	mg/L	NC	20		
9911511	Dissolved Phosphorus (P)	2020/07/06	99	80 - 120	99	80 - 120	<0.10	mg/L				
9911511	Dissolved Potassium (K)	2020/07/06	96	80 - 120	97	80 - 120	<0.30	mg/L	NC	20		
9911511	Dissolved Sodium (Na)	2020/07/06	94	80 - 120	97	80 - 120	<0.50	mg/L	NC	20		
9911834	Total Suspended Solids	2020/07/06	100	80 - 120	97	80 - 120	<1.0	mg/L	17	20		
9912792	Dissolved Chloride (Cl)	2020/07/07	102	80 - 120	105	80 - 120	<1.0	mg/L	11	20		
9912792	Dissolved Sulphate (SO4)	2020/07/07	NC	80 - 120	106	80 - 120	<1.0	mg/L				
9912836	Dissolved Hex. Chromium (Cr 6+)	2020/07/07	97	80 - 120	92	80 - 120	<0.00099	mg/L	NC	20		
9912878	Total Mercury (Hg)	2020/07/07	87	80 - 120	92	80 - 120	<0.0019	ug/L	9.3	20		
9913038	Total Chromium (Cr)	2020/07/07	93	80 - 120	93	80 - 120	<0.010	mg/L				
9913038	Total Phosphorus (P)	2020/07/07	96	80 - 120	95	80 - 120	<0.10	mg/L	NC	20		

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BV Labs Job #: C045482
Report Date: 2020/07/08

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your P.O. #: 209256RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9914126	Total Ammonia (N)	2020/07/08	NC	80 - 120	112	80 - 120	<0.015	mg/L	1.3 (1)	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C045482
Report Date: 2020/07/08

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 2
Site Location: RYLEY,AB
Your P.O. #: 209256RY
Sampler Initials: MN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Harry (Peng) Liang, Senior Analyst

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Appendix D

Primary Leachate Analyses

Quarter 3

Your P.O. #: 211002RY
Your Project #: PRIMARY LEACHATE QTR 3
Your C.O.C. #: 1 of 1

Attention: JORGE MENDOZA

CLEAN HARBORS
P.O. BOX 390
50114 Range Rd 173
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/09/24
Report #: R2933083
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C066787
Received: 2020/09/15, 14:13

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	8	N/A	2020/09/18	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID (1)	1	N/A	2020/09/18	AB SOP-00039	CCME CWS/EPA 8260d m
BTEX/F1 in Water by HS GC/MS/FID (1)	7	N/A	2020/09/19	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	8	N/A	2020/09/19		Auto Calc
Cadmium - low level CCME - Dissolved (1)	8	N/A	2020/09/22		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	8	N/A	2020/09/22	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
COD by Colorimeter (1)	1	N/A	2020/09/19	AB SOP-00016	SM 23 5220D m
COD by Colorimeter (1)	7	N/A	2020/09/21	AB SOP-00016	SM 23 5220D m
Dissolved Hexavalent Chromium (1)	8	N/A	2020/09/22	AB SOP-00063	SM 23 3500-Cr B m
Carbon (DOC) (1, 2)	8	N/A	2020/09/21	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	8	N/A	2020/09/19	AB SOP-00004	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 3)	1	2020/09/17	2020/09/18	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 3)	5	2020/09/17	2020/09/19	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 3)	2	2020/09/17	2020/09/20	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Mercury (Total) by CV (1)	4	2020/09/22	2020/09/22	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV (1)	4	2020/09/22	2020/09/23	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 4)	8	N/A	2020/09/21	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	2	2020/09/23	2020/09/23	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	6	2020/09/23	2020/09/24	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (1, 4)	8	N/A	2020/09/19	AB SOP-00043	EPA 6020b R2 m
Ammonia-N (Total) (1)	8	N/A	2020/09/17	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrogen (Nitrite - Nitrate) by IC (1)	8	N/A	2020/09/18	AB SOP-00023	SM 23 4110 B m
Phenols (4-AAP) (1)	8	N/A	2020/09/21	AB SOP-00088	EPA 9066 R0 m
pH @25C (1, 5)	8	N/A	2020/09/18	AB SOP-00006	SM 23 4500 H+B m
Total Dissolved Solids (Filt. Residue) (1)	8	2020/09/20	2020/09/20	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen (1)	8	2020/09/23	2020/09/24	AB SOP-00008	EPA 351.1 R1978 m

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Your P.O. #: 211002RY
Your Project #: PRIMARY LEACHATE QTR 3
Your C.O.C. #: 1 of 1

Attention: JORGE MENDOZA

CLEAN HARBORS
P.O. BOX 390
50114 Range Rd 173
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/09/24
Report #: R2933083
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C066787
Received: 2020/09/15, 14:13

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Suspended Solids (NFR) (1)	8	2020/09/21	2020/09/21	AB SOP-00061	SM 23 2540 D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by BV Labs Calgary Environmental
(2) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(3) Silica gel clean up employed.
(4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

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Your P.O. #: 211002RY
Your Project #: PRIMARY LEACHATE QTR 3
Your C.O.C. #: 1 of 1

Attention: JORGE MENDOZA

CLEAN HARBORS
P.O. BOX 390
50114 Range Rd 173
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/09/24
Report #: R2933083
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C066787
Received: 2020/09/15, 14:13

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
24 Sep 2020 14:54:12

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Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bvlabs.com
Phone# (780) 577-7100
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Bureau Veritas Laboratories Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

BV Labs Job #: C066787
Report Date: 2020/09/24

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		YL4265	YL4266	YL4267	YL4268		
Sampling Date		2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00		
COC Number		1 of 1	1 of 1	1 of 1	1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 1 (PC1)**	**PRIMARY LEACHATE CELL 2 (PC2)**	**PRIMARY LEACHATE CELL 3A (PC3A)**	**PRIMARY LEACHATE CELL 3B (PC3B)**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/L	3.0	1.7	2.4	2.1	0.10	A003348
Volatiles							
Benzene	ug/L	19	66	260	15	0.40	A005223
Toluene	ug/L	150	11	43	15	0.40	A005223
Ethylbenzene	ug/L	0.73	0.60	5.2	1.5	0.40	A005223
m & p-Xylene	ug/L	2.6	2.9	16	4.7	0.80	A005223
o-Xylene	ug/L	1.2	3.1	9.3	3.4	0.40	A005223
Xylenes (Total)	ug/L	3.9	6.1	25	8.1	0.89	A001829
F1 (C6-C10) - BTEX	ug/L	<100	460	300	1200	100	A001829
F1 (C6-C10)	ug/L	220	550	630	1200	100	A005223
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	105	97	92	100		A005223
4-Bromofluorobenzene (sur.)	%	103	104	104	103		A005223
D4-1,2-Dichloroethane (sur.)	%	101	87	98	98		A005223
O-TERPHENYL (sur.)	%	108	104	106	104		A003348
RDL = Reportable Detection Limit							

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BV Labs Job #: C066787
Report Date: 2020/09/24

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		YL4269	YL4270	YL4271	YL4272		
Sampling Date		2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00		
COC Number		1 of 1	1 of 1	1 of 1	1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 3C (PC3C)**	**PRIMARY LEACHATE CELL 3D (PC3D)**	**PRIMARY LEACHATE CELL 3E (PC3E)**	**PRIMARY LEACHATE CELL 4 (PC4)**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/L	2.8	1.9	1.8	20	0.10	A003348
Volatiles							
Benzene	ug/L	28	19	42	69	0.40	A005223
Toluene	ug/L	410	27	19	190	0.40	A005223
Ethylbenzene	ug/L	140	2.6	4.0	6.2	0.40	A005223
m & p-Xylene	ug/L	530	8.6	4.3	18	0.80	A005223
o-Xylene	ug/L	210	5.5	3.1	10	0.40	A005223
Xylenes (Total)	ug/L	740	14	7.4	28	0.89	A001829
F1 (C6-C10) - BTEX	ug/L	810	420	<100	700	100	A001829
F1 (C6-C10)	ug/L	2100	480	110	990	100	A005223
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	104	100	101	106		A005223
4-Bromofluorobenzene (sur.)	%	100	102	101	100		A005223
D4-1,2-Dichloroethane (sur.)	%	100	98	97	105		A005223
O-TERPHENYL (sur.)	%	106	110	101	118		A003348
RDL = Reportable Detection Limit							

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BV Labs Job #: C066787
Report Date: 2020/09/24

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		YL4265		YL4266		YL4267		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00		2020/09/14 11:00		
COC Number		1 of 1		1 of 1		1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 1 (PC1)**	**RDL**	**PRIMARY LEACHATE CELL 2 (PC2)**	**RDL**	**PRIMARY LEACHATE CELL 3A (PC3A)**	**RDL**	**QC Batch**
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	0.11	0.020	2.1	0.080	0.080	0.020	A001832
Elements								
Dissolved Aluminum (Al)	mg/L	0.12	0.0030	0.062	0.012	0.053	0.0030	A006495
Dissolved Antimony (Sb)	mg/L	0.0044	0.00060	0.0046	0.0024	0.0038	0.00060	A006495
Dissolved Arsenic (As)	mg/L	0.010	0.00020	0.034	0.00080	0.34	0.00020	A006495
Dissolved Barium (Ba)	mg/L	<0.50	0.50	1.0	0.50	1.4	0.50	A008690
Dissolved Boron (B)	mg/L	3.7	1.0	67	1.0	33	1.0	A008690
Dissolved Calcium (Ca)	mg/L	180	15	45	15	310	15	A008690
Dissolved Cobalt (Co)	mg/L	0.015	0.00030	0.0027	0.0012	0.0067	0.00030	A006495
Dissolved Copper (Cu)	mg/L	0.0056	0.00020	<0.00080	0.00080	0.0015	0.00020	A006495
Dissolved Lead (Pb)	mg/L	0.0011	0.00020	<0.00080	0.00080	<0.00020	0.00020	A006495
Dissolved Magnesium (Mg)	mg/L	86	10	340	10	370	10	A008690
Dissolved Manganese (Mn)	mg/L	4.0	0.20	1.2	0.20	2.1	0.20	A008690
Dissolved Molybdenum (Mo)	mg/L	0.64	0.00020	14	0.00080	0.14	0.00020	A006495
Dissolved Nickel (Ni)	mg/L	1.5	0.00050	0.24	0.0020	0.38	0.00050	A006495
Dissolved Phosphorus (P)	mg/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	A008690
Dissolved Potassium (K)	mg/L	100	15	1400	15	780	15	A008690
Dissolved Selenium (Se)	mg/L	0.0015	0.00020	0.019	0.00080	0.0077	0.00020	A006495
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00040	0.00040	<0.00010	0.00010	A006495
Dissolved Sodium (Na)	mg/L	670	25	8800	25	4600	25	A008690
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	0.00084	0.00080	<0.00020	0.00020	A006495
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	0.0084	0.0040	0.0016	0.0010	A006495
Dissolved Uranium (U)	mg/L	0.0073	0.00010	0.0029	0.00040	0.0013	0.00010	A006495
Dissolved Zinc (Zn)	mg/L	0.091	0.0030	0.20	0.012	0.031	0.0030	A006495
RDL = Reportable Detection Limit								

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BV Labs Job #: C066787
Report Date: 2020/09/24

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		YL4268		YL4269		YL4270		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00		2020/09/14 11:00		
COC Number		1 of 1		1 of 1		1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 3B (PC3B)**	**RDL**	**PRIMARY LEACHATE CELL 3C (PC3C)**	**RDL**	**PRIMARY LEACHATE CELL 3D (PC3D)**	**RDL**	**QC Batch**
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	5.6	0.040	0.049	0.040	0.76	0.080	A001832
Elements								
Dissolved Aluminum (Al)	mg/L	0.020	0.0060	0.026	0.0060	0.017	0.012	A006495
Dissolved Antimony (Sb)	mg/L	0.0093	0.0012	<0.0012	0.0012	<0.0024	0.0024	A006495
Dissolved Arsenic (As)	mg/L	0.13	0.00040	0.017	0.00040	0.020	0.00080	A006495
Dissolved Barium (Ba)	mg/L	0.51	0.50	<0.50	0.50	<0.50	0.50	A008690
Dissolved Boron (B)	mg/L	140	1.0	44	1.0	30	1.0	A008690
Dissolved Calcium (Ca)	mg/L	17	15	38	15	240	15	A008690
Dissolved Cobalt (Co)	mg/L	0.020	0.00060	0.0011	0.00060	0.0067	0.0012	A006495
Dissolved Copper (Cu)	mg/L	0.070	0.00040	<0.00040	0.00040	0.14	0.00080	A006495
Dissolved Lead (Pb)	mg/L	0.0069	0.00040	<0.00040	0.00040	0.0014	0.00080	A006495
Dissolved Magnesium (Mg)	mg/L	63	10	95	10	210	10	A008690
Dissolved Manganese (Mn)	mg/L	0.81	0.20	0.28	0.20	2.3	0.20	A008690
Dissolved Molybdenum (Mo)	mg/L	39 (1)	0.0040	0.11	0.00040	4.8	0.00080	A006495
Dissolved Nickel (Ni)	mg/L	1.2	0.0010	0.29	0.0010	4.0	0.0020	A006495
Dissolved Phosphorus (P)	mg/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	A008690
Dissolved Potassium (K)	mg/L	2700	15	410	15	500	15	A008690
Dissolved Selenium (Se)	mg/L	0.078	0.00040	0.010	0.00040	0.012	0.00080	A006495
Dissolved Silver (Ag)	mg/L	0.00047	0.00020	<0.00020	0.00020	<0.00040	0.00040	A006495
Dissolved Sodium (Na)	mg/L	7800	25	2200	25	3200	25	A008690
Dissolved Thallium (Tl)	mg/L	<0.00040	0.00040	<0.00040	0.00040	<0.00080	0.00080	A006495
Dissolved Tin (Sn)	mg/L	0.015	0.0020	<0.0020	0.0020	0.0049	0.0040	A006495
Dissolved Uranium (U)	mg/L	0.0021	0.00020	0.0053	0.00020	0.0044	0.00040	A006495
Dissolved Zinc (Zn)	mg/L	0.11	0.0060	0.070	0.0060	0.069	0.012	A006495

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C066787
Report Date: 2020/09/24

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		YL4271		YL4272		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00		
COC Number		1 of 1		1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 3E (PC3E)**	**RDL**	**PRIMARY LEACHATE CELL 4 (PC4)**	**RDL**	**QC Batch**
Low Level Elements						
Dissolved Cadmium (Cd)	ug/L	0.11	0.040	0.046	0.020	A001832
Elements						
Dissolved Aluminum (Al)	mg/L	0.0071	0.0060	0.076	0.0030	A006495
Dissolved Antimony (Sb)	mg/L	<0.0012	0.0012	<0.00060	0.00060	A006495
Dissolved Arsenic (As)	mg/L	0.010	0.00040	0.0061	0.00020	A006495
Dissolved Barium (Ba)	mg/L	<0.50	0.50	<0.50	0.50	A008690
Dissolved Boron (B)	mg/L	5.9	1.0	16	1.0	A008690
Dissolved Calcium (Ca)	mg/L	82	15	490	15	A008690
Dissolved Cobalt (Co)	mg/L	0.0066	0.00060	0.018	0.00030	A006495
Dissolved Copper (Cu)	mg/L	0.0067	0.00040	0.00032	0.00020	A006495
Dissolved Lead (Pb)	mg/L	<0.00040	0.00040	<0.00020	0.00020	A006495
Dissolved Magnesium (Mg)	mg/L	200	10	140	10	A008690
Dissolved Manganese (Mn)	mg/L	0.66	0.20	7.6	0.20	A008690
Dissolved Molybdenum (Mo)	mg/L	0.55	0.00040	0.13	0.00020	A006495
Dissolved Nickel (Ni)	mg/L	0.61	0.0010	0.26	0.00050	A006495
Dissolved Phosphorus (P)	mg/L	<5.0	5.0	<5.0	5.0	A008690
Dissolved Potassium (K)	mg/L	230	15	150	15	A008690
Dissolved Selenium (Se)	mg/L	0.0031	0.00040	0.0080	0.00020	A006495
Dissolved Silver (Ag)	mg/L	<0.00020	0.00020	<0.00010	0.00010	A006495
Dissolved Sodium (Na)	mg/L	2300	25	1500	25	A008690
Dissolved Thallium (Tl)	mg/L	<0.00040	0.00040	<0.00020	0.00020	A006495
Dissolved Tin (Sn)	mg/L	<0.0020	0.0020	<0.0010	0.0010	A006495
Dissolved Uranium (U)	mg/L	0.0083	0.00020	0.0054	0.00010	A006495
Dissolved Zinc (Zn)	mg/L	0.0065	0.0060	0.10	0.0030	A006495
RDL = Reportable Detection Limit						

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BV Labs Job #: C066787
Report Date: 2020/09/24

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YL4265			YL4266		
Sampling Date		2020/09/14 11:00			2020/09/14 11:00		
COC Number		1 of 1			1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 1 (PC1)**	**RDL**	**QC Batch**	**PRIMARY LEACHATE CELL 2 (PC2)**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	553	10	A006713	8990 (1)	100	A007856
Misc. Inorganics							
Conductivity	uS/cm	6100	1.0	A007295	49000	1.0	A007295
Dissolved Organic Carbon (C)	mg/L	160 (2)	25	A008005	2800 (2)	250	A008005
pH	pH	7.67	N/A	A005842	8.30	N/A	A005842
Total Dissolved Solids	mg/L	3000	10	A007441	>8000 (3)	10	A007441
Total Suspended Solids	mg/L	230 (4)	3.0	A007786	2.9	1.0	A007786
Anions							
Alkalinity (PP as CaCO3)	mg/L	<10	10	A005112	520	10	A005112
Alkalinity (Total as CaCO3)	mg/L	1300	10	A005112	12000	10	A005112
Bicarbonate (HCO3)	mg/L	1600	10	A005112	14000	10	A005112
Carbonate (CO3)	mg/L	<10	10	A005112	620	10	A005112
Hydroxide (OH)	mg/L	<10	10	A005112	<10	10	A005112
Dissolved Chloride (Cl)	mg/L	540 (1)	5.0	A008999	7300 (1)	50	A008999
Dissolved Sulphate (SO4)	mg/L	620 (1)	5.0	A008999	1600 (1)	20	A008999
Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	0.014 (5)	0.0099	A004027	<0.0099 (5)	0.0099	A004027
Nutrients							
Total Ammonia (N)	mg/L	110 (1)	15	A003450	810 (1)	15	A003450
Total Total Kjeldahl Nitrogen	mg/L	160 (1)	5.0	A012122	1100 (1)	50	A012122
Dissolved Nitrite (N)	mg/L	<0.10	0.10	A003938	<0.10	0.10	A003938
Dissolved Nitrate (N)	mg/L	<0.10	0.10	A003938	<0.10	0.10	A003938
Misc. Organics							
Phenols	mg/L	0.084 (2)	0.015	A006150	6.2 (2)	0.19	A006150

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limits raised due to sample matrix.
(3) Sample exceeds operating range of this method.
(4) Detection limit raised based on sample volume used for analysis.
(5) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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BV Labs Job #: C066787
Report Date: 2020/09/24

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YL4267		YL4268		YL4269		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00		2020/09/14 11:00		
COC Number		1 of 1		1 of 1		1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 3A (PC3A)**	**RDL**	**PRIMARY LEACHATE CELL 3B (PC3B)**	**RDL**	**PRIMARY LEACHATE CELL 3C (PC3C)**	**RDL**	**QC Batch**
Demand Parameters								
Chemical Oxygen Demand	mg/L	2840 (1)	50	14300 (1)	100	2120 (1)	50	A007856
Misc. Inorganics								
Conductivity	uS/cm	34000	1.0	50000	1.0	17000	1.0	A007295
Dissolved Organic Carbon (C)	mg/L	780 (2)	25	4900 (2)	250	650 (2)	50	A008005
pH	pH	7.47	N/A	9.25	N/A	8.71	N/A	A005842
Total Dissolved Solids	mg/L	>8000 (3)	10	>8000 (3)	10	7300	10	A007441
Total Suspended Solids	mg/L	2.7	1.0	46	1.0	12	1.0	A007786
Anions								
Alkalinity (PP as CaCO3)	mg/L	<10	10	3100	10	430	10	A005112
Alkalinity (Total as CaCO3)	mg/L	6400	10	12000	10	3900	10	A005112
Bicarbonate (HCO3)	mg/L	7800	10	7000	10	3700	10	A005112
Carbonate (CO3)	mg/L	<10	10	3700	10	510	10	A005112
Hydroxide (OH)	mg/L	<10	10	<10	10	<10	10	A005112
Dissolved Chloride (Cl)	mg/L	6900 (1)	50	8200 (1)	50	2400 (1)	20	A008999
Dissolved Sulphate (SO4)	mg/L	660 (1)	5.0	1500 (1)	10	610 (1)	5.0	A008999
Metals								
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.0099 (4)	0.0099	<0.0099 (4)	0.0099	<0.0099 (4)	0.0099	A004027
Nutrients								
Total Ammonia (N)	mg/L	530 (1)	15	1600 (1)	15	670 (1)	15	A003450
Total Total Kjeldahl Nitrogen	mg/L	670 (1)	25	2100 (1)	100	700 (1)	25	A012122
Dissolved Nitrite (N)	mg/L	<0.10	0.10	<0.10	0.10	<0.010	0.010	A003938
Dissolved Nitrate (N)	mg/L	<0.10	0.10	<0.10	0.10	<0.010	0.010	A003938
Misc. Organics								
Phenols	mg/L	7.6 (2)	0.30	23 (2)	0.75	2.6 (2)	0.075	A006150

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limits raised due to sample matrix.
(3) Sample exceeds operating range of this method.
(4) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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BV Labs Job #: C066787
Report Date: 2020/09/24

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YL4270		YL4271		YL4272		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00		2020/09/14 11:00		
COC Number		1 of 1		1 of 1		1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 3D (PC3D)**	**RDL**	**PRIMARY LEACHATE CELL 3E (PC3E)**	**RDL**	**PRIMARY LEACHATE CELL 4 (PC4)**	**RDL**	**QC Batch**
Demand Parameters								
Chemical Oxygen Demand	mg/L	2940 (1)	50	1140	10	4120 (1)	100	A007856
Misc. Inorganics								
Conductivity	uS/cm	23000	1.0	17000	1.0	8600	1.0	A007295
Dissolved Organic Carbon (C)	mg/L	800 (2)	50	190 (2)	50	1200 (2)	100	A008005
pH	pH	7.83	N/A	7.98	N/A	7.31	N/A	A005842
Total Dissolved Solids	mg/L	>8000 (3)	10	7300	10	7200	10	A007441
Total Suspended Solids	mg/L	8.5	1.0	9.4	1.0	32 (4)	6.0	A007786
Anions								
Alkalinity (PP as CaCO3)	mg/L	<10	10	12	10	<10	10	A005128
Alkalinity (Total as CaCO3)	mg/L	3400	10	4100	10	2000	10	A005128
Bicarbonate (HCO3)	mg/L	4200	10	5000	10	2400	10	A005128
Carbonate (CO3)	mg/L	<10	10	14	10	<10	10	A005128
Hydroxide (OH)	mg/L	<10	10	<10	10	<10	10	A005128
Dissolved Chloride (Cl)	mg/L	4500 (1)	50	2600 (1)	20	2400 (1)	20	A008999
Dissolved Sulphate (SO4)	mg/L	310 (1)	5.0	470 (1)	5.0	610 (1)	5.0	A008999
Metals								
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.0099 (5)	0.0099	0.0053 (6)	0.00099	<0.0099 (5)	0.0099	A004027
Nutrients								
Total Ammonia (N)	mg/L	320 (1)	15	490 (1)	15	130 (1)	15	A003450
Total Total Kjeldahl Nitrogen	mg/L	410 (1)	25	700 (1)	25	270 (1)	10	A012122
Dissolved Nitrite (N)	mg/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	A003938
Dissolved Nitrate (N)	mg/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	A003938
Misc. Organics								
Phenols	mg/L	6.2 (2)	0.15	0.12 (2)	0.015	1.5 (2)	0.075	A006150

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limits raised due to sample matrix.
(3) Sample exceeds operating range of this method.
(4) Detection limit raised based on sample volume used for analysis.
(5) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
(6) Matrix spike exceeds acceptance limits due to probable matrix interference.

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BV Labs Job #: C066787
Report Date: 2020/09/24

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		YL4265	YL4266		YL4267		
Sampling Date		2020/09/14 11:00	2020/09/14 11:00		2020/09/14 11:00		
COC Number		1 of 1	1 of 1		1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 1 (PC1)**	**PRIMARY LEACHATE CELL 2 (PC2)**	**RDL**	**PRIMARY LEACHATE CELL 3A (PC3A)**	**RDL**	**QC Batch**
Elements							
Total Mercury (Hg)	ug/L	2.39 (1)	0.25 (1)	0.19	<0.019 (1)	0.019	A010260

RDL = Reportable Detection Limit
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

BV Labs ID		YL4268	YL4269	YL4270	YL4271		
Sampling Date		2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00		
COC Number		1 of 1	1 of 1	1 of 1	1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 3B (PC3B)**	**PRIMARY LEACHATE CELL 3C (PC3C)**	**PRIMARY LEACHATE CELL 3D (PC3D)**	**PRIMARY LEACHATE CELL 3E (PC3E)**	**RDL**	**QC Batch**
Elements							
Total Mercury (Hg)	ug/L	<0.19 (1)	0.32 (1)	<0.19 (1)	<0.19 (1)	0.19	A010260

RDL = Reportable Detection Limit
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

BV Labs ID		YL4272		
Sampling Date		2020/09/14 11:00		
COC Number		1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 4 (PC4)**	**RDL**	**QC Batch**
Elements				
Total Mercury (Hg)	ug/L	<0.19 (1)	0.19	A010260

RDL = Reportable Detection Limit
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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BV Labs Job #: C066787
Report Date: 2020/09/24

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		YL4265		YL4266	YL4267		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00	2020/09/14 11:00		
COC Number		1 of 1		1 of 1	1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 1 (PC1)**	**QC Batch**	**PRIMARY LEACHATE CELL 2 (PC2)**	**PRIMARY LEACHATE CELL 3A (PC3A)**	**RDL**	**QC Batch**
Elements							
Total Chromium (Cr)	mg/L	<0.20	A010412	0.38	<0.20	0.20	A012856
Total Phosphorus (P)	mg/L	4.8	A010412	6.0	5.9	2.0	A012856
RDL = Reportable Detection Limit							

BV Labs ID		YL4268		YL4269		YL4270		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00		2020/09/14 11:00		
COC Number		1 of 1		1 of 1		1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 3B (PC3B)**	**QC Batch**	**PRIMARY LEACHATE CELL 3C (PC3C)**	**QC Batch**	**PRIMARY LEACHATE CELL 3D (PC3D)**	**RDL**	**QC Batch**
Elements								
Total Chromium (Cr)	mg/L	0.49	A012856	<0.20	A010412	<0.20	0.20	A012856
Total Phosphorus (P)	mg/L	9.0	A012856	<2.0	A010412	<2.0	2.0	A012856
RDL = Reportable Detection Limit								

BV Labs ID		YL4271	YL4272		
Sampling Date		2020/09/14 11:00	2020/09/14 11:00		
COC Number		1 of 1	1 of 1		
	UNITS	**PRIMARY LEACHATE CELL 3E (PC3E)**	**PRIMARY LEACHATE CELL 4 (PC4)**	**RDL**	**QC Batch**
Elements					
Total Chromium (Cr)	mg/L	<0.20	<0.20	0.20	A012856
Total Phosphorus (P)	mg/L	<2.0	9.6	2.0	A012856
RDL = Reportable Detection Limit					

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	12.0°C
Package 2	13.3°C

Sample YL4265 [PRIMARY LEACHATE CELL 1 (PC1)] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

Sample YL4266 [PRIMARY LEACHATE CELL 2 (PC2)] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

Sample YL4267 [PRIMARY LEACHATE CELL 3A (PC3A)] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

Sample YL4268 [PRIMARY LEACHATE CELL 3B (PC3B)] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

Sample YL4269 [PRIMARY LEACHATE CELL 3C (PC3C)] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

Sample YL4270 [PRIMARY LEACHATE CELL 3D (PC3D)] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

Sample YL4271 [PRIMARY LEACHATE CELL 3E (PC3E)] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes. Dissolved Chromium < Dissolved Hexavalent Chromium. High Hexavalent result is likely due to matrix interference.

Sample YL4272 [PRIMARY LEACHATE CELL 4 (PC4)] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

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REGULATED METALS (CCME/AT1) - DISSOLVED Comments

Sample YL4265 [PRIMARY LEACHATE CELL 1 (PC1)] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Client supplied DM bottle contained particulate.
Sample YL4266 [PRIMARY LEACHATE CELL 2 (PC2)] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix. Client supplied dissolved metals bottle contained particulate.
Sample YL4266 [PRIMARY LEACHATE CELL 2 (PC2)] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Client supplied DM bottle contained particulate.
Sample YL4267 [PRIMARY LEACHATE CELL 3A (PC3A)] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Client supplied DM bottle contained particulate.
Sample YL4268 [PRIMARY LEACHATE CELL 3B (PC3B)] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample YL4268 [PRIMARY LEACHATE CELL 3B (PC3B)] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Client supplied DM bottle contained particulate.
Sample YL4269 [PRIMARY LEACHATE CELL 3C (PC3C)] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.Client supplied dissolved metals bottle contained particulate.
Sample YL4269 [PRIMARY LEACHATE CELL 3C (PC3C)] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Client supplied DM bottle contained particulate.
Sample YL4270 [PRIMARY LEACHATE CELL 3D (PC3D)] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.Client supplied dissolved metals bottle contained particulate.
Sample YL4270 [PRIMARY LEACHATE CELL 3D (PC3D)] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Client supplied DM bottle contained particulate.
Sample YL4271 [PRIMARY LEACHATE CELL 3E (PC3E)] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.Client supplied dissolved metals bottle contained particulate.
Sample YL4271 [PRIMARY LEACHATE CELL 3E (PC3E)] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Client supplied DM bottle contained particulate.
Sample YL4272 [PRIMARY LEACHATE CELL 4 (PC4)] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Client supplied DM bottle contained particulate.

RESULTS OF CHEMICAL ANALYSES OF WATER Comments

Sample YL4265 [PRIMARY LEACHATE CELL 1 (PC1)] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to sample matrix.
Sample YL4265 [PRIMARY LEACHATE CELL 1 (PC1)] Nitrogen (Nitrite - Nitrate) by IC: Detection limits raised due to matrix interference.
Sample YL4266 [PRIMARY LEACHATE CELL 2 (PC2)] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to sample matrix.
Sample YL4266 [PRIMARY LEACHATE CELL 2 (PC2)] Nitrogen (Nitrite - Nitrate) by IC: Detection limits raised due to matrix interference.
Sample YL4267 [PRIMARY LEACHATE CELL 3A (PC3A)] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to sample matrix.
Sample YL4267 [PRIMARY LEACHATE CELL 3A (PC3A)] Nitrogen (Nitrite - Nitrate) by IC: Detection limits raised due to matrix interference.
Sample YL4268 [PRIMARY LEACHATE CELL 3B (PC3B)] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to sample matrix.
Sample YL4268 [PRIMARY LEACHATE CELL 3B (PC3B)] Nitrogen (Nitrite - Nitrate) by IC: Detection limits raised due to matrix interference.
Sample YL4269 [PRIMARY LEACHATE CELL 3C (PC3C)] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to sample matrix.
Sample YL4269 [PRIMARY LEACHATE CELL 3C (PC3C)] Nitrogen (Nitrite - Nitrate) by IC: Detection limits raised due to matrix interference.
Sample YL4270 [PRIMARY LEACHATE CELL 3D (PC3D)] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to sample matrix.
Sample YL4270 [PRIMARY LEACHATE CELL 3D (PC3D)] Nitrogen (Nitrite - Nitrate) by IC: Detection limits raised due to matrix interference.
Sample YL4271 [PRIMARY LEACHATE CELL 3E (PC3E)] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to sample matrix.
Sample YL4271 [PRIMARY LEACHATE CELL 3E (PC3E)] Nitrogen (Nitrite - Nitrate) by IC: Detection limits raised due to matrix interference.
Sample YL4272 [PRIMARY LEACHATE CELL 4 (PC4)] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to sample matrix.
Sample YL4272 [PRIMARY LEACHATE CELL 4 (PC4)] Nitrogen (Nitrite - Nitrate) by IC: Detection limits raised due to matrix interference.

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments

Sample YL4265 [PRIMARY LEACHATE CELL 1 (PC1)] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL4266 [PRIMARY LEACHATE CELL 2 (PC2)] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL4267 [PRIMARY LEACHATE CELL 3A (PC3A)] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL4268 [PRIMARY LEACHATE CELL 3B (PC3B)] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL4269 [PRIMARY LEACHATE CELL 3C (PC3C)] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL4270 [PRIMARY LEACHATE CELL 3D (PC3D)] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL4271 [PRIMARY LEACHATE CELL 3E (PC3E)] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL4272 [PRIMARY LEACHATE CELL 4 (PC4)] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

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BV Labs Job #: C066787
Report Date: 2020/09/24

QUALITY ASSURANCE REPORT

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A003348	O-TERPHENYL (sur.)	2020/09/18	107	60 - 140	108	60 - 140	113	%				
A005223	1,4-Difluorobenzene (sur.)	2020/09/18	100	50 - 140	100	50 - 140	101	%				
A005223	4-Bromofluorobenzene (sur.)	2020/09/18	100	50 - 140	100	50 - 140	102	%				
A005223	D4-1,2-Dichloroethane (sur.)	2020/09/18	105	50 - 140	105	50 - 140	98	%				
A003348	F2 (C10-C16 Hydrocarbons)	2020/09/18	107	60 - 140	104	60 - 140	<0.10	mg/L	9.1	30		
A003450	Total Ammonia (N)	2020/09/17	100	80 - 120	102	80 - 120	<0.015	mg/L	NC	20		
A003938	Dissolved Nitrate (N)	2020/09/18	105	80 - 120	104	80 - 120	<0.010	mg/L	NC	20		
A003938	Dissolved Nitrite (N)	2020/09/18	94	80 - 120	103	80 - 120	<0.010	mg/L	NC	20		
A004027	Dissolved Hex. Chromium (Cr 6+)	2020/09/22	2.2 (1)	80 - 120	107	80 - 120	<0.00099	mg/L	12	20		
A005112	Alkalinity (PP as CaCO3)	2020/09/18					<1.0	mg/L	NC	20		
A005112	Alkalinity (Total as CaCO3)	2020/09/18			95	80 - 120	<1.0	mg/L	5.3	20		
A005112	Bicarbonate (HCO3)	2020/09/18					<1.0	mg/L	5.3	20		
A005112	Carbonate (CO3)	2020/09/18					<1.0	mg/L	NC	20		
A005112	Hydroxide (OH)	2020/09/18					<1.0	mg/L	NC	20		
A005128	Alkalinity (PP as CaCO3)	2020/09/18					<1.0	mg/L	NC	20		
A005128	Alkalinity (Total as CaCO3)	2020/09/18			98	80 - 120	<1.0	mg/L	2.4	20		
A005128	Bicarbonate (HCO3)	2020/09/18					<1.0	mg/L	2.4	20		
A005128	Carbonate (CO3)	2020/09/18					<1.0	mg/L	NC	20		
A005128	Hydroxide (OH)	2020/09/18					<1.0	mg/L	NC	20		
A005223	Benzene	2020/09/18	97	50 - 140	100	60 - 130	<0.40	ug/L	NC	30		
A005223	Ethylbenzene	2020/09/18	95	50 - 140	96	60 - 130	<0.40	ug/L	NC	30		
A005223	F1 (C6-C10)	2020/09/18	82	60 - 140	91	60 - 140	<100	ug/L	NC	30		
A005223	m & p-Xylene	2020/09/18	95	50 - 140	98	60 - 130	<0.80	ug/L	NC	30		
A005223	o-Xylene	2020/09/18	96	50 - 140	99	60 - 130	<0.40	ug/L	NC	30		
A005223	Toluene	2020/09/18	92	50 - 140	94	60 - 130	<0.40	ug/L	2.5	30		
A005842	pH	2020/09/18			100	97 - 103			0.48	N/A		
A006150	Phenols	2020/09/21	97	80 - 120	102	80 - 120	<0.0015	mg/L	NC	20		
A006495	Dissolved Aluminum (Al)	2020/09/19	90	80 - 120	89	80 - 120	<0.0030	mg/L	NC	20		
A006495	Dissolved Antimony (Sb)	2020/09/19	89	80 - 120	89	80 - 120	<0.00060	mg/L	NC	20		
A006495	Dissolved Arsenic (As)	2020/09/19	100	80 - 120	99	80 - 120	<0.00020	mg/L	5.6	20		
A006495	Dissolved Cobalt (Co)	2020/09/19	95	80 - 120	97	80 - 120	<0.00030	mg/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A006495	Dissolved Copper (Cu)	2020/09/19	94	80 - 120	102	80 - 120	<0.00020	mg/L	3.6	20		
A006495	Dissolved Lead (Pb)	2020/09/19	92	80 - 120	100	80 - 120	<0.00020	mg/L	NC	20		
A006495	Dissolved Molybdenum (Mo)	2020/09/19	108	80 - 120	99	80 - 120	<0.00020	mg/L	4.1	20		
A006495	Dissolved Nickel (Ni)	2020/09/19	94	80 - 120	96	80 - 120	<0.00050	mg/L	5.1	20		
A006495	Dissolved Selenium (Se)	2020/09/19	108	80 - 120	111	80 - 120	<0.00020	mg/L	8.5	20		
A006495	Dissolved Silver (Ag)	2020/09/19	93	80 - 120	96	80 - 120	<0.00010	mg/L	NC	20		
A006495	Dissolved Thallium (Tl)	2020/09/19	91	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20		
A006495	Dissolved Tin (Sn)	2020/09/19	99	80 - 120	91	80 - 120	<0.0010	mg/L	NC	20		
A006495	Dissolved Uranium (U)	2020/09/19	NC	80 - 120	99	80 - 120	<0.00010	mg/L	4.1	20		
A006495	Dissolved Zinc (Zn)	2020/09/19	89	80 - 120	96	80 - 120	<0.0030	mg/L	NC	20		
A006713	Chemical Oxygen Demand	2020/09/19	101	80 - 120	100	80 - 120	<10	mg/L	4.9	20		
A007295	Conductivity	2020/09/19			99	90 - 110	<1.0	uS/cm	2.9	20		
A007441	Total Dissolved Solids	2020/09/20	96	80 - 120	93	80 - 120	<10	mg/L	3.3	20		
A007786	Total Suspended Solids	2020/09/21	90	80 - 120	90	80 - 120	<1.0	mg/L	1.8	20		
A007856	Chemical Oxygen Demand	2020/09/21	99	80 - 120	99	80 - 120	<10	mg/L	5.7	20		
A008005	Dissolved Organic Carbon (C)	2020/09/21	NC	N/A	113	80 - 120	<0.50	mg/L	1.7	20		
A008690	Dissolved Barium (Ba)	2020/09/21	92	80 - 120	95	80 - 120	<0.010	mg/L	4.8	20		
A008690	Dissolved Boron (B)	2020/09/21	95	80 - 120	96	80 - 120	<0.020	mg/L	3.3	20		
A008690	Dissolved Calcium (Ca)	2020/09/21	NC	80 - 120	101	80 - 120	<0.30	mg/L	0.054	20		
A008690	Dissolved Magnesium (Mg)	2020/09/21	94	80 - 120	98	80 - 120	<0.20	mg/L	0.35	20		
A008690	Dissolved Manganese (Mn)	2020/09/21	96	80 - 120	100	80 - 120	<0.0040	mg/L	0.43	20		
A008690	Dissolved Phosphorus (P)	2020/09/21	100	80 - 120	99	80 - 120	<0.10	mg/L	NC	20		
A008690	Dissolved Potassium (K)	2020/09/21	103	80 - 120	103	80 - 120	<0.30	mg/L	0.080	20		
A008690	Dissolved Sodium (Na)	2020/09/21	NC	80 - 120	101	80 - 120	<0.50	mg/L	0.032	20		
A008999	Dissolved Chloride (Cl)	2020/09/22	114	80 - 120	114	80 - 120	<1.0	mg/L	2.1	20		
A008999	Dissolved Sulphate (SO4)	2020/09/21	111	80 - 120	107	80 - 120	<1.0	mg/L				
A010260	Total Mercury (Hg)	2020/09/22	95	80 - 120	99	80 - 120	<0.0019	ug/L	NC	20		
A010412	Total Chromium (Cr)	2020/09/23	93	80 - 120	89	80 - 120	<0.010	mg/L				
A010412	Total Phosphorus (P)	2020/09/23	100	80 - 120	96	80 - 120	<0.10	mg/L	0.76	20		
A012122	Total Total Kjeldahl Nitrogen	2020/09/24	NC	80 - 120	98	80 - 120	<0.050	mg/L	14	20	84	80 - 120
A012856	Total Chromium (Cr)	2020/09/24	102	80 - 120	99	80 - 120	<0.010	mg/L				

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QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A012856	Total Phosphorus (P)	2020/09/24	98	80 - 120	96	80 - 120	<0.10	mg/L				

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Bureau Veritas Laboratories Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

BV Labs Job #: C066787
Report Date: 2020/09/24

CLEAN HARBORS
Client Project #: PRIMARY LEACHATE QTR 3
Your P.O. #: 211002RY
Sampler Initials: MN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

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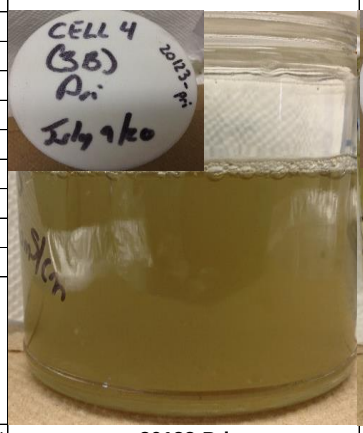
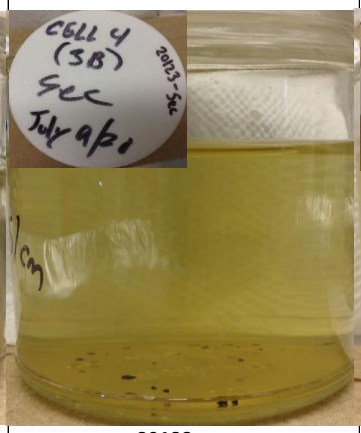
For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Analytical Report	Log Number:	20123 and 20124	
Ryley Laboratory			
			
Analyst: Todd Webb			
Sample Date: July 9, 2020			
Report Date: July 13, 2020			
Lab Comments: No sample obtained for Cell 3C Primary - Murray says pump is down			
Lab log #	**20123-Pri**	**20123-sec**	**20124**
Sample Name→	**Primary Leachate Cell 3B**	**Secondary Leachate Cell 3B**	**Secondary Leachate Cell 3C**
Sample Date	**9-Jul-20**	**9-Jul-20**	**9-Jul-20**
pH	8.7	7.4	7.2
Conductivity (µS/cm)	13500	12600	9070
Reactive Ammonia Screen	Positive	Negative	Trace
Reactive Sulfide Screen	Trace	Negative	Negative
Analyte (mg/L)			
Silver (Ag)	<0.2	<0.2	<0.2
Aluminum (Al)	<0.2	<0.2	<0.2
Arsenic (As)	<0.5	<0.5	<0.5
Boron (B)	7	0.3	1
Barium (Ba)	<0.2	<0.2	<0.2
Beryllium (Be)	<0.2	<0.2	<0.2
Calcium (Ca)	150	230	200
Cadmium (Cd)	<0.2	<0.2	<0.2
Cobalt (Co)	<0.2	<0.2	<0.2
Chromium (Cr)	<0.2	<0.2	<0.2
Copper (Cu)	<0.2	<0.2	<0.2
Iron (Fe)	0.8	0.7	0.6
Mercury (Hg)	<0.2	<0.2	<0.2
Potassium (K)	140	18	16
Lithium (Li)	0.4	<0.2	<0.2
Magnesium (Mg)	160	190	140
Manganese (Mn)	3	6	5
Molybdenum (Mo)	2	<0.2	<0.2
Sodium (Na)	2000	2200	1400
Nickel (Ni)	<0.2	<0.2	<0.2
Phosphorus (P)	3	0.7	0.3
Lead (Pb)	<0.2	<0.2	<0.2
Sulfur (S)	1600	2000	1200
Antimony (Sb)	<0.2	<0.2	<0.2
Selenium (Se)	<1	<1	<1
Silica (Si)	6	6	5
Strontium (Sr)	3	4	3
Thallium (Tl)	<0.5	<0.5	<0.5
Uranium (U)	<2	<2	<2
Vanadium (V)	<1	<1	<1
Zinc (Zn)	<0.2	0.3	<0.2
Zirconium (Zr)	<0.2	<0.2	<0.2

Appendix D

Primary Leachate Analyses

Quarter 4

Clean Harbors Canada Inc.
ATTN: Todd Webb
PO BOX 390
RYLEY AB T0B 4A0

Date Received: 01-DEC-20
Report Date: 08-DEC-20 11:52 (MT)
Version: FINAL

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2535313
Project P.O. #: 212964RY
Job Reference:
C of C Numbers: 17-805837
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
L2535313-1 PRIMARY LEACHATE CELL 2 (PC2)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.00219		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
Toluene	0.00556		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
EthylBenzene	<0.00050		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
m+p-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
o-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
F1(C6-C10)	<0.10		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
F1-BTEX	<0.10		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
Xylenes	<0.00071		0.00071	mg/L	02-DEC-20	07-DEC-20	R5300605
Surrogate: 1,4-Difluorobenzene (SS)	101.1		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	89.1		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 3,4-Dichlorotoluene (SS)	106.5		70-130	%	02-DEC-20	07-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	0.19		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	97.4		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0199		0.0010	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	19.8	DLHC	0.50	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	379		10	mg/L		04-DEC-20	R5308279
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		03-DEC-20	R5306923
Dissolved Organic Carbon	134	DLM	5.0	mg/L		03-DEC-20	R5307325
Phenols (4AAP)	0.0362		0.0010	mg/L		01-DEC-20	R5302680
Total Kjeldahl Nitrogen	25.9	DLHC	0.60	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	0.99	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	14300	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	4.76	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	31.6		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	263	DLDS	5.0	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	0.0038		0.0010	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.0067		0.0010	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.105		0.0010	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	1.50		0.10	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	0.000141		0.000050	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	423		0.50	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	0.00075		0.00010	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	0.0043		0.0010	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	0.0054		0.0010	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	0.0032		0.0020	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	2.16		0.10	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616

* 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
L2535313-1 PRIMARY LEACHATE CELL 2 (PC2)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.605		0.010	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	275		0.10	mg/L		02-DEC-20	R5304616
Manganese (Mn)-Dissolved	9.71		0.0010	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	0.693		0.00050	mg/L		02-DEC-20	R5304616
Nickel (Ni)-Dissolved	0.0344		0.0050	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	1.34		0.50	mg/L		02-DEC-20	R5304616
Potassium (K)-Dissolved	47.4		0.50	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.0341		0.0020	mg/L		02-DEC-20	R5304616
Selenium (Se)-Dissolved	0.00178		0.00050	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	13.8		0.50	mg/L		02-DEC-20	R5304616
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	3730		1.0	mg/L		02-DEC-20	R5304616
Strontium (Sr)-Dissolved	6.65		0.0020	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	3240		5.0	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	0.0030		0.0030	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	0.391		0.0010	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.0207		0.00010	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	0.0149		0.0050	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	0.030		0.010	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.0047		0.0020	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	1.82	DLDS	0.20	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	95.7			%		04-DEC-20	
TDS (Calculated)	14700			mg/L		04-DEC-20	
Hardness (as CaCO3)	2190			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.22		0.22	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	9680	DLDS	3.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	7.19		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	14600		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	538		5.0	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	441		2.0	mg/L		01-DEC-20	R5300441
L2535313-2 PRIMARY LEACHATE CELL 3A (PC3A)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.208		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605

* 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
L2535313-2 PRIMARY LEACHATE CELL 3A (PC3A)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Toluene	0.0348		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
EthylBenzene	0.00624		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
m+p-Xylene	0.0225		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
o-Xylene	0.0128		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
F1(C6-C10)	0.55		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
F1-BTEX	0.26		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
Xylenes	0.0353		0.00071	mg/L	02-DEC-20	07-DEC-20	R5300605
Surrogate: 1,4-Difluorobenzene (SS)	105.6		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	100.2		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 3,4-Dichlorotoluene (SS)	109.5		70-130	%	02-DEC-20	07-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	4.48		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	92.2		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.232		0.010	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	629	DLHC	50	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	4030	DLHC	100	mg/L		04-DEC-20	R5308279
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		03-DEC-20	R5306923
Dissolved Organic Carbon	963	DLM	10	mg/L		03-DEC-20	R5307325
Phenols (4AAP)	10.7	DLHC	0.20	mg/L		02-DEC-20	R5302680
Total Kjeldahl Nitrogen	970	DLHC	100	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	4.04	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	18900	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	4.06	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	92.8		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	9750	DLDS	10	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.10	DLDS	0.10	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.310		0.010	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	1.63		0.010	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.0050	DLDS	0.0050	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	54.3		1.0	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	298		5.0	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	0.0015		0.0010	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	0.221		0.010	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	<0.020	DLDS	0.020	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	<1.0	DLDS	1.0	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.0050	DLDS	0.0050	mg/L		02-DEC-20	R5304616
Lithium (Li)-Dissolved	2.91		0.10	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	398		0.50	mg/L		02-DEC-20	R5304616

* 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
L2535313-2 PRIMARY LEACHATE CELL 3A (PC3A)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Manganese (Mn)-Dissolved	2.15		0.010	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	0.298		0.0050	mg/L		02-DEC-20	R5304616
Nickel (Ni)-Dissolved	0.466		0.050	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	8.0		5.0	mg/L		02-DEC-20	R5304616
Potassium (K)-Dissolved	1010		5.0	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.862		0.020	mg/L		02-DEC-20	R5304616
Selenium (Se)-Dissolved	0.0153		0.0050	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	17.1		5.0	mg/L		02-DEC-20	R5304616
Silver (Ag)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	5600		5.0	mg/L		02-DEC-20	R5304616
Strontium (Sr)-Dissolved	4.98		0.020	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	418		50	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.020	DLDS	0.020	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	0.074		0.030	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	1.34		0.010	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.0014		0.0010	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	0.169		0.050	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	<0.10	DLDS	0.10	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.173		0.020	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	7.09	DLDS	0.40	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	86.7	BL:INT		%		04-DEC-20	
TDS (Calculated)	21500			mg/L		04-DEC-20	
Hardness (as CaCO3)	2380			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	351	DLDS	6.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	7.71		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	29700		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	8230	DLHC	50	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	6750	DLHC	20	mg/L		01-DEC-20	R5300441
L2535313-3 PRIMARY LEACHATE CELL 3B (PC3B)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0235		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
Toluene	0.0272		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
EthylBenzene	0.00186		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605

* 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
L2535313-3 PRIMARY LEACHATE CELL 3B (PC3B)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
m+p-Xylene	0.00556		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
o-Xylene	0.00424		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
F1(C6-C10)	1.03		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
F1-BTEX	0.97		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
Xylenes	0.00980		0.00071	mg/L	02-DEC-20	07-DEC-20	R5300605
Surrogate: 1,4-Difluorobenzene (SS)	105.9		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	98.7		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 3,4-Dichlorotoluene (SS)	101.8		70-130	%	02-DEC-20	07-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	3.53		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	104.9		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.433		0.010	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	1540	DLHC	50	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	18900	DLHC	200	mg/L		05-DEC-20	R5308503
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		03-DEC-20	R5306923
Dissolved Organic Carbon	6040	DLM	100	mg/L		04-DEC-20	R5308417
Phenols (4AAP)	23.0	DLHC	0.60	mg/L		02-DEC-20	R5302680
Total Kjeldahl Nitrogen	3000	DLHC	200	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	4.26	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	32500	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.000050		0.000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	4.37	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	5.8		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	8180	DLDS	10	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.10	DLDS	0.10	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	0.020		0.010	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.127		0.010	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.341		0.010	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.0050	DLDS	0.0050	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	207		1.0	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	0.0166		0.00050	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	24.2		5.0	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	0.142		0.0010	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	0.414		0.010	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	0.024		0.010	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	0.132		0.020	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	1.1		1.0	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	0.0197		0.0050	mg/L		02-DEC-20	R5304616
Lithium (Li)-Dissolved	5.51		0.10	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	49.6		0.50	mg/L		02-DEC-20	R5304616
Manganese (Mn)-Dissolved	0.350		0.010	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	59.8		0.0050	mg/L		02-DEC-20	R5304616

* 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
L2535313-3 PRIMARY LEACHATE CELL 3B (PC3B)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Nickel (Ni)-Dissolved	1.70		0.050	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	14.0		5.0	mg/L		02-DEC-20	R5304616
Potassium (K)-Dissolved	3750		5.0	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	6.25		0.020	mg/L		02-DEC-20	R5304616
Selenium (Se)-Dissolved	0.145		0.0050	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	46.5		5.0	mg/L		02-DEC-20	R5304616
Silver (Ag)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	7890		5.0	mg/L		02-DEC-20	R5304616
Strontium (Sr)-Dissolved	0.906		0.020	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	1040		50	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.020	DLDS	0.020	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	0.012		0.010	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	0.060		0.030	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	5.61		0.010	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.0027		0.0010	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	0.444		0.050	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	0.11		0.10	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.037		0.020	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	20.5	DLDS	0.40	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	103			%		04-DEC-20	
TDS (Calculated)	30000			mg/L		04-DEC-20	
Hardness (as CaCO3)	265			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	2090	DLDS	6.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	9.45		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	39500		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	4780	DLHC	50	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	5610	DLHC	50	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	13300	DLHC	20	mg/L		01-DEC-20	R5300441
L2535313-4 PRIMARY LEACHATE CELL 3C (PC3C)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0267		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
Toluene	0.443	DLHC	0.025	mg/L	02-DEC-20	07-DEC-20	R5300605
EthylBenzene	0.165		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
m+p-Xylene	0.569	DLHC	0.025	mg/L	02-DEC-20	07-DEC-20	R5300605
o-Xylene	0.281		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605

* 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
L2535313-4 PRIMARY LEACHATE CELL 3C (PC3C)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
F1(C6-C10)	1.95		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
F1-BTEX	0.47		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
Xylenes	0.851		0.025	mg/L	02-DEC-20	07-DEC-20	R5300605
Surrogate: 1,4-Difluorobenzene (SS)	103.9		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	109.7		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 3,4-Dichlorotoluene (SS)	107.1		70-130	%	02-DEC-20	07-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	0.75		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	100.5		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0021		0.0010	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	478	DLHC	50	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	1370		10	mg/L		04-DEC-20	R5308279
Chromium (VI)-Dissolved	<0.0050	DLM	0.0050	mg/L		04-DEC-20	R5306923
Dissolved Organic Carbon	321	DLM	10	mg/L		03-DEC-20	R5307325
Phenols (4AAP)	0.941	DLHC	0.020	mg/L		02-DEC-20	R5302680
Total Kjeldahl Nitrogen	660	DLHC	100	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	1.83	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	5230	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	1.88	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	5.6		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	1800	DLDS	10	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.0136		0.0010	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.0668		0.0010	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	25.1		0.10	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	0.000102		0.000050	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	80.6		0.50	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	0.00074		0.00010	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	0.0034		0.0010	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	0.0014		0.0010	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	0.0109		0.0020	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	0.26		0.10	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Lithium (Li)-Dissolved	1.37		0.010	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	150		0.10	mg/L		02-DEC-20	R5304616
Manganese (Mn)-Dissolved	0.493		0.0010	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	0.490		0.00050	mg/L		02-DEC-20	R5304616
Nickel (Ni)-Dissolved	0.332		0.0050	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	2.58		0.50	mg/L		02-DEC-20	R5304616

* 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
L2535313-4 PRIMARY LEACHATE CELL 3C (PC3C)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Potassium (K)-Dissolved	298		0.50	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.179		0.0020	mg/L		02-DEC-20	R5304616
Selenium (Se)-Dissolved	0.0131		0.00050	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	10.6		0.50	mg/L		02-DEC-20	R5304616
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	1570		1.0	mg/L		02-DEC-20	R5304616
Strontium (Sr)-Dissolved	0.504		0.0020	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	1110		5.0	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	0.0132		0.0010	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.00426		0.00010	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	5.34		0.0050	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.0269		0.0020	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	2.34	DLDS	0.40	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	95.9			%		04-DEC-20	
TDS (Calculated)	6700			mg/L		04-DEC-20	
Hardness (as CaCO3)	819			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	978	DLDS	6.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	8.34		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	11600		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	3570		5.0	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	62.2		5.0	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	3030		2.0	mg/L		01-DEC-20	R5300441
L2535313-5 PRIMARY LEACHATE CELL 3D (PC3D)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0161		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
Toluene	0.0199		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
EthylBenzene	0.00142		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
m+p-Xylene	0.00454		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
o-Xylene	0.00284		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
F1(C6-C10)	0.31		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605

* 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
L2535313-5 PRIMARY LEACHATE CELL 3D (PC3D)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
F1-BTEX	0.27		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
Xylenes	0.00738		0.00071	mg/L	02-DEC-20	07-DEC-20	R5300605
Surrogate: 1,4-Difluorobenzene (SS)	105.4		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	96.1		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 3,4-Dichlorotoluene (SS)	115.9		70-130	%	02-DEC-20	07-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	0.66		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	98.3		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0193		0.0020	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	480	DLHC	50	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	3490	DLHC	100	mg/L		04-DEC-20	R5308279
Chromium (VI)-Dissolved	<0.0050	DLM	0.0050	mg/L		04-DEC-20	R5306923
Dissolved Organic Carbon	940	DLM	10	mg/L		03-DEC-20	R5307325
Phenols (4AAP)	5.40	DLHC	0.10	mg/L		02-DEC-20	R5302680
Total Kjeldahl Nitrogen	480	DLHC	100	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	0.947		0.020	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	11700	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.000050		0.000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	1.05	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	29.0		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	5310	DLDS	10	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.020	DLDS	0.020	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	0.0021		0.0020	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.0237		0.0020	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.470		0.0020	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	52.3		0.20	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	0.00128		0.00010	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	216		1.0	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	0.00280		0.00020	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	0.0222		0.0020	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	0.0072		0.0020	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	0.215		0.0040	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	1.40		0.20	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Lithium (Li)-Dissolved	1.97		0.020	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	215		0.10	mg/L		02-DEC-20	R5304616
Manganese (Mn)-Dissolved	1.89		0.0020	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	5.00		0.0010	mg/L		02-DEC-20	R5304616
Nickel (Ni)-Dissolved	4.06		0.010	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	2.2		1.0	mg/L		02-DEC-20	R5304616
Potassium (K)-Dissolved	608		1.0	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.421		0.0040	mg/L		02-DEC-20	R5304616

* 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
L2535313-5 PRIMARY LEACHATE CELL 3D (PC3D)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Selenium (Se)-Dissolved	0.0124		0.0010	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	12.9		1.0	mg/L		02-DEC-20	R5304616
Silver (Ag)-Dissolved	0.00058		0.00020	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	3560		1.0	mg/L		02-DEC-20	R5304616
Strontium (Sr)-Dissolved	2.28		0.0040	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	280		10	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	0.0140		0.0060	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	0.0936		0.0020	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.00344		0.00020	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	5.75		0.010	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	0.089		0.020	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.0757		0.0040	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	5.89	DLDS	0.40	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	101			%		04-DEC-20	
TDS (Calculated)	12500			mg/L		04-DEC-20	
Hardness (as CaCO3)	1420			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	352	DLDS	6.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	8.03		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	19300		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	4510		5.0	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	3700		2.0	mg/L		01-DEC-20	R5300441
L2535313-6 PRIMARY LEACHATE CELL 3E (PC3E)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.0589		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
Toluene	0.0125		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
EthylBenzene	0.00183		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
m+p-Xylene	0.00237		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
o-Xylene	0.00141		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
F1(C6-C10)	<0.10		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
F1-BTEX	<0.10		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
Xylenes	0.00378		0.00071	mg/L	02-DEC-20	07-DEC-20	R5300605

* 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
L2535313-6 PRIMARY LEACHATE CELL 3E (PC3E)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Surrogate: 1,4-Difluorobenzene (SS)	103.8		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	89.9		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 3,4-Dichlorotoluene (SS)	115.4		70-130	%	02-DEC-20	07-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	2.89		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	92.6		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0042		0.0020	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	1210	DLHC	50	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	1570	DLHC	100	mg/L		04-DEC-20	R5308279
Chromium (VI)-Dissolved	<0.0050	DLM	0.0050	mg/L		04-DEC-20	R5306923
Dissolved Organic Carbon	395	DLM	20	mg/L		04-DEC-20	R5308417
Phenols (4AAP)	0.162	DLHC	0.0030	mg/L		02-DEC-20	R5302680
Total Kjeldahl Nitrogen	1790	DLHC	200	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	1.62	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	8290	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	1.67	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	16.8		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2690	DLDS	10	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.020	DLDS	0.020	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.0146		0.0020	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.129		0.0020	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	14.3		0.20	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	0.00019		0.00010	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	62.6		1.0	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	0.00773		0.00020	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	0.0026		0.0020	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	0.0048		0.0020	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	0.0155		0.0040	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	0.38		0.20	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Lithium (Li)-Dissolved	0.950		0.020	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	226		0.10	mg/L		02-DEC-20	R5304616
Manganese (Mn)-Dissolved	0.294		0.0020	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	0.595		0.0010	mg/L		02-DEC-20	R5304616
Nickel (Ni)-Dissolved	0.766		0.010	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	2.2		1.0	mg/L		02-DEC-20	R5304616
Potassium (K)-Dissolved	329		1.0	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.487		0.0040	mg/L		02-DEC-20	R5304616
Selenium (Se)-Dissolved	0.0064		0.0010	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	9.9		1.0	mg/L		02-DEC-20	R5304616

* 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
L2535313-6 PRIMARY LEACHATE CELL 3E (PC3E)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Silver (Ag)-Dissolved	0.00084		0.00020	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	2410		1.0	mg/L		02-DEC-20	R5304616
Strontium (Sr)-Dissolved	1.71		0.0040	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	499		10	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	<0.0060	DLDS	0.0060	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	0.0555		0.0020	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.00636		0.00020	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	4.33		0.010	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	<0.020	DLDS	0.020	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.251		0.0040	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	5.52	DLDS	0.40	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	96.0			%		04-DEC-20	
TDS (Calculated)	10700			mg/L		04-DEC-20	
Hardness (as CaCO3)	1090			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	916	DLDS	6.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	8.42		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	17700		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	7510	DLHC	50	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	368	DLHC	50	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	6770	DLHC	20	mg/L		01-DEC-20	R5300441
L2535313-7 PRIMARY LEACHATE CELL 4 (PC4)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.206		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
Toluene	0.432	DLHC	0.025	mg/L	02-DEC-20	07-DEC-20	R5300605
EthylBenzene	0.0130		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
m+p-Xylene	0.0352		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
o-Xylene	0.0193		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	07-DEC-20	R5300605
F1(C6-C10)	1.69		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
F1-BTEX	0.99		0.10	mg/L	02-DEC-20	07-DEC-20	R5300605
Xylenes	0.0545		0.00071	mg/L	02-DEC-20	07-DEC-20	R5300605
Surrogate: 1,4-Difluorobenzene (SS)	104.9		70-130	%	02-DEC-20	07-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	90.9		70-130	%	02-DEC-20	07-DEC-20	R5300605

* 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
L2535313-7 PRIMARY LEACHATE CELL 4 (PC4)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Surrogate: 3,4-Dichlorotoluene (SS)	91.4		70-130	%	02-DEC-20	07-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	4.77		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	103.5		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0156		0.0020	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	416	DLHC	50	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	10600	DLHC	100	mg/L		04-DEC-20	R5308279
Chromium (VI)-Dissolved	0.00120		0.00050	mg/L		03-DEC-20	R5306923
Dissolved Organic Carbon	2650	DLM	100	mg/L		05-DEC-20	R5308564
Phenols (4AAP)	4.50	DLHC	0.20	mg/L		02-DEC-20	R5302680
Total Kjeldahl Nitrogen	477	DLHC	40	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	2.69	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	13200	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.000050		0.000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	3.22	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	63.6	DLHC	6.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	4750	DLDS	10	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	0.107		0.020	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	0.0032		0.0020	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.0113		0.0020	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.712		0.0020	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	35.6		0.20	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	0.00047		0.00010	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	879		1.0	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	0.0137		0.00020	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	0.0138		0.0020	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	0.0062		0.0020	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	0.0073		0.0040	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	1.47		0.20	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Lithium (Li)-Dissolved	0.152		0.020	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	258		0.10	mg/L		02-DEC-20	R5304616
Manganese (Mn)-Dissolved	13.9		0.0020	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	1.42		0.0010	mg/L		02-DEC-20	R5304616
Nickel (Ni)-Dissolved	0.189		0.010	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	6.1		1.0	mg/L		02-DEC-20	R5304616
Potassium (K)-Dissolved	320		1.0	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.123		0.0040	mg/L		02-DEC-20	R5304616
Selenium (Se)-Dissolved	0.0089		0.0010	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	18.1		1.0	mg/L		02-DEC-20	R5304616
Silver (Ag)-Dissolved	<0.00020	DLDS	0.00020	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	2870		1.0	mg/L		02-DEC-20	R5304616

* 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
L2535313-7 PRIMARY LEACHATE CELL 4 (PC4)							
Sampled By: CLIENT on 30-NOV-20							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Strontium (Sr)-Dissolved	3.88		0.0040	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	144		10	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	0.0580		0.0060	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	0.0593		0.0020	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.00343		0.00020	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	0.156		0.010	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	0.030		0.020	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.0224		0.0040	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	2.15	DLDS	0.40	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	111	BL:INT		%		04-DEC-20	
TDS (Calculated)	11200			mg/L		04-DEC-20	
Hardness (as CaCO3)	3260			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLDS	0.40	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.45		0.45	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	38.7	DLDS	6.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	7.22		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	17900		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	4290		5.0	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	3520		2.0	mg/L		01-DEC-20	R5300441

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

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
SPL	NH3-COL-ED - Sample was Preserved at the laboratory

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-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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 H_2SO_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
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-805837

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

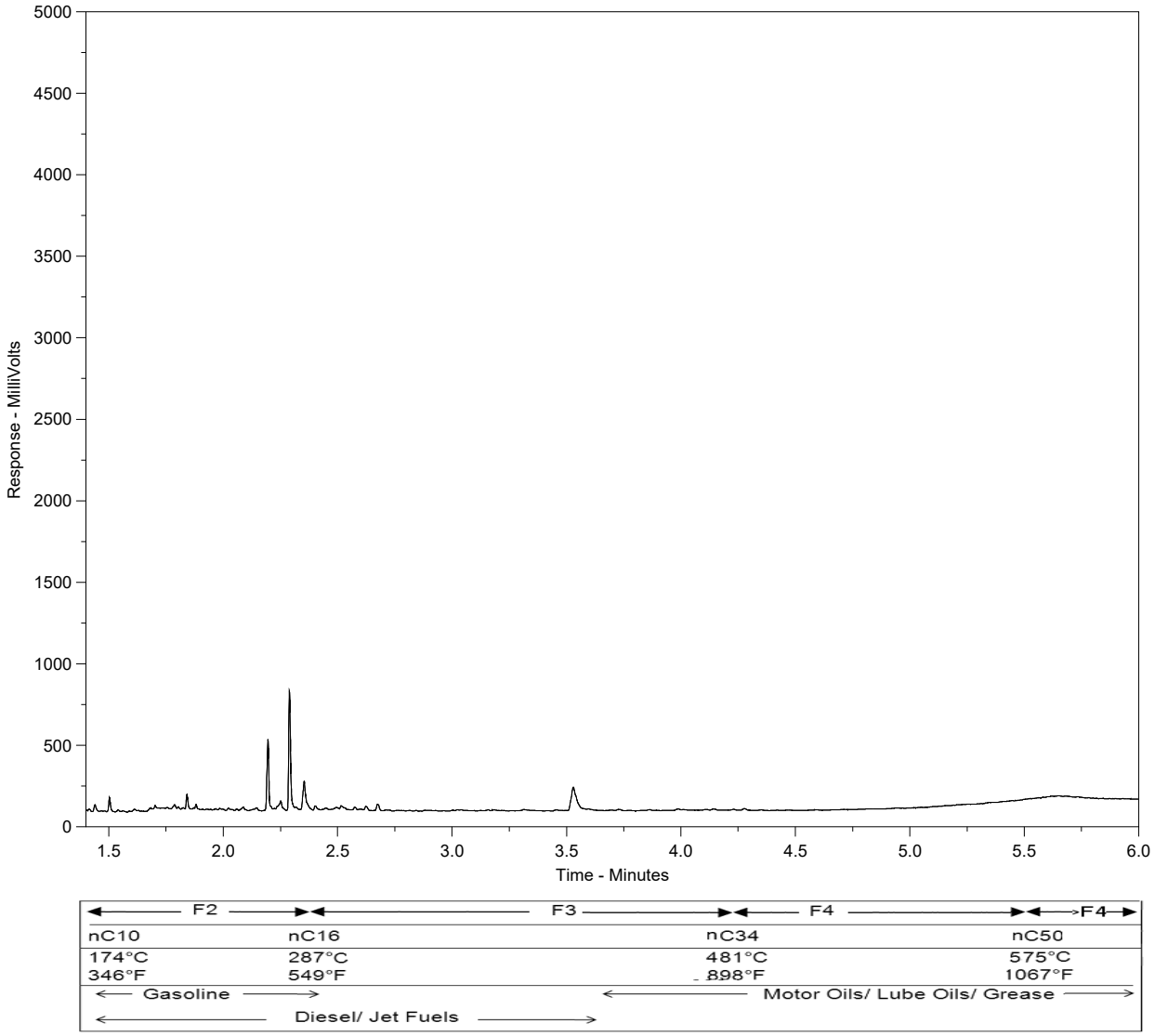
GLOSSARY OF REPORT TERMS

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: L2535313-1
Client ID: PRIMARY LEACHATE CELL 2 (PC2)



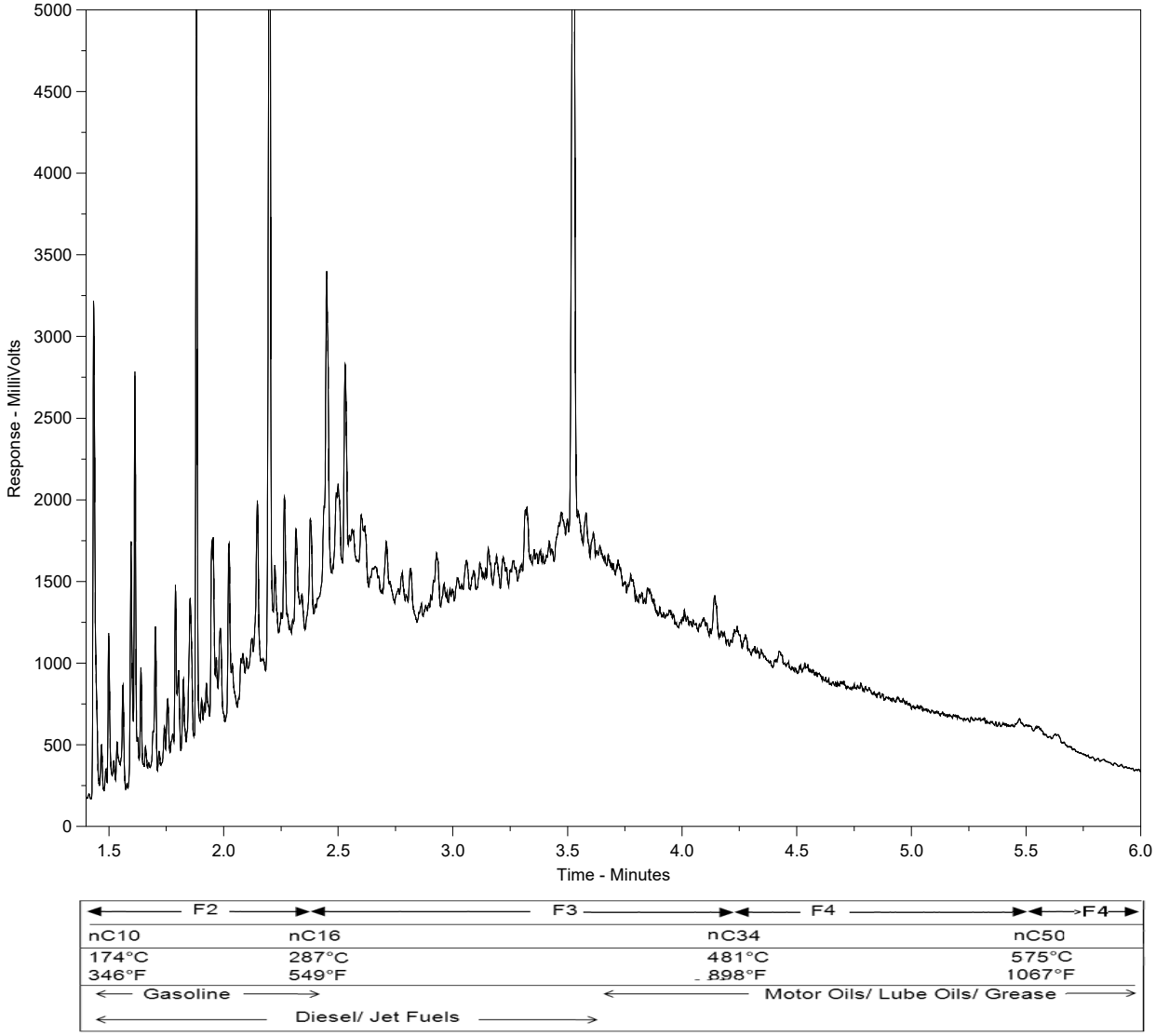
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2535313-2
Client ID: PRIMARY LEACHATE CELL 3A (PC3A)



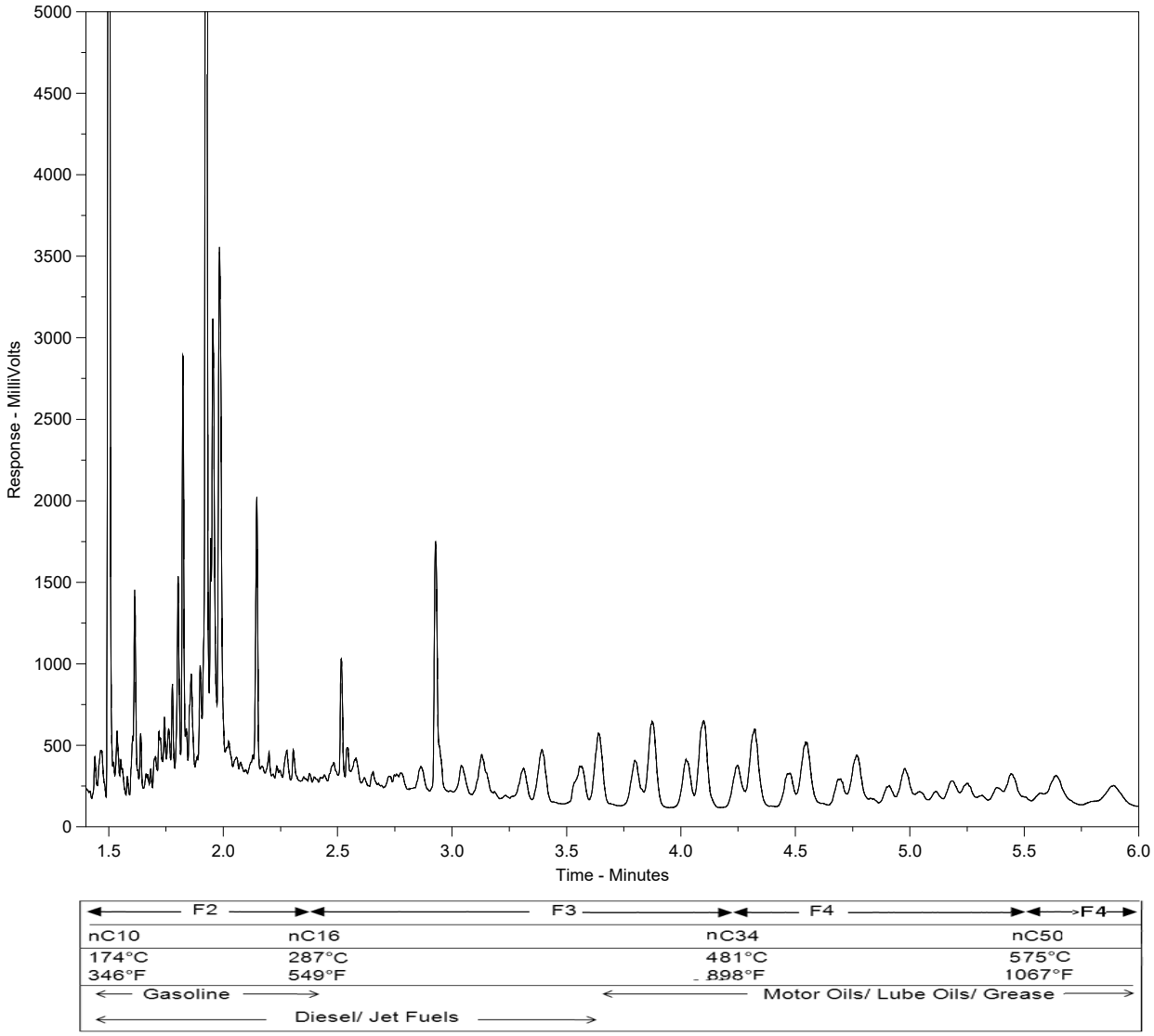
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2535313-3
Client ID: PRIMARY LEACHATE CELL 3B (PC3B)



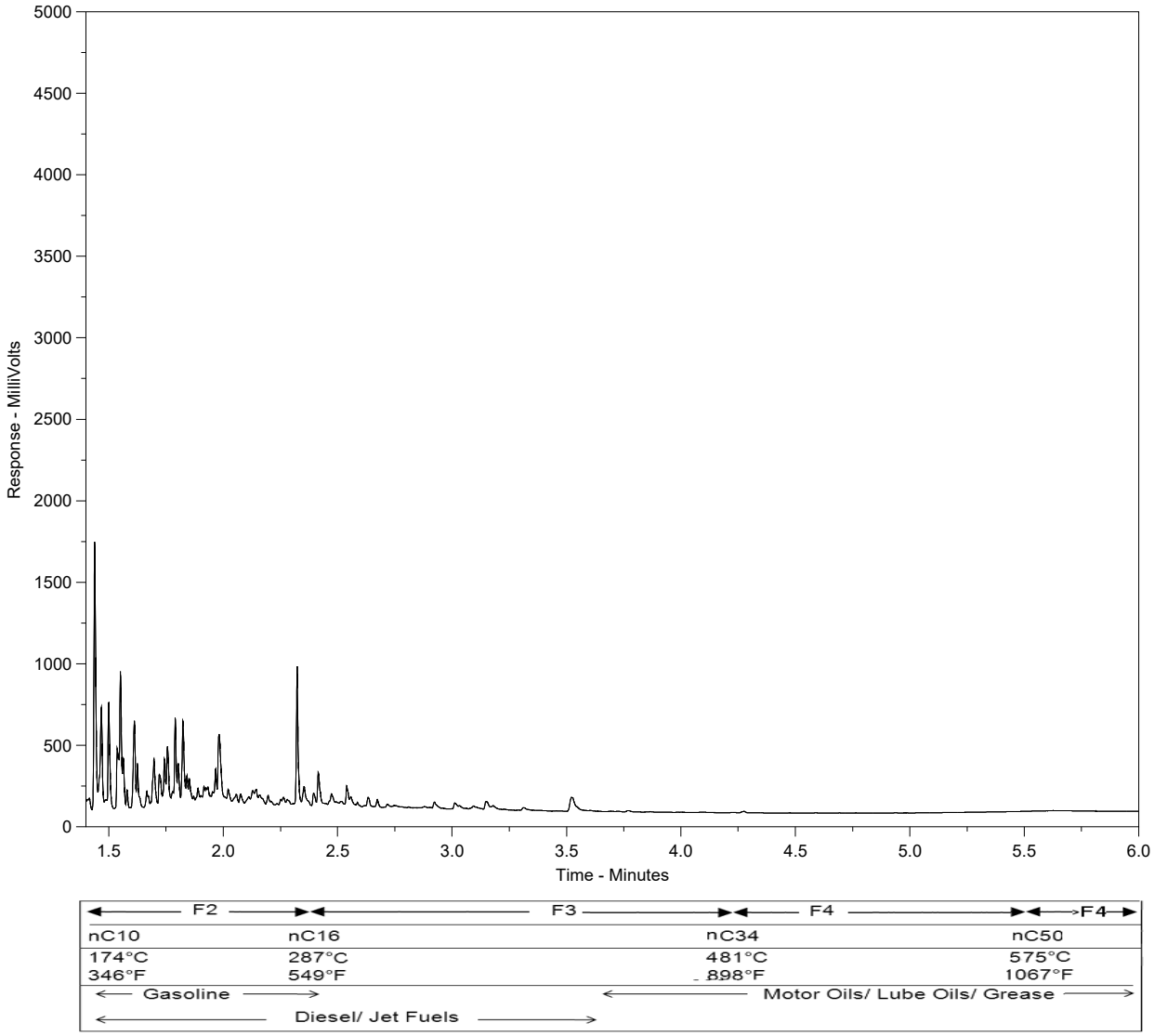
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2535313-4
Client ID: PRIMARY LEACHATE CELL 3C (PC3C)



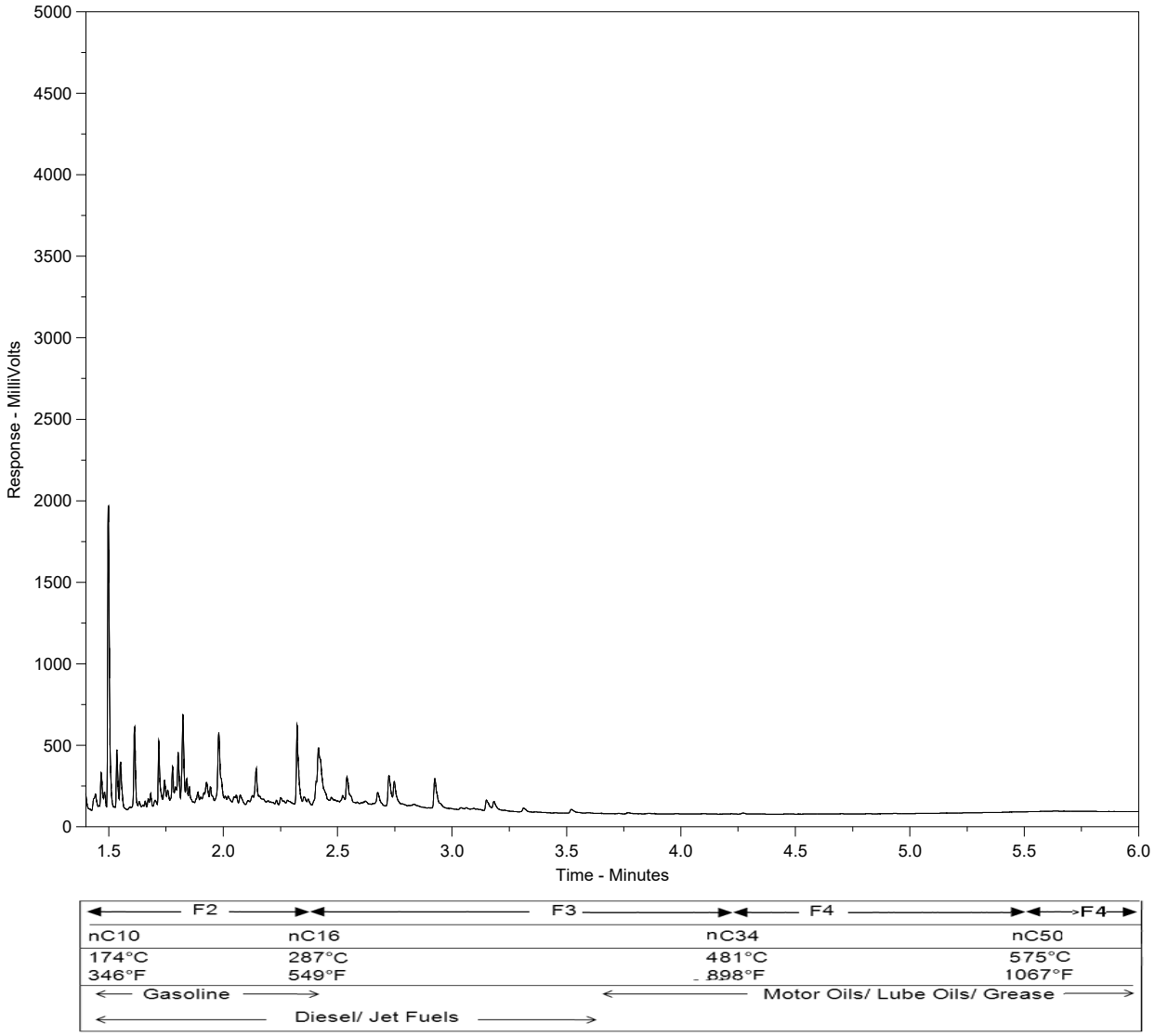
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2535313-5
Client ID: PRIMARY LEACHATE CELL 3D (PC3D)



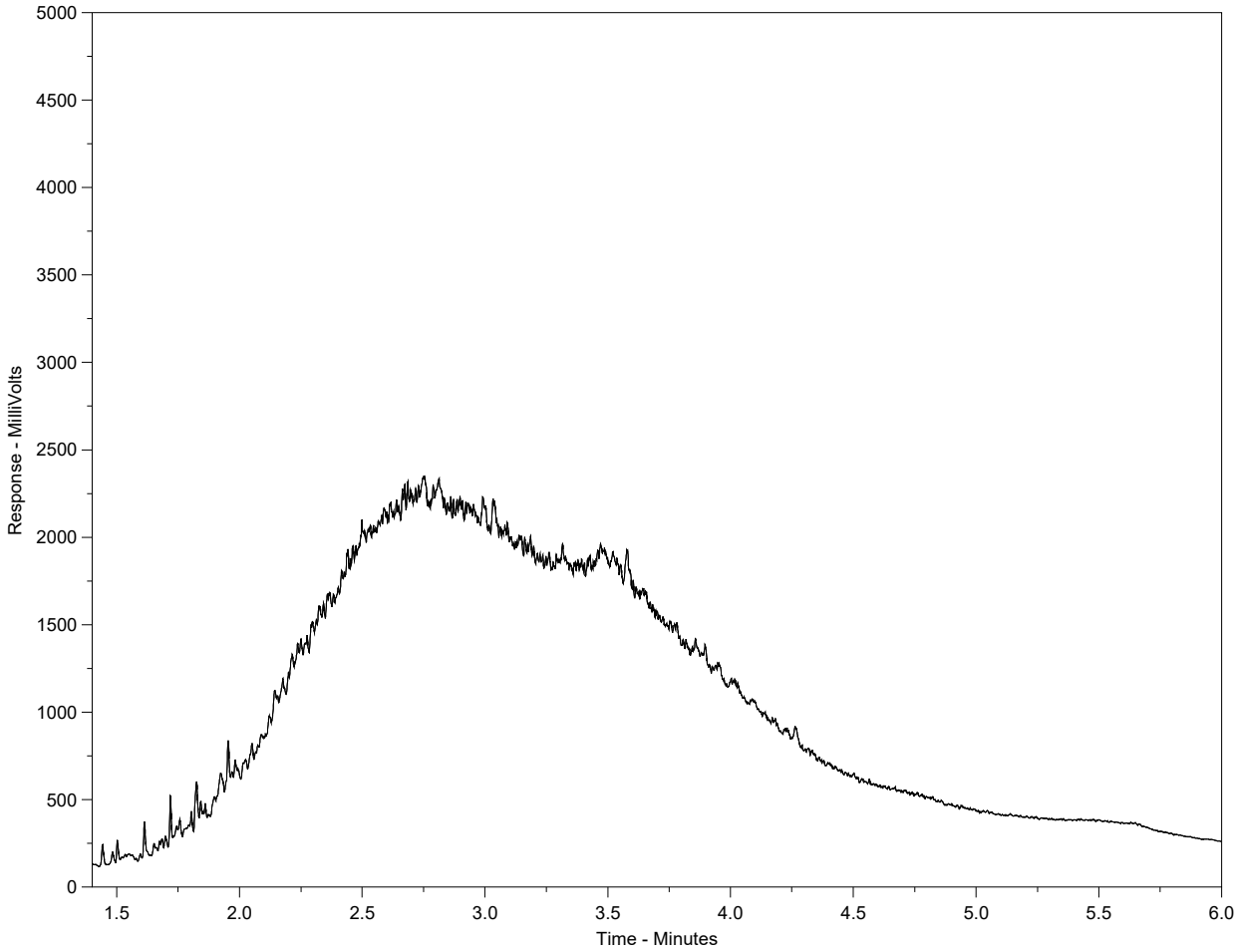
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2535313-6
Client ID: PRIMARY LEACHATE CELL 3E (PC3E)



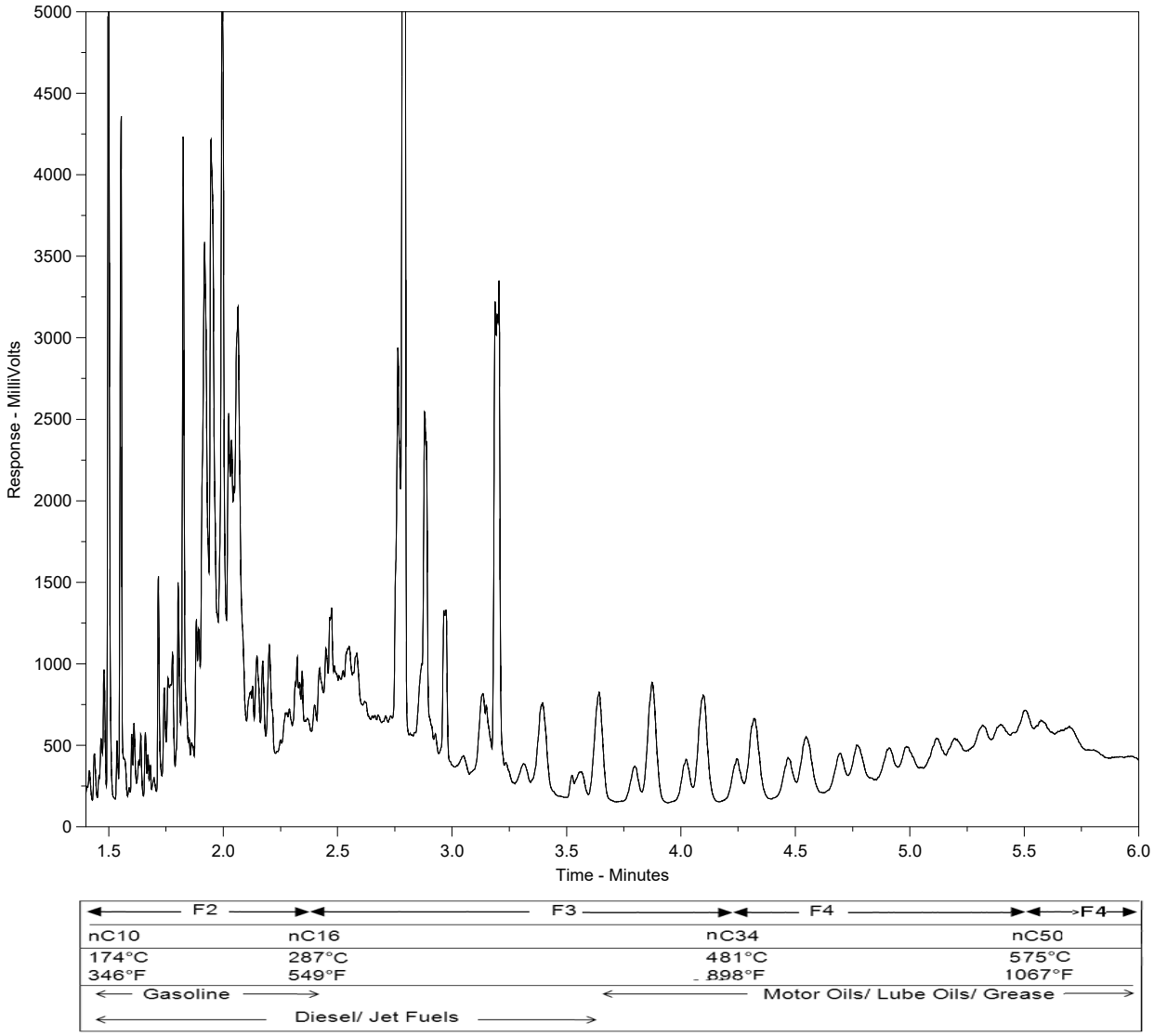
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2535313-7
Client ID: PRIMARY LEACHATE CELL 4 (PC4)



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.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2535313-COFC

COC Number: 17 - 805837

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Clean Harbors Canada
Contact:	Todd Webb, Stan Yuha
Phone:	780 663-2513
	Company address below will appear on the final report
Street:	PO Box 390, 50114 Range Road 173
City/Province:	Ryley, AB
Postal Code:	T0B 4A0
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	Clean Harbors Canada
Contact:	Dana Robinson

Report Format / Distribution

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

Quality Control (QC) Report with Report ☑ YES ☐ NO

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

Select Distribution: ☑ EMAIL | | MAIL ☐ FAX

Email 1 or Fax: Webb.Todd@cleanharbors.com

Email 2: Yuha.Stan@cleanharbors.com

Email 3:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Robinson-Dana@cleanharbors.com

Email 2:

Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] [illegible] TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐; 3 day [P3-25%] ☐; 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E - 100%] ☐; Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:

Job #: Primary Leachate Qtr 4

PO / AFE: 212964 RY

LSD:

ALS Lab Work Order # (lab use only): L2535313

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Contact: Sampler:

Analysis Request

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

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: Table 4.4A Leachate + Leak Detection Monitoring	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	Primary Leachate Cell 2 (PC2)	30-Nov-20			✓		
	Primary Leachate Cell 3A (PC3A)				✓		
	Primary Leachate Cell 3B (PC3B)				✓		
	Primary Leachate Cell 3C (PC3C)				✓		
	Primary Leachate Cell 3D (PC3D)				✓		
	Primary Leachate Cell 3E (PC3E)				✓		
	Primary Leachate Cell 4 (PC4)	30-Nov-20			✓		

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

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? | | YES | | NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Analyze as per quote QB2438
Table 4.4A package (attached)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
15.8	13.8	12.3			

SHIPMENT RELEASE (client use)

Released by: Todd Webb Date: Nov 30/20 Time: 17:00

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: [illegible] Date: 01 DEC 20 Time: 11:00

FINAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

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

APPENDIX E

Volume of Leachate Removed

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2020-01-01								
2020-01-02		**Records**	574	1686		197	14933	Frozen
2020-01-03		**prior to**	157	657		96	8924	Frozen
2020-01-04		**12-Jan**						
2020-01-05		**were lost**		.				
2020-01-06		**in fire of**	513	1735	30041	902	25253	Frozen
2020-01-07		**that date,**	135	594	9317		11543	Frozen
2020-01-08		**Reference**	161	621	9529		3997	Frozen
2020-01-09		**# 362650**	227	724	9710	48542	9102	Frozen
2020-01-10		**No liquid**	197	546	8747	5588	8220	Frozen
2020-01-11		**removed**						
2020-01-12		**until**						
2020-01-13		**30-Jun**	1380	1616	25783	44527	25112	Frozen
2020-01-14				581	8031	9	11076	Frozen
2020-01-15				535	2380		3938	Frozen
2020-01-16				456		4		Frozen
2020-01-17				541		1		Frozen
2020-01-18								
2020-01-19								
2020-01-20				1592	30041	4		Frozen
2020-01-21				267	7460	47	44889	Frozen
2020-01-22					8289	161062		Frozen
2020-01-23						63060		Frozen
2020-01-24						2052	30154	Frozen
2020-01-25								
2020-01-26								
2020-01-27					27435	48673	27722	Frozen
2020-01-28				8536	7625	16290	11579	Frozen
2020-01-29				1481	6708	16752	4103	Frozen
2020-01-30				952	6349	18295	7997	Frozen
2020-01-31				838	1503	22455	8289	Frozen
2020-02-01								
2020-02-02								
2020-02-03				1995	19411	57945	25497	Frozen

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2020-02-04				836	6692	12442	10478	60591
2020-02-05				680	6381	15015	4169	6175
2020-02-06				771	6225	23253	8538	17738
2020-02-07				600	4926	20307	8400	
2020-02-08								
2020-02-09								
2020-02-10				1657	17779	41929	23030	31778
2020-02-11				579	4360	12605	9632	15517
2020-02-12				648	5459		4431	23989
2020-02-13				615	4866		6890	20
2020-02-14				540	5404		8018	15053
2020-02-15								
2020-02-16								
2020-02-17								
2020-02-18				3026	19535		20354	46352
2020-02-19				591	4505		18122	
2020-02-20				602	4619	19465	7365	11739
2020-02-21				633	4778	3990	7750	3
2020-02-22								
2020-02-23								
2020-02-24				1701	14054	6568	23603	21933
2020-02-25				549	4353	1948	9391	4728
2020-02-26				400	3972	1759	3076	4988
2020-02-27				530	4123	2439	7234	4665
2020-02-28				516	4054	1218	6847	5036
2020-02-29								
2020-03-01								
2020-03-02			14557	1480	12286	7840	23565	16327
2020-03-03				640	4229	2580	12200	5230
2020-03-04				551	4087	2358	4462	5249
2020-03-05			4003	544	4208	2285	9981	5086
2020-03-06			1901	480	3707	1900	10508	5526
2020-03-07								

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2020-03-08								
2020-03-09			489	1213	12228	59982	33535	15730
2020-03-10	120		113	431	3863	2048	4014	5274
2020-03-11			194	23	4070	2178	17742	5670
2020-03-12			243	10	3961	2363	11484	5164
2020-03-13			156	13	3747	1845	9899	4472
2020-03-14								
2020-03-15								
2020-03-16			356	5	10938	5141	28277	14183
2020-03-17			148	172	3807	2061	16274	5444
2020-03-18			125		3979	2315	5685	
2020-03-19			118		3769	2076	9730	8191
2020-03-20				475	3534	1900	9340	6457
2020-03-21								
2020-03-22								
2020-03-23				373	11317	6411	29438	17136
2020-03-24				19	4008	2366	16359	6838
2020-03-25				13	3813	2117	5992	7132
2020-03-26				11	3880	2119	11314	7461
2020-03-27					3899	2478	1189	7672
2020-03-28								
2020-03-29								
2020-03-30				1348	12963	6382	35612	
2020-03-31					4265	1995	17018	
2020-04-01					4321	1913	6266	
2020-04-02				877	4261	1809	11048	
2020-04-03					4252	1845	10925	
2020-04-04								
2020-04-05								
2020-04-06				1084	12639	6296	33729	
2020-04-07					4169	2301	16445	35945
2020-04-08					4158	2288	5867	26152
2020-04-09				1612	3860	1847	9980	10321
2020-04-10				2492				

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2020-04-11								
2020-04-12								
2020-04-13					18728	7955	45898	41512
2020-04-14					5236	1963	17512	9336
2020-04-15					5648	2257	6832	9069
2020-04-16				4335	5642	1962	11379	8517
2020-04-17				982	5127	1991	11565	9037
2020-04-18								
2020-04-19								
2020-04-20				1809	17380	6711	36699	27598
2020-04-21			1243	536	5710	2172	17383	10919
2020-04-22			7059	565	5675	2253	6369	8873
2020-04-23			4379	495	2028	2102	10993	9275
2020-04-24			1200	499	4524	2135	10636	8106
2020-04-25								
2020-04-26								
2020-04-27	300		875	947	17029	6479	30692	28062
2020-04-28			151	904	4688	2212	14279	9280
2020-04-29			114	495	5245	1916	4842	8557
2020-04-30			129	455	5187	1959	9059	8869
2020-05-01			135	453	5243	2371	9763	8991
2020-05-02								
2020-05-03								
2020-05-04			352	1548	14874	6294	26895	26058
2020-05-05			114	358	4820	2152	12978	8849
2020-05-06			102	432	4234	1948	5194	9012
2020-05-07			227	424	4759	2142	8818	9423
2020-05-08			112	403	5244	2203	8666	9043
2020-05-09								
2020-05-10								
2020-05-11			294	976	12727	6430	24671	27711
2020-05-12			125	393	4458	2805	12922	9781
2020-05-13			152	419	4573	3189	5070	10171
2020-05-14			192	516	5527	4100	9325	9779

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2020-05-15			76	279	3485	2054	8851	9274
2020-05-16								
2020-05-17								
2020-05-18								
2020-05-19			490	1519	17758	11085	37459	38444
2020-05-20			109	407	4260	2541	4165	9514
2020-05-21			159	383	4627	2418	7874	10551
2020-05-22			105	373	4163	3145	9177	12338
2020-05-23			336					
2020-05-24								
2020-05-25				1060	13720	12065	30096	49546
2020-05-26			126	468	4515	3610	13444	26682
2020-05-27			150	461	5196	3474	4841	45364
2020-05-28			77	328	4013	2520	8736	16838
2020-05-29			82	400	4448	2467	8360	12018
2020-05-30						2539		
2020-05-31								
2020-06-01			393	1203	14362		28043	59001
2020-06-02			127	470	3407		14300	25967
2020-06-03			117	410	4880		5185	22625
2020-06-04			125	403	4906	4583	9850	18701
2020-06-05			119	336	1253	182		
2020-06-06								
2020-06-07								
2020-06-08			675	1260		23		71630
2020-06-09			720	412	5197	9193	29120	56545
2020-06-10			330	482	9850	10509	8633	10728
2020-06-11			147	142	9483		22432	35944
2020-06-12			250				17209	42109
2020-06-13								
2020-06-14								
2020-06-15			1267		17708		30044	84512
2020-06-16			201		5457		14127	20371
2020-06-17			15				4841	19759

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2020-06-18			1145		11927		8452	39954
2020-06-19			95				8448	10173
2020-06-20								
2020-06-21								
2020-06-22			29		22061		26539	87611
2020-06-23					7492		12692	18355
2020-06-24				4523	7289	10435	4781	18365
2020-06-25				734	5026	15540	5265	524
2020-06-26			3786	541	6460	16873		45035
2020-06-27								
2020-06-28								
2020-06-29			2608	1443	15035	13593	37427	85100
2020-06-30		500	119	606		3041	12219	31054
2020-07-01								
2020-07-02		680	105	909	13249	7003	13928	40491
2020-07-03		722	198	449	6006	4657	9330	43550
2020-07-04								
2020-07-05								
2020-07-06		807	2260	617	10233	11467	13616	123652
2020-07-07						3738	11686	34459
2020-07-08		321	1768	1462	7403	3875	4608	525566
2020-07-09		1114	1005	16	5613	4389	8631	60253
2020-07-10		991	1041	311		4582	8943	49035
2020-07-11								
2020-07-12								
2020-07-13		789	840	311		12841	25781	79429
2020-07-14		741	1470	314		3776	14425	39419
2020-07-15		1111	1427	511		3576	4628	33723
2020-07-16		455		13		3410	615	31667
2020-07-17		496	915	145		3372	15101	26600
2020-07-18								
2020-07-19								
2020-07-20		1261	2155	364		10007	24260	84264
2020-07-21		381	**445**	51	7557	3147	12765	21664

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2020-07-22		383		135	12630	3277	4550	30473
2020-07-23		475		90	12711	3306	8432	48579
2020-07-24		126	1422	58	13431	4083	8473	63204
2020-07-25								
2020-07-26								
2020-07-27				30		9253	23817	130433
2020-07-28		1303	2405	76		1808	11764	53564
2020-07-29		435	5174	62		3312	4656	55147
2020-07-30			2	0		3100	4141	
2020-07-31		92	1	16	14124	5026	3	
2020-08-01								
2020-08-02								
2020-08-03								
2020-08-04		389	137	132	33679	9829		
2020-08-05		263				2950		
2020-08-06		1009				3017		53695
2020-08-07						3233		42623
2020-08-08								
2020-08-09								
2020-08-10		1715	2004		26543	9128		119348
2020-08-11		316	81		9980			43123
2020-08-12		391	89					37325
2020-08-13		384	80					
2020-08-14		348	74					12871
2020-08-15								
2020-08-16								
2020-08-17		1027						70823
2020-08-18					18195			
2020-08-19		219			8069			
2020-08-20		851	2902		2972			54875
2020-08-21		497	210		12275			47788
2020-08-22								
2020-08-23								
2020-08-24		1229	235		5699		37807	137398

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2020-08-25		345	79		5918			30299
2020-08-26		361	153	2636	4812		28713	
2020-08-27		738	82	1156	10847	16788	10324	54605
2020-08-28			45	30	9427	20885	18748	
2020-08-29								
2020-08-30								
2020-08-31		1008	2	20	25005		54776	32494
2020-09-01		361	1699	169	7558		34535	39778
2020-09-02		347	86	1096	6898	17417	19201	43797
2020-09-03		15		1300	4460	6344	16385	55267
2020-09-04		580	176	2160		2962		45921
2020-09-05								
2020-09-06								
2020-09-07								
2020-09-08		1245	85	10800	14397	11131	61079	121988
2020-09-09		94	14	800	6929	2853	4570	28931
2020-09-10		133	38	550	9621	2963	7960	29426
2020-09-11		274	46	1460	3867	2978	7868	25776
2020-09-12			76					
2020-09-13								
2020-09-14	200	925		7690	1721	8538	23075	74694
2020-09-15		138	57	510	4149	2758	11042	23946
2020-09-16		398	36	1900	7979	2670	3924	13449
2020-09-17		328		1734	8319	2712	6958	14311
2020-09-18		286	11	1850	7379	2796	7376	16936
2020-09-19								
2020-09-20								
2020-09-21		954	194	5400	19763	9167	23178	89406
2020-09-22		305	111	1800	5338	2851	10707	19337
2020-09-23		295	142	1800	5527	2706	3769	21227
2020-09-24		296	96	1315	5603	2846	7047	20950
2020-09-25		335	112	1634	5339	3297	8102	17827
2020-09-26								
2020-09-27								

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2020-09-28		940	241	7050	14287	8226	21653	47988
2020-09-29		306	106	1800	3203	2509	9785	16096
2020-09-30		265	66	1800		2611	3648	9713
2020-10-01		276	46	1500		2309	6243	10565
2020-10-02		243	24	600	2495	2474	6446	11894
2020-10-03								
2020-10-04								
2020-10-05		843	220	3400	18266	8455	21235	37997
2020-10-06		321	52	1600	5472	2779	10481	11823
2020-10-07		27	20	1800	5111	2773	3778	11338
2020-10-08		303	13	1800	5913	3288	6431	12147
2020-10-09		274	308	1800	4134	2297	7111	10146
2020-10-10								
2020-10-11								
2020-10-12								
2020-10-13		1244	947	6500	18831	11544	31999	43585
2020-10-14		283	124	1600	4383	2452	3543	1953
2020-10-15		303	95	1800	4131	2473	6385	2535
2020-10-16		256	155	1500	4182	2255	5971	11387
2020-10-17								
2020-10-18								
2020-10-19		825	426	5300	12327	7491	18806	16187
2020-10-20		272	130	1800	1297	2664	9802	882
2020-10-21		840	126	1700		2650	3560	10230
2020-10-22		418	149	1800	6807	3245	6340	2653
2020-10-23		286	8	1800	3486	1318	5854	126
2020-10-24								
2020-10-25								
2020-10-26		873	160	6800	13012	7376	18175	380
2020-10-27		363	145	1200	3779	2766	10340	10384
2020-10-28		333		1300	4326	3020	4107	5277
2020-10-29		417	271	1800	2225	2562	6444	2937
2020-10-30		349	210	1600		2560	6430	4817
2020-10-31								

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2020-11-01								
2020-11-02		992	700	5400		7625	19532	25409
2020-11-03		287	231	1800		2601	9795	7542
2020-11-04		341	261	1800		2639	3658	8926
2020-11-05		350	245	14700	6161	2479	6644	11412
2020-11-06		393	675	1832	7211	2603	6440	8992
2020-11-07								
2020-11-08								
2020-11-09		230	618	4168	26242	6969	18262	30295
2020-11-10		993	353	360	3876	1938	9279	8411
2020-11-11		524	307	5400	5105	2842		9643
2020-11-12		345	131	3500	5661	2134		7555
2020-11-13		344	36		5592	2203		5984
2020-11-14								
2020-11-15								
2020-11-16		996	517		7316	6807		24323
2020-11-17		232	70			1572		
2020-11-18		964	80			2011		
2020-11-19		407	65			2278		
2020-11-20		334	211			1782		
2020-11-21								
2020-11-22								
2020-11-23		847	279			2736		
2020-11-24		307	137			2201		
2020-11-25		327	74			2195		
2020-11-26		322	157			2266		
2020-11-27		369	300			2092		
2020-11-28								
2020-11-29								
2020-11-30		902	1122			5997	63	37
2020-12-01		408	16		16253	2268	28917	949
2020-12-02		349	30	8711	7579	1827	1909	10766
2020-12-03		270	79	4083	8240	2335		10873
2020-12-04		365		2299	1487	1507	12713	5369

Date	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4
2020-12-05								
2020-12-06								
2020-12-07		990	2007	3739		5874	49367	44086
2020-12-08				1218	10661	2098	9096	13900
2020-12-09		200	650	1800	7657	2092	17236	21701
2020-12-10		754	492	2520	6907	2014	17245	
2020-12-11		382	607	1800	7494	1923	4803	
2020-12-12								
2020-12-13								
2020-12-14		989	86	1900	18992	6382		27000
2020-12-15		279	326			1418		3000
2020-12-16		625	996		1496	2145		
2020-12-17		1407	1137		6576	2269		
2020-12-18		373	253	7332	4551	2007	16536	970
2020-12-19								
2020-12-20								
2020-12-21		1381	93	7892		6189	16117	1174
2020-12-22		434	38	1800	5514	3192		
2020-12-23		307		1800	3565	2110		237
2020-12-24		268		1800	2144	644		393
2020-12-25								
2020-12-26								
2020-12-27								
2020-12-28		1340	4477	5400		7467		760
2020-12-29		808	1593	1800	7587	2700		1281
2020-12-30		863		1800		1105		1344
2020-12-31		506	963	1800		3845		
TOTAL (L)	**620**	**160820**	**112919**	**303866**	**1623705**	**1507371**	**2802060**	**5458203**

APPENDIX F

Leak Detection Liquid Analysis

		Clean Harbors Canada, Inc. - Approval 10348-02					
	2020 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	2020-03-10	7.2	10480	Cell 1	2020-05-19	7.4	8782
Cell 2	Not Sampled			Cell 2	2020-06-30	7.4	16870
Cell 3A	2020-03-12	7.2	12260	Cell 3A	2020-04-27	7.3	14740
Cell 3B	2020-03-09	8.3	17390	Cell 3B	2020-04-27	7.6	11860
Cell 3C	2020-03-09	7.7	8132	Cell 3C	2020-04-27	7.6	8434
Cell 3D	2020-03-09	7.2	11020	Cell 3D	2020-04-27	7.4	11740
Cell 3E	2020-03-09	8.1	7698	Cell 3E	2020-04-27	7.9	9031
Cell 4	2020-03-09	7.3	9606	Cell 4	2020-04-27	7.5	11070
	Qtr 3				Qtr 4		
	Date	pH	Conductivity (uS/cm)		Date	pH	Conductivity (uS/cm)
Cell 1	2020-09-11	7.5	11700	Cell 1		Not Sampled	
Cell 2	2020-09-14	6.9	14430	Cell 2	2020-11-30	7.0	15390
Cell 3A	2020-09-14	7.2	12850	Cell 3A	2020-11-30	7.4	13740
Cell 3B	2020-09-14	8.9	19840	Cell 3B	2020-11-30	8.0	17450
Cell 3C	2020-09-14	7.5	10770	Cell 3C	2020-11-30	7.7	11050
Cell 3D	2020-09-14	7.2	11480	Cell 3D	2020-11-30	7.4	11830
Cell 3E	2020-09-14	8.0	7391	Cell 3E	2020-11-30	8.1	7423
Cell 4	2020-09-14	7.2	11160	Cell 4	2020-11-30	7.4	12420

APPENDIX F

Leak Detection Liquid Analysis

Quarter 1

Your P.O. #: 206455RY
Your Project #: 4.4-A; SECONDARY LEACHATE QTR
Your C.O.C. #: 603408-02-01

Attention: Todd Webb

CLEAN HARBORS
P.O. BOX 390
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/03/18
Report #: R2859373
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C017805
Received: 2020/03/10, 12:00

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	6	N/A	2020/03/11	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID (1)	6	N/A	2020/03/11	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	6	N/A	2020/03/12		Auto Calc
Cadmium - low level CCME - Dissolved (1)	2	N/A	2020/03/13		Auto Calc
Cadmium - low level CCME - Dissolved (1)	4	N/A	2020/03/15		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	1	N/A	2020/03/13	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
Chloride/Sulphate by Auto Colourimetry (1)	4	N/A	2020/03/15	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
Chloride/Sulphate by Auto Colourimetry (1)	1	N/A	2020/03/16	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
COD by Colorimeter (1)	6	N/A	2020/03/12	AB SOP-00016	SM 23 5220D m
Dissolved Hexavalent Chromium (1)	6	N/A	2020/03/16	AB SOP-00063	SM 23 3500-Cr B m
Carbon (DOC) (1, 3)	6	N/A	2020/03/13	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	6	N/A	2020/03/11	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 4)	6	2020/03/11	2020/03/11	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Mercury (Total) by CV (2)	6	2020/03/14	2020/03/14	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 5)	6	N/A	2020/03/12	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	6	2020/03/13	2020/03/13	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Dissolved (1, 5)	6	N/A	2020/03/12	AB SOP-00043	EPA 6020b R2 m
Ammonia-N (Total) (1)	6	N/A	2020/03/14	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrogen (Nitrite - Nitrate) by IC (1)	6	N/A	2020/03/11	AB SOP-00023	SM 23 4110 B m
pH @25°C (1, 6)	6	N/A	2020/03/11	AB SOP-00005	SM 23 4500-H+B m
Phenols (4-AAP) (1)	6	N/A	2020/03/12	AB SOP-00088	EPA 9066 R0 m
Total Dissolved Solids (Filt. Residue) (1)	6	2020/03/12	2020/03/12	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen (1)	5	2020/03/12	2020/03/12	AB SOP-00008	EPA 351.1 R1978 m
Total Kjeldahl Nitrogen (1)	1	2020/03/17	2020/03/18	AB SOP-00008	EPA 351.1 R1978 m
Total Suspended Solids (NFR) (1)	6	2020/03/13	2020/03/13	AB SOP-00061	SM 23 2540 D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used

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Your P.O. #: 206455RY
Your Project #: 4.4-A; SECONDARY LEACHATE QTR
Your C.O.C. #: 603408-02-01

Attention: Todd Webb

CLEAN HARBORS
P.O. BOX 390
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/03/18
Report #: R2859373
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C017805
Received: 2020/03/10, 12:00

by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by BV Labs Calgary Environmental
(2) This test was performed by BV Labs Vancouver
(3) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Silica gel clean up employed.
(5) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(6) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
18 Mar 2020 15:17:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bvlabs.com
Phone# (780) 577-7100
==========
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BV Labs Job #: C017805
Report Date: 2020/03/18

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		XN2934	XN2935	XN2936	XN2937		
Sampling Date		2020/03/10	2020/03/09	2020/03/09	2020/03/09		
COC Number		603408-02-01	603408-02-01	603408-02-01	603408-02-01		
	UNITS	**SECONDARY LEACHATE CELL 1**	**SECONDARY LEACHATE CELL 3B**	**SECONDARY LEACHATE CELL 3C**	**SECONDARY LEACHATE CELL 3D**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/L	0.14	0.58	<0.10	<0.10	0.10	9794012
Volatiles							
Benzene	ug/L	6.2	0.40	<0.40	<0.40	0.40	9794436
Toluene	ug/L	<0.40	0.47	<0.40	<0.40	0.40	9794436
Ethylbenzene	ug/L	1.6	<0.40	<0.40	<0.40	0.40	9794436
m & p-Xylene	ug/L	1.4	<0.80	<0.80	<0.80	0.80	9794436
o-Xylene	ug/L	0.68	<0.40	<0.40	<0.40	0.40	9794436
Xylenes (Total)	ug/L	2.0	<0.89	<0.89	<0.89	0.89	9792801
F1 (C6-C10) - BTEX	ug/L	<100	<100	<100	<100	100	9792801
F1 (C6-C10)	ug/L	<100	<100	<100	<100	100	9794436
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	95	95	97	97		9794436
4-Bromofluorobenzene (sur.)	%	105	104	105	103		9794436
D4-1,2-Dichloroethane (sur.)	%	103	105	101	103		9794436
O-TERPHENYL (sur.)	%	109	116	109	108		9794012
RDL = Reportable Detection Limit							

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Report Date: 2020/03/18

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		XN2938	XN2939		
Sampling Date		2020/03/09	2020/03/09		
COC Number		603408-02-01	603408-02-01		
	UNITS	**SECONDARY LEACHATE CELL 3E**	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/L	0.12	<0.10	0.10	9794012
Volatiles					
Benzene	ug/L	<0.40	<0.40	0.40	9794436
Toluene	ug/L	<0.40	<0.40	0.40	9794436
Ethylbenzene	ug/L	<0.40	<0.40	0.40	9794436
m & p-Xylene	ug/L	<0.80	<0.80	0.80	9794436
o-Xylene	ug/L	<0.40	<0.40	0.40	9794436
Xylenes (Total)	ug/L	<0.89	<0.89	0.89	9792801
F1 (C6-C10) - BTEX	ug/L	<100	<100	100	9792801
F1 (C6-C10)	ug/L	<100	<100	100	9794436
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	96	97		9794436
4-Bromofluorobenzene (sur.)	%	104	103		9794436
D4-1,2-Dichloroethane (sur.)	%	102	104		9794436
O-TERPHENYL (sur.)	%	110	107		9794012
RDL = Reportable Detection Limit					

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BV Labs Job #: C017805
Report Date: 2020/03/18

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		XN2934	XN2935			XN2936		
Sampling Date		2020/03/10	2020/03/09			2020/03/09		
COC Number		603408-02-01	603408-02-01			603408-02-01		
	UNITS	**SECONDARY LEACHATE CELL 1**	**SECONDARY LEACHATE CELL 3B**	**RDL**	**QC Batch**	**SECONDARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	<0.40	<0.40	0.40	9792885	<0.40	0.40	9792885
Elements								
Dissolved Aluminum (Al)	mg/L	<0.060	<0.060	0.060	9794959	<0.060	0.060	9794961
Dissolved Antimony (Sb)	mg/L	<0.012	<0.012	0.012	9794959	<0.012	0.012	9794961
Dissolved Arsenic (As)	mg/L	0.020	0.021	0.0040	9794959	0.0049	0.0040	9794961
Dissolved Barium (Ba)	mg/L	0.26	<0.20	0.20	9795614	0.029	0.010	9795614
Dissolved Boron (B)	mg/L	7.4	25	0.40	9795614	2.2	0.020	9795614
Dissolved Calcium (Ca)	mg/L	390	230	6.0	9795614	260	0.30	9795614
Dissolved Cobalt (Co)	mg/L	1.7	<0.0060	0.0060	9794959	<0.0060	0.0060	9794961
Dissolved Copper (Cu)	mg/L	0.012	0.0077	0.0040	9794959	0.039	0.0040	9794961
Dissolved Lead (Pb)	mg/L	<0.0040	<0.0040	0.0040	9794959	<0.0040	0.0040	9794961
Dissolved Magnesium (Mg)	mg/L	190	240	4.0	9795614	170	0.20	9795614
Dissolved Manganese (Mn)	mg/L	9.6	1.6	0.080	9795614	0.79	0.0040	9795614
Dissolved Molybdenum (Mo)	mg/L	0.14	2.1	0.0040	9794959	0.033	0.0040	9794961
Dissolved Nickel (Ni)	mg/L	12	0.17	0.010	9794959	0.041	0.010	9794961
Dissolved Phosphorus (P)	mg/L	<2.0	11	2.0	9795614	0.13	0.10	9795614
Dissolved Potassium (K)	mg/L	13	420	6.0	9795614	27	0.30	9795614
Dissolved Selenium (Se)	mg/L	0.0053	0.0063	0.0040	9794959	<0.0040	0.0040	9794961
Dissolved Silver (Ag)	mg/L	<0.0020	<0.0020	0.0020	9794959	<0.0020	0.0020	9794961
Dissolved Sodium (Na)	mg/L	2100	3900	10	9795614	1700 (1)	2.5	9795614
Dissolved Thallium (Tl)	mg/L	<0.0040	<0.0040	0.0040	9794959	<0.0040	0.0040	9794961
Dissolved Tin (Sn)	mg/L	<0.020	<0.020	0.020	9794959	<0.020	0.020	9794961
Dissolved Uranium (U)	mg/L	0.0080	0.015	0.0020	9794959	0.012	0.0020	9794961
Dissolved Zinc (Zn)	mg/L	0.41	<0.060	0.060	9794959	0.28	0.060	9794961

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C017805
Report Date: 2020/03/18

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		XN2937		XN2938		XN2939		
Sampling Date		2020/03/09		2020/03/09		2020/03/09		
COC Number		603408-02-01		603408-02-01		603408-02-01		
	UNITS	**SECONDARY LEACHATE CELL 3D**	**RDL**	**SECONDARY LEACHATE CELL 3E**	**RDL**	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	1.7	0.40	0.44	0.40	<0.40	0.40	9792885
Elements								
Dissolved Aluminum (Al)	mg/L	<0.060	0.060	<0.060	0.060	0.81	0.060	9794961
Dissolved Antimony (Sb)	mg/L	<0.012	0.012	<0.012	0.012	<0.012	0.012	9794961
Dissolved Arsenic (As)	mg/L	0.016	0.0040	0.0076	0.0040	0.0070	0.0040	9794961
Dissolved Barium (Ba)	mg/L	0.12	0.010	0.056	0.010	0.071	0.010	9795614
Dissolved Boron (B)	mg/L	8.9 (1)	0.10	2.2	0.020	1.1	0.020	9795614
Dissolved Calcium (Ca)	mg/L	500 (1)	1.5	82	0.30	500 (1)	1.5	9795614
Dissolved Cobalt (Co)	mg/L	0.0099	0.0060	<0.0060	0.0060	<0.0060	0.0060	9794961
Dissolved Copper (Cu)	mg/L	0.044	0.0040	0.018	0.0040	0.016	0.0040	9794961
Dissolved Lead (Pb)	mg/L	<0.0040	0.0040	<0.0040	0.0040	<0.0040	0.0040	9794961
Dissolved Magnesium (Mg)	mg/L	330	0.20	200	0.20	170	0.20	9795614
Dissolved Manganese (Mn)	mg/L	4.3	0.0040	0.12	0.0040	4.0	0.0040	9795614
Dissolved Molybdenum (Mo)	mg/L	3.9	0.0040	1.5	0.0040	0.28	0.0040	9794961
Dissolved Nickel (Ni)	mg/L	1.2	0.010	0.20	0.010	0.061	0.010	9794961
Dissolved Phosphorus (P)	mg/L	0.48	0.10	0.22	0.10	0.15	0.10	9795614
Dissolved Potassium (K)	mg/L	170	0.30	55	0.30	17	0.30	9795614
Dissolved Selenium (Se)	mg/L	0.0081	0.0040	<0.0040	0.0040	<0.0040	0.0040	9794961
Dissolved Silver (Ag)	mg/L	<0.0020	0.0020	<0.0020	0.0020	<0.0020	0.0020	9794961
Dissolved Sodium (Na)	mg/L	1400 (1)	2.5	1600 (1)	2.5	1700 (1)	2.5	9795614
Dissolved Thallium (Tl)	mg/L	<0.0040	0.0040	<0.0040	0.0040	<0.0040	0.0040	9794961
Dissolved Tin (Sn)	mg/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	9794961
Dissolved Uranium (U)	mg/L	0.012	0.0020	0.063	0.0020	0.090	0.0020	9794961
Dissolved Zinc (Zn)	mg/L	0.34	0.060	<0.060	0.060	6.3	0.060	9794961

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C017805
Report Date: 2020/03/18

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XN2934		XN2935		
Sampling Date		2020/03/10		2020/03/09		
COC Number		603408-02-01		603408-02-01		
	UNITS	**SECONDARY LEACHATE CELL 1**	**RDL**	**SECONDARY LEACHATE CELL 3B**	**RDL**	**QC Batch**
Demand Parameters						
Chemical Oxygen Demand	mg/L	1430	10	882	10	9795374
Misc. Inorganics						
Conductivity	uS/cm	11000	2.0	18000	2.0	9794472
Dissolved Organic Carbon (C)	mg/L	450 (1)	10	180 (1)	10	9796495
pH	pH	7.60	N/A	8.29	N/A	9794471
Total Dissolved Solids	mg/L	8400 (2)	25	>8000 (3)	10	9794934
Total Suspended Solids	mg/L	1200 (2)	5.0	9.2	1.0	9797105
Anions						
Bicarbonate (HCO3)	mg/L	1300	1.0	2700	1.0	9794467
Carbonate (CO3)	mg/L	<1.0	1.0	<1.0	1.0	9794467
Dissolved Chloride (Cl)	mg/L	1800 (4)	10	1700 (4)	10	9798141
Dissolved Sulphate (SO4)	mg/L	2500 (5)	20	6000 (5)	50	9798141
Metals						
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.00099	0.00099	<0.00099	0.00099	9799150
Nutrients						
Total Ammonia (N)	mg/L	14 (5)	0.15	170 (5)	7.5	9797827
Total Total Kjeldahl Nitrogen	mg/L	14 (4)	5.0	230 (5)	13	9794929
Dissolved Nitrite (N)	mg/L	<0.20 (1)	0.20	<0.010	0.010	9794383
Dissolved Nitrate (N)	mg/L	2.2 (1)	0.20	0.13	0.010	9794383
Misc. Organics						
Phenols	mg/L	0.094 (1)	0.038	0.22 (1)	0.015	9795406

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to sample matrix.
(2) Detection limit raised based on sample volume used for analysis.
(3) Sample exceeds calibration range.
(4) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
(5) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C017805
Report Date: 2020/03/18

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XN2936			XN2937		
Sampling Date		2020/03/09			2020/03/09		
COC Number		603408-02-01			603408-02-01		
	UNITS	**SECONDARY LEACHATE CELL 3C**	**RDL**	**QC Batch**	**SECONDARY LEACHATE CELL 3D**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	216	10	9795374	246	10	9795374
Misc. Inorganics							
Conductivity	uS/cm	8400	2.0	9794472	11000	2.0	9794472
Dissolved Organic Carbon (C)	mg/L	62 (1)	5.0	9796495	31 (1)	5.0	9796495
pH	pH	7.93	N/A	9794471	7.73	N/A	9794471
Total Dissolved Solids	mg/L	6800	10	9794934	8000	10	9794934
Total Suspended Solids	mg/L	16	1.0	9797105	4.2	1.0	9797418
Anions							
Bicarbonate (HCO3)	mg/L	870	1.0	9794467	350	1.0	9794467
Carbonate (CO3)	mg/L	<1.0	1.0	9794467	<1.0	1.0	9794467
Dissolved Chloride (Cl)	mg/L	260 (2)	2.0	9798141	2200 (2)	20	9798141
Dissolved Sulphate (SO4)	mg/L	4100 (2)	25	9798141	1700 (2)	10	9798141
Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.00099	0.00099	9799150	0.025	0.00099	9799150
Nutrients							
Total Ammonia (N)	mg/L	17 (2)	0.15	9797826	26 (2)	0.30	9797827
Total Total Kjeldahl Nitrogen	mg/L	21 (2)	2.5	9794929	<0.50 (3)	0.50	9800003
Dissolved Nitrite (N)	mg/L	0.33	0.010	9794383	2.0	0.010	9794383
Dissolved Nitrate (N)	mg/L	2.6	0.010	9794383	340 (2)	0.50	9794383
Misc. Organics							
Phenols	mg/L	0.015 (1)	0.0075	9795406	0.011 (1)	0.0075	9795406

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to sample matrix.
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.
(3) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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BV Labs Job #: C017805
Report Date: 2020/03/18

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XN2938			XN2939		
Sampling Date		2020/03/09			2020/03/09		
COC Number		603408-02-01			603408-02-01		
	UNITS	**SECONDARY LEACHATE CELL 3E**	**RDL**	**QC Batch**	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	137	10	9795374	229	10	9795374
Misc. Inorganics							
Conductivity	uS/cm	8000	2.0	9794472	9900	2.0	9794472
Dissolved Organic Carbon (C)	mg/L	32 (1)	5.0	9796495	57 (1)	5.0	9796495
pH	pH	8.30	N/A	9794471	7.72	N/A	9794471
Total Dissolved Solids	mg/L	5700	10	9794939	7300	10	9794939
Total Suspended Solids	mg/L	2.1	1.0	9797418	4.9	1.0	9797418
Anions							
Bicarbonate (HCO3)	mg/L	680	1.0	9794467	730	1.0	9794467
Carbonate (CO3)	mg/L	<1.0	1.0	9794467	<1.0	1.0	9794467
Dissolved Chloride (Cl)	mg/L	590 (2)	5.0	9796446	1700 (2)	10	9798141
Dissolved Sulphate (SO4)	mg/L	3000 (2)	20	9796446	2600 (2)	20	9798141
Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	0.0017	0.00099	9799150	<0.00099	0.00099	9799150
Nutrients							
Total Ammonia (N)	mg/L	16 (2)	0.15	9797827	0.73 (2)	0.075	9797827
Total Total Kjeldahl Nitrogen	mg/L	21 (2)	2.5	9794929	4.5 (3)	0.50	9794929
Dissolved Nitrite (N)	mg/L	0.22	0.010	9794328	0.015	0.010	9794383
Dissolved Nitrate (N)	mg/L	33 (2)	0.050	9794328	0.37	0.010	9794383
Misc. Organics							
Phenols	mg/L	0.0092 (1)	0.0075	9795406	0.015 (1)	0.0075	9795406

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to sample matrix.
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.
(3) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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BV Labs Job #: C017805
Report Date: 2020/03/18

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		XN2934	XN2935		XN2936		
Sampling Date		2020/03/10	2020/03/09		2020/03/09		
COC Number		603408-02-01	603408-02-01		603408-02-01		
	UNITS	**SECONDARY LEACHATE CELL 1**	**SECONDARY LEACHATE CELL 3B**	**RDL**	**SECONDARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Elements							
Total Mercury (Hg)	ug/L	<0.19 (1)	<0.19 (1)	0.19	<0.0019	0.0019	9797824

RDL = Reportable Detection Limit
(1) Detection limit raised based on sample volume used and sample matrix

BV Labs ID		XN2937	XN2938	XN2939		
Sampling Date		2020/03/09	2020/03/09	2020/03/09		
COC Number		603408-02-01	603408-02-01	603408-02-01		
	UNITS	**SECONDARY LEACHATE CELL 3D**	**SECONDARY LEACHATE CELL 3E**	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Elements						
Total Mercury (Hg)	ug/L	<0.0019 (1)	<0.0019	<0.0019	0.0019	9797824

RDL = Reportable Detection Limit
(1) Matrix spike exceeds acceptance limits due to probable matrix interference.

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CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		XN2934	XN2935	XN2936	XN2937		
Sampling Date		2020/03/10	2020/03/09	2020/03/09	2020/03/09		
COC Number		603408-02-01	603408-02-01	603408-02-01	603408-02-01		
	UNITS	**SECONDARY LEACHATE CELL 1**	**SECONDARY LEACHATE CELL 3B**	**SECONDARY LEACHATE CELL 3C**	**SECONDARY LEACHATE CELL 3D**	**RDL**	**QC Batch**
Elements							
Total Chromium (Cr)	mg/L	0.20	<0.20	<0.20	<0.20	0.20	9797053
Total Phosphorus (P)	mg/L	12	11	<2.0	<2.0	2.0	9797053
RDL = Reportable Detection Limit							

BV Labs ID		XN2938	XN2939		
Sampling Date		2020/03/09	2020/03/09		
COC Number		603408-02-01	603408-02-01		
	UNITS	**SECONDARY LEACHATE CELL 3E**	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Elements					
Total Chromium (Cr)	mg/L	<0.20	<0.20	0.20	9797053
Total Phosphorus (P)	mg/L	<2.0	<2.0	2.0	9797053
RDL = Reportable Detection Limit					

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CLEAN HARBORS
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Sampler Initials: MN

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.0°C
Package 2	0.7°C

Sample XN2937 [SECONDARY LEACHATE CELL 3D] : Dissolved Chromium < Dissolved Hexavalent Chromium. High Hexavalent result is likely due to matrix interference.

Sample XN2938 [SECONDARY LEACHATE CELL 3E] : Dissolved Chromium < Dissolved Hexavalent Chromium. High Hexavalent result is likely due to matrix interference.

REGULATED METALS (CCME/AT1) - DISSOLVED Comments

Sample XN2934 [SECONDARY LEACHATE CELL 1] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XN2934 [SECONDARY LEACHATE CELL 1] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2935 [SECONDARY LEACHATE CELL 3B] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XN2935 [SECONDARY LEACHATE CELL 3B] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2936 [SECONDARY LEACHATE CELL 3C] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XN2937 [SECONDARY LEACHATE CELL 3D] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XN2938 [SECONDARY LEACHATE CELL 3E] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample XN2939 [SECONDARY LEACHATE CELL 4] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments

Sample XN2934 [SECONDARY LEACHATE CELL 1] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2935 [SECONDARY LEACHATE CELL 3B] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2936 [SECONDARY LEACHATE CELL 3C] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2937 [SECONDARY LEACHATE CELL 3D] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2938 [SECONDARY LEACHATE CELL 3E] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample XN2939 [SECONDARY LEACHATE CELL 4] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9794012	O-TERPHENYL (sur.)	2020/03/11	107	60 - 140	119	60 - 140	110	%				
9794436	1,4-Difluorobenzene (sur.)	2020/03/11	102	50 - 140	102	50 - 140	101	%				
9794436	4-Bromofluorobenzene (sur.)	2020/03/11	99	50 - 140	100	50 - 140	98	%				
9794436	D4-1,2-Dichloroethane (sur.)	2020/03/11	100	50 - 140	101	50 - 140	105	%				
9794012	F2 (C10-C16 Hydrocarbons)	2020/03/11	106	60 - 140	102	60 - 140	<0.10	mg/L	NC	30		
9794328	Dissolved Nitrate (N)	2020/03/11	119	80 - 120	101	80 - 120	<0.010	mg/L	0.31	20		
9794328	Dissolved Nitrite (N)	2020/03/11	76 (1)	80 - 120	97	80 - 120	<0.010	mg/L	NC	20		
9794383	Dissolved Nitrate (N)	2020/03/11	NC	80 - 120	103	80 - 120	<0.010	mg/L	0.064	20		
9794383	Dissolved Nitrite (N)	2020/03/11	NC	80 - 120	97	80 - 120	<0.010	mg/L	0.24	20		
9794436	Benzene	2020/03/11	106	50 - 140	107	60 - 130	<0.40	ug/L	NC	30		
9794436	Ethylbenzene	2020/03/11	108	50 - 140	108	60 - 130	<0.40	ug/L	NC	30		
9794436	F1 (C6-C10)	2020/03/11	87	60 - 140	93	60 - 140	<100	ug/L	NC	30		
9794436	m & p-Xylene	2020/03/11	109	50 - 140	108	60 - 130	<0.80	ug/L	NC	30		
9794436	o-Xylene	2020/03/11	106	50 - 140	106	60 - 130	<0.40	ug/L	NC	30		
9794436	Toluene	2020/03/11	103	50 - 140	103	60 - 130	<0.40	ug/L	NC	30		
9794467	Bicarbonate (HCO3)	2020/03/11					<1.0	mg/L	0.054	20		
9794467	Carbonate (CO3)	2020/03/11					<1.0	mg/L	NC	20		
9794471	pH	2020/03/11			99	97 - 103			1.5	N/A		
9794472	Conductivity	2020/03/11			100	90 - 110	<2.0	uS/cm	0.62	10		
9794929	Total Total Kjeldahl Nitrogen	2020/03/12	NC	80 - 120	100	80 - 120	<0.050	mg/L	6.3 (2)	20	108	80 - 120
9794934	Total Dissolved Solids	2020/03/12	98	80 - 120	94	80 - 120	<10	mg/L	NC	20		
9794939	Total Dissolved Solids	2020/03/12	94	80 - 120	94	80 - 120	<10	mg/L	0.11	20		
9794959	Dissolved Aluminum (Al)	2020/03/12	85	80 - 120	94	80 - 120	<0.0030	mg/L	NC	20		
9794959	Dissolved Antimony (Sb)	2020/03/12	84	80 - 120	94	80 - 120	<0.00060	mg/L	NC	20		
9794959	Dissolved Arsenic (As)	2020/03/12	87	80 - 120	94	80 - 120	<0.00020	mg/L	3.4	20		
9794959	Dissolved Cobalt (Co)	2020/03/12	87	80 - 120	103	80 - 120	<0.00030	mg/L	NC	20		
9794959	Dissolved Copper (Cu)	2020/03/12	86	80 - 120	105	80 - 120	<0.00020	mg/L	NC	20		
9794959	Dissolved Lead (Pb)	2020/03/12	86	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20		
9794959	Dissolved Molybdenum (Mo)	2020/03/12	93	80 - 120	101	80 - 120	<0.00020	mg/L	15	20		
9794959	Dissolved Nickel (Ni)	2020/03/12	87	80 - 120	103	80 - 120	<0.00050	mg/L	NC	20		
9794959	Dissolved Selenium (Se)	2020/03/12	87	80 - 120	101	80 - 120	<0.00020	mg/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9794959	Dissolved Silver (Ag)	2020/03/12	80	80 - 120	100	80 - 120	<0.00010	mg/L	NC	20		
9794959	Dissolved Thallium (Tl)	2020/03/12	87	80 - 120	99	80 - 120	<0.00020	mg/L	NC	20		
9794959	Dissolved Tin (Sn)	2020/03/12	90	80 - 120	97	80 - 120	<0.0010	mg/L	NC	20		
9794959	Dissolved Uranium (U)	2020/03/12	96	80 - 120	109	80 - 120	<0.00010	mg/L	3.8	20		
9794959	Dissolved Zinc (Zn)	2020/03/12	82	80 - 120	102	80 - 120	<0.0030	mg/L	NC	20		
9794961	Dissolved Aluminum (Al)	2020/03/12	105	80 - 120	86	80 - 120	<0.0030	mg/L	NC	20		
9794961	Dissolved Antimony (Sb)	2020/03/12	96	80 - 120	87	80 - 120	<0.00060	mg/L	NC	20		
9794961	Dissolved Arsenic (As)	2020/03/12	94	80 - 120	90	80 - 120	<0.00020	mg/L	1.4	20		
9794961	Dissolved Cobalt (Co)	2020/03/12	96	80 - 120	92	80 - 120	<0.00030	mg/L	NC	20		
9794961	Dissolved Copper (Cu)	2020/03/12	98	80 - 120	91	80 - 120	<0.00020	mg/L	11	20		
9794961	Dissolved Lead (Pb)	2020/03/12	97	80 - 120	91	80 - 120	<0.00020	mg/L	NC	20		
9794961	Dissolved Molybdenum (Mo)	2020/03/12	NC	80 - 120	91	80 - 120	<0.00020	mg/L	2.2	20		
9794961	Dissolved Nickel (Ni)	2020/03/12	NC	80 - 120	90	80 - 120	<0.00050	mg/L	5.5	20		
9794961	Dissolved Selenium (Se)	2020/03/12	110	80 - 120	92	80 - 120	<0.00020	mg/L	NC	20		
9794961	Dissolved Silver (Ag)	2020/03/12	102	80 - 120	92	80 - 120	<0.00010	mg/L	NC	20		
9794961	Dissolved Thallium (Tl)	2020/03/12	98	80 - 120	90	80 - 120	<0.00020	mg/L	NC	20		
9794961	Dissolved Tin (Sn)	2020/03/12	102	80 - 120	93	80 - 120	<0.0010	mg/L	NC	20		
9794961	Dissolved Uranium (U)	2020/03/12	NC	80 - 120	94	80 - 120	<0.00010	mg/L	5.9	20		
9794961	Dissolved Zinc (Zn)	2020/03/12	96	80 - 120	95	80 - 120	<0.0030	mg/L	NC	20		
9795374	Chemical Oxygen Demand	2020/03/12	110	80 - 120	100	80 - 120	<10	mg/L	5.2	20		
9795406	Phenols	2020/03/12	59 (1)	80 - 120	90	80 - 120	<0.0015	mg/L	6.9	20		
9795614	Dissolved Barium (Ba)	2020/03/12	96	80 - 120	96	80 - 120	<0.010	mg/L				
9795614	Dissolved Boron (B)	2020/03/12	100	80 - 120	96	80 - 120	<0.020	mg/L				
9795614	Dissolved Calcium (Ca)	2020/03/12	98	80 - 120	96	80 - 120	<0.30	mg/L	NC	20		
9795614	Dissolved Magnesium (Mg)	2020/03/12	100	80 - 120	99	80 - 120	<0.20	mg/L	NC	20		
9795614	Dissolved Manganese (Mn)	2020/03/12	101	80 - 120	97	80 - 120	<0.0040	mg/L				
9795614	Dissolved Phosphorus (P)	2020/03/12	101	80 - 120	96	80 - 120	<0.10	mg/L				
9795614	Dissolved Potassium (K)	2020/03/12	100	80 - 120	99	80 - 120	<0.30	mg/L				
9795614	Dissolved Sodium (Na)	2020/03/12	98	80 - 120	97	80 - 120	<0.50	mg/L				
9796446	Dissolved Chloride (Cl)	2020/03/12	104	80 - 120	104	80 - 120	<1.0	mg/L	7.6	20		
9796446	Dissolved Sulphate (SO4)	2020/03/12	NC	80 - 120	111	80 - 120	<1.0	mg/L	4.8	20		

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QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9796495	Dissolved Organic Carbon (C)	2020/03/13	95	80 - 120	97	80 - 120	<0.50	mg/L	6.0	20		
9797053	Total Chromium (Cr)	2020/03/13	97	80 - 120	97	80 - 120	<0.010	mg/L	NC	20		
9797053	Total Phosphorus (P)	2020/03/13	100	80 - 120	98	80 - 120	<0.10	mg/L	0.31	20		
9797105	Total Suspended Solids	2020/03/13	94	80 - 120	97	80 - 120	<1.0	mg/L	NC	20		
9797418	Total Suspended Solids	2020/03/13	92	80 - 120	99	80 - 120	<1.0	mg/L	NC	20		
9797824	Total Mercury (Hg)	2020/03/14	67 (1)	80 - 120	80	80 - 120	<0.0019	ug/L	NC	20		
9797826	Total Ammonia (N)	2020/03/14	96	80 - 120	101	80 - 120	<0.015	mg/L	NC	20		
9797827	Total Ammonia (N)	2020/03/14	NC	80 - 120	101	80 - 120	<0.015	mg/L	2.1 (2)	20		
9798141	Dissolved Chloride (Cl)	2020/03/15	103	80 - 120	102	80 - 120	<1.0	mg/L	6.6	20		
9798141	Dissolved Sulphate (SO4)	2020/03/15	NC	80 - 120	101	80 - 120	<1.0	mg/L	5.8	20		
9799150	Dissolved Hex. Chromium (Cr 6+)	2020/03/16	91	80 - 120	99	80 - 120	<0.00099	mg/L	10	20		
9800003	Total Total Kjeldahl Nitrogen	2020/03/18	NC	80 - 120	114	80 - 120	<0.050	mg/L	3.1	20	107	80 - 120

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Detection limits raised due to dilution to bring analyte within the calibrated range.

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CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Andy Lu, Ph.D., P.Chem., Scientific Specialist

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Janet Gao, B.Sc., QP, Supervisor, Organics

Harry (Peng) Liang, Senior Analyst

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Your P.O. #: 206455RY
Your Project #: 4.4-A; SECONDARY LEACHATE QTR
Your C.O.C. #: 603408-03-01

Attention: Todd Webb

CLEAN HARBORS
P.O. BOX 390
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/03/20
Report #: R2860305
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C018774
Received: 2020/03/13, 10:09

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	1	N/A	2020/03/16	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID (1)	1	N/A	2020/03/16	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	1	N/A	2020/03/17		Auto Calc
Cadmium - low level CCME - Dissolved (1)	1	N/A	2020/03/18		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	1	N/A	2020/03/17	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
COD by Colorimeter (1)	1	N/A	2020/03/16	AB SOP-00016	SM 23 5220D m
Dissolved Hexavalent Chromium (1)	1	N/A	2020/03/16	AB SOP-00063	SM 23 3500-Cr B m
Carbon (DOC) (1, 3)	1	N/A	2020/03/19	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	1	N/A	2020/03/16	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 4)	1	2020/03/16	2020/03/16	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Mercury (Total) by CV (2)	1	2020/03/17	2020/03/18	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 5)	1	N/A	2020/03/17	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	1	2020/03/17	2020/03/17	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Dissolved (1, 5)	1	N/A	2020/03/16	AB SOP-00043	EPA 6020b R2 m
Ammonia-N (Total) (1)	1	N/A	2020/03/19	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate and Nitrite (1)	1	N/A	2020/03/17		Auto Calc
Nitrate + Nitrite-N (calculated) (1)	1	N/A	2020/03/17		Auto Calc
Nitrogen (Nitrite - Nitrate) by IC (1)	1	N/A	2020/03/17	AB SOP-00023	SM 23 4110 B m
pH @25°C (1, 6)	1	N/A	2020/03/16	AB SOP-00005	SM 23 4500-H+B m
Phenols (4-AAP) (1)	1	N/A	2020/03/16	AB SOP-00088	EPA 9066 R0 m
Total Dissolved Solids (Filt. Residue) (1)	1	2020/03/18	2020/03/18	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen (1)	1	2020/03/16	2020/03/18	AB SOP-00008	EPA 351.1 R1978 m
Total Suspended Solids (NFR) (1)	1	2020/03/17	2020/03/17	AB SOP-00061	SM 23 2540 D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All

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Your P.O. #: 206455RY
Your Project #: 4.4-A; SECONDARY LEACHATE QTR
Your C.O.C. #: 603408-03-01

Attention: Todd Webb

CLEAN HARBORS
P.O. BOX 390
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/03/20
Report #: R2860305
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C018774
Received: 2020/03/13, 10:09

data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by BV Labs Calgary Environmental
(2) This test was performed by BV Labs Vancouver
(3) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Silica gel clean up employed.
(5) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(6) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
20 Mar 2020 12:15:12

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bvlabs.com
Phone# (780) 577-7100
==========
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Bureau Veritas Laboratories Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

BV Labs Job #: C018774
Report Date: 2020/03/20

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		XN7563		
Sampling Date		2020/03/12		
COC Number		603408-03-01		
	UNITS	**SC3A(SECONDARY LEACHATE CELL 3A**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/L	0.14	0.10	9796027
Volatiles				
Benzene	ug/L	0.87	0.40	9797857
Toluene	ug/L	5.6	0.40	9797857
Ethylbenzene	ug/L	0.71	0.40	9797857
m & p-Xylene	ug/L	<0.80	0.80	9797857
o-Xylene	ug/L	<0.40	0.40	9797857
Xylenes (Total)	ug/L	<0.89	0.89	9796788
F1 (C6-C10) - BTEX	ug/L	<100	100	9796788
F1 (C6-C10)	ug/L	<100	100	9797857
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	93		9797857
4-Bromofluorobenzene (sur.)	%	99		9797857
D4-1,2-Dichloroethane (sur.)	%	90		9797857
O-TERPHENYL (sur.)	%	126		9796027
RDL = Reportable Detection Limit				

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BV Labs Job #: C018774
Report Date: 2020/03/20

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		XN7563		
Sampling Date		2020/03/12		
COC Number		603408-03-01		
	UNITS	**SC3A(SECONDARY LEACHATE CELL 3A**	**RDL**	**QC Batch**
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	1.3	0.020	9796702
Elements				
Dissolved Aluminum (Al)	mg/L	0.040	0.0030	9798565
Dissolved Antimony (Sb)	mg/L	0.0050	0.00060	9798565
Dissolved Arsenic (As)	mg/L	0.0062	0.00020	9798565
Dissolved Barium (Ba)	mg/L	0.12	0.10	9798099
Dissolved Boron (B)	mg/L	0.63	0.20	9798099
Dissolved Calcium (Ca)	mg/L	470	3.0	9798099
Dissolved Cobalt (Co)	mg/L	0.029	0.00030	9798565
Dissolved Copper (Cu)	mg/L	0.030	0.00020	9798565
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	9798565
Dissolved Magnesium (Mg)	mg/L	370	2.0	9798099
Dissolved Manganese (Mn)	mg/L	7.2	0.040	9798099
Dissolved Molybdenum (Mo)	mg/L	1.1	0.00020	9798565
Dissolved Nickel (Ni)	mg/L	0.42	0.00050	9798565
Dissolved Phosphorus (P)	mg/L	<1.0	1.0	9798099
Dissolved Potassium (K)	mg/L	44	3.0	9798099
Dissolved Selenium (Se)	mg/L	0.0018	0.00020	9798565
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	9798565
Dissolved Sodium (Na)	mg/L	3600 (1)	5.0	9798099
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	9798565
Dissolved Tin (Sn)	mg/L	0.0047	0.0010	9798565
Dissolved Uranium (U)	mg/L	0.043	0.00010	9798565
Dissolved Zinc (Zn)	mg/L	0.10	0.0030	9798565

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C018774
Report Date: 2020/03/20

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XN7563		
Sampling Date		2020/03/12		
COC Number		603408-03-01		
	UNITS	**SC3A(SECONDARY LEACHATE CELL 3A**	**RDL**	**QC Batch**
Calculated Parameters				
Dissolved Nitrate (NO3)	mg/L	<0.22	0.22	9796700
Nitrate plus Nitrite (N)	mg/L	<0.071	0.071	9796701
Dissolved Nitrite (NO2)	mg/L	<0.16	0.16	9796700
Demand Parameters				
Chemical Oxygen Demand	mg/L	400	10	9798997
Misc. Inorganics				
Conductivity	uS/cm	15000	2.0	9798660
Dissolved Organic Carbon (C)	mg/L	120 (1)	2.5	9799734
pH	pH	7.75	N/A	9798659
Total Dissolved Solids	mg/L	>8000 (2)	10	9800610
Total Suspended Solids	mg/L	190 (3)	2.1	9800297
Anions				
Bicarbonate (HCO3)	mg/L	890	1.0	9798657
Carbonate (CO3)	mg/L	<1.0	1.0	9798657
Dissolved Chloride (Cl)	mg/L	520 (4)	5.0	9799209
Dissolved Sulphate (SO4)	mg/L	8800 (4)	50	9799209
Metals				
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.00099	0.00099	9799150
Nutrients				
Total Ammonia (N)	mg/L	38 (4)	0.38	9801816
Total Total Kjeldahl Nitrogen	mg/L	54 (4)	2.5	9798980
Dissolved Nitrite (N)	mg/L	<0.050 (5)	0.050	9797867
Dissolved Nitrate (N)	mg/L	<0.050 (5)	0.050	9797867
Misc. Organics				
Phenols	mg/L	<0.0075 (1)	0.0075	9798187

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to sample matrix.
(2) Sample exceeds calibration range.
(3) Detection limit raised based on sample volume used for analysis.
(4) Detection limits raised due to dilution to bring analyte within the calibrated range.
(5) Detection limits raised due to matrix interference.

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BV Labs Job #: C018774
Report Date: 2020/03/20

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		XN7563		
Sampling Date		2020/03/12		
COC Number		603408-03-01		
	UNITS	**SC3A(SECONDARY LEACHATE CELL 3A**	**RDL**	**QC Batch**
Elements				
Total Mercury (Hg)	ug/L	<0.19 (1)	0.19	9800465

RDL = Reportable Detection Limit
(1) Detection limit raised based on sample volume used and sample matrix

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BV Labs Job #: C018774
Report Date: 2020/03/20

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		XN7563		
Sampling Date		2020/03/12		
COC Number		603408-03-01		
	UNITS	**SC3A(SECONDARY LEACHATE CELL 3A**	**RDL**	**QC Batch**
Elements				
Total Chromium (Cr)	mg/L	<0.10	0.10	9799642
Total Phosphorus (P)	mg/L	<1.0	1.0	9799642
RDL = Reportable Detection Limit				

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BV Labs Job #: C018774
Report Date: 2020/03/20

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.7°C

Sample XN7563 [SC3A(SECONDARY LEACHATE CELL 3A] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments

Sample XN7563 [SC3A(SECONDARY LEACHATE CELL 3A] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

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BV Labs Job #: C018774
Report Date: 2020/03/20

QUALITY ASSURANCE REPORT

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9796027	O-TERPHENYL (sur.)	2020/03/16	118	60 - 140	121	60 - 140	123	%				
9797857	1,4-Difluorobenzene (sur.)	2020/03/16	93	50 - 140	95	50 - 140	97	%				
9797857	4-Bromofluorobenzene (sur.)	2020/03/16	99	50 - 140	99	50 - 140	100	%				
9797857	D4-1,2-Dichloroethane (sur.)	2020/03/16	94	50 - 140	91	50 - 140	91	%				
9796027	F2 (C10-C16 Hydrocarbons)	2020/03/16	102	60 - 140	102	60 - 140	<0.10	mg/L	NC	30		
9797857	Benzene	2020/03/16	NC	50 - 140	99	60 - 130	<0.40	ug/L	3.0	30		
9797857	Ethylbenzene	2020/03/16	93	50 - 140	98	60 - 130	<0.40	ug/L	NC	30		
9797857	F1 (C6-C10)	2020/03/16	79	60 - 140	103	60 - 140	<100	ug/L	3.8	30		
9797857	m & p-Xylene	2020/03/16	92	50 - 140	96	60 - 130	<0.80	ug/L	NC	30		
9797857	o-Xylene	2020/03/16	94	50 - 140	97	60 - 130	<0.40	ug/L	NC	30		
9797857	Toluene	2020/03/16	92	50 - 140	96	60 - 130	<0.40	ug/L	NC	30		
9797867	Dissolved Nitrate (N)	2020/03/16	104	80 - 120	102	80 - 120	<0.010	mg/L	7.9	20		
9797867	Dissolved Nitrite (N)	2020/03/16	99	80 - 120	97	80 - 120	<0.010	mg/L	NC	20		
9798099	Dissolved Barium (Ba)	2020/03/16	98	80 - 120	101	80 - 120	<0.010	mg/L	0.97	20		
9798099	Dissolved Boron (B)	2020/03/16	102	80 - 120	102	80 - 120	<0.020	mg/L	2.1	20		
9798099	Dissolved Calcium (Ca)	2020/03/16	92	80 - 120	97	80 - 120	<0.30	mg/L	1.5	20		
9798099	Dissolved Magnesium (Mg)	2020/03/16	99	80 - 120	101	80 - 120	<0.20	mg/L	1.1	20		
9798099	Dissolved Manganese (Mn)	2020/03/16	102	80 - 120	102	80 - 120	<0.0040	mg/L	2.1	20		
9798099	Dissolved Phosphorus (P)	2020/03/16	102	80 - 120	99	80 - 120	<0.10	mg/L	NC	20		
9798099	Dissolved Potassium (K)	2020/03/16	100	80 - 120	100	80 - 120	<0.30	mg/L	1.5	20		
9798099	Dissolved Sodium (Na)	2020/03/16	NC	80 - 120	98	80 - 120	<0.50	mg/L	1.2	20		
9798187	Phenols	2020/03/16	98	80 - 120	94	80 - 120	<0.0015	mg/L	NC	20		
9798565	Dissolved Aluminum (Al)	2020/03/16	94	80 - 120	94	80 - 120	<0.0030	mg/L	NC	20		
9798565	Dissolved Antimony (Sb)	2020/03/16	90	80 - 120	90	80 - 120	<0.00060	mg/L	NC	20		
9798565	Dissolved Arsenic (As)	2020/03/16	95	80 - 120	97	80 - 120	<0.00020	mg/L	2.1	20		
9798565	Dissolved Cobalt (Co)	2020/03/16	92	80 - 120	90	80 - 120	<0.00030	mg/L	12	20		
9798565	Dissolved Copper (Cu)	2020/03/16	89	80 - 120	94	80 - 120	<0.00020	mg/L	NC	20		
9798565	Dissolved Lead (Pb)	2020/03/16	91	80 - 120	96	80 - 120	<0.00020	mg/L	NC	20		
9798565	Dissolved Molybdenum (Mo)	2020/03/16	100	80 - 120	95	80 - 120	<0.00020	mg/L	2.7	20		
9798565	Dissolved Nickel (Ni)	2020/03/16	88	80 - 120	93	80 - 120	<0.00050	mg/L	NC	20		
9798565	Dissolved Selenium (Se)	2020/03/16	95	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20		

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BV Labs Job #: C018774
Report Date: 2020/03/20

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9798565	Dissolved Silver (Ag)	2020/03/16	95	80 - 120	94	80 - 120	<0.00010	mg/L	NC	20		
9798565	Dissolved Thallium (Tl)	2020/03/16	95	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20		
9798565	Dissolved Tin (Sn)	2020/03/16	97	80 - 120	98	80 - 120	<0.0010	mg/L	NC	20		
9798565	Dissolved Uranium (U)	2020/03/16	105	80 - 120	104	80 - 120	<0.00010	mg/L	0.76	20		
9798565	Dissolved Zinc (Zn)	2020/03/16	89	80 - 120	92	80 - 120	<0.0030	mg/L	NC	20		
9798657	Bicarbonate (HCO3)	2020/03/16					<1.0	mg/L	0.19	20		
9798657	Carbonate (CO3)	2020/03/16					<1.0	mg/L	NC	20		
9798659	pH	2020/03/16			100	97 - 103			0.081	N/A		
9798660	Conductivity	2020/03/16			100	90 - 110	<2.0	uS/cm	0.29	10		
9798980	Total Total Kjeldahl Nitrogen	2020/03/18	108	80 - 120	109	80 - 120	<0.050	mg/L	NC	20	111	80 - 120
9798997	Chemical Oxygen Demand	2020/03/16	106	80 - 120	101	80 - 120	<10	mg/L	13	20		
9799150	Dissolved Hex. Chromium (Cr 6+)	2020/03/16	91	80 - 120	99	80 - 120	<0.00099	mg/L	10	20		
9799209	Dissolved Chloride (Cl)	2020/03/16	NC	80 - 120	106	80 - 120	<1.0	mg/L	5.1	20		
9799209	Dissolved Sulphate (SO4)	2020/03/16	NC	80 - 120	102	80 - 120	<1.0	mg/L	0.57	20		
9799642	Total Chromium (Cr)	2020/03/17	94	80 - 120	95	80 - 120	<0.010	mg/L				
9799642	Total Phosphorus (P)	2020/03/17	96	80 - 120	97	80 - 120	<0.10	mg/L				
9799734	Dissolved Organic Carbon (C)	2020/03/19	112	80 - 120	101	80 - 120	<0.50	mg/L	0.80	20		
9800297	Total Suspended Solids	2020/03/17	95	80 - 120	100	80 - 120	<1.0	mg/L	6.8	20		
9800465	Total Mercury (Hg)	2020/03/18	70 (1)	80 - 120	101	80 - 120	<0.0019	ug/L	NC	20		
9800610	Total Dissolved Solids	2020/03/18	102	80 - 120	97	80 - 120	<10	mg/L	0.36	20		

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BV Labs Job #: C018774
Report Date: 2020/03/20

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9801816	Total Ammonia (N)	2020/03/19	113	80 - 120	100	80 - 120	<0.015	mg/L	NC	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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BV Labs Job #: C018774
Report Date: 2020/03/20

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR
Your P.O. #: 206455RY
Sampler Initials: MN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Janet Gao, B.Sc., QP, Supervisor, Organics

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Rob Reinert, B.Sc., Scientific Specialist

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APPENDIX F

Leak Detection Liquid Analysis

Quarter 2

Your P.O. #: 207709RY
Your Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your C.O.C. #: 607716-01-01

Attention: Todd Webb

CLEAN HARBORS
P.O. BOX 390
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/05/05
Report #: R2875827
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C028361
Received: 2020/04/28, 09:00

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	6	N/A	2020/04/29	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID (1)	6	N/A	2020/04/30	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	6	N/A	2020/05/01		Auto Calc
Cadmium - low level CCME - Dissolved (1)	6	N/A	2020/05/01		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	4	N/A	2020/05/02	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
Chloride/Sulphate by Auto Colourimetry (1)	2	N/A	2020/05/03	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
COD by Colorimeter (1)	6	N/A	2020/04/30	AB SOP-00016	SM 23 5220D m
Dissolved Hexavalent Chromium (1)	6	N/A	2020/05/05	AB SOP-00063	SM 23 3500-Cr B m
Carbon (DOC) (1, 2)	6	N/A	2020/04/30	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	6	N/A	2020/04/29	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 3)	2	2020/04/29	2020/04/29	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 3)	4	2020/04/29	2020/04/30	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Mercury (Total) by CV (1)	6	2020/05/05	2020/05/05	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 4)	5	N/A	2020/04/29	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Dissolved (1, 4)	1	N/A	2020/04/30	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	6	2020/05/04	2020/05/04	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Dissolved (1, 4)	6	N/A	2020/04/30	AB SOP-00043	EPA 6020b R2 m
Ammonia-N (Total) (1)	5	N/A	2020/04/30	AB SOP-00007	SM 23 4500 NH3 A G m
Ammonia-N (Total) (1)	1	N/A	2020/05/01	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrogen (Nitrite - Nitrate) by IC (1)	6	N/A	2020/04/29	AB SOP-00023	SM 23 4110 B m
pH @25°C (1, 5)	6	N/A	2020/04/29	AB SOP-00005	SM 23 4500-H+B m
Phenols (4-AAP) (1)	6	N/A	2020/05/01	AB SOP-00088	EPA 9066 R0 m
Total Dissolved Solids (Filt. Residue) (1)	6	2020/05/01	2020/05/01	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen (1)	6	2020/04/30	2020/05/01	AB SOP-00008	EPA 351.1 R1978 m
Total Suspended Solids (NFR) (1)	6	2020/05/01	2020/05/01	AB SOP-00061	SM 23 2540 D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used

Bureau Veritas Laboratories Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Your P.O. #: 207709RY
Your Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your C.O.C. #: 607716-01-01

Attention: Todd Webb

CLEAN HARBORS
P.O. BOX 390
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/05/05
Report #: R2875827
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C028361
Received: 2020/04/28, 09:00

by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by BV Labs Calgary Environmental
(2) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(3) Silica gel clean up employed.
(4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
05 May 2020 23:19:02

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bvlabs.com
Phone# (780) 577-7100
==========
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BV Labs Job #: C028361
Report Date: 2020/05/05

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		XR8694	XR8695	XR8696		
Sampling Date		2020/04/27	2020/04/27	2020/04/27		
COC Number		607716-01-01	607716-01-01	607716-01-01		
	UNITS	**SECONDARY LEACHATE CELL 3A**	**SECONDARY LEACHATE CELL 3B**	**SECONDARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	9832624
Volatiles						
Benzene	ug/L	1.4	<0.40	<0.40	0.40	9834540
Toluene	ug/L	3.0	<0.40	<0.40	0.40	9834540
Ethylbenzene	ug/L	0.99	<0.40	<0.40	0.40	9834540
m & p-Xylene	ug/L	0.95	<0.80	<0.80	0.80	9834540
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	9834540
Xylenes (Total)	ug/L	0.95	<0.89	<0.89	0.89	9833891
F1 (C6-C10) - BTEX	ug/L	<100	<100	<100	100	9833891
F1 (C6-C10)	ug/L	<100	<100	<100	100	9834540
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	97	99	101		9834540
4-Bromofluorobenzene (sur.)	%	100	98	102		9834540
D4-1,2-Dichloroethane (sur.)	%	102	103	105		9834540
O-TERPHENYL (sur.)	%	110	114	111		9832624
RDL = Reportable Detection Limit						

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BV Labs Job #: C028361
Report Date: 2020/05/05

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		XR8697	XR8698	XR8699		
Sampling Date		2020/04/27	2020/04/27	2020/04/27		
COC Number		607716-01-01	607716-01-01	607716-01-01		
	UNITS	**SECONDARY LEACHATE CELL 3D**	**SECONDARY LEACHATE CELL 3E**	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.69	<0.10	0.10	9834658
Volatiles						
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	9834540
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	9834540
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	9834540
m & p-Xylene	ug/L	<0.80	<0.80	<0.80	0.80	9834540
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	9834540
Xylenes (Total)	ug/L	<0.89	<0.89	<0.89	0.89	9833891
F1 (C6-C10) - BTEX	ug/L	<100	<100	<100	100	9833891
F1 (C6-C10)	ug/L	<100	<100	<100	100	9834540
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	96	100	100		9834540
4-Bromofluorobenzene (sur.)	%	100	98	100		9834540
D4-1,2-Dichloroethane (sur.)	%	105	102	101		9834540
O-TERPHENYL (sur.)	%	109	112	109		9834658
RDL = Reportable Detection Limit						

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BV Labs Job #: C028361
Report Date: 2020/05/05

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		XR8694		XR8695		XR8696		
Sampling Date		2020/04/27		2020/04/27		2020/04/27		
COC Number		607716-01-01		607716-01-01		607716-01-01		
	UNITS	**SECONDARY LEACHATE CELL 3A**	**RDL**	**SECONDARY LEACHATE CELL 3B**	**RDL**	**SECONDARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	0.078	0.040	0.16	0.020	<0.020	0.020	9833900
Elements								
Dissolved Aluminum (Al)	mg/L	0.043	0.0060	0.014	0.0030	0.0061	0.0030	9836601
Dissolved Antimony (Sb)	mg/L	0.0051	0.0012	0.00078	0.00060	<0.00060	0.00060	9836601
Dissolved Arsenic (As)	mg/L	0.0052	0.00040	0.0048	0.00020	0.0014	0.00020	9836601
Dissolved Barium (Ba)	mg/L	0.088	0.010	0.16	0.010	0.039	0.010	9835270
Dissolved Boron (B)	mg/L	0.37	0.020	0.89	0.020	1.7	0.020	9835270
Dissolved Calcium (Ca)	mg/L	380	0.30	350	0.30	270	0.30	9835270
Dissolved Cobalt (Co)	mg/L	0.015	0.00060	0.0043	0.00030	0.00075	0.00030	9836601
Dissolved Copper (Cu)	mg/L	0.0010	0.00040	0.0035	0.00020	0.0057	0.00020	9836601
Dissolved Lead (Pb)	mg/L	<0.00040	0.00040	0.0018	0.00020	<0.00020	0.00020	9836601
Dissolved Magnesium (Mg)	mg/L	300	0.20	210	0.20	160	0.20	9835270
Dissolved Manganese (Mn)	mg/L	5.4	0.0040	6.7	0.0040	2.7	0.0040	9835270
Dissolved Molybdenum (Mo)	mg/L	0.54	0.00040	0.16	0.00020	0.012	0.00020	9836601
Dissolved Nickel (Ni)	mg/L	0.38	0.0010	0.029	0.00050	0.030	0.00050	9836601
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	4.4	0.10	0.10	0.10	9835270
Dissolved Potassium (K)	mg/L	46	0.30	35	0.30	19	0.30	9835270
Dissolved Selenium (Se)	mg/L	0.0016	0.00040	0.0014	0.00020	0.00060	0.00020	9836601
Dissolved Silver (Ag)	mg/L	<0.00020	0.00020	<0.00010	0.00010	<0.00010	0.00010	9836601
Dissolved Sodium (Na)	mg/L	3100 (1)	5.0	2500 (1)	5.0	1700 (1)	2.5	9835270
Dissolved Thallium (Tl)	mg/L	<0.00040	0.00040	<0.00020	0.00020	<0.00020	0.00020	9836601
Dissolved Tin (Sn)	mg/L	0.0057	0.0020	0.0016	0.0010	<0.0010	0.0010	9836601
Dissolved Uranium (U)	mg/L	0.028	0.00020	0.084	0.00010	0.010	0.00010	9836601
Dissolved Zinc (Zn)	mg/L	0.11	0.0060	0.049	0.0030	0.040	0.0030	9836601

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C028361
Report Date: 2020/05/05

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		XR8697		XR8698	XR8699		
Sampling Date		2020/04/27		2020/04/27	2020/04/27		
COC Number		607716-01-01		607716-01-01	607716-01-01		
	UNITS	**SECONDARY LEACHATE CELL 3D**	**RDL**	**SECONDARY LEACHATE CELL 3E**	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Low Level Elements							
Dissolved Cadmium (Cd)	ug/L	0.86	0.020	0.33	0.16	0.020	9833900
Elements							
Dissolved Aluminum (Al)	mg/L	0.0058	0.0030	0.0054	0.013	0.0030	9836601
Dissolved Antimony (Sb)	mg/L	0.0014	0.00060	0.0015	0.0010	0.00060	9836601
Dissolved Arsenic (As)	mg/L	0.012	0.00020	0.0058	0.0016	0.00020	9836601
Dissolved Barium (Ba)	mg/L	0.13	0.010	0.072	0.066	0.010	9835270
Dissolved Boron (B)	mg/L	10 (1)	0.10	3.5	1.2	0.020	9835270
Dissolved Calcium (Ca)	mg/L	470	0.30	96	500	0.30	9835270
Dissolved Cobalt (Co)	mg/L	0.010	0.00030	0.0031	0.0050	0.00030	9836601
Dissolved Copper (Cu)	mg/L	0.018	0.00020	0.011	0.0041	0.00020	9836601
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	0.00027	<0.00020	0.00020	9836601
Dissolved Magnesium (Mg)	mg/L	320	0.20	220	190	0.20	9835270
Dissolved Manganese (Mn)	mg/L	3.6	0.0040	0.23	3.5	0.0040	9835270
Dissolved Molybdenum (Mo)	mg/L	4.0	0.00020	2.2	0.24	0.00020	9836601
Dissolved Nickel (Ni)	mg/L	1.1	0.00050	0.21	0.063	0.00050	9836601
Dissolved Phosphorus (P)	mg/L	0.55	0.10	0.45	0.49	0.10	9835270
Dissolved Potassium (K)	mg/L	170	0.30	87	17	0.30	9835270
Dissolved Selenium (Se)	mg/L	0.0094	0.00020	0.0017	0.00093	0.00020	9836601
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	<0.00010	0.00010	9836601
Dissolved Sodium (Na)	mg/L	1500 (1)	2.5	1700 (1)	1900 (1)	2.5	9835270
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	<0.00020	0.00020	9836601
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	<0.0010	0.0010	9836601
Dissolved Uranium (U)	mg/L	0.011	0.00010	0.042	0.089	0.00010	9836601
Dissolved Zinc (Zn)	mg/L	0.11	0.0030	0.049	0.020	0.0030	9836601

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C028361
Report Date: 2020/05/05

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XR8694		XR8695		XR8696		
Sampling Date		2020/04/27		2020/04/27		2020/04/27		
COC Number		607716-01-01		607716-01-01		607716-01-01		
	UNITS	**SECONDARY LEACHATE CELL 3A**	**RDL**	**SECONDARY LEACHATE CELL 3B**	**RDL**	**SECONDARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Demand Parameters								
Chemical Oxygen Demand	mg/L	388	10	374	10	197	10	9836078
Misc. Inorganics								
Conductivity	uS/cm	14000	2.0	12000	2.0	8200	2.0	9835512
Dissolved Organic Carbon (C)	mg/L	110 (1)	2.5	110 (1)	13	70 (1)	13	9835590
pH	pH	7.76	N/A	7.90	N/A	8.01	N/A	9835504
Total Dissolved Solids	mg/L	>8000 (2)	10	>8000 (2)	10	>8000 (2)	10	9837314
Total Suspended Solids	mg/L	86 (3)	1.5	53 (3)	1.5	15	1.0	9837996
Anions								
Bicarbonate (HCO3)	mg/L	1200	1.0	1200	1.0	1100	1.0	9835499
Carbonate (CO3)	mg/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	9835499
Dissolved Chloride (Cl)	mg/L	550 (1)	5.0	250 (1)	5.0	260 (1)	5.0	9838263
Dissolved Sulphate (SO4)	mg/L	4800 (1)	100	5200 (1)	100	2500 (1)	50	9838263
Metals								
Dissolved Hex. Chromium (Cr 6+)	mg/L	0.0034	0.00099	0.033	0.00099	0.0039	0.00099	9841434
Nutrients								
Total Ammonia (N)	mg/L	37 (1)	1.5	11 (1)	0.15	11 (1)	0.15	9837149
Total Total Kjeldahl Nitrogen	mg/L	55 (1)	2.5	21 (1)	2.5	15 (1)	0.50	9837030
Dissolved Nitrite (N)	mg/L	<0.010	0.010	<0.010	0.010	0.28	0.010	9835324
Dissolved Nitrate (N)	mg/L	0.022	0.010	<0.010	0.010	2.0	0.010	9835324
Misc. Organics								
Phenols	mg/L	0.015 (4)	0.0075	0.094 (4)	0.0075	<0.0075 (4)	0.0075	9836944

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Sample exceeds calibration range.
(3) Detection limit raised based on sample volume used for analysis.
(4) Detection limits raised due to sample matrix.

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BV Labs Job #: C028361
Report Date: 2020/05/05

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XR8697			XR8698		
Sampling Date		2020/04/27			2020/04/27		
COC Number		607716-01-01			607716-01-01		
	UNITS	**SECONDARY LEACHATE CELL 3D**	**RDL**	**QC Batch**	**SECONDARY LEACHATE CELL 3E**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	300	10	9836078	203	10	9836078
Misc. Inorganics							
Conductivity	uS/cm	12000	2.0	9835512	8900	2.0	9835512
Dissolved Organic Carbon (C)	mg/L	42 (1)	13	9835590	42 (1)	1.0	9835590
pH	pH	7.69	N/A	9835504	8.05	N/A	9835504
Total Dissolved Solids	mg/L	5900	10	9837314	>8000 (2)	10	9837314
Total Suspended Solids	mg/L	4.3	1.0	9837996	2.9	1.0	9837996
Anions							
Bicarbonate (HCO3)	mg/L	370	1.0	9835499	930	1.0	9835499
Carbonate (CO3)	mg/L	<1.0	1.0	9835499	<1.0	1.0	9835499
Dissolved Chloride (Cl)	mg/L	2300 (1)	20	9838518	700 (1)	5.0	9838264
Dissolved Sulphate (SO4)	mg/L	1700 (1)	20	9838518	3000 (1)	50	9838264
Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.00099 (3)	0.00099	9841434	<0.00099	0.00099	9841434
Nutrients							
Total Ammonia (N)	mg/L	15 (1)	0.15	9837149	44 (1)	0.38	9837122
Total Total Kjeldahl Nitrogen	mg/L	3.5 (1)	0.50	9837030	48 (1)	2.5	9837030
Dissolved Nitrite (N)	mg/L	1.5	0.010	9835324	0.44	0.010	9835324
Dissolved Nitrate (N)	mg/L	320 (1)	0.50	9835324	36 (1)	0.050	9835324
Misc. Organics							
Phenols	mg/L	<0.0075 (4)	0.0075	9836944	0.019 (4)	0.0075	9836944

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Sample exceeds calibration range.
(3) Matrix spike exceeds acceptance limits due to probable matrix interference.
(4) Detection limits raised due to sample matrix.

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BV Labs Job #: C028361
Report Date: 2020/05/05

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XR8699		
Sampling Date		2020/04/27		
COC Number		607716-01-01		
	UNITS	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Demand Parameters				
Chemical Oxygen Demand	mg/L	252	10	9836078
Misc. Inorganics				
Conductivity	uS/cm	11000	2.0	9835512
Dissolved Organic Carbon (C)	mg/L	67 (1)	13	9835590
pH	pH	7.86	N/A	9835504
Total Dissolved Solids	mg/L	3700	10	9837314
Total Suspended Solids	mg/L	5.6	1.0	9837996
Anions				
Bicarbonate (HCO3)	mg/L	750	1.0	9835499
Carbonate (CO3)	mg/L	<1.0	1.0	9835499
Dissolved Chloride (Cl)	mg/L	1700 (1)	20	9838264
Dissolved Sulphate (SO4)	mg/L	3300 (1)	50	9838264
Metals				
Dissolved Hex. Chromium (Cr 6+)	mg/L	0.0035	0.00099	9841434
Nutrients				
Total Ammonia (N)	mg/L	0.52	0.015	9837122
Total Total Kjeldahl Nitrogen	mg/L	6.1 (1)	0.50	9837030
Dissolved Nitrite (N)	mg/L	0.013	0.010	9835324
Dissolved Nitrate (N)	mg/L	0.67	0.010	9835324
Misc. Organics				
Phenols	mg/L	0.012 (2)	0.0075	9836944

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

(2) Detection limits raised due to sample matrix.

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BV Labs Job #: C028361
Report Date: 2020/05/05

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		XR8694		XR8695		XR8696		
Sampling Date		2020/04/27		2020/04/27		2020/04/27		
COC Number		607716-01-01		607716-01-01		607716-01-01		
	UNITS	**SECONDARY LEACHATE CELL 3A**	**RDL**	**SECONDARY LEACHATE CELL 3B**	**RDL**	**SECONDARY LEACHATE CELL 3C**	**RDL**	**QC Batch**
Elements								
Total Mercury (Hg)	ug/L	<0.0019	0.0019	0.021 (1)	0.019	<0.0019	0.0019	9841065

RDL = Reportable Detection Limit
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

BV Labs ID		XR8697	XR8698	XR8699		
Sampling Date		2020/04/27	2020/04/27	2020/04/27		
COC Number		607716-01-01	607716-01-01	607716-01-01		
	UNITS	**SECONDARY LEACHATE CELL 3D**	**SECONDARY LEACHATE CELL 3E**	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Elements						
Total Mercury (Hg)	ug/L	0.0035	<0.0019	<0.0019	0.0019	9841065

RDL = Reportable Detection Limit

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CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		XR8694	XR8695	XR8696	XR8697		
Sampling Date		2020/04/27	2020/04/27	2020/04/27	2020/04/27		
COC Number		607716-01-01	607716-01-01	607716-01-01	607716-01-01		
	UNITS	**SECONDARY LEACHATE CELL 3A**	**SECONDARY LEACHATE CELL 3B**	**SECONDARY LEACHATE CELL 3C**	**SECONDARY LEACHATE CELL 3D**	**RDL**	**QC Batch**
Elements							
Total Chromium (Cr)	mg/L	0.012	<0.010	<0.010	<0.010	0.010	9839545
Total Phosphorus (P)	mg/L	0.39	6.2	0.12	0.55	0.10	9839545
RDL = Reportable Detection Limit							

BV Labs ID		XR8698	XR8699		
Sampling Date		2020/04/27	2020/04/27		
COC Number		607716-01-01	607716-01-01		
	UNITS	**SECONDARY LEACHATE CELL 3E**	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Elements					
Total Chromium (Cr)	mg/L	<0.010	0.028	0.010	9839545
Total Phosphorus (P)	mg/L	0.47	0.57	0.10	9839545
RDL = Reportable Detection Limit					

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CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.7°C

Sample XR8695 [SECONDARY LEACHATE CELL 3B] : Dissolved Chromium < Dissolved Hexavalent Chromium. High Hexavalent result is likely due to matrix interference.

Sample XR8696 [SECONDARY LEACHATE CELL 3C] : Dissolved Chromium < Dissolved Hexavalent Chromium. High Hexavalent result is likely due to matrix interference.

Sample XR8699 [SECONDARY LEACHATE CELL 4] : Dissolved Chromium < Dissolved Hexavalent Chromium. High Hexavalent result is likely due to matrix interference.

REGULATED METALS (CCME/AT1) - DISSOLVED Comments

Sample XR8694 [SECONDARY LEACHATE CELL 3A] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.

Results relate only to the items tested.

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BV Labs Job #: C028361
Report Date: 2020/05/05

QUALITY ASSURANCE REPORT

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9832624	O-TERPHENYL (sur.)	2020/04/29	114	60 - 140	114	60 - 140	95	%				
9834540	1,4-Difluorobenzene (sur.)	2020/04/30	99	50 - 140	101	50 - 140	100	%				
9834540	4-Bromofluorobenzene (sur.)	2020/04/30	112	50 - 140	100	50 - 140	99	%				
9834540	D4-1,2-Dichloroethane (sur.)	2020/04/30	108	50 - 140	102	50 - 140	101	%				
9834658	O-TERPHENYL (sur.)	2020/04/29	109	60 - 140	109	60 - 140	112	%				
9832624	F2 (C10-C16 Hydrocarbons)	2020/04/29	110	60 - 140	105	60 - 140	<0.10	mg/L	NC	30		
9834540	Benzene	2020/04/30	113	50 - 140	112	60 - 130	<0.40	ug/L	NC	30		
9834540	Ethylbenzene	2020/04/30	107	50 - 140	108	60 - 130	<0.40	ug/L	NC	30		
9834540	F1 (C6-C10)	2020/04/30	105	60 - 140	105	60 - 140	<100	ug/L	NC	30		
9834540	m & p-Xylene	2020/04/30	107	50 - 140	107	60 - 130	<0.80	ug/L	NC	30		
9834540	o-Xylene	2020/04/30	103	50 - 140	105	60 - 130	<0.40	ug/L	NC	30		
9834540	Toluene	2020/04/30	106	50 - 140	107	60 - 130	<0.40	ug/L	NC	30		
9834658	F2 (C10-C16 Hydrocarbons)	2020/04/29	104	60 - 140	103	60 - 140	<0.10	mg/L	NC	30		
9835270	Dissolved Barium (Ba)	2020/04/29	97	80 - 120	103	80 - 120	<0.010	mg/L				
9835270	Dissolved Boron (B)	2020/04/29	95	80 - 120	102	80 - 120	<0.020	mg/L				
9835270	Dissolved Calcium (Ca)	2020/04/29	95	80 - 120	102	80 - 120	<0.30	mg/L				
9835270	Dissolved Magnesium (Mg)	2020/04/29	94	80 - 120	105	80 - 120	<0.20	mg/L				
9835270	Dissolved Manganese (Mn)	2020/04/29	97	80 - 120	103	80 - 120	<0.0040	mg/L	0.56	20		
9835270	Dissolved Phosphorus (P)	2020/04/29	106	80 - 120	103	80 - 120	<0.10	mg/L				
9835270	Dissolved Potassium (K)	2020/04/29	97	80 - 120	100	80 - 120	<0.30	mg/L				
9835270	Dissolved Sodium (Na)	2020/04/29	NC	80 - 120	100	80 - 120	<0.50	mg/L				
9835324	Dissolved Nitrate (N)	2020/04/29	107	80 - 120	102	80 - 120	<0.010	mg/L	13	20		
9835324	Dissolved Nitrite (N)	2020/04/29	103	80 - 120	98	80 - 120	<0.010	mg/L	NC	20		
9835499	Bicarbonate (HCO3)	2020/04/29					<1.0	mg/L	1.4	20		
9835499	Carbonate (CO3)	2020/04/29					<1.0	mg/L	NC	20		
9835504	pH	2020/04/29			100	97 - 103			1.5	N/A		
9835512	Conductivity	2020/04/29			100	90 - 110	<2.0	uS/cm	0.25	10		
9835590	Dissolved Organic Carbon (C)	2020/04/30	NC	80 - 120	88	80 - 120	<0.50	mg/L	6.2	20		
9836078	Chemical Oxygen Demand	2020/04/30	104	80 - 120	102	80 - 120	<10	mg/L	6.9	20		
9836601	Dissolved Aluminum (Al)	2020/04/30	NC	80 - 120	102	80 - 120	<0.0030	mg/L	0.88	20		
9836601	Dissolved Antimony (Sb)	2020/04/30	90	80 - 120	103	80 - 120	<0.00060	mg/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9836601	Dissolved Arsenic (As)	2020/04/30	89	80 - 120	103	80 - 120	<0.00020	mg/L	14	20		
9836601	Dissolved Cobalt (Co)	2020/04/30	90	80 - 120	100	80 - 120	<0.00030	mg/L	0.39	20		
9836601	Dissolved Copper (Cu)	2020/04/30	87	80 - 120	99	80 - 120	<0.00020	mg/L	0.93	20		
9836601	Dissolved Lead (Pb)	2020/04/30	88	80 - 120	99	80 - 120	<0.00020	mg/L	NC	20		
9836601	Dissolved Molybdenum (Mo)	2020/04/30	92	80 - 120	102	80 - 120	<0.00020	mg/L	13	20		
9836601	Dissolved Nickel (Ni)	2020/04/30	88	80 - 120	102	80 - 120	<0.00050	mg/L	4.1	20		
9836601	Dissolved Selenium (Se)	2020/04/30	93	80 - 120	103	80 - 120	<0.00020	mg/L	NC	20		
9836601	Dissolved Silver (Ag)	2020/04/30	82	80 - 120	99	80 - 120	<0.00010	mg/L	NC	20		
9836601	Dissolved Thallium (Tl)	2020/04/30	87	80 - 120	99	80 - 120	<0.00020	mg/L	NC	20		
9836601	Dissolved Tin (Sn)	2020/04/30	93	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
9836601	Dissolved Uranium (U)	2020/04/30	89	80 - 120	99	80 - 120	<0.00010	mg/L	17	20		
9836601	Dissolved Zinc (Zn)	2020/04/30	84	80 - 120	100	80 - 120	<0.0030	mg/L	9.8	20		
9836944	Phenols	2020/05/01	98	80 - 120	99	80 - 120	<0.0015	mg/L	NC	20		
9837030	Total Total Kjeldahl Nitrogen	2020/05/01	90	80 - 120	95	80 - 120	<0.050	mg/L	0.54	20	81	80 - 120
9837122	Total Ammonia (N)	2020/05/01	95	80 - 120	100	80 - 120	<0.015	mg/L	2.1	20		
9837149	Total Ammonia (N)	2020/04/30	123 (1)	80 - 120	101	80 - 120	<0.015	mg/L	0.28	20		
9837314	Total Dissolved Solids	2020/05/01	NC	80 - 120	94	80 - 120	<10	mg/L	0.99	20		
9837996	Total Suspended Solids	2020/05/01	98	80 - 120	98	80 - 120	<1.0	mg/L	NC	20		
9838263	Dissolved Chloride (Cl)	2020/05/01	NC	80 - 120	107	80 - 120	<1.0	mg/L	1.4	20		
9838263	Dissolved Sulphate (SO4)	2020/05/01	NC	80 - 120	97	80 - 120	<1.0	mg/L				
9838264	Dissolved Chloride (Cl)	2020/05/02	NC	80 - 120	110	80 - 120	<1.0	mg/L	10 (2)	20		
9838264	Dissolved Sulphate (SO4)	2020/05/02	NC	80 - 120	110	80 - 120	<1.0	mg/L				
9838518	Dissolved Chloride (Cl)	2020/05/02	NC	80 - 120	108	80 - 120	<1.0	mg/L	1.4	20		
9838518	Dissolved Sulphate (SO4)	2020/05/02	NC	80 - 120	93	80 - 120	<1.0	mg/L	1.2 (2)	20		
9839545	Total Chromium (Cr)	2020/05/04	96	80 - 120	102	80 - 120	<0.010	mg/L				
9839545	Total Phosphorus (P)	2020/05/04	103	80 - 120	101	80 - 120	<0.10	mg/L	8.3	20		
9841065	Total Mercury (Hg)	2020/05/05	96	80 - 120	99	80 - 120	<0.0019	ug/L	NC	20		

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BV Labs Job #: C028361
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QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9841434	Dissolved Hex. Chromium (Cr 6+)	2020/05/05	3.4 (1)	80 - 120	106	80 - 120	<0.00099	mg/L	NC	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Detection limits raised due to dilution to bring analyte within the calibrated range.

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Report Date: 2020/05/05

CLEAN HARBORS
Client Project #: 4.4-A; SECONDARY LEACHATE QTR2
Your P.O. #: 207709RY
Sampler Initials: TW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Nadia Rafique, Dipl. WQT., QP, Supervisor, Inorganics

Harry (Peng) Liang, Senior Analyst

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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Your P.O. #: 207709RY
Your Project #: LEACHATE AND LEAK DETECTION
Site Location: RYLEY, AB
Your C.O.C. #: 1 of 1

Attention: STAN YUHA

CLEAN HARBORS
P.O. BOX 390
50114 Range Rd 173
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/05/26
Report #: R2882768
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C033511
Received: 2020/05/19, 13:46

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	1	N/A	2020/05/21	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID (1)	1	N/A	2020/05/22	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	1	N/A	2020/05/22		Auto Calc
Cadmium - low level CCME - Dissolved (1)	1	N/A	2020/05/26		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	1	N/A	2020/05/22	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
COD by Colorimeter (1)	1	N/A	2020/05/22	AB SOP-00016	SM 23 5220D m
Dissolved Hexavalent Chromium (1)	1	N/A	2020/05/20	AB SOP-00063	SM 23 3500-Cr B m
Carbon (DOC) (1, 2)	1	N/A	2020/05/20	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	1	N/A	2020/05/21	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 3)	1	2020/05/21	2020/05/21	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Mercury (Total) by CV (1)	1	2020/05/22	2020/05/22	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 4)	1	N/A	2020/05/21	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	1	2020/05/20	2020/05/20	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Dissolved (1, 4)	1	N/A	2020/05/24	AB SOP-00043	EPA 6020b R2 m
Ammonia-N (Total) (1)	1	N/A	2020/05/21	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrogen (Nitrite - Nitrate) by IC (1)	1	N/A	2020/05/21	AB SOP-00023	SM 23 4110 B m
pH @25°C (1, 5)	1	N/A	2020/05/21	AB SOP-00005	SM 23 4500-H+B m
Phenols (4-AAP) (1)	1	N/A	2020/05/20	AB SOP-00088	EPA 9066 R0 m
Total Dissolved Solids (Filt. Residue) (1)	1	2020/05/22	2020/05/22	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen (1)	1	2020/05/21	2020/05/23	AB SOP-00008	EPA 351.1 R1978 m
Total Suspended Solids (NFR) (1)	1	2020/05/25	2020/05/25	AB SOP-00061	SM 23 2540 D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless

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Your P.O. #: 207709RY
Your Project #: LEACHATE AND LEAK DETECTION
Site Location: RYLEY, AB
Your C.O.C. #: 1 of 1

Attention: STAN YUHA

CLEAN HARBORS
P.O. BOX 390
50114 Range Rd 173
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/05/26
Report #: R2882768
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C033511
Received: 2020/05/19, 13:46

indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by BV Labs Calgary Environmental
(2) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(3) Silica gel clean up employed.
(4) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
26 May 2020 09:46:05

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bvlabs.com
Phone# (780) 577-7100
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BV Labs Job #: C033511
Report Date: 2020/05/26

CLEAN HARBORS
Client Project #: LEACHATE AND LEAK DETECTION
Site Location: RYLEY, AB
Your P.O. #: 207709RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		XU1773		
Sampling Date		2020/05/19 08:00		
COC Number		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 1**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/L	0.12	0.10	9855535
Volatiles				
Benzene	ug/L	1.1	0.40	9857092
Toluene	ug/L	<0.40	0.40	9857092
Ethylbenzene	ug/L	<0.40	0.40	9857092
m & p-Xylene	ug/L	<0.80	0.80	9857092
o-Xylene	ug/L	<0.40	0.40	9857092
Xylenes (Total)	ug/L	<0.89	0.89	9854975
F1 (C6-C10) - BTEX	ug/L	230	100	9854975
F1 (C6-C10)	ug/L	230	100	9857092
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	94		9857092
4-Bromofluorobenzene (sur.)	%	101		9857092
D4-1,2-Dichloroethane (sur.)	%	97		9857092
O-TERPHENYL (sur.)	%	105		9855535
RDL = Reportable Detection Limit				

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BV Labs Job #: C033511
Report Date: 2020/05/26

CLEAN HARBORS
Client Project #: LEACHATE AND LEAK DETECTION
Site Location: RYLEY, AB
Your P.O. #: 207709RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		XU1773		
Sampling Date		2020/05/19 08:00		
COC Number		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 1**	**RDL**	**QC Batch**
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	0.15	0.020	9854405
Elements				
Dissolved Aluminum (Al)	mg/L	0.013	0.0030	9859491
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	9859491
Dissolved Arsenic (As)	mg/L	0.0077	0.00020	9859491
Dissolved Barium (Ba)	mg/L	0.15	0.010	9855606
Dissolved Boron (B)	mg/L	6.4 (1)	0.10	9855606
Dissolved Calcium (Ca)	mg/L	300	0.30	9855606
Dissolved Cobalt (Co)	mg/L	1.6	0.00030	9859491
Dissolved Copper (Cu)	mg/L	0.019	0.00020	9859491
Dissolved Lead (Pb)	mg/L	0.0017	0.00020	9859491
Dissolved Magnesium (Mg)	mg/L	140	0.20	9855606
Dissolved Manganese (Mn)	mg/L	8.3	0.0040	9855606
Dissolved Molybdenum (Mo)	mg/L	0.063	0.00020	9859491
Dissolved Nickel (Ni)	mg/L	9.2	0.00050	9859491
Dissolved Phosphorus (P)	mg/L	0.19	0.10	9855606
Dissolved Potassium (K)	mg/L	12	0.30	9855606
Dissolved Selenium (Se)	mg/L	0.0015	0.00020	9859491
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	9859491
Dissolved Sodium (Na)	mg/L	1600 (1)	2.5	9855606
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	9859491
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	9859491
Dissolved Uranium (U)	mg/L	0.0060	0.00010	9859491
Dissolved Zinc (Zn)	mg/L	0.19	0.0030	9859491

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C033511
Report Date: 2020/05/26

CLEAN HARBORS
Client Project #: LEACHATE AND LEAK DETECTION
Site Location: RYLEY, AB
Your P.O. #: 207709RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XU1773		
Sampling Date		2020/05/19 08:00		
COC Number		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 1**	**RDL**	**QC Batch**
Demand Parameters				
Chemical Oxygen Demand	mg/L	963	10	9858528
Misc. Inorganics				
Conductivity	uS/cm	8600	2.0	9857045
Dissolved Organic Carbon (C)	mg/L	310 (1)	10	9856014
pH	pH	8.01	N/A	9857044
Total Dissolved Solids	mg/L	6600	10	9857752
Total Suspended Solids	mg/L	44 (2)	1.5	9860167
Anions				
Bicarbonate (HCO3)	mg/L	1100	1.0	9857039
Carbonate (CO3)	mg/L	<1.0	1.0	9857039
Dissolved Chloride (Cl)	mg/L	1200 (3)	10	9858748
Dissolved Sulphate (SO4)	mg/L	1900 (3)	20	9858748
Metals				
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.00099	0.00099	9856084
Nutrients				
Total Ammonia (N)	mg/L	7.7 (4)	1.5	9857738
Total Total Kjeldahl Nitrogen	mg/L	99 (3)	2.5	9857056
Dissolved Nitrite (N)	mg/L	<0.10 (5)	0.10	9856355
Dissolved Nitrate (N)	mg/L	<0.010	0.010	9856355
Misc. Organics				
Phenols	mg/L	0.085 (1)	0.0075	9855837

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to sample matrix.
(2) Detection limit raised based on sample volume used for analysis.
(3) Detection limits raised due to dilution to bring analyte within the calibrated range.
(4) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
(5) Detection limits raised due to matrix interference.

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BV Labs Job #: C033511
Report Date: 2020/05/26

CLEAN HARBORS
Client Project #: LEACHATE AND LEAK DETECTION
Site Location: RYLEY, AB
Your P.O. #: 207709RY
Sampler Initials: MN

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		XU1773		
Sampling Date		2020/05/19 08:00		
COC Number		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 1**	**RDL**	**QC Batch**
Elements				
Total Mercury (Hg)	ug/L	0.0037	0.0019	9858434
RDL = Reportable Detection Limit				

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BV Labs Job #: C033511
Report Date: 2020/05/26

CLEAN HARBORS
Client Project #: LEACHATE AND LEAK DETECTION
Site Location: RYLEY, AB
Your P.O. #: 207709RY
Sampler Initials: MN

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		XU1773		
Sampling Date		2020/05/19 08:00		
COC Number		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 1**	**RDL**	**QC Batch**
Elements				
Total Chromium (Cr)	mg/L	0.081	0.010	9855460
Total Phosphorus (P)	mg/L	0.33	0.10	9855460
RDL = Reportable Detection Limit				

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BV Labs Job #: C033511
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CLEAN HARBORS
Client Project #: LEACHATE AND LEAK DETECTION
Site Location: RYLEY, AB
Your P.O. #: 207709RY
Sampler Initials: MN

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	12.7°C

Results relate only to the items tested.

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BV Labs Job #: C033511
Report Date: 2020/05/26

QUALITY ASSURANCE REPORT

CLEAN HARBORS
Client Project #: LEACHATE AND LEAK DETECTION
Site Location: RYLEY, AB
Your P.O. #: 207709RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9855535	O-TERPHENYL (sur.)	2020/05/21	122	60 - 140	108	60 - 140	106	%				
9857092	1,4-Difluorobenzene (sur.)	2020/05/22	91	50 - 140	96	50 - 140	94	%				
9857092	4-Bromofluorobenzene (sur.)	2020/05/22	91	50 - 140	91	50 - 140	93	%				
9857092	D4-1,2-Dichloroethane (sur.)	2020/05/22	94	50 - 140	86	50 - 140	83	%				
9855460	Total Chromium (Cr)	2020/05/20	95	80 - 120	96	80 - 120	<0.010	mg/L				
9855460	Total Phosphorus (P)	2020/05/20	98	80 - 120	99	80 - 120	<0.10	mg/L	NC	20		
9855535	F2 (C10-C16 Hydrocarbons)	2020/05/21	118	60 - 140	102	60 - 140	<0.10	mg/L	16	30		
9855606	Dissolved Barium (Ba)	2020/05/20	95	80 - 120	98	80 - 120	<0.010	mg/L	0.056	20		
9855606	Dissolved Boron (B)	2020/05/20	97	80 - 120	98	80 - 120	<0.020	mg/L	15	20		
9855606	Dissolved Calcium (Ca)	2020/05/20	95	80 - 120	101	80 - 120	<0.30	mg/L	0.19	20		
9855606	Dissolved Magnesium (Mg)	2020/05/20	100	80 - 120	104	80 - 120	<0.20	mg/L	0.32	20		
9855606	Dissolved Manganese (Mn)	2020/05/20	98	80 - 120	100	80 - 120	<0.0040	mg/L	NC	20		
9855606	Dissolved Phosphorus (P)	2020/05/20	101	80 - 120	99	80 - 120	<0.10	mg/L	NC	20		
9855606	Dissolved Potassium (K)	2020/05/20	97	80 - 120	98	80 - 120	<0.30	mg/L	3.0	20		
9855606	Dissolved Sodium (Na)	2020/05/20	93	80 - 120	96	80 - 120	<0.50	mg/L	0.56	20		
9855837	Phenols	2020/05/20	84	80 - 120	100	80 - 120	<0.0015	mg/L	7.2	20		
9856014	Dissolved Organic Carbon (C)	2020/05/20	94	80 - 120	95	80 - 120	<0.50	mg/L	2.7	20		
9856084	Dissolved Hex. Chromium (Cr 6+)	2020/05/20	101	80 - 120	104	80 - 120	<0.00099	mg/L	NC	20		
9856355	Dissolved Nitrate (N)	2020/05/21	116	80 - 120	98	80 - 120	<0.010	mg/L	NC	20		
9856355	Dissolved Nitrite (N)	2020/05/21	118	80 - 120	100	80 - 120	<0.010	mg/L	NC	20		
9857039	Bicarbonate (HCO3)	2020/05/21					<1.0	mg/L	0.26	20		
9857039	Carbonate (CO3)	2020/05/21					<1.0	mg/L	NC	20		
9857044	pH	2020/05/21			101	97 - 103			0.20	N/A		
9857045	Conductivity	2020/05/21			100	90 - 110	<2.0	uS/cm	0.48	10		
9857056	Total Total Kjeldahl Nitrogen	2020/05/22	89	80 - 120	95	80 - 120	0.054, RDL=0.050 (1)	mg/L	0.67	20	92	80 - 120
9857092	Benzene	2020/05/22	85	50 - 140	80	60 - 130	<0.40	ug/L	NC	30		
9857092	Ethylbenzene	2020/05/22	85	50 - 140	83	60 - 130	<0.40	ug/L	NC	30		
9857092	F1 (C6-C10)	2020/05/22	84	60 - 140	87	60 - 140	<100	ug/L	NC	30		
9857092	m & p-Xylene	2020/05/22	85	50 - 140	83	60 - 130	<0.80	ug/L	NC	30		
9857092	o-Xylene	2020/05/22	87	50 - 140	83	60 - 130	<0.40	ug/L	NC	30		

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BV Labs Job #: C033511
Report Date: 2020/05/26

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: LEACHATE AND LEAK DETECTION
Site Location: RYLEY, AB
Your P.O. #: 207709RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9857092	Toluene	2020/05/22	82	50 - 140	79	60 - 130	<0.40	ug/L	NC	30		
9857738	Total Ammonia (N)	2020/05/21	90	80 - 120	92	80 - 120	<0.015	mg/L	10	20		
9857752	Total Dissolved Solids	2020/05/22	NC	80 - 120	102	80 - 120	<10	mg/L	3.7	20		
9858434	Total Mercury (Hg)	2020/05/22	106	80 - 120	93	80 - 120	<0.0019	ug/L	NC	20		
9858528	Chemical Oxygen Demand	2020/05/22	103	80 - 120	102	80 - 120	<10	mg/L	NC	20		
9858748	Dissolved Chloride (Cl)	2020/05/22	NC	80 - 120	106	80 - 120	<1.0	mg/L	2.9	20		
9858748	Dissolved Sulphate (SO4)	2020/05/22	NC	80 - 120	102	80 - 120	<1.0	mg/L				
9859491	Dissolved Aluminum (Al)	2020/05/24	106	80 - 120	107	80 - 120	<0.0030	mg/L	19	20		
9859491	Dissolved Antimony (Sb)	2020/05/24	117	80 - 120	120	80 - 120	<0.00060	mg/L	NC	20		
9859491	Dissolved Arsenic (As)	2020/05/24	106	80 - 120	97	80 - 120	<0.00020	mg/L	7.8	20		
9859491	Dissolved Cobalt (Co)	2020/05/24	106	80 - 120	103	80 - 120	<0.00030	mg/L	NC	20		
9859491	Dissolved Copper (Cu)	2020/05/24	104	80 - 120	100	80 - 120	<0.00020	mg/L	NC	20		
9859491	Dissolved Lead (Pb)	2020/05/24	96	80 - 120	96	80 - 120	<0.00020	mg/L	NC	20		
9859491	Dissolved Molybdenum (Mo)	2020/05/24	106	80 - 120	100	80 - 120	<0.00020	mg/L	6.2	20		
9859491	Dissolved Nickel (Ni)	2020/05/24	93	80 - 120	100	80 - 120	<0.00050	mg/L	NC	20		
9859491	Dissolved Selenium (Se)	2020/05/24	103	80 - 120	99	80 - 120	<0.00020	mg/L	NC	20		
9859491	Dissolved Silver (Ag)	2020/05/24	103	80 - 120	100	80 - 120	<0.00010	mg/L	NC	20		
9859491	Dissolved Thallium (Tl)	2020/05/24	96	80 - 120	97	80 - 120	<0.00020	mg/L	NC	20		
9859491	Dissolved Tin (Sn)	2020/05/24	103	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
9859491	Dissolved Uranium (U)	2020/05/24	104	80 - 120	102	80 - 120	<0.00010	mg/L	2.5	20		
9859491	Dissolved Zinc (Zn)	2020/05/24	98	80 - 120	102	80 - 120	<0.0030	mg/L	NC	20		

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BV Labs Job #: C033511
Report Date: 2020/05/26

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: LEACHATE AND LEAK DETECTION
Site Location: RYLEY, AB
Your P.O. #: 207709RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9860167	Total Suspended Solids	2020/05/25	97	80 - 120	100	80 - 120	<1.0	mg/L	0.75	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Method blank above criteria. Data inspected. All data < RDL or greater than 10x Method Blank.

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BV Labs Job #: C033511
Report Date: 2020/05/26

CLEAN HARBORS
Client Project #: LEACHATE AND LEAK DETECTION
Site Location: RYLEY, AB
Your P.O. #: 207709RY
Sampler Initials: MN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Harry (Peng) Liang, Senior Analyst

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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Bureau Veritas Laboratories Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Your P.O. #: 209257RY
Your Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your C.O.C. #: 1 of 1

Attention: STAN YUHA

CLEAN HARBORS
P.O. BOX 390
50114 Range Rd 173
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/07/09
Report #: R2900729
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C045474
Received: 2020/07/02, 06:00

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	N/A	2020/07/03	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	1	N/A	2020/07/05	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	1	N/A	2020/07/06		Auto Calc
Cadmium - low level CCME - Dissolved	1	N/A	2020/07/07		Auto Calc
Chloride/Sulphate by Auto Colourimetry	1	N/A	2020/07/07	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
COD by Colorimeter	1	N/A	2020/07/05	AB SOP-00016	SM 23 5220D m
Dissolved Hexavalent Chromium	1	N/A	2020/07/07	AB SOP-00063	SM 23 3500-Cr B m
Carbon (DOC) (1)	1	N/A	2020/07/07	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C	1	N/A	2020/07/03	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (2)	1	2020/07/06	2020/07/06	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Mercury (Total) by CV	1	2020/07/07	2020/07/08	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (3)	1	N/A	2020/07/08	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total	1	2020/07/07	2020/07/07	AB SOP-00014 / AB SOP-00042	EPA 6010d R4 m
Elements by ICPMS - Dissolved (3)	1	N/A	2020/07/07	AB SOP-00043	EPA 6020b R2 m
Ammonia-N (Total)	1	N/A	2020/07/08	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate and Nitrite	1	N/A	2020/07/06		Auto Calc
Nitrate + Nitrite-N (calculated)	1	N/A	2020/07/06		Auto Calc
Nitrogen (Nitrite - Nitrate) by IC	1	N/A	2020/07/05	AB SOP-00023	SM 23 4110 B m
pH @25°C (4)	1	N/A	2020/07/03	AB SOP-00005	SM 23 4500-H+B m
Phenols (4-AAP)	1	N/A	2020/07/03	AB SOP-00088	EPA 9066 R0 m
Total Dissolved Solids (Filt. Residue)	1	2020/07/06	2020/07/06	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen	1	2020/07/06	2020/07/07	AB SOP-00008	EPA 351.1 R1978 m
Total Suspended Solids (NFR)	1	2020/07/06	2020/07/06	AB SOP-00061	SM 23 2540 D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using

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Your P.O. #: 209257RY
Your Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your C.O.C. #: 1 of 1

Attention: STAN YUHA

CLEAN HARBORS
P.O. BOX 390
50114 Range Rd 173
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/07/09
Report #: R2900729
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C045474
Received: 2020/07/02, 06:00

accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
09 Jul 2020 14:54:57

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Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bvlabs.com
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BV Labs Job #: C045474
Report Date: 2020/07/09

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your P.O. #: 209257RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YA1752		
Sampling Date		2020/06/30 09:00		
COC Number		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Calculated Parameters				
Dissolved Nitrate (NO3)	mg/L	0.59	0.22	9908493
Nitrate plus Nitrite (N)	mg/L	0.13	0.071	9908502
Dissolved Nitrite (NO2)	mg/L	<0.16	0.16	9908493
Demand Parameters				
Chemical Oxygen Demand	mg/L	363	10	9910825
Misc. Inorganics				
Conductivity	uS/cm	16000	2.0	9909925
Dissolved Organic Carbon (C)	mg/L	<250 (1)	250	9911385
pH	pH	7.82	N/A	9909919
Total Dissolved Solids	mg/L	>13000 (2)	17	9910885
Total Suspended Solids	mg/L	140 (3)	3.0	9911834
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	0.13	0.040	9908413
Anions				
Bicarbonate (HCO3)	mg/L	1400	1.0	9909916
Carbonate (CO3)	mg/L	<1.0	1.0	9909916
Dissolved Chloride (Cl)	mg/L	160	1.0	9913053
Dissolved Sulphate (SO4)	mg/L	8500 (4)	50	9913053
Metals				
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.0099 (5)	0.0099	9912836
Nutrients				
Total Ammonia (N)	mg/L	11 (4)	0.15	9914126

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to sample matrix.
(2) Detection limit raised based on sample volume used for analysis.
Sample exceeds operating range of this method.
(3) Detection limit raised based on sample volume used for analysis.
(4) Detection limits raised due to dilution to bring analyte within the calibrated range.
(5) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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BV Labs Job #: C045474
Report Date: 2020/07/09

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your P.O. #: 209257RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YA1752		
Sampling Date		2020/06/30 09:00		
COC Number		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Total Total Kjeldahl Nitrogen	mg/L	18 (1)	1.3	9911635
Dissolved Nitrite (N)	mg/L	<0.050 (2)	0.050	9910486
Dissolved Nitrate (N)	mg/L	0.13 (2)	0.050	9910486
Misc. Organics				
Phenols	mg/L	<0.0075 (3)	0.0075	9909750

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limits raised due to matrix interference.
(3) Detection limits raised due to sample matrix.

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BV Labs Job #: C045474
Report Date: 2020/07/09

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your P.O. #: 209257RY
Sampler Initials: MN

PETROLEUM HYDROCARBONS (CCME)

BV Labs ID		YA1752		
Sampling Date		2020/06/30 09:00		
COC Number		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.10	9909297
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	109		9909297
RDL = Reportable Detection Limit				

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BV Labs Job #: C045474
Report Date: 2020/07/09

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your P.O. #: 209257RY
Sampler Initials: MN

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		YA1752		
Sampling Date		2020/06/30 09:00		
COC Number		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Elements				
Total Mercury (Hg)	ug/L	<0.19 (1)	0.19	9912878

RDL = Reportable Detection Limit
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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BV Labs Job #: C045474
Report Date: 2020/07/09

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your P.O. #: 209257RY
Sampler Initials: MN

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		YA1752		
Sampling Date		2020/06/30 09:00		
COC Number		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Elements				
Dissolved Aluminum (Al)	mg/L	2.5	0.0060	9912860
Dissolved Antimony (Sb)	mg/L	<0.0012	0.0012	9912860
Dissolved Arsenic (As)	mg/L	0.0075	0.00040	9912860
Dissolved Barium (Ba)	mg/L	<0.20	0.20	9914157
Dissolved Boron (B)	mg/L	0.76	0.40	9914157
Dissolved Calcium (Ca)	mg/L	410	6.0	9914157
Total Chromium (Cr)	mg/L	<0.20	0.20	9912376
Dissolved Cobalt (Co)	mg/L	0.0038	0.00060	9912860
Dissolved Copper (Cu)	mg/L	<0.00040	0.00040	9912860
Dissolved Lead (Pb)	mg/L	0.0023	0.00040	9912860
Dissolved Magnesium (Mg)	mg/L	300	4.0	9914157
Dissolved Manganese (Mn)	mg/L	7.6	0.080	9914157
Dissolved Molybdenum (Mo)	mg/L	0.25	0.00040	9912860
Dissolved Nickel (Ni)	mg/L	0.049	0.0010	9912860
Dissolved Phosphorus (P)	mg/L	7.2	2.0	9914157
Total Phosphorus (P)	mg/L	<2.0	2.0	9912376
Dissolved Potassium (K)	mg/L	28	6.0	9914157
Dissolved Selenium (Se)	mg/L	0.0026	0.00040	9912860
Dissolved Silver (Ag)	mg/L	<0.00020	0.00020	9912860
Dissolved Sodium (Na)	mg/L	3900	10	9914157
Dissolved Thallium (Tl)	mg/L	<0.00040	0.00040	9912860
Dissolved Tin (Sn)	mg/L	<0.0020	0.0020	9912860
Dissolved Uranium (U)	mg/L	0.048	0.00020	9912860
Dissolved Zinc (Zn)	mg/L	0.11	0.0060	9912860
RDL = Reportable Detection Limit				

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BV Labs Job #: C045474
Report Date: 2020/07/09

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your P.O. #: 209257RY
Sampler Initials: MN

VOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		YA1752		
Sampling Date		2020/06/30 09:00		
COC Number		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Volatiles				
Benzene	ug/L	0.60	0.40	9909921
Toluene	ug/L	5.7	0.40	9909921
Ethylbenzene	ug/L	<0.40	0.40	9909921
m & p-Xylene	ug/L	<0.80	0.80	9909921
o-Xylene	ug/L	<0.40	0.40	9909921
Xylenes (Total)	ug/L	<0.89	0.89	9908523
F1 (C6-C10) - BTEX	ug/L	<100	100	9908523
F1 (C6-C10)	ug/L	<100	100	9909921
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	102		9909921
4-Bromofluorobenzene (sur.)	%	102		9909921
D4-1,2-Dichloroethane (sur.)	%	116		9909921
RDL = Reportable Detection Limit				

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BV Labs Job #: C045474
Report Date: 2020/07/09

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your P.O. #: 209257RY
Sampler Initials: MN

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.3°C

Sample YA1752 [SECONDARY LEACHATE CELL 2] : Nitrogen (Nitrite - Nitrate) by IC completed within 48h after laboratory receipt to a maximum of five days from sampling. Data are satisfactory for compliance purposes.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments

Sample YA1752 [SECONDARY LEACHATE CELL 2] Elements by ICPMS - Dissolved: Detection limits raised due to sample matrix.
Sample YA1752 [SECONDARY LEACHATE CELL 2] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YA1752 [SECONDARY LEACHATE CELL 2] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C045474
Report Date: 2020/07/09

QUALITY ASSURANCE REPORT

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your P.O. #: 209257RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9909297	O-TERPHENYL (sur.)	2020/07/06	105	60 - 140	107	60 - 140	107	%				
9909921	1,4-Difluorobenzene (sur.)	2020/07/05	104	50 - 140	104	50 - 140	104	%				
9909921	4-Bromofluorobenzene (sur.)	2020/07/05	99	50 - 140	100	50 - 140	102	%				
9909921	D4-1,2-Dichloroethane (sur.)	2020/07/05	121	50 - 140	121	50 - 140	113	%				
9909297	F2 (C10-C16 Hydrocarbons)	2020/07/06	98	60 - 140	96	60 - 140	<0.10	mg/L	NC	30		
9909750	Phenols	2020/07/03	98	80 - 120	98	80 - 120	<0.0015	mg/L	NC	20		
9909916	Bicarbonate (HCO3)	2020/07/03					<1.0	mg/L	9.0	20		
9909916	Carbonate (CO3)	2020/07/03					<1.0	mg/L	NC	20		
9909919	pH	2020/07/03			100	97 - 103			1.9	N/A		
9909921	Benzene	2020/07/05	94	50 - 140	93	60 - 130	<0.40	ug/L	NC	30		
9909921	Ethylbenzene	2020/07/05	84	50 - 140	83	60 - 130	<0.40	ug/L	NC	30		
9909921	F1 (C6-C10)	2020/07/05	83	60 - 140	89	60 - 140	<100	ug/L	NC	30		
9909921	m & p-Xylene	2020/07/05	80	50 - 140	79	60 - 130	<0.80	ug/L	NC	30		
9909921	o-Xylene	2020/07/05	79	50 - 140	78	60 - 130	<0.40	ug/L	NC	30		
9909921	Toluene	2020/07/05	86	50 - 140	85	60 - 130	<0.40	ug/L	NC	30		
9909925	Conductivity	2020/07/03			97	90 - 110	<2.0	uS/cm	0.44	10		
9910486	Dissolved Nitrate (N)	2020/07/04	102	80 - 120	101	80 - 120	<0.010	mg/L	2.9	20		
9910486	Dissolved Nitrite (N)	2020/07/04	102	80 - 120	103	80 - 120	<0.010	mg/L	NC	20		
9910825	Chemical Oxygen Demand	2020/07/05	102	80 - 120	102	80 - 120	<10	mg/L	5.0	20		
9910885	Total Dissolved Solids	2020/07/06	NC	80 - 120	95	80 - 120	<10	mg/L	2.3	20		
9911385	Dissolved Organic Carbon (C)	2020/07/07	100	80 - 120	106	80 - 120	<0.50	mg/L	2.9	20		
9911635	Total Total Kjeldahl Nitrogen	2020/07/07	NC	80 - 120	95	80 - 120	<0.050	mg/L	2.9 (1)	20	98	80 - 120
9911834	Total Suspended Solids	2020/07/06	100	80 - 120	97	80 - 120	<1.0	mg/L	17	20		
9912376	Total Chromium (Cr)	2020/07/07	91	80 - 120	93	80 - 120	<0.010	mg/L				
9912376	Total Phosphorus (P)	2020/07/07	94	80 - 120	95	80 - 120	<0.10	mg/L	NC	20		
9912836	Dissolved Hex. Chromium (Cr 6+)	2020/07/07	97	80 - 120	92	80 - 120	<0.00099	mg/L	NC	20		
9912860	Dissolved Aluminum (Al)	2020/07/07	89	80 - 120	96	80 - 120	<0.0030	mg/L	NC	20		
9912860	Dissolved Antimony (Sb)	2020/07/07	94	80 - 120	104	80 - 120	<0.00060	mg/L	NC	20		
9912860	Dissolved Arsenic (As)	2020/07/07	87	80 - 120	95	80 - 120	<0.00020	mg/L	NC	20		
9912860	Dissolved Cobalt (Co)	2020/07/07	87	80 - 120	97	80 - 120	<0.00030	mg/L	NC	20		
9912860	Dissolved Copper (Cu)	2020/07/07	87	80 - 120	94	80 - 120	<0.00020	mg/L	NC	20		

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BV Labs Job #: C045474
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QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your P.O. #: 209257RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9912860	Dissolved Lead (Pb)	2020/07/07	88	80 - 120	96	80 - 120	<0.00020	mg/L	NC	20		
9912860	Dissolved Molybdenum (Mo)	2020/07/07	91	80 - 120	100	80 - 120	<0.00020	mg/L	NC	20		
9912860	Dissolved Nickel (Ni)	2020/07/07	85	80 - 120	94	80 - 120	<0.00050	mg/L	NC	20		
9912860	Dissolved Selenium (Se)	2020/07/07	91	80 - 120	100	80 - 120	<0.00020	mg/L	NC	20		
9912860	Dissolved Silver (Ag)	2020/07/07	88	80 - 120	97	80 - 120	<0.00010	mg/L	NC	20		
9912860	Dissolved Thallium (Tl)	2020/07/07	87	80 - 120	94	80 - 120	<0.00020	mg/L	NC	20		
9912860	Dissolved Tin (Sn)	2020/07/07	91	80 - 120	95	80 - 120	<0.0010	mg/L	NC	20		
9912860	Dissolved Uranium (U)	2020/07/07	87	80 - 120	95	80 - 120	<0.00010	mg/L	NC	20		
9912860	Dissolved Zinc (Zn)	2020/07/07	84	80 - 120	91	80 - 120	<0.0030	mg/L	NC	20		
9912878	Total Mercury (Hg)	2020/07/07	87	80 - 120	92	80 - 120	<0.0019	ug/L	9.3	20		
9913053	Dissolved Chloride (Cl)	2020/07/07	101	80 - 120	104	80 - 120	<1.0	mg/L	1.5	20		
9913053	Dissolved Sulphate (SO4)	2020/07/07	NC	80 - 120	107	80 - 120	<1.0	mg/L	0.25	20		
9914126	Total Ammonia (N)	2020/07/08	NC	80 - 120	112	80 - 120	<0.015	mg/L	1.3 (1)	20		
9914157	Dissolved Barium (Ba)	2020/07/08	90	80 - 120	95	80 - 120	<0.010	mg/L				
9914157	Dissolved Boron (B)	2020/07/08	NC	80 - 120	99	80 - 120	<0.020	mg/L				
9914157	Dissolved Calcium (Ca)	2020/07/08	NC	80 - 120	96	80 - 120	<0.30	mg/L	0.68	20		
9914157	Dissolved Magnesium (Mg)	2020/07/08	94	80 - 120	100	80 - 120	<0.20	mg/L	0.011	20		
9914157	Dissolved Manganese (Mn)	2020/07/08	93	80 - 120	98	80 - 120	<0.0040	mg/L				
9914157	Dissolved Phosphorus (P)	2020/07/08	99	80 - 120	97	80 - 120	<0.10	mg/L				
9914157	Dissolved Potassium (K)	2020/07/08	92	80 - 120	94	80 - 120	<0.30	mg/L				

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BV Labs Job #: C045474
Report Date: 2020/07/09

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your P.O. #: 209257RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9914157	Dissolved Sodium (Na)	2020/07/08	92	80 - 120	97	80 - 120	<0.50	mg/L				

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C045474
Report Date: 2020/07/09

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 2
Site Location: RYLEY, AB
Your P.O. #: 209257RY
Sampler Initials: MN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Harry (Peng) Liang, Senior Analyst

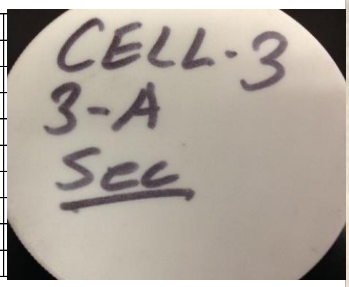
Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

CleanHarbors Environmental Services Inc.

RYLEY LABORATORY	**Lab Log Number: 20093**
Certificate of Analysis	
Customer/Generator:	**CH Ryley**
Sample Label:	**Cell 3A Secondary, June 9 2020**
Requested by: Stan	
Report Date: June 9, 2020	
Analyst: T. Webb	



Lab Comments: Conductivity = 12.6 mS/cm.

Physical State		**Ash (%)**			**Volatiles (mg/L)**	
Solid without free liquid (x)		<0.1			Benzene	<0.2
Powder (x)		0.1-1.0			Toluene	<0.2
Monolithic solid (x)		1.1-5.0			Ethylbenzene	<0.2
Liquid with no solids (x)	X	5.1-20			Xylenes	<0.2
Liquid/solid mixture (x)		>20			Naphthalene	<0.2
Sludge (x)		unknown	X			
Gas/Aerosol (x)					**Analyte (Dissolved)**	**(mg/L)**
					Silver (Ag)	<0.2
BTU/Pound (MJ/Kg)		**Viscosity (Centipoise)**			Aluminum (Al)	<0.2
<2,000 (<4.6)	X	1-100 (water)	X		Arsenic (As)	<0.2
2,000-5,000 (4.6-11.6)		101-500 (motor oil)			Boron (B)	0.4
5,000-10,000 (11.6-23.2)		501-10,000 (molasses)			Barium (Ba)	<0.2
>10,000 (>23.2)		>10,000			Beryllium (Be)	<0.2
					Calcium (Ca)	480
pH		**Flash Point °F (°C)**			Cadmium (Cd)	<0.2
< = 2		<73 (<23)			Cobalt (Co)	<0.2
2.1-6.9	X	73-100 (23-38)			Chromium (Cr)	<0.2
7 (Neutral)		101-140 (38-60)			Copper (Cu)	<0.2
7.1-12.4		141-200 (60-93)			Iron (Fe)	20
> = 12.5		>142 (>61)	X		Mercury (Hg)	<0.2
Actual	**6.7**				Potassium (K)	35
		Number of Phases/ Layers			Lithium (Li)	0.2
Specific Gravity		Top % v/v (Approx.)			Magnesium (Mg)	300
<0.8 (Gasoline)		Middle % v/v (Approx.)			Manganese (Mn)	6
0.8-1.0 (Ethanol)		Bottom % v/v (Approx.)			Molybdenum (Mo)	0.2
1.0 (Water)	X				Sodium (Na)	2800
1.0-1.2 (Antifreeze)		Liquid/solid mixture (%) Vol/Vol			Nickel (Ni)	0.2
>1.2 (Methylene Chloride)		% Free Liquid	**100**		Phosphorus (P)	<0.2
Actual		% Settled solid (approx)			Lead (Pb)	<0.2
		% Total Suspended Solids (approx)			Sulfur (S)	2400
Melting Point °F (° C)		% Sludge (vol. by centrifuge)			Antimony (Sb)	<0.2
<140 (<60)	X				Selenium (Se)	<1
140-200 (60-93)		**Screens**			Silica (Si)	20
>200 (>93)		Reactive Cyanide Screen	**Not tested**		Strontium (Sr)	4
		Reactive Sulfide Screen	**Negative**		Thallium (Tl)	<0.5
Boiling Point °F (°C)		Head Space Sulfide Screen	**Negative**		Uranium (U)	<2
<= 95 (< =35)		Oxidizer Screen	**Not tested**		Vanadium (V)	<0.2
95-100 (35-38)		Radioactivity Screen	**Negative**		Zinc (Zn)	<0.2
101-129 (38-54)		Reactive Ammonia Screen	**Trace**		Zirconium (Zr)	<0.2
> = 130 (>54)	X	Organic Halogenated compounds	**Negative**		Ammonia-N	<100

Note: There are 39 pesticides, herbicides and fungicides listed in the Alberta Regulations with specific leachate limits for each
Any suspicion that these compounds may be present will require that analyses be performed.

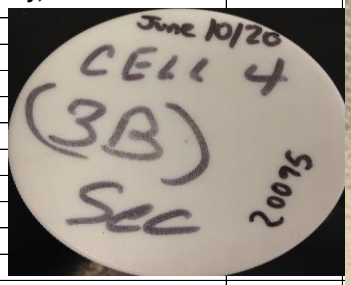
Certification:

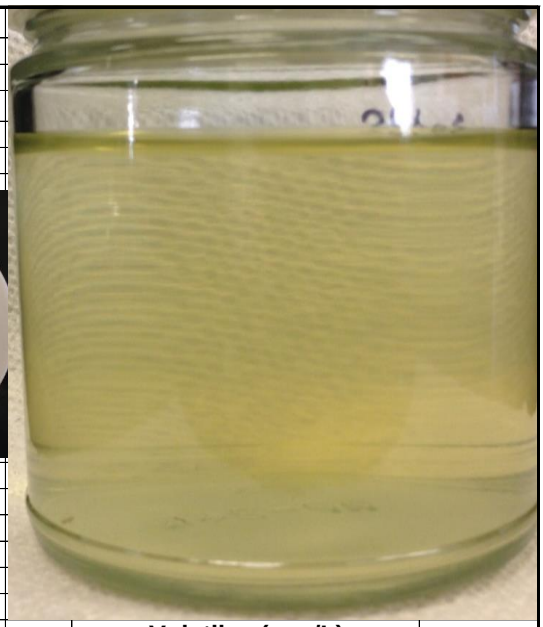
The Ryley Laboratory is not an accredited laboratory, the reports and the data provided are to be used for internal purposes.

In order to report to Governments, regulators or other agencies you must seek the services of an accredited laboratory.

CleanHarbors Environmental Services Inc.

RYLEY LABORATORY	**Lab Log Number: 20095**	
Certificate of Analysis		
Customer/Generator:	**CH Ryley**	
Sample Label:	**Cell 3B Secondary, June 10 2020**	
Requested by: Stan		
Report Date: June 10, 2020		
Analyst: T. Webb		





Lab Comments: Conductivity = 12.8 mS/cm.

Physical State		**Ash (%)**			**Volatiles (mg/L)**	
Solid without free liquid (x)		<0.1			Benzene	<0.2
Powder (x)		0.1-1.0			Toluene	<0.2
Monolithic solid (x)		1.1-5.0			Ethylbenzene	<0.2
Liquid with no solids (x)	X	5.1-20			Xylenes	<0.2
Liquid/solid mixture (x)		>20			Naphthalene	<0.2
Sludge (x)		unknown	X			
Gas/Aerosol (x)					**Analyte (Dissolved)**	**(mg/L)**
					Silver (Ag)	<0.2
BTU/Pound (MJ/Kg)		**Viscosity (Centipoise)**			Aluminum (Al)	<0.2
<2,000 (<4.6)	X	1-100 (water)	X		Arsenic (As)	<0.2
2,000-5,000 (4.6-11.6)		101-500 (motor oil)			Boron (B)	0.2
5,000-10,000 (11.6-23.2)		501-10,000 (molasses)			Barium (Ba)	<0.2
>10,000 (>23.2)		>10,000			Beryllium (Be)	<0.2
					Calcium (Ca)	520
pH		**Flash Point °F (°C)**			Cadmium (Cd)	<0.2
< = 2		<73 (<23)			Cobalt (Co)	<0.2
2.1-6.9		73-100 (23-38)			Chromium (Cr)	<0.2
7 (Neutral)		101-140 (38-60)			Copper (Cu)	<0.2
7.1-12.4	X	141-200 (60-93)			Iron (Fe)	2
> = 12.5		>142 (>61)	X		Mercury (Hg)	<0.2
Actual	**7.5**				Potassium (K)	19
		Number of Phases/ Layers			Lithium (Li)	<0.2
Specific Gravity		Top % v/v (Approx.)			Magnesium (Mg)	300
<0.8 (Gasoline)		Middle % v/v (Approx.)			Manganese (Mn)	6
0.8-1.0 (Ethanol)		Bottom % v/v (Approx.)			Molybdenum (Mo)	<0.2
1.0 (Water)	X				Sodium (Na)	2700
1.0-1.2 (Antifreeze)		Liquid/solid mixture (%) Vol/Vol			Nickel (Ni)	<0.2
>1.2 (Methylene Chloride)		% Free Liquid	**100**		Phosphorus (P)	1
Actual		% Settled solid (approx)			Lead (Pb)	<0.2
		% Total Suspended Solids (approx)			Sulfur (S)	2300
Melting Point °F (° C)		% Sludge (vol. by centrifuge)			Antimony (Sb)	<0.2
<140 (<60)	X				Selenium (Se)	<1
140-200 (60-93)		**Screens**			Silica (Si)	4
>200 (>93)		Reactive Cyanide Screen	**Not tested**		Strontium (Sr)	4
		Reactive Sulfide Screen	**Negative**		Thallium (Tl)	<0.5
Boiling Point °F (°C)		Head Space Sulfide Screen	**Negative**		Uranium (U)	<2
<= 95 (< =35)		Oxidizer Screen	**Negative**		Vanadium (V)	<0.2
95-100 (35-38)		Radioactivity Screen	**Negative**		Zinc (Zn)	<0.2
101-129 (38-54)		Reactive Ammonia Screen	**Negative**		Zirconium (Zr)	<0.2
> = 130 (>54)	X	Organic Halogenated compounds	**Negative**		Ammonia-N	<100

Note: There are 39 pesticides, herbicides and fungicides listed in the Alberta Regulations with specific leachate limits for each
Any suspicion that these compounds may be present will require that analyses be performed.

Certification:

The Ryley Laboratory is not an accredited laboratory, the reports and the data provided are to be used for internal purposes.

In order to report to Governments, regulators or other agencies you must seek the services of an accredited laboratory.

APPENDIX F

Leak Detection Liquid Analysis

Quarter 3

Your P.O. #: 211003RY
Your Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your C.O.C. #: 1 of 1

Attention: STAN YUHA

CLEAN HARBORS
P.O. BOX 390
50114 Range Rd 173
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/09/23
Report #: R2932726
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C066480
Received: 2020/09/15, 14:13

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	7	N/A	2020/09/17	AB SOP-00005	SM 23 2320 B m
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	1	N/A	2020/09/18	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID (1)	8	N/A	2020/09/18	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	8	N/A	2020/09/21		Auto Calc
Cadmium - low level CCME - Dissolved (1)	8	N/A	2020/09/22		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	6	N/A	2020/09/22	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
Chloride/Sulphate by Auto Colourimetry (1)	2	N/A	2020/09/23	AB SOP-00020 / AB SOP-00018	SM23-4500-Cl/SO4-E m
COD by Colorimeter (1)	7	N/A	2020/09/19	AB SOP-00016	SM 23 5220D m
COD by Colorimeter (1)	1	N/A	2020/09/21	AB SOP-00016	SM 23 5220D m
Dissolved Hexavalent Chromium-Lab Filter (1, 2)	6	N/A	2020/09/22	AB SOP-00063	SM 23 3500-Cr B m
Dissolved Hexavalent Chromium-Lab Filter (1, 2)	2	N/A	2020/09/23	AB SOP-00063	SM 23 3500-Cr B m
Carbon (DOC) (1, 3)	7	N/A	2020/09/21	AB SOP-00087	MMCW 119 1996 m
Carbon (DOC) (1, 3)	1	N/A	2020/09/22	AB SOP-00087	MMCW 119 1996 m
Conductivity @25C (1)	8	N/A	2020/09/17	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 4)	4	2020/09/17	2020/09/18	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 4)	4	2020/09/17	2020/09/19	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Mercury (Total) by CV (1)	3	2020/09/22	2020/09/22	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV (1)	5	2020/09/22	2020/09/23	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP - Dissolved (1, 5)	1	N/A	2020/09/20	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Dissolved (1, 5)	7	N/A	2020/09/22	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	8	2020/09/23	2020/09/23	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (1, 5)	8	N/A	2020/09/19	AB SOP-00043	EPA 6020b R2 m
Ammonia-N (Total) (1)	8	N/A	2020/09/17	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrogen (Nitrite - Nitrate) by IC (1)	8	N/A	2020/09/16	AB SOP-00023	SM 23 4110 B m
pH @25°C (1, 6)	8	N/A	2020/09/17	AB SOP-00005	SM 23 4500-H+B m
Phenols (4-AAP) (1)	7	N/A	2020/09/21	AB SOP-00088	EPA 9066 R0 m

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Your P.O. #: 211003RY
Your Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your C.O.C. #: 1 of 1

Attention: STAN YUHA

CLEAN HARBORS
P.O. BOX 390
50114 Range Rd 173
RYLEY, AB
CANADA T0B 4A0

Report Date: 2020/09/23
Report #: R2932726
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C066480
Received: 2020/09/15, 14:13

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Phenols (4-AAP) (1)	1	N/A	2020/09/22	AB SOP-00088	EPA 9066 R0 m
Total Dissolved Solids (Filt. Residue) (1)	8	2020/09/20	2020/09/20	AB SOP-00065	SM 23 2540 C m
Total Kjeldahl Nitrogen (1)	8	2020/09/23	2020/09/23	AB SOP-00008	EPA 351.1 R1978 m
Total Suspended Solids (NFR) (1)	8	2020/09/21	2020/09/21	AB SOP-00061	SM 23 2540 D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by BV Labs Calgary Environmental
(2) Samples were filtered and preserved at the lab. Values may not reflect concentrations at the time of sampling.
(3) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Silica gel clean up employed.
(5) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(6) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

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Your P.O. #: 211003RY
Your Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your C.O.C. #: 1 of 1

Attention: STAN YUHA

CLEAN HARBORS
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50114 Range Rd 173
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Report Date: 2020/09/23
Report #: R2932726
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C066480
Received: 2020/09/15, 14:13

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
23 Sep 2020 18:05:17

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bvlabs.com
Phone# (780) 577-7100
==========
This report has been generated and distributed using a secure automated process.
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BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		YL2767	YL2768	YL2769	YL2770		
Sampling Date		2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00		
COC Number		1 of 1	1 of 1	1 of 1	1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 1**	**SECONDARY LEACHATE CELL 2**	**SECONDARY LEACHATE CELL 3A**	**SECONDARY LEACHATE CELL 3B**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/L	0.19	0.17	0.12	3.5	0.10	A002280
Volatiles							
Benzene	ug/L	1.5	1.1	5.1	1.6	0.40	A003296
Toluene	ug/L	<0.40	5.3	1.6	0.81	0.40	A003296
Ethylbenzene	ug/L	<0.40	<0.40	0.44	<0.40	0.40	A003296
m & p-Xylene	ug/L	<0.80	<0.80	<0.80	<0.80	0.80	A003296
o-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	0.40	A003296
Xylenes (Total)	ug/L	<0.89	<0.89	<0.89	<0.89	0.89	A001111
F1 (C6-C10) - BTEX	ug/L	<100	<100	<100	210	100	A001111
F1 (C6-C10)	ug/L	<100	<100	<100	210	100	A003296
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	107	108	103	108		A003296
4-Bromofluorobenzene (sur.)	%	98	98	93	98		A003296
D4-1,2-Dichloroethane (sur.)	%	107	109	108	109		A003296
O-TERPHENYL (sur.)	%	94	98	97	98		A002280
RDL = Reportable Detection Limit							

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BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		YL2771	YL2772	YL2773		
Sampling Date		2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00		
COC Number		1 of 1	1 of 1	1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 3C**	**SECONDARY LEACHATE CELL 3D**	**SECONDARY LEACHATE CELL 3E**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	A002280
Volatiles						
Benzene	ug/L	7.0	<0.40	<0.40	0.40	A003296
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	A003296
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	A003296
m & p-Xylene	ug/L	<0.80	<0.80	<0.80	0.80	A003296
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	A003296
Xylenes (Total)	ug/L	<0.89	<0.89	<0.89	0.89	A001111
F1 (C6-C10) - BTEX	ug/L	<100	<100	<100	100	A001111
F1 (C6-C10)	ug/L	<100	<100	<100	100	A003296
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	106	109	109		A003296
4-Bromofluorobenzene (sur.)	%	98	97	97		A003296
D4-1,2-Dichloroethane (sur.)	%	110	107	107		A003296
O-TERPHENYL (sur.)	%	102	99	97		A002280
RDL = Reportable Detection Limit						

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BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

AT1 BTEX AND F1-F2 IN WATER (WATER)

BV Labs ID		YL2774		
Sampling Date		2020/09/14 11:00		
COC Number		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/L	0.14	0.10	A002280
Volatiles				
Benzene	ug/L	<0.40	0.40	A003296
Toluene	ug/L	<0.40	0.40	A003296
Ethylbenzene	ug/L	<0.40	0.40	A003296
m & p-Xylene	ug/L	<0.80	0.80	A003296
o-Xylene	ug/L	<0.40	0.40	A003296
Xylenes (Total)	ug/L	<0.89	0.89	A001829
F1 (C6-C10) - BTEX	ug/L	<100	100	A001829
F1 (C6-C10)	ug/L	<100	100	A003296
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	107		A003296
4-Bromofluorobenzene (sur.)	%	97		A003296
D4-1,2-Dichloroethane (sur.)	%	106		A003296
O-TERPHENYL (sur.)	%	98		A002280
RDL = Reportable Detection Limit				

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BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		YL2767		YL2768		YL2769		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00		2020/09/14 11:00		
COC Number		1 of 1		1 of 1		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 1**	**RDL**	**SECONDARY LEACHATE CELL 2**	**RDL**	**SECONDARY LEACHATE CELL 3A**	**RDL**	**QC Batch**
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	0.25	0.020	0.048	0.020	0.023	0.020	A001112
Elements								
Dissolved Aluminum (Al)	mg/L	0.011	0.0030	0.025	0.0030	0.053	0.0030	A006492
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	<0.00060	0.00060	0.0018	0.00060	A006492
Dissolved Arsenic (As)	mg/L	0.0085	0.00020	0.0068	0.00020	0.0074	0.00020	A006492
Dissolved Barium (Ba)	mg/L	0.18	0.010	0.042	0.010	0.047	0.010	A007689
Dissolved Boron (B)	mg/L	9.0 (1)	0.20	0.50	0.020	0.24	0.020	A007689
Dissolved Calcium (Ca)	mg/L	420	0.30	420	0.30	440	0.30	A007689
Dissolved Cobalt (Co)	mg/L	1.3	0.00030	0.0057	0.00030	0.0051	0.00030	A006492
Dissolved Copper (Cu)	mg/L	0.0033	0.00020	0.0017	0.00020	0.0011	0.00020	A006492
Dissolved Lead (Pb)	mg/L	0.0043	0.00020	<0.00020	0.00020	<0.00020	0.00020	A006492
Dissolved Magnesium (Mg)	mg/L	200	0.20	250	0.20	280	0.20	A007689
Dissolved Manganese (Mn)	mg/L	12	0.0040	9.7	0.0040	6.6	0.0040	A007689
Dissolved Molybdenum (Mo)	mg/L	0.072	0.00020	0.31	0.00020	0.11	0.00020	A006492
Dissolved Nickel (Ni)	mg/L	11 (1)	0.0020	0.030	0.00050	0.12	0.00050	A006492
Dissolved Phosphorus (P)	mg/L	0.24	0.10	1.3	0.10	<0.10	0.10	A007689
Dissolved Potassium (K)	mg/L	16	0.30	30	0.30	21	0.30	A007689
Dissolved Selenium (Se)	mg/L	0.00093	0.00020	0.0013	0.00020	0.0013	0.00020	A006492
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	A006492
Dissolved Sodium (Na)	mg/L	2300 (1)	5.0	3500 (1)	10	3100 (1)	5.0	A007689
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	0.00020	<0.00020	0.00020	A006492
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	0.0010	0.0029	0.0010	A006492
Dissolved Uranium (U)	mg/L	0.0063	0.00010	0.043	0.00010	0.039	0.00010	A006492
Dissolved Zinc (Zn)	mg/L	0.19	0.0030	0.030	0.0030	0.041	0.0030	A006492

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Bureau Veritas Laboratories Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		YL2770		YL2771		YL2772		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00		2020/09/14 11:00		
COC Number		1 of 1		1 of 1		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 3B**	**RDL**	**SECONDARY LEACHATE CELL 3C**	**RDL**	**SECONDARY LEACHATE CELL 3D**	**RDL**	**QC Batch**
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	0.30	0.040	<0.020	0.020	0.92	0.020	A001112
Elements								
Dissolved Aluminum (Al)	mg/L	0.61	0.0060	0.0043	0.0030	0.0076	0.0030	A006492
Dissolved Antimony (Sb)	mg/L	<0.0012	0.0012	<0.00060	0.00060	0.00090	0.00060	A006492
Dissolved Arsenic (As)	mg/L	0.019	0.00040	0.0033	0.00020	0.011	0.00020	A006492
Dissolved Barium (Ba)	mg/L	<0.10	0.10	0.046	0.010	0.15	0.010	A007689
Dissolved Boron (B)	mg/L	39	0.20	0.98	0.020	12 (1)	0.10	A007689
Dissolved Calcium (Ca)	mg/L	160	3.0	370	0.30	600 (1)	1.5	A007689
Dissolved Cobalt (Co)	mg/L	0.0025	0.00060	0.00099	0.00030	0.0072	0.00030	A006492
Dissolved Copper (Cu)	mg/L	0.0092	0.00040	0.014	0.00020	0.024	0.00020	A006492
Dissolved Lead (Pb)	mg/L	<0.00040	0.00040	0.00024	0.00020	<0.00020	0.00020	A006492
Dissolved Magnesium (Mg)	mg/L	250	2.0	220	0.20	320	0.20	A007689
Dissolved Manganese (Mn)	mg/L	1.6	0.040	4.3	0.0040	4.4	0.0040	A007689
Dissolved Molybdenum (Mo)	mg/L	1.9	0.00040	0.010	0.00020	4.7	0.00020	A006492
Dissolved Nickel (Ni)	mg/L	0.22	0.0010	0.020	0.00050	1.0	0.00050	A006492
Dissolved Phosphorus (P)	mg/L	5.0	1.0	<0.10	0.10	0.44	0.10	A007689
Dissolved Potassium (K)	mg/L	630	3.0	17	0.30	160	0.30	A007689
Dissolved Selenium (Se)	mg/L	0.016	0.00040	0.0010	0.00020	0.0056	0.00020	A006492
Dissolved Silver (Ag)	mg/L	<0.00020	0.00020	<0.00010	0.00010	<0.00010	0.00010	A006492
Dissolved Sodium (Na)	mg/L	4500	5.0	2400 (1)	5.0	1600 (1)	2.5	A007689
Dissolved Thallium (Tl)	mg/L	<0.00040	0.00040	<0.00020	0.00020	<0.00020	0.00020	A006492
Dissolved Tin (Sn)	mg/L	0.011	0.0020	<0.0010	0.0010	<0.0010	0.0010	A006492
Dissolved Uranium (U)	mg/L	0.021	0.00020	0.041	0.00010	0.010	0.00010	A006492
Dissolved Zinc (Zn)	mg/L	0.12	0.0060	0.062	0.0030	0.21	0.0030	A006492

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

REGULATED METALS (CCME/AT1) - DISSOLVED

BV Labs ID		YL2773		YL2774		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00		
COC Number		1 of 1		1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 3E**	**RDL**	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Low Level Elements						
Dissolved Cadmium (Cd)	ug/L	0.11	0.020	0.11	0.020	A001832
Elements						
Dissolved Aluminum (Al)	mg/L	0.017	0.0030	0.0032	0.0030	A006492
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	0.00090	0.00060	A006492
Dissolved Arsenic (As)	mg/L	0.0055	0.00020	0.0016	0.00020	A006492
Dissolved Barium (Ba)	mg/L	0.052	0.010	0.067	0.010	A007689
Dissolved Boron (B)	mg/L	1.4	0.020	4.1	0.020	A007689
Dissolved Calcium (Ca)	mg/L	120	0.30	570 (1)	1.5	A007689
Dissolved Cobalt (Co)	mg/L	0.0017	0.00030	0.0025	0.00030	A006492
Dissolved Copper (Cu)	mg/L	0.024	0.00020	0.0026	0.00020	A006492
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	<0.00020	0.00020	A006492
Dissolved Magnesium (Mg)	mg/L	140	0.20	210	0.20	A007689
Dissolved Manganese (Mn)	mg/L	0.049	0.0040	5.6	0.0040	A007689
Dissolved Molybdenum (Mo)	mg/L	0.32	0.00020	0.74	0.00020	A006492
Dissolved Nickel (Ni)	mg/L	0.13	0.00050	0.037	0.00050	A006492
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	0.58	0.10	A007689
Dissolved Potassium (K)	mg/L	26	0.30	19	0.30	A007689
Dissolved Selenium (Se)	mg/L	0.0013	0.00020	0.0014	0.00020	A006492
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	0.00010	A006492
Dissolved Sodium (Na)	mg/L	1600 (1)	2.5	2100 (1)	2.5	A007689
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	0.00020	A006492
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	0.0010	A006492
Dissolved Uranium (U)	mg/L	0.055	0.00010	0.081	0.00010	A006492
Dissolved Zinc (Zn)	mg/L	0.055	0.0030	0.040	0.0030	A006492

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YL2767			YL2768		
Sampling Date		2020/09/14 11:00			2020/09/14 11:00		
COC Number		1 of 1			1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 1**	**RDL**	**QC Batch**	**SECONDARY LEACHATE CELL 2**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	978	10	A006713	333	10	A006713
Misc. Inorganics							
Conductivity	uS/cm	12000	2.0	A003665	15000	2.0	A003665
Dissolved Organic Carbon (C)	mg/L	370 (1)	10	A008017	<250 (1)	250	A008005
pH	pH	7.97	N/A	A003664	7.40	N/A	A003664
Total Dissolved Solids	mg/L	>8000 (2)	10	A007440	>8000 (2)	10	A007440
Total Suspended Solids	mg/L	200 (3)	2.1	A007746	100 (3)	2.1	A007746
Anions							
Bicarbonate (HCO3)	mg/L	1300	1.0	A003662	770	1.0	A003662
Carbonate (CO3)	mg/L	<1.0	1.0	A003662	<1.0	1.0	A003662
Dissolved Chloride (Cl)	mg/L	1800 (4)	10	A009008	230 (4)	5.0	A009008
Dissolved Sulphate (SO4)	mg/L	3300 (4)	25	A009008	8300 (4)	50	A009008
Lab Filtered Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	0.025 (5)	0.0099	A004029	<0.00099 (6)	0.00099	A012543
Nutrients							
Total Ammonia (N)	mg/L	15 (4)	0.15	A003312	6.7 (4)	0.15	A003295
Total Total Kjeldahl Nitrogen	mg/L	100 (4)	2.5	A011445	14 (4)	0.50	A011445
Dissolved Nitrite (N)	mg/L	<0.050 (7)	0.050	A002073	<0.10 (7)	0.10	A002073
Dissolved Nitrate (N)	mg/L	1.7 (4)	0.050	A002073	<0.10 (7)	0.10	A002073
Misc. Organics							
Phenols	mg/L	0.029 (1)	0.015	A006156	0.021 (1)	0.0075	A006156

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to sample matrix.
(2) Sample exceeds operating range of this method.
(3) Detection limit raised based on sample volume used for analysis.
(4) Detection limits raised due to dilution to bring analyte within the calibrated range.
(5) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
(6) Matrix spike exceeds acceptance limits due to matrix interference.
(7) Detection limits raised due to matrix interference.

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BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YL2769			YL2770		
Sampling Date		2020/09/14 11:00			2020/09/14 11:00		
COC Number		1 of 1			1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 3A**	**RDL**	**QC Batch**	**SECONDARY LEACHATE CELL 3B**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	371	10	A006713	3140 (1)	50	A007856
Misc. Inorganics							
Conductivity	uS/cm	13000	2.0	A003665	20000	2.0	A003665
Dissolved Organic Carbon (C)	mg/L	130 (2)	5.0	A008005	1200 (2)	50	A008005
pH	pH	7.80	N/A	A003664	8.78	N/A	A003664
Total Dissolved Solids	mg/L	>8000 (3)	10	A007440	>8000 (3)	10	A007440
Total Suspended Solids	mg/L	54 (4)	1.5	A007746	36	1.0	A007746
Anions							
Bicarbonate (HCO3)	mg/L	1500	1.0	A003662	2900	10	A003662
Carbonate (CO3)	mg/L	<1.0	1.0	A003662	350	10	A003662
Dissolved Chloride (Cl)	mg/L	280 (1)	5.0	A009008	2200 (1)	20	A009008
Dissolved Sulphate (SO4)	mg/L	6300 (1)	50	A009008	5300 (1)	50	A009008
Lab Filtered Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.0099 (5)	0.0099	A004029	<0.0099 (5)	0.0099	A004029
Nutrients							
Total Ammonia (N)	mg/L	11 (1)	0.15	A003312	360 (1)	3.8	A003295
Total Total Kjeldahl Nitrogen	mg/L	23 (1)	1.0	A011445	500 (1)	25	A011445
Dissolved Nitrite (N)	mg/L	<0.050 (6)	0.050	A002073	<0.10 (6)	0.10	A002073
Dissolved Nitrate (N)	mg/L	0.095 (6)	0.050	A002073	<0.10 (6)	0.10	A002073
Misc. Organics							
Phenols	mg/L	0.026 (2)	0.0075	A006156	4.5 (1)	0.15	A006156

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Detection limits raised due to sample matrix.
(3) Sample exceeds operating range of this method.
(4) Detection limit raised based on sample volume used for analysis.
(5) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
(6) Detection limits raised due to matrix interference.

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BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YL2771			YL2772		
Sampling Date		2020/09/14 11:00			2020/09/14 11:00		
COC Number		1 of 1			1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 3C**	**RDL**	**QC Batch**	**SECONDARY LEACHATE CELL 3D**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	267	10	A006713	178	10	A006713
Misc. Inorganics							
Conductivity	uS/cm	11000	2.0	A003665	12000	2.0	A003665
Dissolved Organic Carbon (C)	mg/L	100 (1)	5.0	A008005	33 (1)	5.0	A008005
pH	pH	8.01	N/A	A003664	7.75	N/A	A003664
Total Dissolved Solids	mg/L	>8000 (2)	10	A007440	>8000 (2)	10	A007440
Total Suspended Solids	mg/L	32	1.0	A007746	2.6	1.0	A007746
Anions							
Bicarbonate (HCO3)	mg/L	1400	1.0	A003662	420	1.0	A003662
Carbonate (CO3)	mg/L	<1.0	1.0	A003662	<1.0	1.0	A003662
Dissolved Chloride (Cl)	mg/L	240 (3)	5.0	A009008	2400 (3)	20	A009008
Dissolved Sulphate (SO4)	mg/L	4500 (3)	50	A009008	1600 (3)	20	A009008
Lab Filtered Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.0099 (4)	0.0099	A004029	0.019	0.00099	A012543
Nutrients							
Total Ammonia (N)	mg/L	7.6 (3)	0.15	A003295	4.6 (3)	0.15	A003295
Total Total Kjeldahl Nitrogen	mg/L	15 (3)	0.50	A011445	4.9 (3)	0.25	A011445
Dissolved Nitrite (N)	mg/L	<0.010	0.010	A002073	0.24	0.010	A002073
Dissolved Nitrate (N)	mg/L	0.25 (5)	0.050	A002073	330 (3)	0.50	A002073
Misc. Organics							
Phenols	mg/L	<0.0075 (1)	0.0075	A006156	<0.0075 (1)	0.0075	A006156

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to sample matrix.
(2) Sample exceeds operating range of this method.
(3) Detection limits raised due to dilution to bring analyte within the calibrated range.
(4) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
(5) Detection limits raised due to matrix interference.

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BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YL2773			YL2774		
Sampling Date		2020/09/14 11:00			2020/09/14 11:00		
COC Number		1 of 1			1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 3E**	**RDL**	**QC Batch**	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Demand Parameters							
Chemical Oxygen Demand	mg/L	125	10	A006713	256	10	A006713
Misc. Inorganics							
Conductivity	uS/cm	7500	2.0	A003669	11000	2.0	A003669
Dissolved Organic Carbon (C)	mg/L	48 (1)	5.0	A008005	64 (1)	5.0	A008017
pH	pH	8.20	N/A	A003668	7.77	N/A	A003668
Total Dissolved Solids	mg/L	5700	10	A007440	>8000 (2)	10	A007441
Total Suspended Solids	mg/L	3.5	1.0	A007786	5.9	1.0	A007786
Anions							
Bicarbonate (HCO3)	mg/L	930	1.0	A003666	980	1.0	A003666
Carbonate (CO3)	mg/L	<1.0	1.0	A003666	<1.0	1.0	A003666
Dissolved Chloride (Cl)	mg/L	410 (3)	5.0	A010263	1400 (3)	10	A010263
Dissolved Sulphate (SO4)	mg/L	2900 (3)	20	A010263	3400 (3)	25	A010263
Lab Filtered Metals							
Dissolved Hex. Chromium (Cr 6+)	mg/L	<0.00099	0.00099	A004029	<0.0099 (4)	0.0099	A004029
Nutrients							
Total Ammonia (N)	mg/L	<0.15 (3)	0.15	A003312	3.2 (3)	0.075	A003312
Total Total Kjeldahl Nitrogen	mg/L	3.9 (3)	0.25	A011445	9.5 (3)	0.25	A011445
Dissolved Nitrite (N)	mg/L	0.10	0.010	A002073	<0.010	0.010	A002073
Dissolved Nitrate (N)	mg/L	11 (3)	0.10	A002073	0.068 (5)	0.050	A002073
Misc. Organics							
Phenols	mg/L	0.10 (1)	0.0075	A006156	0.010 (1)	0.0075	A006156

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to sample matrix.
(2) Sample exceeds operating range of this method.
(3) Detection limits raised due to dilution to bring analyte within the calibrated range.
(4) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
(5) Detection limits raised due to matrix interference.

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BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		YL2767		YL2768	YL2769		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00	2020/09/14 11:00		
COC Number		1 of 1		1 of 1	1 of 1		
	UNITS	SECONDARY LEACHATE CELL 1	RDL	SECONDARY LEACHATE CELL 2	SECONDARY LEACHATE CELL 3A	RDL	QC Batch
Elements							
Total Mercury (Hg)	ug/L	<0.19 (1)	0.19	<0.019 (1)	0.022 (1)	0.019	A010260

RDL = Reportable Detection Limit
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

BV Labs ID		YL2770		YL2771		YL2772		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00		2020/09/14 11:00		
COC Number		1 of 1		1 of 1		1 of 1		
	UNITS	SECONDARY LEACHATE CELL 3B	RDL	SECONDARY LEACHATE CELL 3C	RDL	SECONDARY LEACHATE CELL 3D	RDL	QC Batch
Elements								
Total Mercury (Hg)	ug/L	<0.19 (1)	0.19	<0.019 (1)	0.019	0.0032	0.0019	A010260

RDL = Reportable Detection Limit
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

BV Labs ID		YL2773		YL2774		
Sampling Date		2020/09/14 11:00		2020/09/14 11:00		
COC Number		1 of 1		1 of 1		
	UNITS	SECONDARY LEACHATE CELL 3E	RDL	SECONDARY LEACHATE CELL 4	RDL	QC Batch
Elements						
Total Mercury (Hg)	ug/L	<0.019 (1)	0.019	<0.0019	0.0019	A010260

RDL = Reportable Detection Limit
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		YL2767	YL2768	YL2769	YL2770		
Sampling Date		2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00		
COC Number		1 of 1	1 of 1	1 of 1	1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 1**	**SECONDARY LEACHATE CELL 2**	**SECONDARY LEACHATE CELL 3A**	**SECONDARY LEACHATE CELL 3B**	**RDL**	**QC Batch**
Elements							
Total Chromium (Cr)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	A012443
Total Phosphorus (P)	mg/L	<2.0	3.3	<2.0	4.0	2.0	A012443
RDL = Reportable Detection Limit							

BV Labs ID		YL2771	YL2772	YL2773	YL2774		
Sampling Date		2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00	2020/09/14 11:00		
COC Number		1 of 1	1 of 1	1 of 1	1 of 1		
	UNITS	**SECONDARY LEACHATE CELL 3C**	**SECONDARY LEACHATE CELL 3D**	**SECONDARY LEACHATE CELL 3E**	**SECONDARY LEACHATE CELL 4**	**RDL**	**QC Batch**
Elements							
Total Chromium (Cr)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	A012443
Total Phosphorus (P)	mg/L	<2.0	<2.0	<2.0	<2.0	2.0	A012443
RDL = Reportable Detection Limit							

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BV Labs Job #: C066480
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CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	12.7°C
Package 2	13.7°C

Sample YL2768 [SECONDARY LEACHATE CELL 2] : Dissolved Chromium < Dissolved Hexavalent Chromium. High Hexavalent result is likely due to matrix interference.

Sample YL2772 [SECONDARY LEACHATE CELL 3D] : Dissolved Chromium < Dissolved Hexavalent Chromium. High Hexavalent result is likely due to matrix interference.

REGULATED METALS (CCME/AT1) - DISSOLVED Comments

Sample YL2770 [SECONDARY LEACHATE CELL 3B] Elements by ICPMS - Dissolved: Client supplied dissolved metals bottle contained particulate. Detection limits raised due to sample matrix.
Sample YL2770 [SECONDARY LEACHATE CELL 3B] Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

RESULTS OF CHEMICAL ANALYSES OF WATER Comments

Sample YL2770 [SECONDARY LEACHATE CELL 3B] Alkalinity @25C (pp, total), CO3,HCO3,OH: Detection limits raised due to dilution to bring analyte within the calibrated range.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments

Sample YL2767 [SECONDARY LEACHATE CELL 1] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL2768 [SECONDARY LEACHATE CELL 2] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL2769 [SECONDARY LEACHATE CELL 3A] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL2770 [SECONDARY LEACHATE CELL 3B] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL2771 [SECONDARY LEACHATE CELL 3C] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL2772 [SECONDARY LEACHATE CELL 3D] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL2773 [SECONDARY LEACHATE CELL 3E] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample YL2774 [SECONDARY LEACHATE CELL 4] Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

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BV Labs Job #: C066480
Report Date: 2020/09/23

QUALITY ASSURANCE REPORT

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A002280	O-TERPHENYL (sur.)	2020/09/18	95	60 - 140	98	60 - 140	98	%				
A003296	1,4-Difluorobenzene (sur.)	2020/09/18	106	50 - 140	107	50 - 140	108	%				
A003296	4-Bromofluorobenzene (sur.)	2020/09/18	96	50 - 140	97	50 - 140	98	%				
A003296	D4-1,2-Dichloroethane (sur.)	2020/09/18	114	50 - 140	110	50 - 140	108	%				
A002073	Dissolved Nitrate (N)	2020/09/16	103	80 - 120	102	80 - 120	<0.010	mg/L	NC	20		
A002073	Dissolved Nitrite (N)	2020/09/16	103	80 - 120	102	80 - 120	<0.010	mg/L	NC	20		
A002280	F2 (C10-C16 Hydrocarbons)	2020/09/18	92	60 - 140	95	60 - 140	<0.10	mg/L	NC	30		
A003295	Total Ammonia (N)	2020/09/17	NC	80 - 120	101	80 - 120	<0.015	mg/L	0.28 (1)	20		
A003296	Benzene	2020/09/18	112	50 - 140	111	60 - 130	<0.40	ug/L	NC	30		
A003296	Ethylbenzene	2020/09/18	99	50 - 140	102	60 - 130	<0.40	ug/L	NC	30		
A003296	F1 (C6-C10)	2020/09/18	90	60 - 140	92	60 - 140	<100	ug/L	NC	30		
A003296	m & p-Xylene	2020/09/18	98	50 - 140	100	60 - 130	<0.80	ug/L	NC	30		
A003296	o-Xylene	2020/09/18	97	50 - 140	98	60 - 130	<0.40	ug/L	NC	30		
A003296	Toluene	2020/09/18	101	50 - 140	101	60 - 130	<0.40	ug/L	NC	30		
A003312	Total Ammonia (N)	2020/09/17	92	80 - 120	102	80 - 120	<0.015	mg/L	7.1	20		
A003662	Bicarbonate (HCO3)	2020/09/17					<1.0	mg/L	0.87	20		
A003662	Carbonate (CO3)	2020/09/17					<1.0	mg/L	NC	20		
A003664	pH	2020/09/17			100	97 - 103			0.52	N/A		
A003665	Conductivity	2020/09/17			100	90 - 110	<2.0	uS/cm	0.16	10		
A003666	Bicarbonate (HCO3)	2020/09/17					<1.0	mg/L	11	20		
A003666	Carbonate (CO3)	2020/09/17					<1.0	mg/L	NC	20		
A003668	pH	2020/09/17			100	97 - 103			0.87	N/A		
A003669	Conductivity	2020/09/17			101	90 - 110	<2.0	uS/cm	0.27	10		
A004029	Dissolved Hex. Chromium (Cr 6+)	2020/09/22	52 (2)	80 - 120	104	80 - 120	<0.00099	mg/L	NC	20		
A006156	Phenols	2020/09/21	103	80 - 120	100	80 - 120	<0.0015	mg/L	NC	20		
A006492	Dissolved Aluminum (Al)	2020/09/19	97	80 - 120	116	80 - 120	<0.0030	mg/L	16	20		
A006492	Dissolved Antimony (Sb)	2020/09/19	106	80 - 120	109	80 - 120	<0.00060	mg/L	NC	20		
A006492	Dissolved Arsenic (As)	2020/09/19	99	80 - 120	107	80 - 120	<0.00020	mg/L	8.5	20		
A006492	Dissolved Cobalt (Co)	2020/09/19	100	80 - 120	108	80 - 120	<0.00030	mg/L	0.33	20		
A006492	Dissolved Copper (Cu)	2020/09/19	99	80 - 120	110	80 - 120	<0.00020	mg/L	NC	20		
A006492	Dissolved Lead (Pb)	2020/09/19	96	80 - 120	103	80 - 120	<0.00020	mg/L	NC	20		

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BV Labs Job #: C066480
Report Date: 2020/09/23

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A006492	Dissolved Molybdenum (Mo)	2020/09/19	106	80 - 120	111	80 - 120	<0.00020	mg/L	3.7	20		
A006492	Dissolved Nickel (Ni)	2020/09/19	100	80 - 120	110	80 - 120	<0.00050	mg/L	1.4	20		
A006492	Dissolved Selenium (Se)	2020/09/19	93	80 - 120	109	80 - 120	<0.00020	mg/L	17	20		
A006492	Dissolved Silver (Ag)	2020/09/19	84	80 - 120	112	80 - 120	<0.00010	mg/L	NC	20		
A006492	Dissolved Thallium (Tl)	2020/09/19	94	80 - 120	110	80 - 120	<0.00020	mg/L	NC	20		
A006492	Dissolved Tin (Sn)	2020/09/19	91	80 - 120	114	80 - 120	<0.0010	mg/L	NC	20		
A006492	Dissolved Uranium (U)	2020/09/19	101	80 - 120	111	80 - 120	<0.00010	mg/L	17	20		
A006492	Dissolved Zinc (Zn)	2020/09/19	99	80 - 120	111	80 - 120	<0.0030	mg/L	NC	20		
A006713	Chemical Oxygen Demand	2020/09/19	101	80 - 120	100	80 - 120	<10	mg/L	4.9	20		
A007440	Total Dissolved Solids	2020/09/20	94	80 - 120	89	80 - 120	<10	mg/L	5.7	20		
A007441	Total Dissolved Solids	2020/09/20	96	80 - 120	93	80 - 120	<10	mg/L	3.3	20		
A007689	Dissolved Barium (Ba)	2020/09/20	89	80 - 120	96	80 - 120	<0.010	mg/L				
A007689	Dissolved Boron (B)	2020/09/20	98	80 - 120	102	80 - 120	<0.020	mg/L				
A007689	Dissolved Calcium (Ca)	2020/09/20	NC	80 - 120	97	80 - 120	<0.30	mg/L	1.2	20		
A007689	Dissolved Magnesium (Mg)	2020/09/20	90	80 - 120	94	80 - 120	<0.20	mg/L	1.4	20		
A007689	Dissolved Manganese (Mn)	2020/09/20	103	80 - 120	97	80 - 120	<0.0040	mg/L	NC	20		
A007689	Dissolved Phosphorus (P)	2020/09/20	98	80 - 120	94	80 - 120	<0.10	mg/L				
A007689	Dissolved Potassium (K)	2020/09/20	98	80 - 120	99	80 - 120	<0.30	mg/L	0.92	20		
A007689	Dissolved Sodium (Na)	2020/09/20	NC	80 - 120	98	80 - 120	<0.50	mg/L	0.82	20		
A007746	Total Suspended Solids	2020/09/21	101	80 - 120	103	80 - 120	<1.0	mg/L	13	20		
A007786	Total Suspended Solids	2020/09/21	90	80 - 120	90	80 - 120	<1.0	mg/L	1.8	20		
A007856	Chemical Oxygen Demand	2020/09/21	99	80 - 120	99	80 - 120	<10	mg/L	5.7	20		
A008005	Dissolved Organic Carbon (C)	2020/09/21	NC	N/A	113	80 - 120	<0.50	mg/L	1.7	20		
A008017	Dissolved Organic Carbon (C)	2020/09/22	NC	80 - 120	112	80 - 120	<0.50	mg/L	5.4	20		
A009008	Dissolved Chloride (Cl)	2020/09/21	118	80 - 120	114	80 - 120	<1.0	mg/L	14	20		
A009008	Dissolved Sulphate (SO4)	2020/09/21	123 (2)	80 - 120	104	80 - 120	<1.0	mg/L	2.0	20		
A010260	Total Mercury (Hg)	2020/09/22	95	80 - 120	99	80 - 120	<0.0019	ug/L	NC	20		
A010263	Dissolved Chloride (Cl)	2020/09/22	NC	80 - 120	107	80 - 120	<1.0	mg/L	0.33	20		
A010263	Dissolved Sulphate (SO4)	2020/09/22	NC	80 - 120	107	80 - 120	<1.0	mg/L	0.40	20		
A011445	Total Total Kjeldahl Nitrogen	2020/09/23	NC	80 - 120	103	80 - 120	<0.050	mg/L	0.47	20	102	80 - 120
A012443	Total Chromium (Cr)	2020/09/23	84	80 - 120	91	80 - 120	<0.010	mg/L				

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BV Labs Job #: C066480
Report Date: 2020/09/23

QUALITY ASSURANCE REPORT(CONT'D)

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A012443	Total Phosphorus (P)	2020/09/23	99	80 - 120	96	80 - 120	<0.10	mg/L				
A012543	Dissolved Hex. Chromium (Cr 6+)	2020/09/23	1.2 (2)	80 - 120	107	80 - 120	<0.00099	mg/L	NC	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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BV Labs Job #: C066480
Report Date: 2020/09/23

CLEAN HARBORS
Client Project #: SECONDARY LEACHATE QTR 3
Site Location: RYLEY, AB
Your P.O. #: 211003RY
Sampler Initials: MN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Gita Pokhrel, Laboratory Supervisor

Maria Magdalena Florescu, Ph.D., P.Chem., QP, Inorganics Manager

Harry (Peng) Liang, Senior Analyst

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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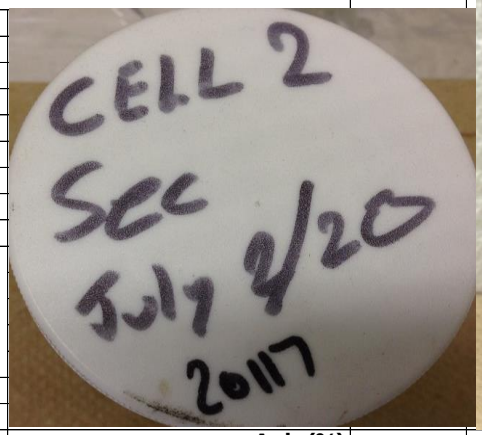
CleanHarbors Environmental Services Inc.

RYLEY LABORATORY	**Lab Log Number: 20117**					
Certificate of Analysis						
Customer/Generator:	**CH Ryley**					
Sample Label:	**Cell 2 Secondary, July 2 2020**					
Requested by: Murray						
Report Date: July 6, 2020						
Analyst: T. Webb						
Lab Comments: Conductivity = 15.8 mS/cm.						
Physical State		**Ash (%)**			**Volatiles**	**(mg/L)**
Solid without free liquid (x)		<0.1			Benzene	<0.2
Powder (x)		0.1-1.0			Toluene	<0.2
Monolithic solid (x)		1.1-5.0			Ethylbenzene	<0.2
Liquid with no solids (x)	**X**	5.1-20			Xylenes	<0.2
Liquid/solid mixture (x)		>20			Naphthalene	<0.2
Sludge (x)		unknown	**X**			
Gas/Aerosol (x)					**Analyte (Dissolved)**	**(mg/L)**
					Silver (Ag)	<0.2
BTU/Pound (MJ/Kg)		**Viscosity (Centipoise)**			Aluminum (Al)	<0.2
<2,000 (<4.6)	**X**	1-100 (water)	**X**		Arsenic (As)	<0.2
2,000-5,000 (4.6-11.6)		101-500 (motor oil)			Boron (B)	0.3
5,000-10,000 (11.6-23.2)		501-10,000 (molasses)			Barium (Ba)	<0.2
>10,000 (>23.2)		>10,000			Beryllium (Be)	<0.2
					Calcium (Ca)	410
pH		**Flash Point °F (°C)**			Cadmium (Cd)	<0.2
< = 2		<73 (<23)			Cobalt (Co)	<0.2
2.1-6.9	**X**	73-100 (23-38)			Chromium (Cr)	<0.2
7 (Neutral)		101-140 (38-60)			Copper (Cu)	<0.2
7.1-12.4		141-200 (60-93)			Iron (Fe)	0.4
> = 12.5		>142 (>61)	**X**		Mercury (Hg)	<0.2
Actual	**6.7**				Potassium (K)	20
		Number of Phases/ Layers			Lithium (Li)	0.4
Specific Gravity		Top % v/v (Approx.)			Magnesium (Mg)	280
<0.8 (Gasoline)		Middle % v/v (Approx.)			Manganese (Mn)	7
0.8-1.0 (Ethanol)		Bottom % v/v (Approx.)			Molybdenum (Mo)	<0.5
1.0 (Water)	**X**				Sodium (Na)	3100
1.0-1.2 (Antifreeze)		Liquid/solid mixture (%) Vol/Vol			Nickel (Ni)	<0.2
>1.2 (Methylene Chloride)		% Free Liquid	**100**		Phosphorus (P)	1
Actual		% Settled solid (approx)			Lead (Pb)	<0.2
		% Total Suspended Solids (approx)			Sulfur (S)	2500
Melting Point °F (° C)		% Sludge (vol. by centrifuge)			Antimony (Sb)	<0.2
<140 (<60)	**X**				Selenium (Se)	<1
140-200 (60-93)		**Screens**			Silica (Si)	9
>200 (>93)		Reactive Cyanide Screen	**Negative**		Strontium (Sr)	6
		Reactive Sulfide Screen	**Negative**		Thallium (Tl)	<0.5
Boiling Point °F (°C)		Head Space Sulfide Screen	**Negative**		Uranium (U)	<2
<= 95 (< =35)		Oxidizer Screen	**Negative**		Vanadium (V)	<0.5
95-100 (35-38)		Radioactivity Screen	**Negative**		Zinc (Zn)	<0.2
101-129 (38-54)		Reactive Ammonia Screen	**Negative**		Zirconium (Zr)	<0.2
> = 130 (>54)	**X**	Organic Halogenated compounds	**Negative**		Ammonia-N	<100

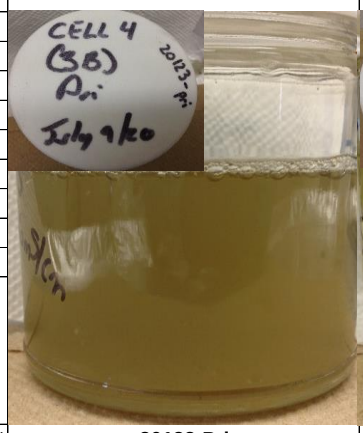
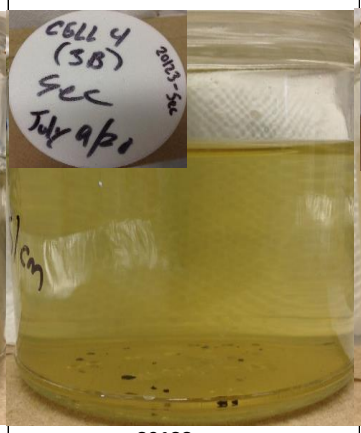


Note: There are 39 pesticides, herbicides and fungicides listed in the Alberta Regulations with specific leachate limits for each
Any suspicion that these compounds may be present will require that analyses be performed.

Certification:

The Ryley Laboratory is not an accredited laboratory, the reports and the data provided are to be used for internal purposes.

In order to report to Governments, regulators or other agencies you must seek the services of an accredited laboratory.

Analytical Report	Log Number:	20123 and 20124	
Ryley Laboratory			
			
Analyst: Todd Webb			
Sample Date: July 9, 2020			
Report Date: July 13, 2020			
Lab Comments: No sample obtained for Cell 3C Primary - Murray says pump is down			
Lab log #	**20123-Pri**	**20123-sec**	**20124**
Sample Name→	**Primary Leachate Cell 3B**	**Secondary Leachate Cell 3B**	**Secondary Leachate Cell 3C**
Sample Date	**9-Jul-20**	**9-Jul-20**	**9-Jul-20**
pH	8.7	7.4	7.2
Conductivity (µS/cm)	13500	12600	9070
Reactive Ammonia Screen	Positive	Negative	Trace
Reactive Sulfide Screen	Trace	Negative	Negative
Analyte (mg/L)			
Silver (Ag)	<0.2	<0.2	<0.2
Aluminum (Al)	<0.2	<0.2	<0.2
Arsenic (As)	<0.5	<0.5	<0.5
Boron (B)	7	0.3	1
Barium (Ba)	<0.2	<0.2	<0.2
Beryllium (Be)	<0.2	<0.2	<0.2
Calcium (Ca)	150	230	200
Cadmium (Cd)	<0.2	<0.2	<0.2
Cobalt (Co)	<0.2	<0.2	<0.2
Chromium (Cr)	<0.2	<0.2	<0.2
Copper (Cu)	<0.2	<0.2	<0.2
Iron (Fe)	0.8	0.7	0.6
Mercury (Hg)	<0.2	<0.2	<0.2
Potassium (K)	140	18	16
Lithium (Li)	0.4	<0.2	<0.2
Magnesium (Mg)	160	190	140
Manganese (Mn)	3	6	5
Molybdenum (Mo)	2	<0.2	<0.2
Sodium (Na)	2000	2200	1400
Nickel (Ni)	<0.2	<0.2	<0.2
Phosphorus (P)	3	0.7	0.3
Lead (Pb)	<0.2	<0.2	<0.2
Sulfur (S)	1600	2000	1200
Antimony (Sb)	<0.2	<0.2	<0.2
Selenium (Se)	<1	<1	<1
Silica (Si)	6	6	5
Strontium (Sr)	3	4	3
Thallium (Tl)	<0.5	<0.5	<0.5
Uranium (U)	<2	<2	<2
Vanadium (V)	<1	<1	<1
Zinc (Zn)	<0.2	0.3	<0.2
Zirconium (Zr)	<0.2	<0.2	<0.2

APPENDIX F

Leak Detection Liquid Analysis

Quarter 4

Clean Harbors Canada Inc.
ATTN: Todd Webb
PO BOX 390
RYLEY AB T0B 4A0

Date Received: 01-DEC-20
Report Date: 08-DEC-20 16:58 (MT)
Version: FINAL

Client Phone: 780-663-2513

Certificate of Analysis

Lab Work Order #: L2535314

Project P.O. #: 212965R4
Job Reference: SECONDARY LEACHATE QTR 4
C of C Numbers: 17-805840
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
L2535314-1 SECONDARY LEACHATE CELL 2 (SC2)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
Toluene	0.00311		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
EthylBenzene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
m+p-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
o-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
F1(C6-C10)	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
F1-BTEX	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
Xylenes	<0.00071		0.00071	mg/L	02-DEC-20	03-DEC-20	R5300605
Surrogate: 1,4-Difluorobenzene (SS)	100.9		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	91.2		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 3,4-Dichlorotoluene (SS)	100.0		70-130	%	02-DEC-20	03-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	0.16		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	95.9		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0072		0.0010	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	13.7	DLHC	0.50	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	317		10	mg/L		04-DEC-20	R5308279
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		03-DEC-20	R5306923
Dissolved Organic Carbon	133	DLHC	5.0	mg/L		02-DEC-20	R5304796
Phenols (4AAP)	<0.0010		0.0010	mg/L		01-DEC-20	R5302680
Total Kjeldahl Nitrogen	18.2	DLHC	0.60	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	0.946		0.020	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	14100	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	3.52	DLHC	0.10	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	55.0		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	215	DLDS	5.0	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.0043		0.0010	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.0333		0.0010	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	0.92		0.10	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	0.000091		0.000050	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	432		0.50	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	0.00063		0.00010	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	0.0019		0.0010	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	0.0052		0.0010	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	6.49		0.10	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616

* 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
L2535314-1 SECONDARY LEACHATE CELL 2 (SC2)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.644		0.010	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	267		0.10	mg/L		02-DEC-20	R5304616
Manganese (Mn)-Dissolved	9.69		0.0010	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	0.353		0.00050	mg/L		02-DEC-20	R5304616
Nickel (Ni)-Dissolved	0.0297		0.0050	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	1.47		0.50	mg/L		02-DEC-20	R5304616
Potassium (K)-Dissolved	37.4		0.50	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.0322		0.0020	mg/L		02-DEC-20	R5304616
Selenium (Se)-Dissolved	0.00106		0.00050	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	13.2		0.50	mg/L		02-DEC-20	R5304616
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	3620		1.0	mg/L		02-DEC-20	R5304616
Strontium (Sr)-Dissolved	6.63		0.0020	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	3340		5.0	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	0.260		0.0010	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.0235		0.00010	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	0.0091		0.0050	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	0.025		0.010	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.0032		0.0020	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	1.79	DLDS	0.20	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	94.9			%		04-DEC-20	
TDS (Calculated)	14400			mg/L		04-DEC-20	
Hardness (as CaCO3)	2180			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.22		0.22	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	9480	DLDS	3.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	7.02		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	14000		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	632		5.0	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	518		2.0	mg/L		01-DEC-20	R5300441
L2535314-2 SECONDARY LEACHATE CELL 3A (SC3A)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.00193		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605

* 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
L2535314-2 SECONDARY LEACHATE CELL 3A (SC3A)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
Toluene	0.00104		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
EthylBenzene	0.00074		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
m+p-Xylene	0.00057		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
o-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
F1(C6-C10)	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
F1-BTEX	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
Xylenes	<0.00071		0.00071	mg/L	02-DEC-20	03-DEC-20	R5300605
Surrogate: 1,4-Difluorobenzene (SS)	101.5		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	92.2		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 3,4-Dichlorotoluene (SS)	105.1		70-130	%	02-DEC-20	03-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	0.11		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	87.6		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0062		0.0010	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	8.60	DLHC	0.50	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	283		10	mg/L		04-DEC-20	R5308279
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		03-DEC-20	R5306923
Dissolved Organic Carbon	132	DLHC	5.0	mg/L		02-DEC-20	R5304796
Phenols (4AAP)	<0.0010		0.0010	mg/L		01-DEC-20	R5302680
Total Kjeldahl Nitrogen	16.0		0.20	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	0.037		0.020	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	12600	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	0.160		0.020	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	41.4		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	211	DLDS	5.0	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	0.0015		0.0010	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.0038		0.0010	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.0557		0.0010	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	0.34		0.10	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	0.000182		0.000050	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	440		0.50	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	0.0029		0.0010	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	0.0078		0.0010	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	1.24		0.10	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Lithium (Li)-Dissolved	0.339		0.010	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	315		0.10	mg/L		02-DEC-20	R5304616

* 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
L2535314-2 SECONDARY LEACHATE CELL 3A (SC3A)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Manganese (Mn)-Dissolved	5.47		0.0010	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	0.588		0.00050	mg/L		02-DEC-20	R5304616
Nickel (Ni)-Dissolved	0.0966		0.0050	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	<0.50	DLDS	0.50	mg/L		02-DEC-20	R5304616
Potassium (K)-Dissolved	18.7		0.50	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.0252		0.0020	mg/L		02-DEC-20	R5304616
Selenium (Se)-Dissolved	0.00097		0.00050	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	7.48		0.50	mg/L		02-DEC-20	R5304616
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	3150		1.0	mg/L		02-DEC-20	R5304616
Strontium (Sr)-Dissolved	4.87		0.0020	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	2820		5.0	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	0.0025		0.0010	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	0.0159		0.0010	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.0504		0.00010	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	<0.0050	DLDS	0.0050	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	0.080		0.010	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.0066		0.0020	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	0.79	DLDS	0.20	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	88.4	BL:INT		%		04-DEC-20	
TDS (Calculated)	13600			mg/L		04-DEC-20	
Hardness (as CaCO3)	2400			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.22		0.22	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	8900	DLDS	3.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	7.48		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	12400		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	1170		5.0	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	958		2.0	mg/L		01-DEC-20	R5300441
L2535314-3 SECONDARY LEACHATE CELL 3B (SC3B)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	0.00059		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
Toluene	0.00087		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
EthylBenzene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605

* 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
L2535314-3 SECONDARY LEACHATE CELL 3B (SC3B)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
m+p-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
o-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
F1(C6-C10)	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
F1-BTEX	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
Xylenes	<0.00071		0.00071	mg/L	02-DEC-20	03-DEC-20	R5300605
Surrogate: 1,4-Difluorobenzene (SS)	103.2		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	90.2		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 3,4-Dichlorotoluene (SS)	118.9		70-130	%	02-DEC-20	03-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	0.22		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	94.4		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0458		0.0020	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	133	DLHC	5.0	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	903		10	mg/L		04-DEC-20	R5308279
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		03-DEC-20	R5306923
Dissolved Organic Carbon	274	DLHC	5.0	mg/L		02-DEC-20	R5304796
Phenols (4AAP)	0.145	DLHC	0.0050	mg/L		02-DEC-20	R5302680
Total Kjeldahl Nitrogen	207	DLHC	20	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	7.10	DLHC	0.40	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	15900	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	7.68	DLHC	0.40	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	10.6		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	1210	DLDS	5.0	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.020	DLDS	0.020	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.0181		0.0020	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.123		0.0020	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	21.1		0.20	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	0.00053		0.00010	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	281		1.0	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	0.00669		0.00020	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	0.0412		0.0020	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	0.0037		0.0020	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	0.0093		0.0040	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	0.83		0.20	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Lithium (Li)-Dissolved	1.08		0.020	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	284		0.10	mg/L		02-DEC-20	R5304616
Manganese (Mn)-Dissolved	1.65		0.0020	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	1.93		0.0010	mg/L		02-DEC-20	R5304616

* 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
L2535314-3 SECONDARY LEACHATE CELL 3B (SC3B)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Nickel (Ni)-Dissolved	0.143		0.010	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	8.9		1.0	mg/L		02-DEC-20	R5304616
Potassium (K)-Dissolved	278		1.0	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.410		0.0040	mg/L		02-DEC-20	R5304616
Selenium (Se)-Dissolved	0.0032		0.0010	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	9.4		1.0	mg/L		02-DEC-20	R5304616
Silver (Ag)-Dissolved	<0.00020	DLDS	0.00020	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	3820		1.0	mg/L		02-DEC-20	R5304616
Strontium (Sr)-Dissolved	3.89		0.0040	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	2580		10	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.0040	DLDS	0.0040	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.00020	DLDS	0.00020	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	0.0076		0.0020	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	0.0166		0.0060	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	0.921		0.0020	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.0218		0.00020	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	0.030		0.010	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	0.061		0.020	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.0152		0.0040	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	1.62	DLDS	0.20	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	95.2			%		04-DEC-20	
TDS (Calculated)	14600			mg/L		04-DEC-20	
Hardness (as CaCO3)	1870			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLDS	0.20	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.22		0.22	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	7460	DLDS	3.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	7.98		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	15800		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	2540		5.0	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	2080		2.0	mg/L		01-DEC-20	R5300441
L2535314-4 SECONDARY LEACHATE CELL 3C (SC3C)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
Toluene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
EthylBenzene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
m+p-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
o-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605

* 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
L2535314-4 SECONDARY LEACHATE CELL 3C (SC3C)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
F1(C6-C10)	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
F1-BTEX	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
Xylenes	<0.00071		0.00071	mg/L	02-DEC-20	03-DEC-20	R5300605
Surrogate: 1,4-Difluorobenzene (SS)	102.7		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	93.0		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 3,4-Dichlorotoluene (SS)	106.9		70-130	%	02-DEC-20	03-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	91.3		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0019		0.0010	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	4.49	DLHC	0.50	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	576		10	mg/L		04-DEC-20	R5308279
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		03-DEC-20	R5306923
Dissolved Organic Carbon	138	DLHC	5.0	mg/L		02-DEC-20	R5304796
Phenols (4AAP)	0.0010		0.0010	mg/L		02-DEC-20	R5302680
Total Kjeldahl Nitrogen	11.6		0.20	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	0.035		0.020	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	9710	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	0.061		0.020	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	17.6		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	240	DLDS	5.0	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.0023		0.0010	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.0393		0.0010	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	1.39		0.10	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	<0.000050	DLDS	0.000050	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	337		0.50	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	0.0019		0.0010	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	0.0030		0.0020	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	<0.10	DLDS	0.10	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Lithium (Li)-Dissolved	0.248		0.010	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	244		0.10	mg/L		02-DEC-20	R5304616
Manganese (Mn)-Dissolved	1.67		0.0010	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	0.0328		0.00050	mg/L		02-DEC-20	R5304616
Nickel (Ni)-Dissolved	0.0276		0.0050	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	<0.50	DLDS	0.50	mg/L		02-DEC-20	R5304616

* 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
L2535314-4 SECONDARY LEACHATE CELL 3C (SC3C)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Potassium (K)-Dissolved	19.6		0.50	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.0054		0.0020	mg/L		02-DEC-20	R5304616
Selenium (Se)-Dissolved	0.00087		0.00050	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	7.64		0.50	mg/L		02-DEC-20	R5304616
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	2450		1.0	mg/L		02-DEC-20	R5304616
Strontium (Sr)-Dissolved	3.04		0.0020	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	2030		5.0	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.0351		0.00010	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	0.112		0.0050	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	0.080		0.010	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.0042		0.0020	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	0.51	DLDS	0.20	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	95.5			%		04-DEC-20	
TDS (Calculated)	9820			mg/L		04-DEC-20	
Hardness (as CaCO3)	1850			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	2.67	DLDS	0.20	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.67		0.22	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	5850	DLDS	3.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	7.77		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	9970		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	1360		5.0	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	1110		2.0	mg/L		01-DEC-20	R5300441
L2535314-5 SECONDARY LEACHATE CELL 3D (SC3D)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
Toluene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
EthylBenzene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
m+p-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
o-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
F1(C6-C10)	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605

* 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
L2535314-5 SECONDARY LEACHATE CELL 3D (SC3D)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
F1-BTEX	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
Xylenes	<0.00071		0.00071	mg/L	02-DEC-20	03-DEC-20	R5300605
Surrogate: 1,4-Difluorobenzene (SS)	102.2		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	90.6		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 3,4-Dichlorotoluene (SS)	106.0		70-130	%	02-DEC-20	03-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	92.7		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	3.92	DLHC	0.50	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	203		10	mg/L		08-DEC-20	R5309412
Chromium (VI)-Dissolved	<0.0050	DLM	0.0050	mg/L		04-DEC-20	R5306923
Dissolved Organic Carbon	59.2		5.0	mg/L		02-DEC-20	R5304796
Phenols (4AAP)	0.0012		0.0010	mg/L		02-DEC-20	R5302680
Total Kjeldahl Nitrogen	4.77	TKNI	0.20	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	0.438		0.020	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	8780	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	0.421		0.020	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	7.4		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2350	DLDS	10	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.0123		0.0010	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.152		0.0010	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	12.6		0.10	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	0.00135		0.000050	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	610		0.50	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	0.0081		0.0010	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	0.0163		0.0020	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	<0.10	DLDS	0.10	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Lithium (Li)-Dissolved	0.654		0.010	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	367		0.10	mg/L		02-DEC-20	R5304616
Manganese (Mn)-Dissolved	3.61		0.0010	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	4.54		0.00050	mg/L		02-DEC-20	R5304616
Nickel (Ni)-Dissolved	1.11		0.0050	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	0.68		0.50	mg/L		02-DEC-20	R5304616
Potassium (K)-Dissolved	170		0.50	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.0397		0.0020	mg/L		02-DEC-20	R5304616

* 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
L2535314-5 SECONDARY LEACHATE CELL 3D (SC3D)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Selenium (Se)-Dissolved	0.00563		0.00050	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	11.2		0.50	mg/L		02-DEC-20	R5304616
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	1570		1.0	mg/L		02-DEC-20	R5304616
Strontium (Sr)-Dissolved	2.89		0.0020	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	703		5.0	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	0.0037		0.0030	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	0.0094		0.0010	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.00722		0.00010	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	27.4		0.0050	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	0.080		0.010	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	1.48	DLDS	0.40	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	99.1			%		04-DEC-20	
TDS (Calculated)	8590			mg/L		04-DEC-20	
Hardness (as CaCO3)	3030			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	333	DLDS	0.40	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	334		0.45	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	0.38	DLDS	0.20	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	1900	DLDS	6.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	7.55		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	10800		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	306		5.0	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	251		2.0	mg/L		01-DEC-20	R5300441
L2535314-6 SECONDARY LEACHATE CELL 3E (SC3E)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
Toluene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
EthylBenzene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
m+p-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
o-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
F1(C6-C10)	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
F1-BTEX	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
Xylenes	<0.00071		0.00071	mg/L	02-DEC-20	03-DEC-20	R5300605

* 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
L2535314-6 SECONDARY LEACHATE CELL 3E (SC3E)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
Surrogate: 1,4-Difluorobenzene (SS)	100.7		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	89.6		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 3,4-Dichlorotoluene (SS)	105.9		70-130	%	02-DEC-20	03-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	95.0		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.00075		0.00050	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	0.079		0.050	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	124		10	mg/L		04-DEC-20	R5308279
Chromium (VI)-Dissolved	0.00051		0.00050	mg/L		03-DEC-20	R5306923
Dissolved Organic Carbon	60.3		5.0	mg/L		02-DEC-20	R5304796
Phenols (4AAP)	<0.0010		0.0010	mg/L		01-DEC-20	R5302680
Total Kjeldahl Nitrogen	3.17		0.20	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	0.494		0.020	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	5960	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	0.510		0.020	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	6.6		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	432	DLDS	5.0	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.0050	DLDS	0.0050	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	0.00174		0.00050	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.00483		0.00050	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.0325		0.00050	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.00025	DLDS	0.00025	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	1.61		0.050	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	0.000119		0.000025	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	110		0.50	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	<0.000050	DLDS	0.000050	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	0.00078		0.00050	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	0.00199		0.00050	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	0.0208		0.0010	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	<0.050	DLDS	0.050	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		02-DEC-20	R5304616
Lithium (Li)-Dissolved	0.373		0.0050	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	163		0.10	mg/L		02-DEC-20	R5304616
Manganese (Mn)-Dissolved	0.0173		0.00050	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	0.362		0.00025	mg/L		02-DEC-20	R5304616
Nickel (Ni)-Dissolved	0.119		0.0025	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	0.67		0.25	mg/L		02-DEC-20	R5304616
Potassium (K)-Dissolved	28.5		0.50	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.0058		0.0010	mg/L		02-DEC-20	R5304616
Selenium (Se)-Dissolved	0.00137		0.00025	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	4.46		0.25	mg/L		02-DEC-20	R5304616

* 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
L2535314-6 SECONDARY LEACHATE CELL 3E (SC3E)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	1560		1.0	mg/L		02-DEC-20	R5304616
Strontium (Sr)-Dissolved	1.89		0.0010	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	1140		2.5	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.000050	DLDS	0.000050	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	<0.0015	DLDS	0.0015	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.0423		0.000050	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	0.166		0.0025	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	0.0561		0.0050	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.0013		0.0010	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	0.56	DLDS	0.20	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	95.5			%		04-DEC-20	
TDS (Calculated)	5980			mg/L		04-DEC-20	
Hardness (as CaCO3)	946			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	23.6	DLDS	0.20	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	23.6		0.22	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	3330	DLDS	3.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	8.11		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	6820		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	514		5.0	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	422		2.0	mg/L		01-DEC-20	R5300441
L2535314-7 SECONDARY LEACHATE CELL 4 (SC4)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
Toluene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
EthylBenzene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
m+p-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
o-Xylene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
Styrene	<0.00050		0.00050	mg/L	02-DEC-20	03-DEC-20	R5300605
F1(C6-C10)	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
F1-BTEX	<0.10		0.10	mg/L	02-DEC-20	03-DEC-20	R5300605
Xylenes	<0.00071		0.00071	mg/L	02-DEC-20	03-DEC-20	R5300605
Surrogate: 1,4-Difluorobenzene (SS)	101.8		70-130	%	02-DEC-20	03-DEC-20	R5300605
Surrogate: 4-Bromofluorobenzene (SS)	91.2		70-130	%	02-DEC-20	03-DEC-20	R5300605

* 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
L2535314-7 SECONDARY LEACHATE CELL 4 (SC4)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
BTEX, Styrene and F1 (C6-C10)							
Surrogate: 3,4-Dichlorotoluene (SS)	104.6		70-130	%	02-DEC-20	03-DEC-20	R5300605
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-DEC-20	02-DEC-20	R5308251
Surrogate: 2-Bromobenzotrifluoride	92.4		60-140	%	02-DEC-20	02-DEC-20	R5308251
Single Metal in Water by ICPMS (Total)							
Total Metals in Water by CRC ICPMS							
Chromium (Cr)-Total	0.0033		0.0010	mg/L		02-DEC-20	R5304616
Miscellaneous Parameters							
Ammonia, Total (as N)	0.176		0.050	mg/L		01-DEC-20	R5302627
Chemical Oxygen Demand	218		10	mg/L		04-DEC-20	R5308279
Chromium (VI)-Dissolved	<0.00050		0.00050	mg/L		03-DEC-20	R5306923
Dissolved Organic Carbon	88.8		5.0	mg/L		02-DEC-20	R5304796
Phenols (4AAP)	<0.0010		0.0010	mg/L		01-DEC-20	R5302680
Total Kjeldahl Nitrogen	4.79		0.20	mg/L	02-DEC-20	03-DEC-20	R5306637
Phosphorus (P)-Total Dissolved	0.401		0.020	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Dissolved Solids	10500	DLDS	400	mg/L		01-DEC-20	R5306976
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		02-DEC-20	R5303259
Phosphorus (P)-Total	0.479		0.020	mg/L	01-DEC-20	02-DEC-20	R5303776
Total Suspended Solids	5.6		3.0	mg/L		02-DEC-20	R5306118
Major Ions & Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	1230	DLDS	5.0	mg/L		01-DEC-20	R5303799
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					01-DEC-20	R5301196
Aluminum (Al)-Dissolved	<0.010	DLDS	0.010	mg/L		02-DEC-20	R5304616
Antimony (Sb)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Arsenic (As)-Dissolved	0.0015		0.0010	mg/L		02-DEC-20	R5304616
Barium (Ba)-Dissolved	0.0657		0.0010	mg/L		02-DEC-20	R5304616
Beryllium (Be)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Bismuth (Bi)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Boron (B)-Dissolved	2.84		0.10	mg/L		02-DEC-20	R5304616
Cadmium (Cd)-Dissolved	0.000386		0.000050	mg/L		02-DEC-20	R5304616
Calcium (Ca)-Dissolved	538		0.50	mg/L		02-DEC-20	R5304616
Cesium (Cs)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Chromium (Cr)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Cobalt (Co)-Dissolved	0.0022		0.0010	mg/L		02-DEC-20	R5304616
Copper (Cu)-Dissolved	0.0026		0.0020	mg/L		02-DEC-20	R5304616
Iron (Fe)-Dissolved	<0.10	DLDS	0.10	mg/L		02-DEC-20	R5304616
Lead (Pb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		02-DEC-20	R5304616
Lithium (Li)-Dissolved	0.329		0.010	mg/L		02-DEC-20	R5304616
Magnesium (Mg)-Dissolved	246		0.10	mg/L		02-DEC-20	R5304616
Manganese (Mn)-Dissolved	4.04		0.0010	mg/L		02-DEC-20	R5304616
Molybdenum (Mo)-Dissolved	1.33		0.00050	mg/L		02-DEC-20	R5304616
Nickel (Ni)-Dissolved	0.0367		0.0050	mg/L		02-DEC-20	R5304616
Phosphorus (P)-Dissolved	0.59		0.50	mg/L		02-DEC-20	R5304616
Potassium (K)-Dissolved	22.8		0.50	mg/L		02-DEC-20	R5304616
Rubidium (Rb)-Dissolved	0.0052		0.0020	mg/L		02-DEC-20	R5304616
Selenium (Se)-Dissolved	0.00127		0.00050	mg/L		02-DEC-20	R5304616
Silicon (Si)-Dissolved	8.32		0.50	mg/L		02-DEC-20	R5304616
Silver (Ag)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Sodium (Na)-Dissolved	2530		1.0	mg/L		02-DEC-20	R5304616

* 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
L2535314-7 SECONDARY LEACHATE CELL 4 (SC4)							
Sampled By: CLIENT on 30-NOV-20 @ 11:00							
Matrix:							
Dissolved Metals in Water by CRC ICPMS							
Strontium (Sr)-Dissolved	4.74		0.0020	mg/L		02-DEC-20	R5304616
Sulfur (S)-Dissolved	1960		5.0	mg/L		02-DEC-20	R5304616
Tellurium (Te)-Dissolved	<0.0020	DLDS	0.0020	mg/L		02-DEC-20	R5304616
Thallium (Tl)-Dissolved	<0.00010	DLDS	0.00010	mg/L		02-DEC-20	R5304616
Thorium (Th)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Tin (Sn)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Titanium (Ti)-Dissolved	<0.0030	DLDS	0.0030	mg/L		02-DEC-20	R5304616
Tungsten (W)-Dissolved	<0.0010	DLDS	0.0010	mg/L		02-DEC-20	R5304616
Uranium (U)-Dissolved	0.0989		0.00010	mg/L		02-DEC-20	R5304616
Vanadium (V)-Dissolved	0.0151		0.0050	mg/L		02-DEC-20	R5304616
Zinc (Zn)-Dissolved	0.092		0.010	mg/L		02-DEC-20	R5304616
Zirconium (Zr)-Dissolved	0.0034		0.0020	mg/L		02-DEC-20	R5304616
Fluoride in Water by IC							
Fluoride (F)	0.64	DLDS	0.20	mg/L		01-DEC-20	R5303799
Ion Balance Calculation							
Ion Balance	99.3			%		04-DEC-20	
TDS (Calculated)	10300			mg/L		04-DEC-20	
Hardness (as CaCO3)	2360			mg/L		04-DEC-20	
Nitrate in Water by IC							
Nitrate (as N)	1.06	DLDS	0.20	mg/L		01-DEC-20	R5303799
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.06		0.22	mg/L		03-DEC-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLDS	0.10	mg/L		01-DEC-20	R5303799
Sulfate in Water by IC							
Sulfate (SO4)	5320	DLDS	3.0	mg/L		01-DEC-20	R5303799
pH, Conductivity and Total Alkalinity							
pH	7.49		0.10	pH		01-DEC-20	R5300441
Conductivity (EC)	11400		2.0	uS/cm		01-DEC-20	R5300441
Bicarbonate (HCO3)	806		5.0	mg/L		01-DEC-20	R5300441
Carbonate (CO3)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Hydroxide (OH)	<5.0		5.0	mg/L		01-DEC-20	R5300441
Alkalinity, Total (as CaCO3)	661		2.0	mg/L		01-DEC-20	R5300441

* 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.
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.			
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.			
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 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.			

** 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:

17-805840

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

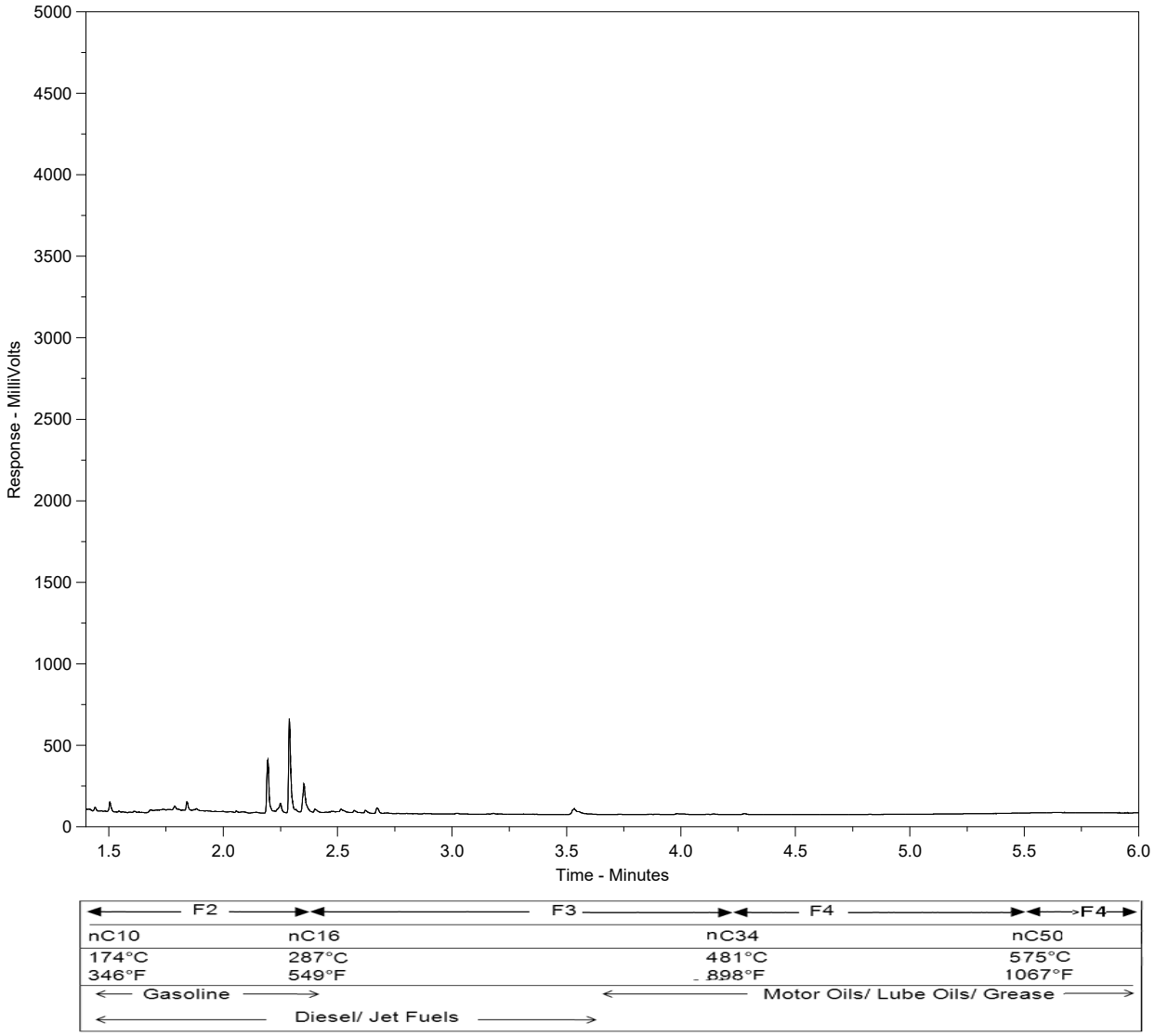
GLOSSARY OF REPORT TERMS

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: L2535314-1
Client ID: SECONDARY LEACHATE CELL 2 (SC2)



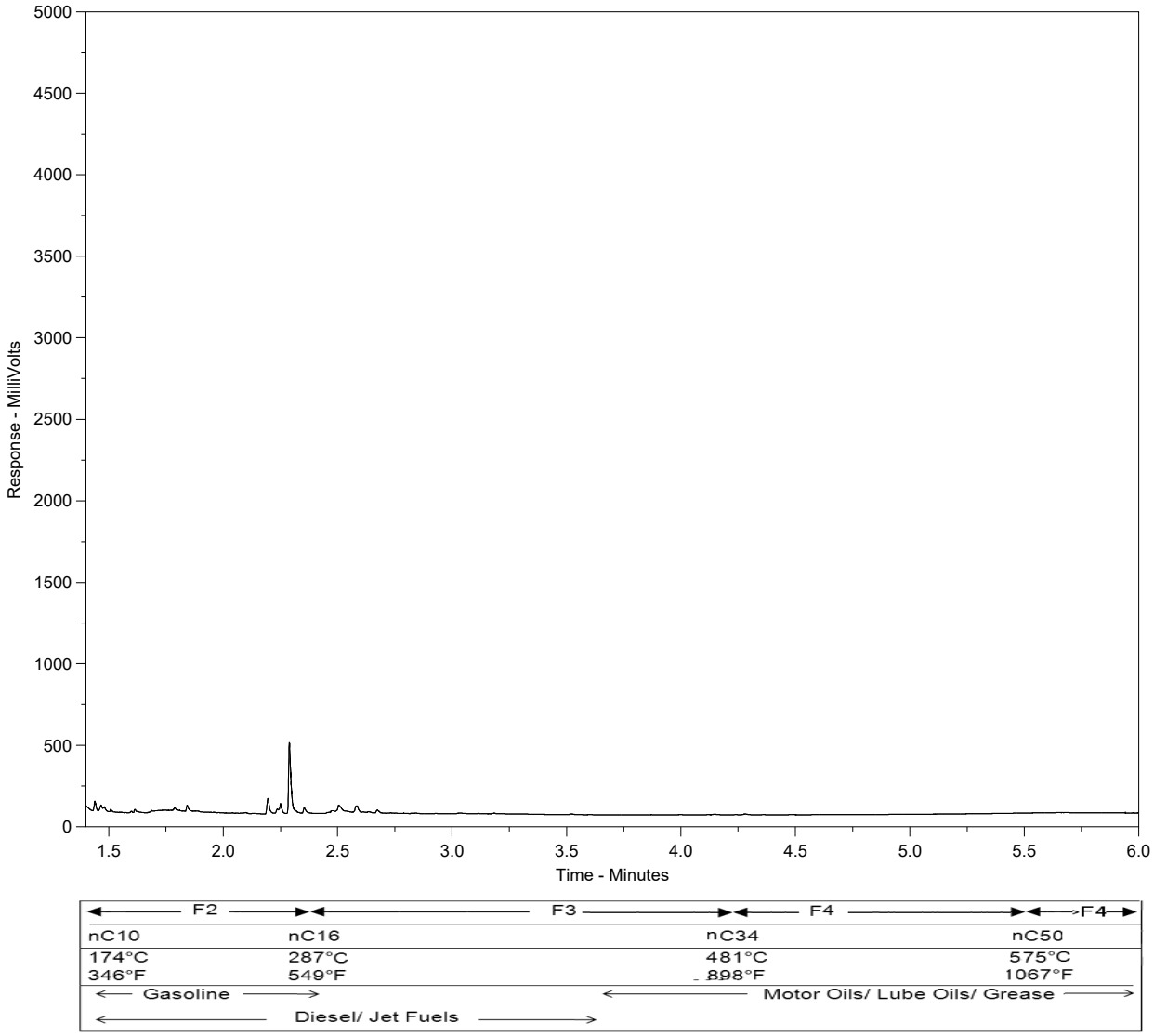
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2535314-2
Client ID: SECONDARY LEACHATE CELL 3A (SC3A)



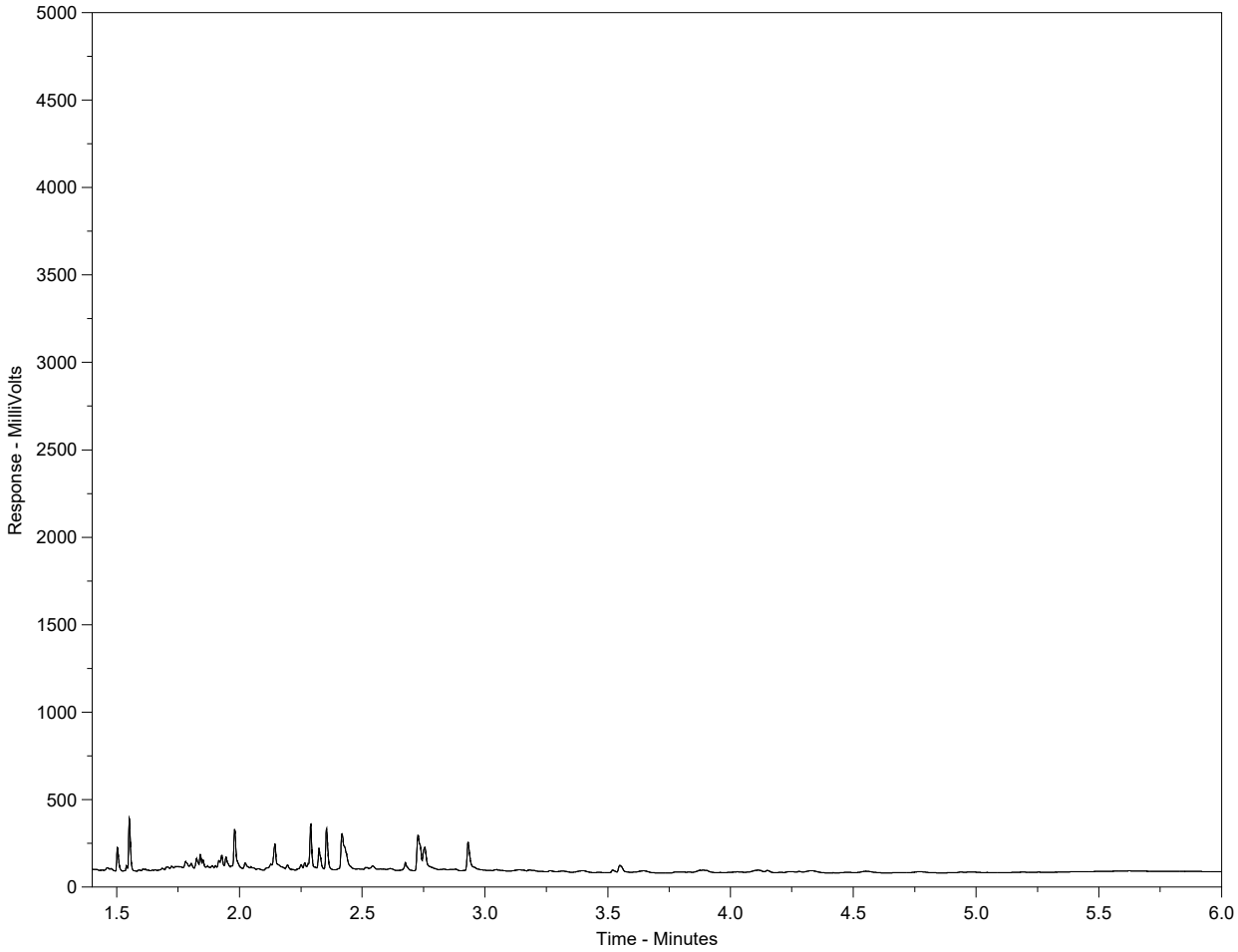
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2535314-3
Client ID: SECONDARY LEACHATE CELL 3B (SC3B)



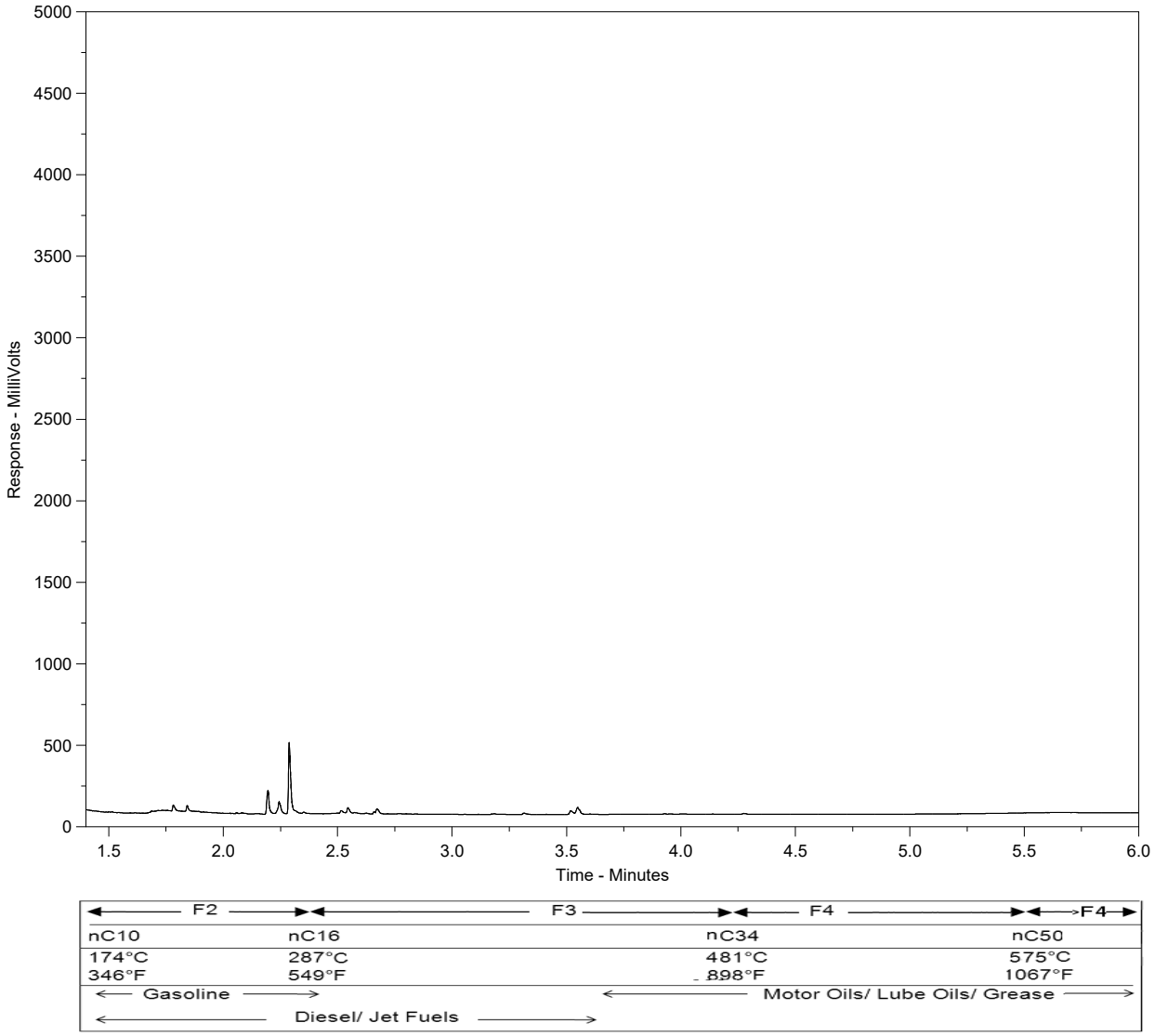
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2535314-4
Client ID: SECONDARY LEACHATE CELL 3C (SC3C)



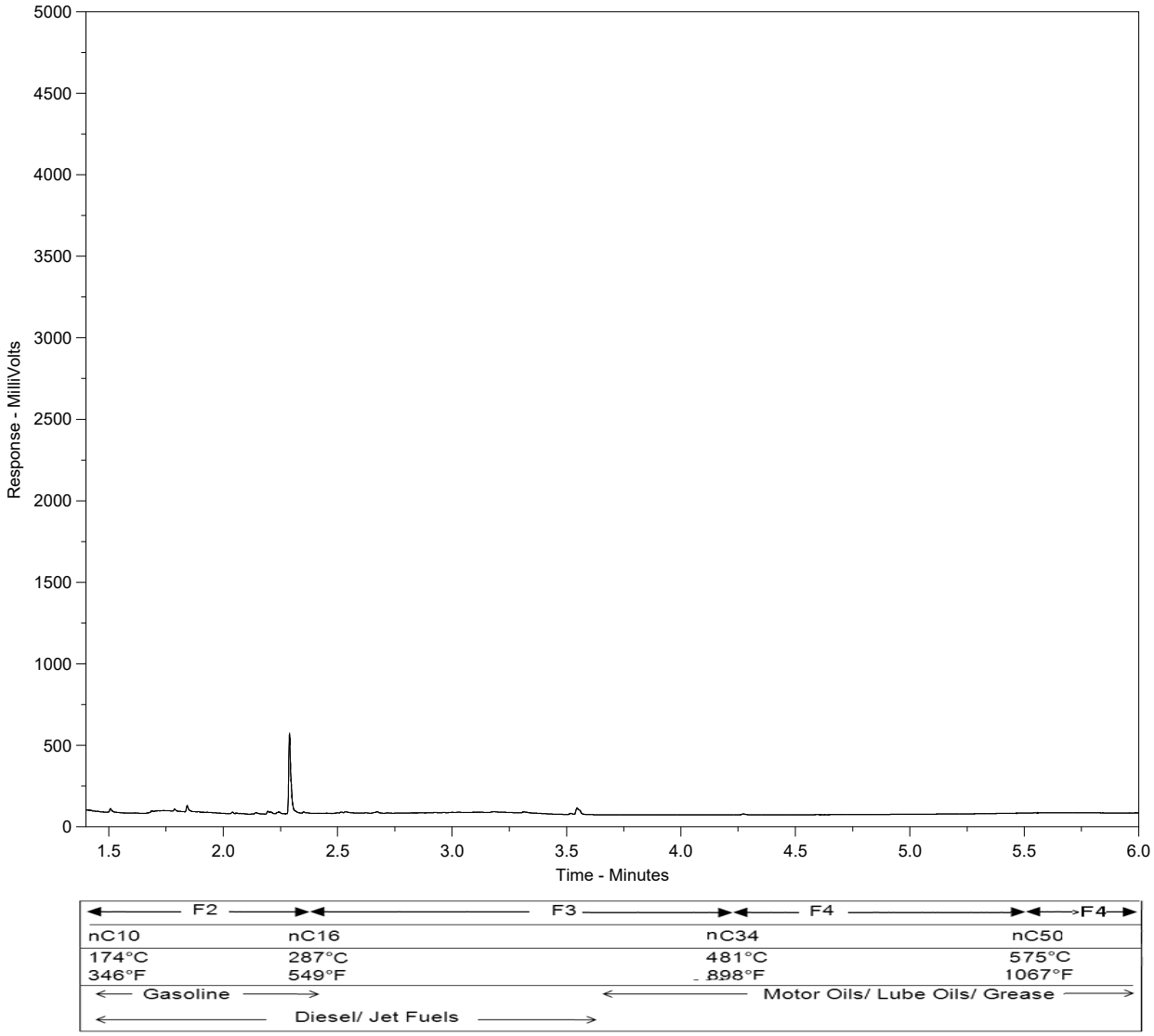
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2535314-5
Client ID: SECONDARY LEACHATE CELL 3D (SC3D)



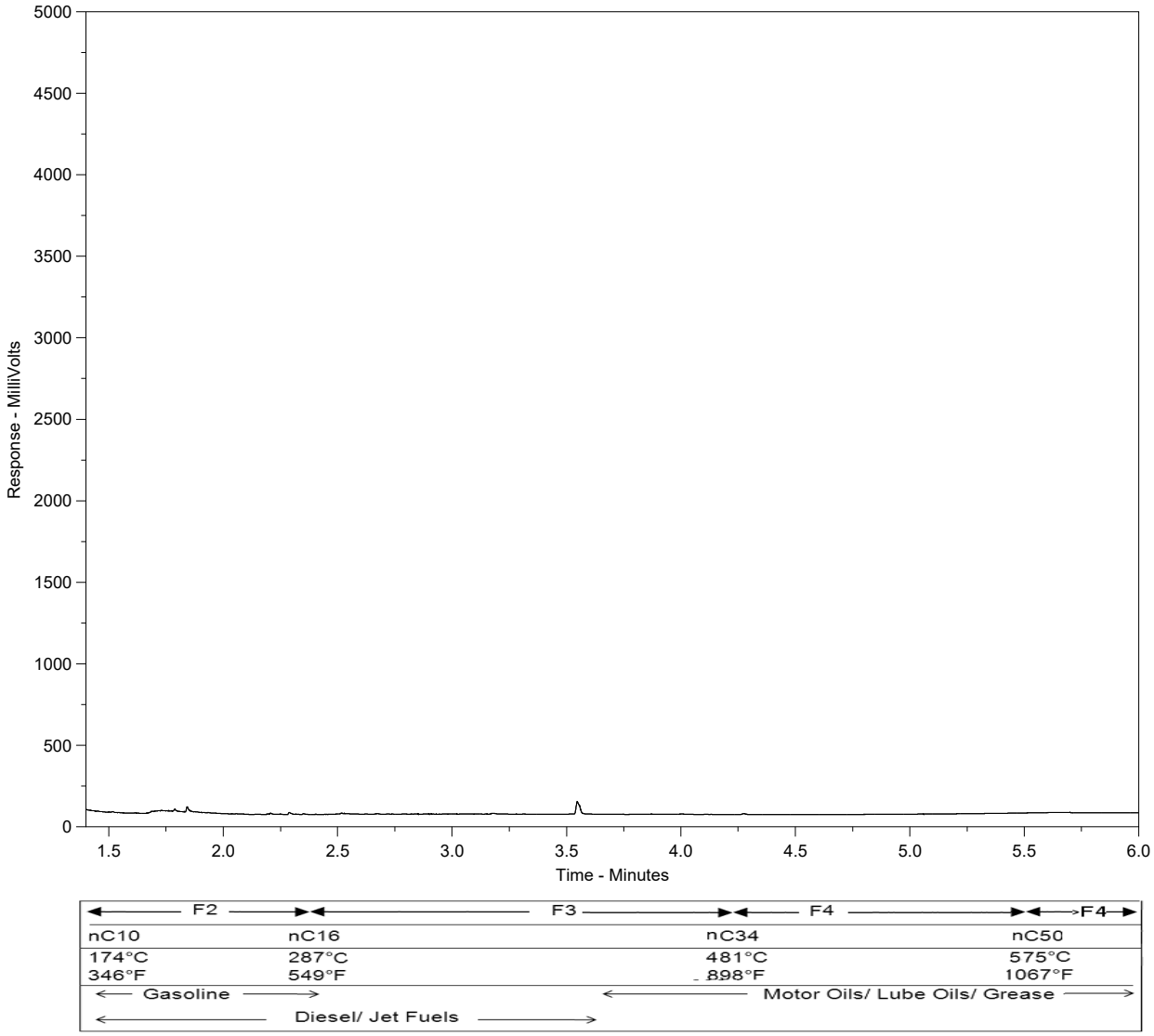
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2535314-6
Client ID: SECONDARY LEACHATE CELL 3E (SC3E)



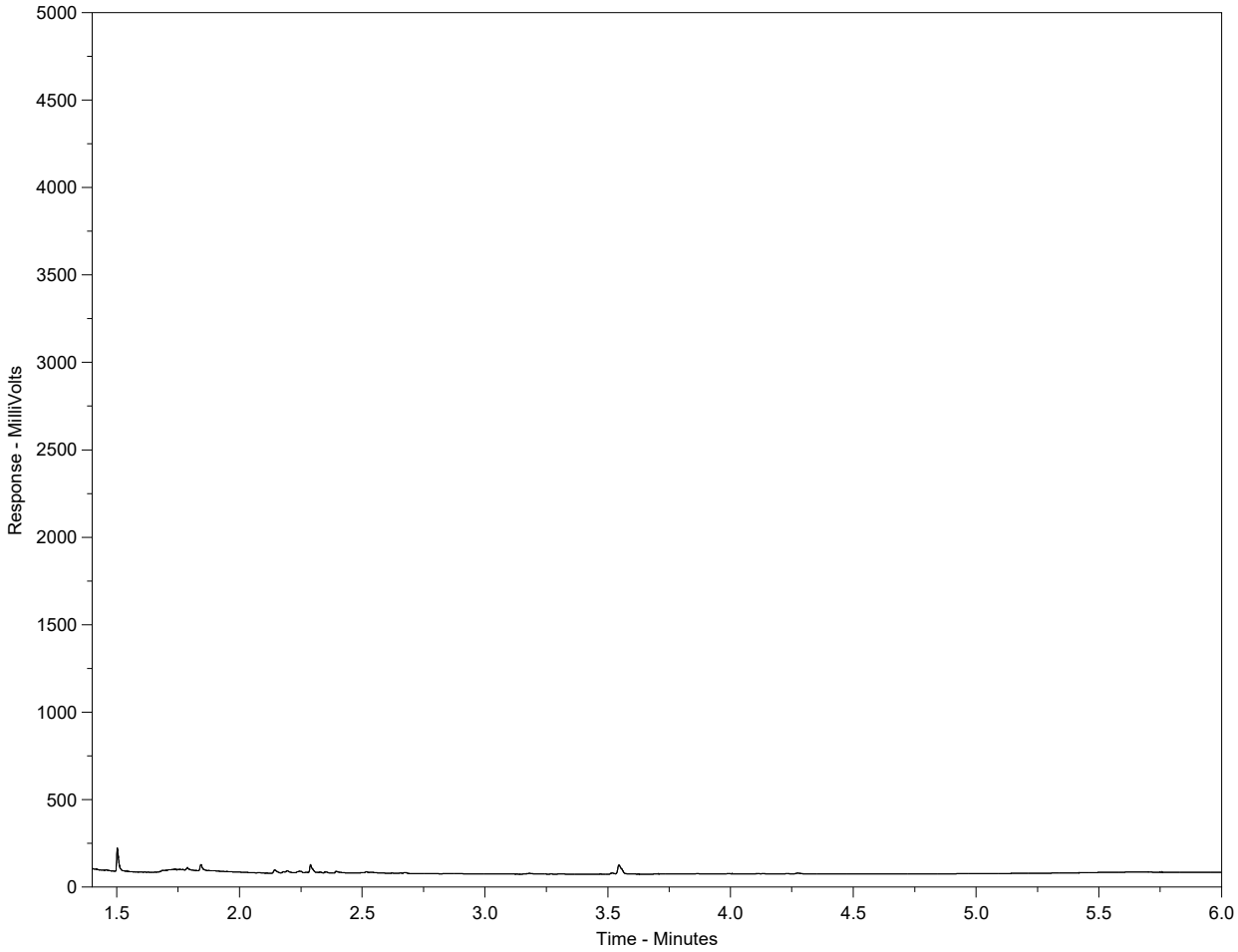
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2535314-7
Client ID: SECONDARY LEACHATE CELL 4 (SC4)



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.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2535314-COFC

COC Number: 17 - 805840

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Clean Harbors Canada
Contact:	Todd Webb, Stan Yuha
Phone:	780 663 -2513
	Company address below will appear on the final report
Street:	PO Box 390 R 50 14 Range Road #73
City/Province:	Ryley, AB
Postal Code:	T0B 4A0
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	Clean Harbors Canada
Contact:	Dana Robinson

Project Information

ALS Account # / Quote #:	
Job #:	Secondary Leachate Qtr 4
PO / AFE:	212965RY
LSD:	
ALS Lab Work Order # (lab use only):	L2535314

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL | | EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL | | MAIL ☐ FAX
Email 1 or Fax: Webb.Todd@cleanharbors.com
Email 2: Yuha.Stan@cleanharbors.com
Email 3:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: Robinson.Dana@cleanharbors.com
Email 2:

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#:
Major/Minor Code: | Routing Code:
Requisitioner:
Location:
ALS Contact: | Sampler:

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐; 3 day [P3-25%] ☐; 2 day [P2-50%] ☐
EMERGENCY: 1 Business day [E - 100%] ☐; Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

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

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: Table 4.4A: Leachate + Leak Detection Monitoring	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	Secondary Leachate Cell 2 (SC2)	30-Nov-20	11:00		✓		
	Secondary Leachate Cell 3A (SC3A)	↓	↓		✓		
	Secondary Leachate Cell 3B (SC3B)				✓		
	Secondary Leachate Cell 3C (SC3C)				✓		
	Secondary Leachate Cell 3D (SC3D)				✓		
	Secondary Leachate Cell 3E (SC3E)				✓		
	Secondary Leachate Cell 4 (SC4)	30-Nov-20	11:00		✓		

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

Are samples taken from a Regulated DW System? ☐ YES ☐ NO
Are samples for human consumption/ use? | | YES | | NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Analyze as per quote Q82438
Table 4.4A Package (attached)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
15.8	13.8	12.3	11.9				

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Todd Webb	Date: Nov 30/20	Time: 17:00	Received by: Simin	Date: 01 DEC 20	Time: 11:00	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

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

APPENDIX G

Volume of Leak Detection Liquid Removed

CLEAN HARBORS CANADA, INC.
Liquid Removed from Leak Detection Systems 2020

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/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)
1-1-20			1-1-20	0.0	0.0	1-1-20	7.6	3.6	1-1-20	0.0	0.0	1-1-20	0.0	0.0	1-1-20	***		1-1-20	75.0	24.4	1-1-20	Frozen	
1-2-20			1-2-20	0.0	0.0	1-2-20	7.6	3.6	1-2-20	0.0	0.0	1-2-20	0.0	0.0	1-2-20	***		1-2-20	75.0	24.4	1-2-20	Frozen	
1-3-20			1-3-20	0.0	0.0	1-3-20	20.0	9.4	1-3-20	20.0	9.4	1-3-20	0.0	0.0	1-3-20	***		1-3-20	50.0	16.2	1-3-20	Frozen	
1-4-20			1-4-20	0.0	0.0	1-4-20	14.0	6.6	1-4-20	8.3	3.9	1-4-20	58.2	22.9	1-4-20	0.0	0.0	1-4-20	16.7	5.4	1-4-20	Frozen	
1-5-20			1-5-20	0.0	0.0	1-5-20	14.0	6.6	1-5-20	8.3	3.9	1-5-20	58.2	22.9	1-5-20	0.0	0.0	1-5-20	16.7	5.4	1-5-20	Frozen	
1-6-20			1-6-20	0.0	0.0	1-6-20	14.0	6.6	1-6-20	8.3	3.9	1-6-20	58.2	22.9	1-6-20	0.0	0.0	1-6-20	16.7	5.4	1-6-20	Frozen	
1-7-20			1-7-20	0.0	0.0	1-7-20	15.0	7.1	1-7-20	20.0	9.4	1-7-20	192.0	75.4	1-7-20	0.0	0.0	1-7-20	20.0	6.5	1-7-20	Frozen	
1-8-20			1-8-20	0.0	0.0	1-8-20	10.0	4.7	1-8-20	15.0	7.1	1-8-20	10.0	3.9	1-8-20	0.0	0.0	1-8-20	20.0	6.5	1-8-20	Frozen	
1-9-20			1-9-20	0.0	0.0	1-9-20	12.0	5.6	1-9-20	0.0	0.0	1-9-20	0.0	0.0	1-9-20	0.0	0.0	1-9-20	5.0	1.6	1-9-20	Frozen	
1-10-20			1-10-20	0.0	0.0	1-10-20	40.0	18.8	1-10-20	15.0	7.1	1-10-20	0.0	0.0	1-10-20	0.0	0.0	1-10-20	15.0	4.9	1-10-20	Frozen	
1-11-20			1-11-20	53.0	39.2	1-11-20	**		1-11-20	10.0	4.7	1-11-20	2.0	0.8	1-11-20	0.0	0.0	1-11-20	30.0	9.7	1-11-20	Frozen	
1-12-20			1-12-20	53.0	39.2	1-12-20	**		1-12-20	10.0	4.7	1-12-20	2.0	0.8	1-12-20	0.0	0.0	1-12-20	30.0	9.7	1-12-20	Frozen	
1-13-20			1-13-20	53.0	39.2	1-13-20	**		1-13-20	10.0	4.7	1-13-20	2.0	0.8	1-13-20	0.0	0.0	1-13-20	30.0	9.7	1-13-20	Frozen	
1-14-20			1-14-20	53.0	39.2	1-14-20	**		1-14-20	0.0	0.0	1-14-20	0.0	0.0	1-14-20	0.0	0.0	1-14-20	5.0	1.6	1-14-20	Frozen	
1-15-20			1-15-20	53.0	39.2	1-15-20	**		1-15-20	0.0	0.0	1-15-20	0.0	0.0	1-15-20	0.0	0.0	1-15-20	2.0	0.6	1-15-20	Frozen	
1-16-20			1-16-20	53.0	39.2	1-16-20	**		1-16-20	0.0	0.0	1-16-20	0.0	0.0	1-16-20	0.0	0.0	1-16-20	0.0	0.0	1-16-20	Frozen	
1-17-20			1-17-20	53.0	39.2	1-17-20	**		1-17-20	0.0	0.0	1-17-20	0.0	0.0	1-17-20	0.0	0.0	1-17-20	0.0	0.0	1-17-20	Frozen	
1-18-20			1-18-20	53.0	39.2	1-18-20	**		1-18-20	0.0	0.0	1-18-20	3.3	1.3	1-18-20	0.0	0.0	1-18-20	0.0	0.0	1-18-20	Frozen	
1-19-20			1-19-20	53.0	39.2	1-19-20	**		1-19-20	0.0	0.0	1-19-20	3.3	1.3	1-19-20	0.0	0.0	1-19-20	0.0	0.0	1-19-20	Frozen	
1-20-20			1-20-20	53.0	39.2	1-20-20	**		1-20-20	15.0	7.1	1-20-20	3.3	1.3	1-20-20	0.0	0.0	1-20-20	0.0	0.0	1-20-20	Frozen	
1-21-20			1-21-20	53.0	39.2	1-21-20	**		1-21-20	10.0	4.7	1-21-20	15.0	5.9	1-21-20	0.0	0.0	1-21-20	20.0	6.5	1-21-20	Frozen	
1-22-20			1-22-20	53.0	39.2	1-22-20	**		1-22-20	0.0	0.0	1-22-20	15.0	5.9	1-22-20	0.0	0.0	1-22-20	20.0	6.5	1-22-20	Frozen	
1-23-20			1-23-20	53.0	39.2	1-23-20	**		1-23-20	15.0	7.1	1-23-20	0.0	0.0	1-23-20	5.0	2.0	1-23-20	10.0	3.2	1-23-20	Frozen	
1-24-20			1-24-20	53.0	39.2	1-24-20	**		1-24-20	0.0	0.0	1-24-20	10.0	3.9	1-24-20	10.0	3.9	1-24-20	15.0	4.9	1-24-20	Frozen	
1-25-20			1-25-20	53.0	39.2	1-25-20	**		1-25-20	5.0	2.4	1-25-20	0.0	0.0	1-25-20	10.0	3.9	1-25-20	30.0	9.7	1-25-20	Frozen	
1-26-20			1-26-20	53.0	39.2	1-26-20	**		1-26-20	5.0	2.4	1-26-20	0.0	0.0	1-26-20	10.0	3.9	1-26-20	30.0	9.7	1-26-20	Frozen	
1-27-20			1-27-20	53.0	39.2	1-27-20	**		1-27-20	5.0	2.4	1-27-20	0.0	0.0	1-27-20	10.0	3.9	1-27-20	30.0	9.7	1-27-20	Frozen	
1-28-20			1-28-20	53.0	39.2	1-28-20	**		1-28-20	10.0	4.7	1-28-20	15.0	5.9	1-28-20	10.0	3.9	1-28-20	35.0	11.4	1-28-20	Frozen	**System**
1-29-20			1-29-20	53.0	39.2	1-29-20	**		1-29-20	10.0	4.7	1-29-20	5.0	2.0	1-29-20	10.0	3.9	1-29-20	15.0	4.9	1-29-20	Frozen	**unable to**
1-30-20			1-30-20	53.0	39.2	1-30-20	**		1-30-20	10.0	4.7	1-30-20	0.0	0.0	1-30-20	15.0	5.9	1-30-20	20.0	6.5	1-30-20	Frozen	**pump**
1-31-20			1-31-20	53.0	39.2	1-31-20	**		1-31-20	10.0	4.7	1-31-20	0.0	0.0	1-31-20	20.0	7.9	1-31-20	15.0	4.9	1-31-20	Frozen	**from**
2-1-20			2-1-20	53.0	39.2	2-1-20	**		2-1-20	5.0	2.4	2-1-20	0.0	0.0	2-1-20	5.0	2.0	2-1-20	3.3	1.1	2-1-20	Frozen	**1-Jan to**
2-2-20			2-2-20	53.0	39.2	2-2-20	**		2-2-20	5.0	2.4	2-2-20	0.0	0.0	2-2-20	5.0	2.0	2-2-20	3.3	1.1	2-2-20	Frozen	**4-Feb**
2-3-20			2-3-20	53.0	39.2	2-3-20	**		2-3-20	5.0	2.4	2-3-20	0.0	0.0	2-3-20	5.0	2.0	2-3-20	3.3	1.1	2-3-20	Frozen	**535L/Ha/D**
2-4-20			2-4-20	53.0	39.2	2-4-20	**		2-4-20	15.0	7.1	2-4-20	0.0	0.0	2-4-20	20.0	7.9	2-4-20	15.0	4.9	2-4-20	18728.0	7707.0
2-5-20			2-5-20	53.0	39.2	2-5-20	**		2-5-20	5.0	2.4	2-5-20	10.0	3.9	2-5-20	15.0	5.9	2-5-20	10.0	3.2	2-5-20	0.0	0.0
2-6-20			2-6-20	53.0	39.2	2-6-20	**		2-6-20	20.0	9.4	2-6-20	0.0	0.0	2-6-20	10.0	3.9	2-6-20	15.0	4.9	2-6-20	80.0	32.9
2-7-20			2-7-20	53.0	39.2	2-7-20	**		2-7-20	15.0	7.1	2-7-20	0.0	0.0	2-7-20	10.0	3.9	2-7-20	10.0	3.2	2-7-20	75.0	30.9
2-8-20			2-8-20	53.0	39.2	2-8-20	**		2-8-20	20.0	9.4	2-8-20	5.0	2.0	2-8-20	15.0	5.9	2-8-20	20.0	6.5	2-8-20	33.3	13.7
2-9-20			2-9-20	53.0	39.2	2-9-20	**		2-9-20	20.0	9.4	2-9-20	5.0	2.0	2-9-20	15.0	5.9	2-9-20	20.0	6.5	2-9-20	33.3	13.7
2-10-20			2-10-20	53.0	39.2	2-10-20	**		2-10-20	20.0	9.4	2-10-20	5.0	2.0	2-10-20	15.0	5.9	2-10-20	20.0	6.5	2-10-20	33.3	13.7
2-11-20			2-11-20	53.0	39.2	2-11-20	**		2-11-20	20.0	9.4	2-11-20	5.0	2.0	2-11-20	10.0	3.9	2-11-20	15.0	4.9	2-11-20	70.0	28.8
2-12-20			2-12-20	53.0	39.2	2-12-20	**		2-12-20	15.0	7.1	2-12-20	0.0	0.0	2-12-20	10.0	3.9	2-12-20	10.0	3.2	2-12-20	50.0	20.6
2-13-20			2-13-20	53.0	39.2	2-13-20	**		2-13-20	25.0	11.8	2-13-20	15.0	5.9	2-13-20	15.0	5.9	2-13-20	20.0	6.5	2-13-20	50.0	20.6
2-14-20			2-14-20	53.0	39.2	2-14-20	**		2-14-20	10.0	4.7	2-14-20	5.0	2.0	2-14-20	10.0	3.9	2-14-20	15.0	4.9	2-14-20	60.0	24.7
2-15-20			2-15-20	53.0	39.2	2-15-20	**		2-15-20	0.0	0.0	2-15-20	0.0	0.0	2-15-20	0.0	0.0	2-15-20	15.0	4.9	2-15-20	0.0	0.0
2-16-20			2-16-20	53.0	39.2	2-16-20	**		2-16-20	0.0	0.0	2-16-20	0.0	0.0	2-16-20	0.0	0.0	2-16-20	15.0	4.9	2-16-20	0.0	0.0
2-17-20			2-17-20	53.0	39.2	2-17-20	**		2-17-20	0.0	0.0	2-17-20	0.0	0.0	2-17-20	0.0	0.0	2-17-20	15.0	4.9	2-17-20	0.0	0.0
2-18-20			2-18-20	53.0	39.2	2-18-20	**		2-18-20	0.0	0.0	2-18-20	0.0	0.0	2-18-20	0.0	0.0	2-18-20	15.0	4.9	2-18-20	0.0	0.0
2-19-20			2-19-20	53.0	39.2	2-19-20	**		2-19-20	0.0	0.0	2-19-20	0.0	0.0	2-19-20	30.0	11.8	2-19-20	15.0	4.9	2-19-20	65.0	26.7
2-20-20			2-20-20	53.0	39.2	2-20-20	**		2-20-20	0.0	0.0	2-20-20	0.0	0.0	2-20-20	10.0	3.9	2-20-20	20.0	6.5	2-20-20	60.0	24.7
2-21-20			2-21-20	53.0	39.2	2-21-20	**		2-21-20	0.0	0.0	2-21-20	15.0	5.9	2-21-20	30.0	11.8	2-21-20	15.0	4.9	2-21-20	60.0	24.7
2-22-20			2-22-20	53.0	39.2	2-22-20	**		2-22-20	5.0	2.4	2-22-20	0.0	0.0	2-22-20	20.0	7.9	2-22-20	20.0	6.5	2-22-20	40.0	16.5
2-23-20			2-23-20	53.0	39.2	2-23-20	**		2-23-20	5.0	2.4	2-23-20	0.0	0.0	2-23-20	20.0	7.9	2-23-20	20.0	6.5	2-23-20	40.0	16.5
2-24-20			2-24-20	53.0	39.2	2-24-20	**		2-24-20	5.0	2.4	2-24-20	0.0	0.0	2-24-20	20.0	7.9	2-24-20	20.0	6.5	2-24-20	40.0	16.5
2-25-20			2-25-20	53.0	39.2	2-25-20	**		2-25-20	15.0	7.1	2-25-20	0.0	0.0	2-25-20	20.0	7.9	2-25-20	20.0	6.5	2-25-20	65.0	26.7
2-26-20			2-26-20	53.0	39.2	2-26-20	**		2-26-20	15.0	7.1	2-26-20	50.0	19.6	2-26-20	0.0	0.0	2-26-20	30.0	9.7	2-26-20	0.0	0.0
2-27-20			2-27-20	53.0	39.2	2-27-20	**		2-27-20	10.0	4.7	2-27-20	15.0	5.9	2-27-20	15.0	5.9	2-27-20	20.0	6.5	2-27-20	30.0	12.3
2-28-20			2-28-20	53.0	39.2	2-28-20	587.0	276.2	2-28-20	10.0	4.7	2-28-20	15.0	5.9	2-28-20	15.0	5.9	2-28-20	20.0	6.5	2-28-20	60.0	24.7
2-29-20			2-29-20	53.0	39.2	2-29-20	**		2-29-20	6.7	3.2	2-29-20	6.7	2.6	2-29-20	8.3	3.3	2-29-20	10.0	3.2	2-29-20	40.0	16.5
3-1-20			3-1-20	53.0	39.2	3-1-20	**		3-1-20	6.7	3.2	3-1-20	6.7	2.6	3-1-20	8.3	3.3	3-1-20	10.0	3.2	3-1-20	40.0	16.5
3-2-20			3-2-20	53.0	39.2	3-2-20	**		3-2-20	6.7	3.2	3-2-20	6.7	2.6	3-2-20	8.3	3.3	3-2-20	10.0	3.2	3-2-20	40.0	16.5
3-3-20			3-3-20	53.0	39.2	3-3-20	**		3-3-20	20.0	9.4	3-3-20	15.0	5.9	3-3-20	15.0	5.9	3-3-20	20.0	6.5	3-3-20	100.0	41.2
3-4-20			3-4-20	53.0	39.2	3-4-20	850.0	400.0	3-4-20	15.0	7.1	3-4-20	15.0	5.9	3-4-20	20.0	7.9	3-4-20	25.0	8.1	3-4-20	80.0	32.9
3-5-20			3-5-20	53.0	39.2	3-5-20	52.0	24.5	3-5-20	20.0	9.4	3-5-20	10.0	3.9	3-5-20	20.0	7.9	3-5-20	20.0	6.5	3-5-20	60.0	24.7
3-6-20			3-6-20	53.0	39.2	3-6-20	0.0	0.0	3-6-20	0.0	0.0	3-6-20	0.0	0.0	3-6-20	0.0	0.0	3-6-20	0.0	0.0	3-6-20	0.0	0.0
3-7-20			3-7-20	53.0	39.2	3-7-20	**		3-7-20	5.0	2.4	3-7-20	3.3	1.3	3-7-20	5.0	2.0	3-7-20	5.0	1.6	3-7-20	5.0	2.1
3-8-20			3-8-20	53.0	39.2	3-8-20	**		3-8-20	5.0	2.4	3-8-20	3.3	1.3	3-8-20	5.0	2.0	3-8-20	5.0	1.6	3-8-20	5.0	2.1
3-9-20		0.0	3-9-20	53.0	39.2	3-9-20	**		3-9-20	5.0	2.4	3-9-20	3.3	1.3	3-9-20	5.0	2.0	3-9-20	5.0	1.6	3-9-20	5.0	2.1

CLEAN HARBORS CANADA, INC.
Liquid Removed from Leak Detection Systems 2020

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/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)
3-10-20	900.0	1308.1	3-10-20	53.0	39.2	3-10-20	**		3-10-20	0.0	0.0	3-10-20	10.0	3.9	3-10-20	0.0	0.0	3-10-20	0.0	0.0	3-10-20	0.0	0.0
3-11-20	**Cell 2**		3-11-20	53.0	39.2	3-11-20	**		3-11-20	5.0	2.4	3-11-20	10.0	3.9	3-11-20	0.0	0.0	3-11-20	0.0	0.0	3-11-20	0.0	0.0
3-12-20	**Secondary**		3-12-20	53.0	39.2	3-12-20	126.0	59.3	3-12-20	0.0	0.0	3-12-20	0.0	0.0	3-12-20	0.0	0.0	3-12-20	0.0	0.0	3-12-20	0.0	0.0
3-13-20	**not**		3-13-20	53.0	39.2	3-13-20	90.0	42.4	3-13-20	0.0	0.0	3-13-20	0.0	0.0	3-13-20	0.0	0.0	3-13-20	5.0	1.6	3-13-20	0.0	0.0
3-14-20	**pumped**		3-14-20	53.0	39.2	3-14-20	24.7	11.6	3-14-20	0.0	0.0	3-14-20	0.0	0.0	3-14-20	0.0	0.0	3-14-20	2.7	0.9	3-14-20	40.0	16.5
3-15-20	**daiky**		3-15-20	53.0	39.2	3-15-20	24.7	11.6	3-15-20	0.0	0.0	3-15-20	0.0	0.0	3-15-20	0.0	0.0	3-15-20	2.7	0.9	3-15-20	40.0	16.5
3-16-20	**Reading**		3-16-20	53.0	39.2	3-16-20	24.6	11.6	3-16-20	0.0	0.0	3-16-20	0.0	0.0	3-16-20	0.0	0.0	3-16-20	2.7	0.9	3-16-20	40.0	16.5
3-17-20	**does not**		3-17-20	53.0	39.2	3-17-20	50.0	23.5	3-17-20	0.0	0.0	3-17-20	40.0	15.7	3-17-20	0.0	0.0	3-17-20	0.0	0.0	3-17-20	60.0	24.7
3-18-20	**indicate**		3-18-20	53.0	39.2	3-18-20	30.0	14.1	3-18-20	0.0	0.0	3-18-20	0.0	0.0	3-18-20	0.0	0.0	3-18-20	3.0	1.0	3-18-20	30.0	12.3
3-19-20	**problem**		3-19-20	53.0	39.2	3-19-20	40.0	18.8	3-19-20	0.0	0.0	3-19-20	0.0	0.0	3-19-20	0.0	0.0	3-19-20	0.0	0.0	3-19-20	40.0	16.5
3-20-20	**with**		3-20-20	53.0	39.2	3-20-20	**		3-20-20	0.0	0.0	3-20-20	0.0	0.0	3-20-20	0.0	0.0	3-20-20	0.0	0.0	3-20-20	60.0	24.7
3-21-20	**ALR limit**		3-21-20	53.0	39.2	3-21-20	**		3-21-20	0.0	0.0	3-21-20	20.0	7.9	3-21-20	0.0	0.0	3-21-20	0.0	0.0	3-21-20	0.0	0.0
3-22-20		0.0	3-22-20	53.0	39.2	3-22-20	**		3-22-20	0.0	0.0	3-22-20	20.0	7.9	3-22-20	0.0	0.0	3-22-20	0.0	0.0	3-22-20	0.0	0.0
3-23-20		0.0	3-23-20	53.0	39.2	3-23-20	**		3-23-20	0.0	0.0	3-23-20	20.0	7.9	3-23-20	0.0	0.0	3-23-20	0.0	0.0	3-23-20	0.0	0.0
3-24-20		0.0	3-24-20	53.0	39.2	3-24-20	**		3-24-20	0.0	0.0	3-24-20	0.0	0.0	3-24-20	0.0	0.0	3-24-20	0.0	0.0	3-24-20	0.0	0.0
3-25-20		0.0	3-25-20	53.0	39.2	3-25-20	**		3-25-20	0.0	0.0	3-25-20	0.0	0.0	3-25-20	0.0	0.0	3-25-20	0.0	0.0	3-25-20	40.0	16.5
3-26-20		0.0	3-26-20	53.0	39.2	3-26-20	**		3-26-20	0.0	0.0	3-26-20	20.0	7.9	3-26-20	10.0	3.9	3-26-20	0.0	0.0	3-26-20	0.0	0.0
3-27-20		0.0	3-27-20	53.0	39.2	3-27-20	**		3-27-20	0.0	0.0	3-27-20	0.0	0.0	3-27-20	0.0	0.0	3-27-20	0.0	0.0	3-27-20	50.0	20.6
3-28-20		0.0	3-28-20	53.0	39.2	3-28-20	**		3-28-20	0.0	0.0	3-28-20	0.0	0.0	3-28-20	0.0	0.0	3-28-20	0.0	0.0	3-28-20	0.0	0.0
3-29-20		0.0	3-29-20	53.0	39.2	3-29-20	**		3-29-20	0.0	0.0	3-29-20	0.0	0.0	3-29-20	0.0	0.0	3-29-20	0.0	0.0	3-29-20	0.0	0.0
3-30-20		0.0	3-30-20	53.0	39.2	3-30-20	**		3-30-20	0.0	0.0	3-30-20	0.0	0.0	3-30-20	0.0	0.0	3-30-20	0.0	0.0	3-30-20	0.0	0.0
3-31-20		0.0	3-31-20	53.0	39.2	3-31-20	**		3-31-20	10.0	4.7	3-31-20	0.0	0.0	3-31-20	0.0	0.0	3-31-20	0.0	0.0	3-31-20	0.0	0.0
4-1-20		0.0	4-1-20	53.0	39.2	4-1-20	**		4-1-20	0.0	0.0	4-1-20	0.0	0.0	4-1-20	0.0	0.0	4-1-20	0.0	0.0	4-1-20	50.0	20.6
4-2-20		0.0	4-2-20	53.0	39.2	4-2-20	**		4-2-20	0.0	0.0	4-2-20	0.0	0.0	4-2-20	0.0	0.0	4-2-20	0.0	0.0	4-2-20	20.0	8.2
4-3-20		0.0	4-3-20	53.0	39.2	4-3-20	**		4-3-20	0.0	0.0	4-3-20	0.0	0.0	4-3-20	0.0	0.0	4-3-20	0.0	0.0	4-3-20	50.0	20.6
4-4-20		0.0	4-4-20	53.0	39.2	4-4-20	**		4-4-20	0.0	0.0	4-4-20	0.0	0.0	4-4-20	0.0	0.0	4-4-20	0.0	0.0	4-4-20	75.0	30.9
4-5-20		0.0	4-5-20	53.0	39.2	4-5-20	**		4-5-20	0.0	0.0	4-5-20	0.0	0.0	4-5-20	0.0	0.0	4-5-20	0.0	0.0	4-5-20	50.0	20.6
4-6-20		0.0	4-6-20	53.0	39.2	4-6-20	**		4-6-20	0.0	0.0	4-6-20	0.0	0.0	4-6-20	0.0	0.0	4-6-20	0.0	0.0	4-6-20	10.0	4.1
4-7-20		0.0	4-7-20	53.0	39.2	4-7-20	**		4-7-20	0.0	0.0	4-7-20	30.0	11.8	4-7-20	0.0	0.0	4-7-20	0.0	0.0	4-7-20	50.0	20.6
4-8-20	800.0	1162.8	4-8-20	53.0	39.2	4-8-20	**		4-8-20	10.0	4.7	4-8-20	30.0	11.8	4-8-20	0.0	0.0	4-8-20	60.0	19.5	4-8-20	10.0	4.1
4-9-20	**Cell 2**		4-9-20	53.0	39.2	4-9-20	**		4-9-20	267.0	125.6	4-9-20	0.0	0.0	4-9-20	0.0	0.0	4-9-20	60.0	19.5	4-9-20	50.0	20.6
4-10-20	**Secondary**		4-10-20	53.0	39.2	4-10-20	**		4-10-20	391.3	184.1	4-10-20	0.0	0.0	4-10-20	0.0	0.0	4-10-20	0.0	0.0	4-10-20	0.0	0.0
4-11-20	**not**		4-11-20	53.0	39.2	4-11-20	**		4-11-20	391.3	184.1	4-11-20	0.0	0.0	4-11-20	0.0	0.0	4-11-20	0.0	0.0	4-11-20	0.0	0.0
4-12-20	**pumped**		4-12-20	53.0	39.2	4-12-20	**		4-12-20	391.3	184.1	4-12-20	0.0	0.0	4-12-20	0.0	0.0	4-12-20	0.0	0.0	4-12-20	0.0	0.0
4-13-20	**daiky**		4-13-20	53.0	39.2	4-13-20	**		4-13-20	391.3	184.1	4-13-20	0.0	0.0	4-13-20	0.0	0.0	4-13-20	0.0	0.0	4-13-20	0.0	0.0
4-14-20	**Reading**		4-14-20	53.0	39.2	4-14-20	**		4-14-20	249.0	117.2	4-14-20	20.0	7.9	4-14-20	0.0	0.0	4-14-20	0.0	0.0	4-14-20	0.0	0.0
4-15-20	**does not**		4-15-20	53.0	39.2	4-15-20	**		4-15-20	163.0	76.7	4-15-20	0.0	0.0	4-15-20	0.0	0.0	4-15-20	0.0	0.0	4-15-20	50.0	20.6
4-16-20	**indicate**		4-16-20	53.0	39.2	4-16-20	**		4-16-20	80.0	37.6	4-16-20	40.0	15.7	4-16-20	0.0	0.0	4-16-20	0.0	0.0	4-16-20	0.0	0.0
4-17-20	**problem**		4-17-20	53.0	39.2	4-17-20	**		4-17-20	80.0	37.6	4-17-20	30.0	11.8	4-17-20	0.0	0.0	4-17-20	10.0	3.2	4-17-20	45.0	18.5
4-18-20	**with**		4-18-20	53.0	39.2	4-18-20	**		4-18-20	755.3	355.4	4-18-20	43.3	17.0	4-18-20	0.0	0.0	4-18-20	0.0	0.0	4-18-20	148.3	61.0
4-19-20	**ALR limit**		4-19-20	53.0	39.2	4-19-20	**		4-19-20	755.3	355.4	4-19-20	43.3	17.0	4-19-20	0.0	0.0	4-19-20	0.0	0.0	4-19-20	148.3	61.0
4-20-20		0.0	4-20-20	53.0	39.2	4-20-20	**		4-20-20	755.3	355.4	4-20-20	43.3	17.0	4-20-20	0.0	0.0	4-20-20	0.0	0.0	4-20-20	148.3	61.0
4-21-20		0.0	4-21-20	53.0	39.2	4-21-20	667.0	313.9	4-21-20	1000.0	470.6	4-21-20	75.0	29.5	4-21-20	0.0	0.0	4-21-20	0.0	0.0	4-21-20	240.0	98.8
4-22-20		0.0	4-22-20	53.0	39.2	4-22-20	100.0	47.1	4-22-20	375.0	176.5	4-22-20	30.0	11.8	4-22-20	0.0	0.0	4-22-20	0.0	0.0	4-22-20	30.0	12.3
4-23-20		0.0	4-23-20	53.0	39.2	4-23-20	20.0	9.4	4-23-20	301.0	141.6	4-23-20	10.0	3.9	4-23-20	0.0	0.0	4-23-20	0.0	0.0	4-23-20	0.0	0.0
4-24-20		0.0	4-24-20	53.0	39.2	4-24-20	10.0	4.7	4-24-20	140.0	65.9	4-24-20	0.0	0.0	4-24-20	0.0	0.0	4-24-20	0.0	0.0	4-24-20	0.0	0.0
4-25-20		0.0	4-25-20	53.0	39.2	4-25-20	20.0	9.4	4-25-20	134.3	63.2	4-25-20	16.7	6.6	4-25-20	5.0	2.0	4-25-20	0.0	0.0	4-25-20	46.7	19.2
4-26-20		0.0	4-26-20	53.0	39.2	4-26-20	20.0	9.4	4-26-20	134.3	63.2	4-26-20	16.7	6.6	4-26-20	5.0	2.0	4-26-20	0.0	0.0	4-26-20	46.7	19.2
4-27-20		0.0	4-27-20	53.0	39.2	4-27-20	20.0	9.4	4-27-20	134.3	63.2	4-27-20	16.7	6.6	4-27-20	5.0	2.0	4-27-20	15.0	4.9	4-27-20	46.7	19.2
4-28-20		0.0	4-28-20	53.0	39.2	4-28-20	30.0	14.1	4-28-20	221.0	104.0	4-28-20	0.0	0.0	4-28-20	0.0	0.0	4-28-20	0.0	0.0	4-28-20	90.0	37.0
4-29-20		0.0	4-29-20	53.0	39.2	4-29-20	0.0	0.0	4-29-20	155.0	72.9	4-29-20	0.0	0.0	4-29-20	0.0	0.0	4-29-20	0.0	0.0	4-29-20	100.0	41.2
4-30-20		0.0	4-30-20	53.0	39.2	4-30-20	0.0	0.0	4-30-20	130.0	61.2	4-30-20	35.0	13.7	4-30-20	0.0	0.0	4-30-20	40.0	13.0	4-30-20	100.0	41.2
5-1-20		0.0	5-1-20	53.0	39.2	5-1-20	0.0	0.0	5-1-20	90.0	42.4	5-1-20	0.0	0.0	5-1-20	10.0	3.9	5-1-20	40.0	13.0	5-1-20	0.0	0.0
5-2-20		0.0	5-2-20	53.0	39.2	5-2-20	57.3	27.0	5-2-20	16.7	7.9	5-2-20	0.0	0.0	5-2-20	0.0	0.0	5-2-20	0.0	0.0	5-2-20	0.0	0.0
5-3-20		0.0	5-3-20	53.0	39.2	5-3-20	57.3	27.0	5-3-20	16.7	7.9	5-3-20	0.0	0.0	5-3-20	0.0	0.0	5-3-20	0.0	0.0	5-3-20	0.0	0.0
5-4-20		0.0	5-4-20	53.0	39.2	5-4-20	57.3	27.0	5-4-20	16.7	7.9	5-4-20	0.0	0.0	5-4-20	0.0	0.0	5-4-20	0.0	0.0	5-4-20	0.0	0.0
5-5-20		0.0	5-5-20	53.0	39.2	5-5-20	90.0	42.4	5-5-20	50.0	23.5	5-5-20	0.0	0.0	5-5-20	0.0	0.0	5-5-20	0.0	0.0	5-5-20	0.0	0.0
5-6-20		0.0	5-6-20	53.0	39.2	5-6-20	81.0	38.1	5-6-20	20.0	9.4	5-6-20	0.0	0.0	5-6-20	0.0	0.0	5-6-20	0.0	0.0	5-6-20	0.0	0.0
5-7-20		0.0	5-7-20	53.0	39.2	5-7-20	78.0	36.7	5-7-20	75.0	35.3	5-7-20	0.0	0.0	5-7-20	0.0	0.0	5-7-20	0.0	0.0	5-7-20	0.0	0.0
5-8-20		0.0	5-8-20	53.0	39.2	5-8-20	80.0	37.6	5-8-20	20.0	9.4	5-8-20	0.0	0.0	5-8-20	0.0	0.0	5-8-20	0.0	0.0	5-8-20	0.0	0.0
5-9-20		0.0	5-9-20	53.0	39.2	5-9-20	64.0	30.1	5-9-20	15.0	7.1	5-9-20	0.0	0.0	5-9-20	0.0	0.0	5-9-20	0.0	0.0	5-9-20	20.0	8.2
5-10-20		0.0	5-10-20	53.0	39.2	5-10-20	64.0	30.1	5-10-20	15.0	7.1	5-10-20	0.0	0.0	5-10-20	0.0	0.0	5-10-20	0.0	0.0	5-10-20	20.0	8.2
5-11-20		0.0	5-11-20	53.0	39.2	5-11-20	64.0	30.1	5-11-20	15.0	7.1	5-11-20	0.0	0.0	5-11-20	0.0	0.0	5-11-20	0.0	0.0	5-11-20	20.0	8.2
5-12-20		0.0	5-12-20	53.0	39.2	5-12-20	60.0	28.2	5-12-20	0.0	0.0	5-12-20	15.0	5.9	5-12-20	0.0	0.0	5-12-20	0.0	0.0	5-12-20	0.0	0.0
5-13-20		0.0	5-13-20	53.0	39.2	5-13-20	55.0	25.9	5-13-20	20.0	9.4	5-13-20	10.0	3.9	5-13-20	0.0	0.0	5-13-20	0.0	0.0	5-13-20	0.0	0.0
5-14-20		0.0	5-14-20	53.0	39.2	5-14-20	57.0	26.8	5-14-20	0.0	0.0	5-14-20	0.0	0.0	5-14-20	0.0	0.0	5-14-20	0.0	0.0	5-14-20	0.0	0.0
5-15-20		0.0	5-15-20	53.0	39.2	5-15-20	56.0	26.4	5-15-20	5.0	2.4	5-15-20	0.0	0.0	5-15-20	0.0	0.0	5-15-20	0.0	0.0	5-15-20	0.0	0.0
5-16-20		0.0	5-16-20	53.0	39.2	5-16-20	**		5-16-20	11.3	5.3	5-16-20	0.0	0.0	5-16-20	0.0	0.0	5-16-20	10.0	3.2	5-16-20	279.0	114.8
5-17-20		0.0	5-17-20	53.0	39.2	5-17-20	**		5-17-20	11.3	5.3	5-17-20	0.0	0.0	5-17-20	0.0	0.0	5-17-20	10.0	3.2	5-17-20	279.0	114.8

CLEAN HARBORS CANADA, INC.
Liquid Removed from Leak Detection Systems 2020

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/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)
5-18-20		0.0	5-18-20	53.0	39.2	5-18-20	**		5-18-20	11.3	5.3	5-18-20	0.0	0.0	5-18-20	0.0	0.0	5-18-20	10.0	3.2	5-18-20	279.0	114.8
5-19-20	900.0	1308.1	5-19-20	53.0	39.2	5-19-20	**		5-19-20	11.3	5.3	5-19-20	0.0	0.0	5-19-20	0.0	0.0	5-19-20	10.0	3.2	5-19-20	279.0	114.8
5-20-20	**Cell 2**		5-20-20	53.0	39.2	5-20-20	73.0	34.4	5-20-20	10.0	4.7	5-20-20	0.0	0.0	5-20-20	0.0	0.0	5-20-20	0.0	0.0	5-20-20	0.0	0.0
5-21-20	**Secondary**		5-21-20	53.0	39.2	5-21-20	55.0	25.9	5-21-20	0.0	0.0	5-21-20	19.0	7.5	5-21-20	0.0	0.0	5-21-20	0.0	0.0	5-21-20	0.0	0.0
5-22-20	**not**		5-22-20	53.0	39.2	5-22-20	49.0	23.1	5-22-20	5.0	2.4	5-22-20	0.0	0.0	5-22-20	0.0	0.0	5-22-20	0.0	0.0	5-22-20	77.0	31.7
5-23-20	**pumped**		5-23-20	53.0	39.2	5-23-20	55.0	25.9	5-23-20	352.7	166.0	5-23-20	6.7	2.6	5-23-20	0.0	0.0	5-23-20	0.0	0.0	5-23-20	146.7	60.4
5-24-20	**daiky**		5-24-20	53.0	39.2	5-24-20	55.0	25.9	5-24-20	352.7	166.0	5-24-20	6.7	2.6	5-24-20	0.0	0.0	5-24-20	0.0	0.0	5-24-20	146.7	60.4
5-25-20	**Reading**		5-25-20	53.0	39.2	5-25-20	55.0	25.9	5-25-20	352.7	166.0	5-25-20	6.7	2.6	5-25-20	0.0	0.0	5-25-20	0.0	0.0	5-25-20	146.7	60.4
5-26-20	**does not**		5-26-20	53.0	39.2	5-26-20	110.0	51.8	5-26-20	478.0	224.9	5-26-20	15.0	5.9	5-26-20	45.0	17.8	5-26-20	0.0	0.0	5-26-20	15.0	6.2
5-27-20	**indicate**		5-27-20	53.0	39.2	5-27-20	238.0	112.0	5-27-20	386.0	181.6	5-27-20	0.0	0.0	5-27-20	0.0	0.0	5-27-20	0.0	0.0	5-27-20	296.0	121.8
5-28-20	**problem**		5-28-20	53.0	39.2	5-28-20	274.0	128.9	5-28-20	254.0	119.5	5-28-20	0.0	0.0	5-28-20	0.0	0.0	5-28-20	0.0	0.0	5-28-20	319.0	131.3
5-29-20	**with**		5-29-20	53.0	39.2	5-29-20	334.0	157.2	5-29-20	193.0	90.8	5-29-20	0.0	0.0	5-29-20	0.0	0.0	5-29-20	0.0	0.0	5-29-20	217.0	89.3
5-30-20	**ALR limit**		5-30-20	53.0	39.2	5-30-20	345.0	162.4	5-30-20	73.3	34.5	5-30-20	6.7	2.6	5-30-20	0.0	0.0	5-30-20	0.0	0.0	5-30-20	364.0	149.8
5-31-20		0.0	5-31-20	53.0	39.2	5-31-20	345.0	162.4	5-31-20	73.3	34.5	5-31-20	6.7	2.6	5-31-20	0.0	0.0	5-31-20	0.0	0.0	5-31-20	364.0	149.8
6-1-20		0.0	6-1-20	53.0	39.2	6-1-20	345.0	162.4	6-1-20	73.3	34.5	6-1-20	6.7	2.6	6-1-20	0.0	0.0	6-1-20	0.0	0.0	6-1-20	364.0	149.8
6-2-20		0.0	6-2-20	53.0	39.2	6-2-20	399.0	187.8	6-2-20	157.0	73.9	6-2-20	0.0	0.0	6-2-20	0.0	0.0	6-2-20	0.0	0.0	6-2-20	200.0	82.3
6-3-20		0.0	6-3-20	53.0	39.2	6-3-20	613.0	288.5	6-3-20	257.0	120.9	6-3-20	50.0	19.6	6-3-20	0.0	0.0	6-3-20	0.0	0.0	6-3-20	240.0	98.8
6-4-20		0.0	6-4-20	53.0	39.2	6-4-20	153.0	72.0	6-4-20	109.0	51.3	6-4-20	1.0	0.4	6-4-20	0.0	0.0	6-4-20	0.0	0.0	6-4-20	73.0	30.0
6-5-20		0.0	6-5-20	53.0	39.2	6-5-20	107.0	50.4	6-5-20	159.0	74.8	6-5-20	0.0	0.0	6-5-20	0.0	0.0	6-5-20	0.0	0.0	6-5-20	67.0	27.6
6-6-20		0.0	6-6-20	53.0	39.2	6-6-20	1323.0	622.6	6-6-20	419.0	197.2	6-6-20	25.0	9.8	6-6-20	0.0	0.0	6-6-20	0.0	0.0	6-6-20	897.7	369.4
6-7-20		0.0	6-7-20	53.0	39.2	6-7-20	1323.0	622.6	6-7-20	419.0	197.2	6-7-20	25.0	9.8	6-7-20	0.0	0.0	6-7-20	0.0	0.0	6-7-20	879.7	362.0
6-8-20		0.0	6-8-20	53.0	39.2	6-8-20	1323.0	622.6	6-8-20	419.0	197.2	6-8-20	25.0	9.8	6-8-20	0.0	0.0	6-8-20	0.0	0.0	6-8-20	879.7	362.0
6-9-20		0.0	6-9-20	53.0	39.2	6-9-20	2457.0	1156.2	6-9-20	1361.0	640.5	6-9-20	167.0	65.6	6-9-20	0.0	0.0	6-9-20	0.0	0.0	6-9-20	143.0	58.8
6-10-20		0.0	6-10-20	53.0	39.2	6-10-20	2054.0	966.6	6-10-20	2356.0	1108.7	6-10-20	407.0	159.9	6-10-20	0.0	0.0	6-10-20	0.0	0.0	6-10-20	140.0	57.6
6-11-20		0.0	6-11-20	53.0	39.2	6-11-20	2337.0	1099.8	6-11-20	1870.0	880.0	6-11-20	515.0	202.3	6-11-20	50.0	19.7	6-11-20	0.0	0.0	6-11-20	236.0	97.1
6-12-20		0.0	6-12-20	53.0	39.2	6-12-20	1857.0	873.9	6-12-20	1535.0	722.4	6-12-20	463.0	181.9	6-12-20	0.0	0.0	6-12-20	0.0	0.0	6-12-20	356.0	146.5
6-13-20		0.0	6-13-20	53.0	39.2	6-13-20	42.0	19.8	6-13-20	53.3	25.1	6-13-20	80.0	31.4	6-13-20	0.0	0.0	6-13-20	0.0	0.0	6-13-20	152.6	62.8
6-14-20		0.0	6-14-20	53.0	39.2	6-14-20	42.0	19.8	6-14-20	53.3	25.1	6-14-20	80.0	31.4	6-14-20	0.0	0.0	6-14-20	0.0	0.0	6-14-20	152.6	62.8
6-15-20		0.0	6-15-20	53.0	39.2	6-15-20	42.0	19.8	6-15-20	53.3	25.1	6-15-20	80.0	31.4	6-15-20	0.0	0.0	6-15-20	0.0	0.0	6-15-20	152.6	62.8
6-16-20		0.0	6-16-20	53.0	39.2	6-16-20	127.0	59.8	6-16-20	142.0	66.8	6-16-20	179.0	70.3	6-16-20	0.0	0.0	6-16-20	0.0	0.0	6-16-20	135.0	55.6
6-17-20		0.0	6-17-20	53.0	39.2	6-17-20	113.0	53.2	6-17-20	202.0	95.1	6-17-20	349.0	137.1	6-17-20	0.0	0.0	6-17-20	50.0	16.2	6-17-20	202.0	83.1
6-18-20		0.0	6-18-20	53.0	39.2	6-18-20	124.0	58.4	6-18-20	204.0	96.0	6-18-20	219.0	86.0	6-18-20	0.0	0.0	6-18-20	30.0	9.7	6-18-20	209.0	86.0
6-19-20		0.0	6-19-20	53.0	39.2	6-19-20	119.0	56.0	6-19-20	164.0	77.2	6-19-20	210.0	82.5	6-19-20	0.0	0.0	6-19-20	40.0	13.0	6-19-20	220.0	90.5
6-20-20		0.0	6-20-20	53.0	39.2	6-20-20	1477.0	695.1	6-20-20	1506.7	709.0	6-20-20	166.0	65.2	6-20-20	0.0	0.0	6-20-20	200.0	64.9	6-20-20	1304.7	536.9
6-21-20		0.0	6-21-20	53.0	39.2	6-21-20	1477.0	695.1	6-21-20	1506.7	709.0	6-21-20	166.0	65.2	6-21-20	0.0	0.0	6-21-20	33.3	10.8	6-21-20	1304.7	536.9
6-22-20		0.0	6-22-20	53.0	39.2	6-22-20	1477.0	695.1	6-22-20	1506.7	709.0	6-22-20	166.0	65.2	6-22-20	0.0	0.0	6-22-20	33.3	10.8	6-22-20	1304.7	536.9
6-23-20		0.0	6-23-20	53.0	39.2	6-23-20	1640.0	771.8	6-23-20	485.0	228.2	6-23-20	302.0	118.6	6-23-20	0.0	0.0	6-23-20	33.3	10.8	6-23-20	6.0	2.5
6-24-20		0.0	6-24-20	53.0	39.2	6-24-20	3228.0	1519.1	6-24-20	352.0	165.6	6-24-20	159.0	62.5	6-24-20	0.0	0.0	6-24-20	0.0	0.0	6-24-20	112.0	46.1
6-25-20		0.0	6-25-20	53.0	39.2	6-25-20	3227.0	1518.6	6-25-20	210.0	98.8	6-25-20	101.0	39.7	6-25-20	0.0	0.0	6-25-20	0.0	0.0	6-25-20	61.0	25.1
6-26-20		0.0	6-26-20	53.0	39.2	6-26-20	1619.0	761.9	6-26-20	100.0	47.1	6-26-20	91.0	35.7	6-26-20	0.0	0.0	6-26-20	50.0	16.2	6-26-20	165.0	67.9
6-27-20		0.0	6-27-20	53.0	39.2	6-27-20	1213.0	570.8	6-27-20	71.3	33.6	6-27-20	25.0	9.8	6-27-20	0.0	0.0	6-27-20	30.0	9.7	6-27-20	369.0	151.9
6-28-20		0.0	6-28-20	53.0	39.2	6-28-20	1213.0	570.8	6-28-20	71.3	33.6	6-28-20	25.0	9.8	6-28-20	0.0	0.0	6-28-20	0.0	0.0	6-28-20	369.0	151.9
6-29-20		0.0	6-29-20	53.0	39.2	6-29-20	1213.0	570.8	6-29-20	71.3	33.6	6-29-20	25.0	9.8	6-29-20	0.0	0.0	6-29-20	0.0	0.0	6-29-20	369.0	151.9
6-30-20		0.0	6-30-20	53.0	39.2	6-30-20	1106.0	520.5	6-30-20	107.0	50.4	6-30-20	62.0	24.4	6-30-20	0.0	0.0	6-30-20	0.0	0.0	6-30-20	289.0	118.9
7-1-20		0.0	7-1-20	2167.5	1602.0	7-1-20	929.0	437.2	7-1-20	59.5	28.0	7-1-20	42.5	16.7	7-1-20	0.0	0.0	7-1-20	0.0	0.0	7-1-20	255.0	104.9
7-2-20		0.0	7-2-20	2167.5	1602.0	7-2-20	929.0	437.2	7-2-20	59.5	28.0	7-2-20	42.5	16.7	7-2-20	0.0	0.0	7-2-20	0.0	0.0	7-2-20	255.0	104.9
7-3-20		0.0	7-3-20	2052.0	1516.6	7-3-20	756.0	355.8	7-3-20	80.0	37.6	7-3-20	0.0	0.0	7-3-20	10.0	3.9	7-3-20	0.0	0.0	7-3-20	10.0	4.1
7-4-20		0.0	7-4-20	633.4	468.1	7-4-20	0.0	0.0	7-4-20	98.8	46.5	7-4-20	0.0	0.0	7-4-20	3.3	1.3	7-4-20	0.0	0.0	7-4-20	214.7	88.4
7-5-20		0.0	7-5-20	633.4	468.1	7-5-20	848.0	399.1	7-5-20	98.8	46.5	7-5-20	0.0	0.0	7-5-20	3.3	1.3	7-5-20	0.0	0.0	7-5-20	214.7	88.4
7-6-20		0.0	7-6-20	633.4	468.1	7-6-20	848.0	399.1	7-6-20	98.8	46.5	7-6-20	0.0	0.0	7-6-20	3.3	1.3	7-6-20	0.0	0.0	7-6-20	214.7	88.4
7-7-20		0.0	7-7-20	633.4	468.1	7-7-20	848.0	399.1	7-7-20	98.8	46.5	7-7-20	0.0	0.0	7-7-20	0.0	0.0	7-7-20	0.0	0.0	7-7-20	20.0	8.2
7-8-20		0.0	7-8-20	633.4	468.1	7-8-20	848.0	399.1	7-8-20	98.8	46.5	7-8-20	197.0	77.4	7-8-20	0.0	0.0	7-8-20	0.0	0.0	7-8-20	20.0	8.2
7-9-20		0.0	7-9-20	583.4	431.2	7-9-20	1622.0	763.3	7-9-20	3479.0	1637.2	7-9-20	1815.0	712.9	7-9-20	0.0	0.0	7-9-20	0.0	0.0	7-9-20	40.0	16.5
7-10-20		0.0	7-10-20	583.4	431.2	7-10-20	2154.0	1013.6	7-10-20	3693.0	1737.9	7-10-20	2937.0	1153.6	7-10-20	0.0	0.0	7-10-20	25.0	8.1	7-10-20	197.0	81.1
7-11-20		0.0	7-11-20	583.4	431.2	7-11-20	1191.0	560.5	7-11-20	3240.0	1524.7	7-11-20	2493.3	979.3	7-11-20	0.0	0.0	7-11-20	0.0	0.0	7-11-20	459.0	188.9
7-12-20		0.0	7-12-20	583.4	431.2	7-12-20	1191.0	560.5	7-12-20	3240.0	1524.7	7-12-20	2493.3	979.3	7-12-20	0.0	0.0	7-12-20	0.0	0.0	7-12-20	459.0	188.9
7-13-20		0.0	7-13-20	583.4	431.2	7-13-20	1191.0	560.5	7-13-20	3240.0	1524.7	7-13-20	2493.3	979.3	7-13-20	0.0	0.0	7-13-20	0.0	0.0	7-13-20	459.0	188.9
7-14-20		0.0	7-14-20	583.4	431.2	7-14-20	4268.0	2008.5	7-14-20	3413.0	1606.1	7-14-20	3978.0	1562.5	7-14-20	0.0	0.0	7-14-20	0.0	0.0	7-14-20	133.0	54.7
7-15-20		0.0	7-15-20	583.4	431.2	7-15-20	3000.0	1411.8	7-15-20	1616.0	760.5	7-15-20	1496.0	587.6	7-15-20	0.0	0.0	7-15-20	0.0	0.0	7-15-20	172.0	70.8
7-16-20		0.0	7-16-20	583.4	431.2	7-16-20	10000.0	4705.9	7-16-20	1914.0	900.7	7-16-20	1295.0	508.6	7-16-20	0.0	0.0	7-16-20	0.0	0.0	7-16-20	131.0	53.9
7-17-20		0.0	7-17-20	583.4	431.2	7-17-20	300.0	141.2	7-17-20	1202.0	565.6	7-17-20	1076.0	422.6	7-17-20	0.0	0.0	7-17-20	0.0	0.0	7-17-20	144.0	59.3
7-18-20		0.0	7-18-20	583.4	431.2	7-18-20	22.0	10.4	7-18-20	595.0	280.0	7-18-20	386.3	151.7	7-18-20	0.0	0.0	7-18-20	0.0	0.0	7-18-20	579.0	238.3
7-19-20		0.0	7-19-20	583.4	431.2	7-19-20	22.0	10.4	7-19-20	595.0	280.0	7-19-20	386.3	151.7	7-19-20	0.0	0.0	7-19-20	0.0	0.0	7-19-20	579.0	238.3
7-20-20		0.0	7-20-20	583.4	431.2	7-20-20	22.0	10.4	7-20-20	595.0	280.0	7-20-20	386.3	151.7	7-20-20	0.0	0.0	7-20-20	65.0	21.1	7-20-20	579.0	238.3
7-21-20		0.0	7-21-20	3871.0	2861.0	7-21-20	74.0	34.8	7-21-20	553.0	260.2	7-21-20	565.0	221.9	7-21-20	0.0	0.0	7-21-20	0.0	0.0	7-21-20	576.0	237.0
7-22-20		0.0	7-22-20	2967.0	2192.9	7-22-20	**		7-22-20	321.0	151.1	7-22-20	362.0	142.2	7-22-20	0.0	0.0	7-22-20	0.0	0.0	7-22-20	234.0	96.3
7-23-20		0.0	7-23-20	2133.0	1576.5	7-23-20	**		7-23-20	281.0	132.2	7-23-20	274.0	107.6	7-23-20	0.0	0.0	7-23-20	0.0	0.0	7-23-20	84.0	34.6
7-24-20		0.0	7-24-20	207.0	153.0	7-24-20	65.4	30.8	7-24-20	236.0	111.1	7-24-20	207.0	81.3	7-24-20	10.0	3.9	7-24-20	0.0	0.0	7-24-20	223.0	91.8

CLEAN HARBORS CANADA, INC.
Liquid Removed from Leak Detection Systems 2020

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/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)
7-25-20		0.0	7-25-20	61.3	45.3	7-25-20	90.0	42.4	7-25-20	188.7	88.8	7-25-20	90.3	35.5	7-25-20	5.0	2.0	7-25-20	0.0	0.0	7-25-20	620.3	255.3
7-26-20		0.0	7-26-20	61.3	45.3	7-26-20	90.0	42.4	7-26-20	188.7	88.8	7-26-20	90.3	35.5	7-26-20	5.0	2.0	7-26-20	0.0	0.0	7-26-20	620.3	255.3
7-27-20		0.0	7-27-20	61.3	45.3	7-27-20	90.0	42.4	7-27-20	188.7	88.8	7-27-20	90.3	35.5	7-27-20	5.0	2.0	7-27-20	0.0	0.0	7-27-20	620.3	255.3
7-28-20		0.0	7-28-20	963.0	711.8	7-28-20	4002.0	1883.3	7-28-20	368.0	173.2	7-28-20	220.0	86.4	7-28-20	5.0	2.0	7-28-20	30.0	9.7	7-28-20	14.0	5.8
7-29-20		0.0	7-29-20	2923.0	2160.4	7-29-20	2260.0	1063.5	7-29-20	302.0	142.1	7-29-20	142.0	55.8	7-29-20	10.0	3.9	7-29-20	30.0	9.7	7-29-20	0.0	0.0
7-30-20		0.0	7-30-20	203.0	150.0	7-30-20	20.0	9.4	7-30-20	135.0	63.5	7-30-20	109.0	42.8	7-30-20	10.0	3.9	7-30-20	0.0	0.0	7-30-20	6.0	2.5
7-31-20		0.0	7-31-20	250.0	184.8	7-31-20	230.0	108.2	7-31-20	145.0	68.2	7-31-20	116.0	45.6	7-31-20	0.0	0.0	7-31-20	0.0	0.0	7-31-20	63.0	25.9
8-1-20		0.0	8-1-20	703.0	519.6	8-1-20	990.8	466.3	8-1-20	87.3	41.1	8-1-20	45.0	17.7	8-1-20	0.0	0.0	8-1-20	7.5	2.4	8-1-20	522.0	214.8
8-2-20		0.0	8-2-20	703.0	519.6	8-2-20	990.8	466.3	8-2-20	87.3	41.1	8-2-20	45.0	17.7	8-2-20	0.0	0.0	8-2-20	7.5	2.4	8-2-20	522.0	214.8
8-3-20		0.0	8-3-20	703.0	519.6	8-3-20	990.8	466.3	8-3-20	87.3	41.1	8-3-20	45.0	17.7	8-3-20	0.0	0.0	8-3-20	7.5	2.4	8-3-20	522.0	214.8
8-4-20		0.0	8-4-20	703.0	519.6	8-4-20	990.8	466.3	8-4-20	87.3	41.1	8-4-20	45.0	17.7	8-4-20	0.0	0.0	8-4-20	7.5	2.4	8-4-20	522.0	214.8
8-5-20		0.0	8-5-20	1233.0	911.3	8-5-20	1106.0	520.5	8-5-20	159.0	74.8	8-5-20	98.0	38.5	8-5-20	0.0	0.0	8-5-20	0.0	0.0	8-5-20	522.0	214.8
8-6-20		0.0	8-6-20	751.0	555.1	8-6-20	663.0	312.0	8-6-20	108.0	50.8	8-6-20	106.0	41.6	8-6-20	20.0	7.9	8-6-20	0.0	0.0	8-6-20	522.0	214.8
8-7-20		0.0	8-7-20	0.0	0.0	8-7-20	469.8	221.1	8-7-20	61.0	28.7	8-7-20	67.0	26.3	8-7-20	0.0	0.0	8-7-20	0.0	0.0	8-7-20	127.0	52.3
8-8-20		0.0	8-8-20	10.0	7.4	8-8-20	469.8	221.1	8-8-20	59.7	28.1	8-8-20	16.7	6.6	8-8-20	10.0	3.9	8-8-20	0.0	0.0	8-8-20	230.0	94.7
8-9-20		0.0	8-9-20	10.0	7.4	8-9-20	469.8	221.1	8-9-20	59.7	28.1	8-9-20	16.7	6.6	8-9-20	10.0	3.9	8-9-20	0.0	0.0	8-9-20	230.0	94.7
8-10-20		0.0	8-10-20	10.0	7.4	8-10-20	469.8	221.1	8-10-20	59.7	28.1	8-10-20	16.7	6.6	8-10-20	10.0	3.9	8-10-20	0.0	0.0	8-10-20	230.0	94.7
8-11-20		0.0	8-11-20	13.0	9.6	8-11-20	553.0	260.2	8-11-20	34.0	16.0	8-11-20	66.0	25.9	8-11-20	5.0	2.0	8-11-20	0.0	0.0	8-11-20	16.0	6.6
8-12-20		0.0	8-12-20	41.0	30.3	8-12-20	1062.0	499.8	8-12-20	29.0	13.6	8-12-20	44.0	17.3	8-12-20	25.0	9.9	8-12-20	0.0	0.0	8-12-20	136.0	56.0
8-13-20		0.0	8-13-20	2010.0	1485.6	8-13-20	464.0	218.4	8-13-20	25.0	11.8	8-13-20	4.0	1.6	8-13-20	0.0	0.0	8-13-20	30.0	9.7	8-13-20	27.0	11.1
8-14-20		0.0	8-14-20	737.0	544.7	8-14-20	444.0	208.9	8-14-20	42.0	19.8	8-14-20	0.0	0.0	8-14-20	0.0	0.0	8-14-20	0.0	0.0	8-14-20	43.0	17.7
8-15-20		0.0	8-15-20	275.3	203.5	8-15-20	386.7	182.0	8-15-20	21.3	10.0	8-15-20	7.6	3.0	8-15-20	0.0	0.0	8-15-20	10.0	3.2	8-15-20	377.3	155.3
8-16-20		0.0	8-16-20	275.3	203.5	8-16-20	386.7	182.0	8-16-20	21.3	10.0	8-16-20	7.6	3.0	8-16-20	0.0	0.0	8-16-20	0.0	0.0	8-16-20	377.3	155.3
8-17-20		0.0	8-17-20	275.3	203.5	8-17-20	386.7	182.0	8-17-20	21.3	10.0	8-17-20	7.6	3.0	8-17-20	0.0	0.0	8-17-20	0.0	0.0	8-17-20	377.3	155.3
8-18-20		0.0	8-18-20	202.0	149.3	8-18-20	382.0	179.8	8-18-20	22.0	10.4	8-18-20	29.0	11.4	8-18-20	0.0	0.0	8-18-20	0.0	0.0	8-18-20	71.0	29.2
8-19-20		0.0	8-19-20	166.0	122.7	8-19-20	270.0	127.1	8-19-20	15.0	7.1	8-19-20	17.0	6.7	8-19-20	0.0	0.0	8-19-20	0.0	0.0	8-19-20	300.0	123.5
8-20-20		0.0	8-20-20	177.0	130.8	8-20-20	305.0	143.5	8-20-20	20.0	9.4	8-20-20	20.0	7.9	8-20-20	0.0	0.0	8-20-20	0.0	0.0	8-20-20	200.0	82.3
8-21-20		0.0	8-21-20	166.0	122.7	8-21-20	309.0	145.4	8-21-20	15.0	7.1	8-21-20	30.0	11.8	8-21-20	15.0	5.9	8-21-20	40.0	13.0	8-21-20	170.0	70.0
8-22-20		0.0	8-22-20	164.7	121.7	8-22-20	259.0	121.9	8-22-20	16.7	7.9	8-22-20	10.0	3.9	8-22-20	10.0	3.9	8-22-20	43.3	14.1	8-22-20	25.0	10.3
8-23-20		0.0	8-23-20	167.7	123.9	8-23-20	259.0	121.9	8-23-20	16.7	7.9	8-23-20	10.0	3.9	8-23-20	10.0	3.9	8-23-20	43.3	14.1	8-23-20	25.0	10.3
8-24-20		0.0	8-24-20	164.7	121.7	8-24-20	259.0	121.9	8-24-20	16.7	7.9	8-24-20	10.0	3.9	8-24-20	10.0	3.9	8-24-20	43.3	14.1	8-24-20	25.0	10.3
8-25-20		0.0	8-25-20	294.0	217.3	8-25-20	215.0	101.2	8-25-20	63.0	29.6	8-25-20	17.0	6.7	8-25-20	5.0	2.0	8-25-20	25.0	8.1	8-25-20	200.0	82.3
8-26-20		0.0	8-26-20	110.0	81.3	8-26-20	190.0	89.4	8-26-20	55.0	25.9	8-26-20	5.0	2.0	8-26-20	0.0	0.0	8-26-20	0.0	0.0	8-26-20	100.0	41.2
8-27-20		0.0	8-27-20	165.0	122.0	8-27-20	296.0	139.3	8-27-20	36.0	16.9	8-27-20	3.0	1.2	8-27-20	0.0	0.0	8-27-20	0.0	0.0	8-27-20	1200.0	493.8
8-28-20		0.0	8-28-20	111.0	82.0	8-28-20	256.0	120.5	8-28-20	19.0	8.9	8-28-20	30.0	11.8	8-28-20	0.0	0.0	8-28-20	0.0	0.0	8-28-20	1200.0	493.8
8-29-20		0.0	8-29-20	106.7	78.9	8-29-20	247.3	116.4	8-29-20	12.0	5.6	8-29-20	6.0	2.4	8-29-20	0.0	0.0	8-29-20	33.0	10.7	8-29-20	433.3	178.3
8-30-20		0.0	8-30-20	106.7	78.9	8-30-20	247.3	116.4	8-30-20	12.0	5.6	8-30-20	6.0	2.4	8-30-20	0.0	0.0	8-30-20	33.0	10.7	8-30-20	433.3	178.3
8-31-20		0.0	8-31-20	106.7	78.9	8-31-20	247.3	116.4	8-31-20	12.0	5.6	8-31-20	6.0	2.4	8-31-20	0.0	0.0	8-31-20	33.0	10.7	8-31-20	433.3	178.3
9-1-20		0.0	9-1-20	114.0	84.3	9-1-20	277.0	130.4	9-1-20	53.0	24.9	9-1-20	36.0	14.1	9-1-20	0.0	0.0	9-1-20	35.0	11.4	9-1-20	988.0	406.6
9-2-20		0.0	9-2-20	101.0	74.6	9-2-20	162.0	76.2	9-2-20	10.0	4.7	9-2-20	5.0	2.0	9-2-20	0.0	0.0	9-2-20	0.0	0.0	9-2-20	341.0	140.3
9-3-20		0.0	9-3-20	112.0	82.8	9-3-20	203.0	95.5	9-3-20	0.0	0.0	9-3-20	0.0	0.0	9-3-20	0.0	0.0	9-3-20	10.0	3.2	9-3-20	178.0	73.3
9-4-20		0.0	9-4-20	76.0	56.2	9-4-20	124.0	58.4	9-4-20	16.0	7.5	9-4-20	0.0	0.0	9-4-20	0.0	0.0	9-4-20	0.0	0.0	9-4-20	19.0	7.8
9-5-20		0.0	9-5-20	78.3	57.9	9-5-20	199.5	93.9	9-5-20	11.0	5.2	9-5-20	0.0	0.0	9-5-20	0.0	0.0	9-5-20	0.0	0.0	9-5-20	260.0	107.0
9-6-20		0.0	9-6-20	78.3	57.9	9-6-20	199.5	93.9	9-6-20	11.0	5.2	9-6-20	0.0	0.0	9-6-20	0.0	0.0	9-6-20	0.0	0.0	9-6-20	260.0	107.0
9-7-20		0.0	9-7-20	78.3	57.9	9-7-20	199.5	93.9	9-7-20	11.0	5.2	9-7-20	0.0	0.0	9-7-20	0.0	0.0	9-7-20	0.0	0.0	9-7-20	260.0	107.0
9-8-20		0.0	9-8-20	78.3	57.9	9-8-20	199.5	93.9	9-8-20	11.0	5.2	9-8-20	0.0	0.0	9-8-20	0.0	0.0	9-8-20	0.0	0.0	9-8-20	260.0	107.0
9-9-20		0.0	9-9-20	209.0	154.5	9-9-20	206.0	96.9	9-9-20	21.0	9.9	9-9-20	0.0	0.0	9-9-20	5.0	2.0	9-9-20	30.0	9.7	9-9-20	351.0	144.4
9-10-20		0.0	9-10-20	88.0	65.0	9-10-20	136.0	64.0	9-10-20	33.0	15.5	9-10-20	10.0	3.9	9-10-20	0.0	0.0	9-10-20	0.0	0.0	9-10-20	172.0	70.8
9-11-20		0.0	9-11-20	72.0	53.2	9-11-20	152.0	71.5	9-11-20	6.0	2.8	9-11-20	16.0	6.3	9-11-20	3.0	1.2	9-11-20	23.0	7.5	9-11-20	20.0	8.2
9-12-20		0.0	9-12-20	59.7	44.1	9-12-20	146.7	69.0	9-12-20	30.0	14.1	9-12-20	25.0	9.8	9-12-20	7.3	2.9	9-12-20	13.3	4.3	9-12-20	158.7	65.3
9-13-20		0.0	9-13-20	59.7	44.1	9-13-20	146.7	69.0	9-13-20	30.0	14.1	9-13-20	0.0	0.0	9-13-20	7.3	2.9	9-13-20	13.3	4.3	9-13-20	158.7	65.3
9-14-20		0.0	9-14-20	59.7	44.1	9-14-20	146.7	69.0	9-14-20	30.0	14.1	9-14-20	0.0	0.0	9-14-20	7.3	2.9	9-14-20	13.3	4.3	9-14-20	158.7	65.3
9-15-20		0.0	9-15-20	67.0	49.5	9-15-20	155.0	72.9	9-15-20	19.0	8.9	9-15-20	0.0	0.0	9-15-20	0.0	0.0	9-15-20	0.0	0.0	9-15-20	118.0	48.6
9-16-20		0.0	9-16-20	73.0	54.0	9-16-20	142.0	66.8	9-16-20	10.0	4.7	9-16-20	0.0	0.0	9-16-20	0.0	0.0	9-16-20	0.0	0.0	9-16-20	29.0	11.9
9-17-20		0.0	9-17-20	63.0	46.6	9-17-20	139.0	65.4	9-17-20	13.0	6.1	9-17-20	0.0	0.0	9-17-20	0.0	0.0	9-17-20	0.0	0.0	9-17-20	160.0	65.8
9-18-20		0.0	9-18-20	62.0	45.8	9-18-20	118.0	55.5	9-18-20	5.0	2.4	9-18-20	15.0	5.9	9-18-20	0.0	0.0	9-18-20	0.0	0.0	9-18-20	224.0	92.2
9-19-20		0.0	9-19-20	38.7	28.6	9-19-20	114.3	53.8	9-19-20	10.0	4.7	9-19-20	16.7	6.6	9-19-20	0.0	0.0	9-19-20	0.0	0.0	9-19-20	159.3	65.6
9-20-20		0.0	9-20-20	38.7	28.6	9-20-20	114.3	53.8	9-20-20	10.0	4.7	9-20-20	16.7	6.6	9-20-20	0.0	0.0	9-20-20	0.0	0.0	9-20-20	159.3	65.6
9-21-20		0.0	9-21-20	38.7	28.6	9-21-20	114.3	53.8	9-21-20	10.0	4.7	9-21-20	16.7	6.6	9-21-20	0.0	0.0	9-21-20	0.0	0.0	9-21-20	159.3	65.6
9-22-20		0.0	9-22-20	49.0	36.2	9-22-20	124.0	58.4	9-22-20	5.0	2.4	9-22-20	10.0	3.9	9-22-20	0.0	0.0	9-22-20	0.0	0.0	9-22-20	109.0	44.9
9-23-20		0.0	9-23-20	46.0	34.0	9-23-20	128.0	60.2	9-23-20	5.0	2.4	9-23-20	10.0	3.9	9-23-20	0.0	0.0	9-23-20	0.0	0.0	9-23-20	0.0	0.0
9-24-20		0.0	9-24-20	65.0	48.0	9-24-20	110.0	51.8	9-24-20	5.0	2.4	9-24-20	48.0	18.9	9-24-20	0.0	0.0	9-24-20	20.0	6.5	9-24-20	33.0	13.6
9-25-20		0.0	9-25-20	55.0	40.7	9-25-20	125.0	58.8	9-25-20	10.0	4.7	9-25-20	35.0	13.7	9-25-20	0.0	0.0	9-25-20	0.0	0.0	9-25-20	314.0	129.2
9-26-20		0.0	9-26-20	38.0	28.1	9-26-20	103.7	48.8	9-26-20	7.0	3.3	9-26-20	0.0	0.0	9-26-20	0.0	0.0	9-26-20	20.0	6.5	9-26-20	170.0	70.0
9-27-20		0.0	9-27-20	38.0	28.1	9-27-20	103.7	48.8	9-27-20	7.0	3.3	9-27-20	0.0	0.0	9-27-20	0.0	0.0	9-27-20	20.0	6.5	9-27-20	170.0	70.0
9-28-20		0.0	9-28-20	38.0	28.1	9-28-20	103.7	48.8	9-28-20	7.0	3.3	9-28-20	0.0	0.0	9-28-20	0.0	0.0	9-28-20	20.0	6.5	9-28-20	170.0	70.0
9-29-20		0.0	9-29-20	61.0	45.1	9-29-20	93.0	43.8	9-29-20	18.0	8.5	9-29-20	0.0	0.0	9-29-20	0.0	0.0	9-29-20	0.0	0.0	9-29-20	10.0	4.1
9-30-20		0.0	9-30-20	55.0	40.7	9-30-20	79.0	37.2	9-30-20	15.0	7.1	9-30-20	0.0	0.0	9-30-20	0.0	0.0	9-30-20	0.0	0.0	9-30-20	20.0	8.2
10-1-20		0.0	10-1-20	101.0	74.6	10-1-20	75.0	35.3	10-1-20	20.0	9.4	10-1-20	5.0	2.0	10-1-20	0.0	0.0	10-1-20	0.0	0.0	10-1-20	15.0	6.2

CLEAN HARBORS CANADA, INC.
Liquid Removed from Leak Detection Systems 2020

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/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)
10-2-20		0.0	10-2-20	44.0	32.5	10-2-20	18.0	8.5	10-2-20	15.0	7.1	10-2-20	0.0	0.0	10-2-20	0.0	0.0	10-2-20	0.0	0.0	10-2-20	40.0	16.5
10-3-20		0.0	10-3-20	22.3	16.5	10-3-20	28.0	13.2	10-3-20	10.0	4.7	10-3-20	10.0	3.9	10-3-20	0.0	0.0	10-3-20	0.0	0.0	10-3-20	107.0	44.0
10-4-20		0.0	10-4-20	22.3	16.5	10-4-20	28.0	13.2	10-4-20	10.0	4.7	10-4-20	10.0	3.9	10-4-20	0.0	0.0	10-4-20	0.0	0.0	10-4-20	107.0	44.0
10-5-20		0.0	10-5-20	22.3	16.5	10-5-20	28.0	13.2	10-5-20	10.0	4.7	10-5-20	10.0	3.9	10-5-20	0.0	0.0	10-5-20	0.0	0.0	10-5-20	107.0	44.0
10-6-20		0.0	10-6-20	61.0	45.1	10-6-20	26.0	12.2	10-6-20	20.0	9.4	10-6-20	25.0	9.8	10-6-20	0.0	0.0	10-6-20	0.0	0.0	10-6-20	438.0	180.2
10-7-20		0.0	10-7-20	596.0	440.5	10-7-20	56.0	26.4	10-7-20	15.0	7.1	10-7-20	5.0	2.0	10-7-20	0.0	0.0	10-7-20	0.0	0.0	10-7-20	43.0	17.7
10-8-20		0.0	10-8-20	46.0	34.0	10-8-20	19.0	8.9	10-8-20	20.0	9.4	10-8-20	20.0	7.9	10-8-20	0.0	0.0	10-8-20	0.0	0.0	10-8-20	50.0	20.6
10-9-20		0.0	10-9-20	22.0	16.3	10-9-20	75.0	35.3	10-9-20	20.0	9.4	10-9-20	0.0	0.0	10-9-20	0.0	0.0	10-9-20	0.0	0.0	10-9-20	30.0	12.3
10-10-20		0.0	10-10-20	21.5	15.9	10-10-20	15.5	7.3	10-10-20	7.5	3.5	10-10-20	0.0	0.0	10-10-20	0.0	0.0	10-10-20	0.0	0.0	10-10-20	125.0	51.4
10-11-20		0.0	10-11-20	21.5	15.9	10-11-20	15.5	7.3	10-11-20	7.5	3.5	10-11-20	0.0	0.0	10-11-20	0.0	0.0	10-11-20	0.0	0.0	10-11-20	125.0	51.4
10-12-20		0.0	10-12-20	21.5	15.9	10-12-20	15.5	7.3	10-12-20	7.5	3.5	10-12-20	0.0	0.0	10-12-20	0.0	0.0	10-12-20	0.0	0.0	10-12-20	125.0	51.4
10-13-20		0.0	10-13-20	86.0	63.6	10-13-20	15.5	7.3	10-13-20	7.5	3.5	10-13-20	0.0	0.0	10-13-20	0.0	0.0	10-13-20	0.0	0.0	10-13-20	125.0	51.4
10-14-20		0.0	10-14-20	50.0	37.0	10-14-20	53.0	24.9	10-14-20	5.0	2.4	10-14-20	0.0	0.0	10-14-20	0.0	0.0	10-14-20	0.0	0.0	10-14-20	20.0	8.2
10-15-20		0.0	10-15-20	41.0	30.3	10-15-20	67.0	31.5	10-15-20	5.0	2.4	10-15-20	0.0	0.0	10-15-20	15.0	5.9	10-15-20	60.0	19.5	10-15-20	68.0	28.0
10-16-20		0.0	10-16-20	33.0	24.4	10-16-20	65.0	30.6	10-16-20	0.0	0.0	10-16-20	0.0	0.0	10-16-20	10.0	3.9	10-16-20	0.0	0.0	10-16-20	41.0	16.9
10-17-20		0.0	10-17-20	12.7	9.4	10-17-20	17.3	8.1	10-17-20	5.0	2.4	10-17-20	20.0	7.9	10-17-20	10.0	3.9	10-17-20	16.7	5.4	10-17-20	299.3	123.2
10-18-20		0.0	10-18-20	12.7	9.4	10-18-20	17.3	8.1	10-18-20	5.0	2.4	10-18-20	20.0	7.9	10-18-20	10.0	3.9	10-18-20	16.7	5.4	10-18-20	299.3	123.2
10-19-20		0.0	10-19-20	12.7	9.4	10-19-20	17.3	8.1	10-19-20	5.0	2.4	10-19-20	20.0	7.9	10-19-20	10.0	3.9	10-19-20	16.7	5.4	10-19-20	299.3	123.2
10-20-20		0.0	10-20-20	33.0	24.4	10-20-20	370.0	174.1	10-20-20	0.0	0.0	10-20-20	5.0	2.0	10-20-20	5.0	2.0	10-20-20	20.0	6.5	10-20-20	22.0	9.1
10-21-20		0.0	10-21-20	35.0	25.9	10-21-20	370.0	174.1	10-21-20	15.0	7.1	10-21-20	0.0	0.0	10-21-20	0.0	0.0	10-21-20	10.0	3.2	10-21-20	30.0	12.3
10-22-20		0.0	10-22-20	38.0	28.1	10-22-20	11.0	5.2	10-22-20	0.0	0.0	10-22-20	0.0	0.0	10-22-20	5.0	2.0	10-22-20	15.0	4.9	10-22-20	35.0	14.4
10-23-20		0.0	10-23-20	31.0	22.9	10-23-20	108.0	50.8	10-23-20	5.0	2.4	10-23-20	0.0	0.0	10-23-20	10.0	3.9	10-23-20	15.0	4.9	10-23-20	30.0	12.3
10-24-20		0.0	10-24-20	15.3	11.3	10-24-20	66.7	31.4	10-24-20	13.3	6.3	10-24-20	10.0	3.9	10-24-20	1.7	0.7	10-24-20	10.0	3.2	10-24-20	111.7	46.0
10-25-20		0.0	10-25-20	15.3	11.3	10-25-20	66.7	31.4	10-25-20	13.3	6.3	10-25-20	10.0	3.9	10-25-20	1.7	0.7	10-25-20	10.0	3.2	10-25-20	111.7	46.0
10-26-20		0.0	10-26-20	15.3	11.3	10-26-20	66.7	31.4	10-26-20	13.3	6.3	10-26-20	10.0	3.9	10-26-20	1.7	0.7	10-26-20	10.0	3.2	10-26-20	111.7	46.0
10-27-20		0.0	10-27-20	40.0	29.6	10-27-20	10.0	4.7	10-27-20	15.0	7.1	10-27-20	10.0	3.9	10-27-20	10.0	3.9	10-27-20	0.0	0.0	10-27-20	0.0	0.0
10-28-20		0.0	10-28-20	32.0	23.7	10-28-20	235.0	110.6	10-28-20	20.0	9.4	10-28-20	20.0	7.9	10-28-20	10.0	3.9	10-28-20	0.0	0.0	10-28-20	10.0	4.1
10-29-20		0.0	10-29-20	45.0	33.3	10-29-20	55.0	25.9	10-29-20	30.0	14.1	10-29-20	0.0	0.0	10-29-20	10.0	3.9	10-29-20	0.0	0.0	10-29-20	10.0	4.1
10-30-20		0.0	10-30-20	39.0	28.8	10-30-20	59.0	27.8	10-30-20	20.0	9.4	10-30-20	44.0	17.3	10-30-20	15.0	5.9	10-30-20	0.0	0.0	10-30-20	20.0	8.2
10-31-20		0.0	10-31-20	16.3	12.0	10-31-20	20.0	9.4	10-31-20	5.0	2.4	10-31-20	10.0	3.9	10-31-20	0.0	0.0	10-31-20	0.0	0.0	10-31-20	238.0	97.9
11-1-20		0.0	11-1-20	16.3	12.0	11-1-20	20.0	9.4	11-1-20	5.0	2.4	11-1-20	10.0	3.9	11-1-20	0.0	0.0	11-1-20	0.0	0.0	11-1-20	238.0	97.9
11-2-20		0.0	11-2-20	16.3	12.0	11-2-20	20.0	9.4	11-2-20	5.0	2.4	11-2-20	10.0	3.9	11-2-20	0.0	0.0	11-2-20	0.0	0.0	11-2-20	238.0	97.9
11-3-20		0.0	11-3-20	33.0	24.4	11-3-20	64.0	30.1	11-3-20	10.0	4.7	11-3-20	20.0	7.9	11-3-20	0.0	0.0	11-3-20	0.0	0.0	11-3-20	55.0	22.6
11-4-20		0.0	11-4-20	24.0	17.7	11-4-20	66.0	31.1	11-4-20	10.0	4.7	11-4-20	0.0	0.0	11-4-20	0.0	0.0	11-4-20	0.0	0.0	11-4-20	50.0	20.6
11-5-20		0.0	11-5-20	23.0	17.0	11-5-20	68.0	32.0	11-5-20	0.0	0.0	11-5-20	0.0	0.0	11-5-20	0.0	0.0	11-5-20	0.0	0.0	11-5-20	20.0	8.2
11-6-20		0.0	11-6-20	21.0	15.5	11-6-20	54.0	25.4	11-6-20	0.0	0.0	11-6-20	0.0	0.0	11-6-20	0.0	0.0	11-6-20	0.0	0.0	11-6-20	19.0	7.8
11-7-20		0.0	11-7-20	13.3	9.8	11-7-20	21.3	10.0	11-7-20	0.0	0.0	11-7-20	5.0	2.0	11-7-20	0.0	0.0	11-7-20	0.0	0.0	11-7-20	179.7	74.0
11-8-20		0.0	11-8-20	13.3	9.8	11-8-20	21.3	10.0	11-8-20	0.0	0.0	11-8-20	5.0	2.0	11-8-20	0.0	0.0	11-8-20	0.0	0.0	11-8-20	179.7	74.0
11-9-20		0.0	11-9-20	13.3	9.8	11-9-20	21.3	10.0	11-9-20	0.0	0.0	11-9-20	5.0	2.0	11-9-20	0.0	0.0	11-9-20	0.0	0.0	11-9-20	179.7	74.0
11-10-20		0.0	11-10-20	70.0	51.7	11-10-20	565.0	265.9	11-10-20	10.0	4.7	11-10-20	0.0	0.0	11-10-20	0.0	0.0	11-10-20	0.0	0.0	11-10-20	0.0	0.0
11-11-20		0.0	11-11-20	0.0	0.0	11-11-20	36.0	16.9	11-11-20	0.0	0.0	11-11-20	0.0	0.0	11-11-20	5.0	2.0	11-11-20	0.0	0.0	11-11-20	590.0	242.8
11-12-20		0.0	11-12-20	0.0	0.0	11-12-20	63.0	29.6	11-12-20	0.0	0.0	11-12-20	10.0	3.9	11-12-20	0.0	0.0	11-12-20	0.0	0.0	11-12-20	376.0	154.7
11-13-20		0.0	11-13-20	*		11-13-20	74.0	34.8	11-13-20	0.0	0.0	11-13-20	41.0	16.1	11-13-20	0.0	0.0	11-13-20	20.0	6.5	11-13-20	38.0	15.6
11-14-20		0.0	11-14-20	*		11-14-20	78.0	36.7	11-14-20	0.0	0.0	11-14-20	0.0	0.0	11-14-20	5.0	2.0	11-14-20	10.0	3.2	11-14-20	156.3	64.3
11-15-20		0.0	11-15-20	*		11-15-20	78.0	36.7	11-15-20	0.0	0.0	11-15-20	0.0	0.0	11-15-20	5.0	2.0	11-15-20	10.0	3.2	11-15-20	156.3	64.3
11-16-20		0.0	11-16-20	81.0	59.9	11-16-20	78.0	36.7	11-16-20	0.0	0.0	11-16-20	0.0	0.0	11-16-20	5.0	2.0	11-16-20	10.0	3.2	11-16-20	156.3	64.3
11-17-20		0.0	11-17-20	61.0	45.1	11-17-20	77.0	36.2	11-17-20	0.0	0.0	11-17-20	0.0	0.0	11-17-20	0.0	0.0	11-17-20	220.0	71.4	11-17-20	120.0	49.4
11-18-20		0.0	11-18-20	56.0	41.4	11-18-20	15.0	7.1	11-18-20	0.0	0.0	11-18-20	0.0	0.0	11-18-20	5.0	2.0	11-18-20	20.0	6.5	11-18-20	455.0	187.2
11-19-20		0.0	11-19-20	46.0	34.0	11-19-20	18.0	8.5	11-19-20	0.0	0.0	11-19-20	0.0	0.0	11-19-20	0.0	0.0	11-19-20	0.0	0.0	11-19-20	0.0	0.0
11-20-20		0.0	11-20-20	46.0	34.0	11-20-20	58.0	27.3	11-20-20	0.0	0.0	11-20-20	0.0	0.0	11-20-20	0.0	0.0	11-20-20	0.0	0.0	11-20-20	6.0	2.5
11-21-20		0.0	11-21-20	24.0	17.7	11-21-20	66.7	31.4	11-21-20	0.0	0.0	11-21-20	0.0	0.0	11-21-20	0.0	0.0	11-21-20	0.0	0.0	11-21-20	84.0	34.6
11-22-20		0.0	11-22-20	24.0	17.7	11-22-20	66.7	31.4	11-22-20	0.0	0.0	11-22-20	0.0	0.0	11-22-20	0.0	0.0	11-22-20	0.0	0.0	11-22-20	84.0	34.6
11-23-20		0.0	11-23-20	24.0	17.7	11-23-20	66.7	31.4	11-23-20	0.0	0.0	11-23-20	0.0	0.0	11-23-20	0.0	0.0	11-23-20	0.0	0.0	11-23-20	84.0	34.6
11-24-20		0.0	11-24-20	52.0	38.4	11-24-20	87.0	40.9	11-24-20	0.0	0.0	11-24-20	0.0	0.0	11-24-20	0.0	0.0	11-24-20	0.0	0.0	11-24-20	272.0	111.9
11-25-20		0.0	11-25-20	102.0	75.4	11-25-20	49.0	23.1	11-25-20	3.0	1.4	11-25-20	0.0	0.0	11-25-20	5.0	2.0	11-25-20	21.0	6.8	11-25-20	266.0	109.5
11-26-20		0.0	11-26-20	44.0	32.5	11-26-20	51.0	24.0	11-26-20	0.0	0.0	11-26-20	0.0	0.0	11-26-20	20.0	7.9	11-26-20	0.0	0.0	11-26-20	78.0	32.1
11-27-20		0.0	11-27-20	32.0	23.7	11-27-20	200.0	94.1	11-27-20	0.0	0.0	11-27-20	0.0	0.0	11-27-20	15.0	5.9	11-27-20	0.0	0.0	11-27-20	101.0	41.6
11-28-20		0.0	11-28-20	19.0	14.0	11-28-20	37.3	17.6	11-28-20	8.3	3.9	11-28-20	10.0	3.9	11-28-20	6.7	2.6	11-28-20	5.0	1.6	11-28-20	114.7	47.2
11-29-20		0.0	11-29-20	19.0	14.0	11-29-20	37.3	17.6	11-29-20	8.3	3.9	11-29-20	10.0	3.9	11-29-20	6.7	2.6	11-29-20	5.0	1.6	11-29-20	114.7	47.2
11-30-20		0.0	11-30-20	19.0	14.0	11-30-20	37.3	17.6	11-30-20	8.3	3.9	11-30-20	10.0	3.9	11-30-20	6.7	2.6	11-30-20	5.0	1.6	11-30-20	114.7	47.2
12-1-20		0.0	12-1-20	44.0	32.5	12-1-20	10.0	4.7	12-1-20	0.0	0.0	12-1-20	0.0	0.0	12-1-20	0.0	0.0	12-1-20	7.0	2.3	12-1-20	4.0	1.6
12-2-20		0.0	12-2-20	38.0	28.1	12-2-20	41.0	19.3	12-2-20	3.0	1.4	12-2-20	0.0	0.0	12-2-20	0.0	0.0	12-2-20	0.0	0.0	12-2-20	86.0	35.4
12-3-20		0.0	12-3-20	26.0	19.2	12-3-20	49.0	23.1	12-3-20	0.0	0.0	12-3-20	0.0	0.0	12-3-20	15.0	5.9	12-3-20	5.0	1.6	12-3-20	45.0	18.5
12-4-20		0.0	12-4-20	24.0	17.7	12-4-20	66.0	31.1	12-4-20	15.0	7.1	12-4-20	0.0	0.0	12-4-20	0.0	0.0	12-4-20	5.0	1.6	12-4-20	6.0	2.5
12-5-20		0.0	12-5-20	15.2	11.2	12-5-20	49.0	23.1	12-5-20	5.0	2.4	12-5-20	0.0	0.0	12-5-20	0.0	0.0	12-5-20	12.3	4.0	12-5-20	143.0	58.8
12-6-20		0.0	12-6-20	15.2	11.2	12-6-20	49.0	23.1	12-6-20	5.0	2.4	12-6-20	0.0	0.0	12-6-20	0.0	0.0	12-6-20	12.3	4.0	12-6-20	143.0	58.8
12-7-20		0.0	12-7-20	15.2	11.2	12-7-20	49.0	23.1	12-7-20	5.0	2.4	12-7-20	0.0	0.0	12-7-20	0.0	0.0	12-7-20	12.3	4.0	12-7-20	143.0	58.8
12-8-20		0.0	12-8-20	15.2	11.2	12-8-20	97.0	45.6	12-8-20	7.0	3.3	12-8-20	16.0	6.3	12-8-20	2.0	0.8	12-8-20	5.0	1.6	12-8-20	0.0	0.0
12-9-20		0.0	12-9-20	47.0	34.7	12-9-20	47.0	22.1	12-9-20	5.0	2.4	12-9-20	0.0	0.0	12-9-20	3.0	1.2	12-9-20	0.0	0.0	12-9-20	0.0	0.0

CLEAN HARBORS CANADA, INC.
Liquid Removed from Leak Detection Systems 2020

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/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)	DATE	VOLUME (litres)	Volume (litres/Ha/ day)	DATE	VOLUME (litres)	Volume (litres/Ha /day)
12-10-20		0.0	12-10-20	48.0	35.5	12-10-20	33.0	15.5	12-10-20	5.0	2.4	12-10-20	0.0	0.0	12-10-20	2.0	0.8	12-10-20	0.0	0.0	12-10-20	0.0	0.0
12-11-20		0.0	12-11-20	31.0	22.9	12-11-20	14.0	6.6	12-11-20	5.0	2.4	12-11-20	0.0	0.0	12-11-20	8.0	3.2	12-11-20	20.0	6.5	12-11-20	20.0	8.2
12-12-20		0.0	12-12-20	9.3	6.9	12-12-20	43.0	20.2	12-12-20	0.0	0.0	12-12-20	0.0	0.0	12-12-20	10.0	3.9	12-12-20	20.0	6.5	12-12-20	33.3	13.7
12-13-20		0.0	12-13-20	9.3	6.9	12-13-20	43.0	20.2	12-13-20	0.0	0.0	12-13-20	0.0	0.0	12-13-20	10.0	3.9	12-13-20	20.0	6.5	12-13-20	33.3	13.7
12-14-20		0.0	12-14-20	9.3	6.9	12-14-20	43.0	20.2	12-14-20	0.0	0.0	12-14-20	0.0	0.0	12-14-20	10.0	3.9	12-14-20	20.0	6.5	12-14-20	33.3	13.7
12-15-20		0.0	12-15-20	30.0	22.2	12-15-20	26.0	12.2	12-15-20	0.0	0.0	12-15-20	0.0	0.0	12-15-20	20.0	7.9	12-15-20	10.0	3.2	12-15-20	25.0	10.3
12-16-20		0.0	12-16-20	36.0	26.6	12-16-20	40.0	18.8	12-16-20	0.0	0.0	12-16-20	34.0	13.4	12-16-20	0.0	0.0	12-16-20	5.0	1.6	12-16-20	35.0	14.4
12-17-20		0.0	12-17-20	24.0	17.7	12-17-20	9.0	4.2	12-17-20	0.0	0.0	12-17-20	49.0	19.2	12-17-20	16.0	6.3	12-17-20	15.0	4.9	12-17-20	0.0	0.0
12-18-20		0.0	12-18-20	23.0	17.0	12-18-20	22.0	10.4	12-18-20	0.0	0.0	12-18-20	0.0	0.0	12-18-20	0.0	0.0	12-18-20	0.0	0.0	12-18-20	0.0	0.0
12-19-20		0.0	12-19-20	14.0	10.3	12-19-20	44.0	20.7	12-19-20	1.0	0.5	12-19-20	0.0	0.0	12-19-20	10.0	3.9	12-19-20	0.0	0.0	12-19-20	83.7	34.4
12-20-20		0.0	12-20-20	14.0	10.3	12-20-20	44.0	20.7	12-20-20	1.0	0.5	12-20-20	0.0	0.0	12-20-20	10.0	3.9	12-20-20	0.0	0.0	12-20-20	83.7	34.4
12-21-20		0.0	12-21-20	14.0	10.3	12-21-20	44.0	20.7	12-21-20	1.0	0.5	12-21-20	0.0	0.0	12-21-20	10.0	3.9	12-21-20	****		12-21-20	83.7	34.4
12-22-20		0.0	12-22-20	15.0	11.1	12-22-20	32.0	15.1	12-22-20	0.0	0.0	12-22-20	0.0	0.0	12-22-20	0.0	0.0	12-22-20	****		12-22-20	70.0	28.8
12-23-20		0.0	12-23-20	10.0	7.4	12-23-20	0.0	0.0	12-23-20	0.0	0.0	12-23-20	0.0	0.0	12-23-20	5.0	2.0	12-23-20	****		12-23-20	0.0	0.0
12-24-20		0.0	12-24-20	10.0	7.4	12-24-20	0.0	0.0	12-24-20	5.0	2.4	12-24-20	0.0	0.0	12-24-20	0.0	0.0	12-24-20	****		12-24-20	0.0	0.0
12-25-20		0.0	12-25-20	8.5	6.3	12-25-20	63.3	29.8	12-25-20	5.0	2.4	12-25-20	10.0	3.9	12-25-20	5.0	2.0	12-25-20	****		12-25-20	127.8	52.6
12-26-20		0.0	12-26-20	8.5	6.3	12-26-20	63.3	29.8	12-26-20	5.0	2.4	12-26-20	10.0	3.9	12-26-20	5.0	2.0	12-26-20	****		12-26-20	127.8	52.6
12-27-20		0.0	12-27-20	8.5	6.3	12-27-20	63.3	29.8	12-27-20	5.0	2.4	12-27-20	10.0	3.9	12-27-20	5.0	2.0	12-27-20	****		12-27-20	127.8	52.6
12-28-20		0.0	12-28-20	8.5	6.3	12-28-20	63.3	29.8	12-28-20	5.0	2.4	12-28-20	10.0	3.9	12-28-20	5.0	2.0	12-28-20	****		12-28-20	127.8	52.6
12-29-20		0.0	12-29-20	23.0	17.0	12-29-20	10.0	4.7	12-29-20	0.0	0.0	12-29-20	10.0	3.9	12-29-20	10.0	3.9	12-29-20	****		12-29-20	75.0	30.9
12-30-20		0.0	12-30-20	20.0	14.8	12-30-20	0.0	0.0	12-30-20	0.0	0.0	12-30-20	5.0	2.0	12-30-20	0.0	0.0	12-30-20	****		12-30-20	80.0	32.9
12-31-20		0.0	12-31-20	21	15.5	12-31-20	34	16.0	12-31-20	0	0.0	12-31-20	0	0.0	12-31-20	5	2.0	12-31-20	****		12-31-20	70	28.8
	2600.0			**55234.1**			**102393.1**			**59668.4**			**30984.4**			**1265.9**			**3404.8**			**255550.7**	

*** denotes system down for repair**

**** denotes line problems and pump problems**

***** denotes pump issues**

****** denotes piping problem**

APPENDIX H

Third-party Compliance Audit Report

CLEAN HARBORS CANADA, INC.

2018 Compliance Audit Summary Report – Ryley Facility

Alberta Environment Approval Number 10348-03-00

February 2019 – 18-8414

February 22, 2019

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Clean Harbors Canada, Inc.
P.O. Box 390
Ryley, Alberta
T0B 4AO

Attention: Mr. Stan Yuha

2018 Compliance Audit Summary Report – Ryley Facility

Dillon Consulting Limited is pleased to submit the enclosed Final 2018 Compliance Audit Summary Report for the Ryley Facility (Facility or Site) to Clean Harbors Canada, Inc. The Report describes the methodological approach used and highlights key findings resulting from the 2018 triennial compliance audit completed at the Facility on September 19-20, 2018.

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

Jack Wallace, P. Eng.
Lead Auditor

Mathew Kress, EIT
Assistant Auditor

MJK:st
cc: Mr. Mike Parker

Our file: 18-8414

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A Ryley Audit Checklist

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 first audit, as part of the new Approval (valid 2017-2027), was required to be initiated on or before October 1, 2018. Dillon Consulting Limited (Dillon) was retained to perform the compliance audit, for which the compliance audit kick-off call was held on September 5, 2018 representing the commencement of the audit activities. The formal Site visit was conducted on September 19 and 20, 2018.

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 a 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 July 11, 2015 (2015 compliance audit completion) to September 18, 2018 (2018 compliance audit commenced). This is the first audit completed at the Facility since the new Approval came into effect in 2017.

Each of the 574 line items in the audit checklist were assessed, and assigned one of the following statuses:

- Information
- Compliant
- Non-compliant
- Not Applicable
- Opportunity for Improvement
- Pending

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. Some conditions of the approval offered information only, and were assigned a status as such. A "Not Applicable" status was assigned to items which were not applicable at the time of the audit. "Opportunity for Improvement" was assigned to items for which the Facility was clearly

implementing compliance measures, but where Dillon identified room to improve. “Pending” was assigned to line items which the Facility is currently in the process of complying with, but has not yet completed.

In addition to assessing compliance with each item of the audit checklist, the auditors also recorded the supporting documentation (where available) which they 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 which were reviewed included, but were not limited to:

- Annual Landfill Operations Report(s);
- Groundwater Monitoring Report(s);
- Calibration records;
- 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 two 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 impossible. Names of personnel who provided verbal information were recorded next to each line item for which verbal confirmation was the only evidence. 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 with them.

Requirements which were 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.

Previous audits completed at the facility have identified several requirements which do not necessarily portray the operating practices which are actually utilized by the facility. After reviewing the amended Approval extensively, it is evident that some recommendations from the 2015 audit were not referred to

in amending the Approval most recently in 2017. The 2015 audit notes that "*recent amendments still contained terms that did not consistently portray the operating practices actually utilized by the Facility*", which identifies an ongoing disconnect between certain Approval requirements and the best operational practices used at the Facility. For example from the 2015 audit: "*Clause 4.5.32 (b) (ii) (4.6.52 (b) in the amended Approval) stipulates that landfill inspections be completed immediately after a storm event, rather than on the next day of operation*". This requirement remains in the amended Approval, even after recommendations from previous audits.

Clarification or modification of such clauses is suggested through ongoing discussion with AEP, to ensure compliance with the Approval and maintain best operational practices at the Facility. As such, Dillon would recommend Facility staff review the Approval in depth on a regular basis as construction progress and operational status changes in response to new systems, infrastructure, and wastes on-site.

2.1 Summary of Findings

Appendix A following the text includes the full checklist used during the facility 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
Information	74
Compliant	329
Non-compliant	4
Not applicable	109
Opportunity for improvement	10
Pending	46
TOTAL	572

Four (4) line items (two (2) when accounting for similarities in line items) were assigned the status "non-compliant". They are as follows:

1. Section 4.1.4 (vi) of the Approval states "*the Approval holder shall operate and maintain the integrity of the following infrastructure components at the facility: (vi) Groundwater monitoring wells*". This requirement is similar to those in Sections 4.9.10 (a) and (b) which state "*The approval holder shall for all groundwater monitoring wells: (a) Protect from damage, and (b) Keep locked except when being sampled*". One well in particular (MW-10) was found to have been damaged, resulting in well cap exposure. The protective casing and locking mechanism was not in place at the time of the Facility tour on September 19, 2018. By September 20, 2018 Facility personnel had stated that repairs to MW-10 were underway and repairs were confirmed

verbally in January 2019. All other groundwater monitoring wells observed by the auditors appeared to be protected and locked. Clarify that SOP was put in place

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 Facility 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 Facility 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.

3.0 Conclusions

The 2018 compliance audit of AEP Approval number 10348-03-01 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 4.1.4 (vi) and 4.9.10 (a) and (b) (three related items counted as one non-compliance): One groundwater monitoring well was found to be damaged to a level which caused the outer protective casing to be destroyed. Facility personnel were in the process of remedying this violation on the second day of the audit; and
- Clause4.6.16 (b): The standard operating procedure (SOP) for tank filling and responding to overflows was available to staff in documentation 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 3.1.4 (b) and (c): No change log for May 4, 2018 to August 30, 2018 versions;
- Clause 4.1.5 (ii): Minor amounts of mud and standing water was identified in roadways and near the Cell 4 construction limit. This was determined to be due to ongoing construction activities on site during the visit and do not represent ongoing grading issues or conditions;

- Clause 4.6.24 (i): Although it appears that the Facility is adhering to the document in question; "Industrial Waste Identification and Management Options, Alberta Environment, May 1996", it should be explicitly referred to in the Facility's Operations Plan;
- Clause 4.6.30 (b): Although it appears that the Facility is adhering to the document in question; "Alberta User Guide for Waste Managers, Alberta Environment, August 1996", it should be explicitly referred to in the Facility's Operations Plan;
- Clause 4.6.34 (w): The 2016 operations plan contained a landfill layout plan from 2013, even though surveys of the landfill are conducted biannually. Dillon would recommend this plan be updated every year and included with the most up-to-date Operations Plan;
- Clause 4.6.35: Both 2017 and 2016 plans were available. The 2016 version should be removed;
- Clause 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 should be explicitly referred to in the Facility's Operations Plan; and
- Clause 4.6.45: Although it appears that the Facility is adhering to the document in question; "Guidelines for the Disposal of Asbestos Waste: Environmental Protection Services, Alberta Environment, 1989, as amended", it should be explicitly referred to in the Facility's Operations Plan.
- Clause 8.1.2: The Approval states "*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*." While it is clear that the decommissioning of the old surface water detention pond took place prior to the construction of Cell 4 as stated in 8.1.1, and appropriate documentation was submitted and approved by AEP, it is not specifically referenced as a "Decommissioning and Land Reclamation Plan" for the old pond, and is instead included in the Soil Management Program and Sampling Proposal. This could be split out as a standalone document for better tracking in future.

4.0 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

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for	Finding: Pending	Documents Reviewed	Details
Part 2 - General									
Section 2.1 - Reporting									
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					Contravention letter to AEP for July, 2017 fire at the landfill.	Calls to the AEP number are placed immediately following any contravention.
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					Contravention correspondence with AEP, including contravention dates and reporting.	Contravention reports are provided as letters to AEP within 7 days of the incident.
2.1.3	The approval holder shall immediately notify the director if any of the following events occurs:				X			Not applicable	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	- Voluntary reporting outside of the Approval may be conducted more frequently. - Failed tests will be repeated until compliance is reached, which represents required frequency. - Failed test results will be included in report results.
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					Monthly and stormwater discharge reports.	Reviewed monthly reports and submission correspondence.
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					2017 Annual Report	- Had a non-compliance for late submission in last audit. - Confirmed that 2017 Annual Report was submitted prior to March 31 deadline.
Section 2.2 - Record Keeping									

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for	Finding: Pending	Documents Reviewed	Details
Part 2 - General									
2.2.1 (b)	The approval holder shall record and retain all the following information I nrespect of any sampling conducted or analyses performed in accordance with this approval for a minumum of 10 years:						X	- Leachate level log data - pH at scrubber data - Surface water and leachate monitoring results	All sampling records contain the information required per this section of the Approval, based on a review of a sample of available records.
2.2.1 (b, i)	The place, date and time of sampling.						X		
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					2017 Annual Report Landfill Operations Plan HWRSP Standard Operating Procedures (SOPs)	All listed items were observed in the documents reviewed.
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					Operating Records for 2017	Operating Records are held on site but are not submitted unless requested by AEP.
Section 2.3 - Analytical Requirements									
2.3.1 (i, A)	Air monitoring analystical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the “Alberta Stack Sampling Code” (AEP, 1995).		X					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for	Finding: Pending	Documents Reviewed	Details
Part 2 - General									
2.3.1 (i, B)	Air monitoring analystical 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					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program.
2.3.1 (i, C)	Air monitoring analystical requirements for collection, preservation, storage, handling, and analysis must be in accordance with: the "Air Monitoring Directive" (AEP 1989).		X					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program.
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					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program.
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					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program.
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					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program.
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 Selenastrum capricornutum" (Environment and Climate Change Canada, 1992).		X					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program
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 Ceriodaphnia dubia" (Environment and Climate Change Canada, 1992).		X					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for	Finding: Pending	Documents Reviewed	Details
Part 2 - General									
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					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program.
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 (Photobacterium phosphoreum)" (Environment and Climate Change Canada, 1992).				X			2016 Air monitoring program	This is not the standard referred to in the Approval attached to the 2016 Air Monitoring Program, but only due to the change which occurred to the Approval in 2017. Standards were updated in 2017 after Approval amendment and should be included in future Air Monitoring Programs.
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			2016 Air monitoring program	Updated in 2017 Approval similar to 2.3.1 (iii, F).
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					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program.
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			2016 Air monitoring program	Updated in 2017 Approval similar to 2.3.1 (iii, F).
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					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program.
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					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program.
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					2016 Air monitoring program	Explicitly referred to in Air Monitoring Program.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for	Finding: Pending	Documents Reviewed	Details
Part 2 - General									
2.3.2	Labs retained for analysis of parameters required by the approval are accredited pursuant to ISO/IEC 17025.		X					Testing Results	- Maxxam and ALS are used for all water/leachate parameters - 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	Information only.
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.*	X						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	Information only.
2.4.3	*Environmental Protection and Enhancement Act Approval No. 10348-02-00, as amended, is cancelled.*	X						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 Observation	- Three get annually inspected by Petroleum Tank Industry (diesel tank and 2 liquid waste tanks). - PTMAA certificate viewed, valid to August 31, 2019. - 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					PTMAA Certificate	

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
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.		X					Verbacl confirmation of correspondence with AEP	Updated for Cell 4 construction. Had increased it last year Submitted to AEP prior to construction, required additional inputs, resubmitted Items missing incl. lay down area construction Included additional items not required End result was less than current amount Sent letter to AEP indicating that they are not changing amount. Didn't hear back from AEP but bond was accepted.
3.1.2	The approval holder shall construct each new Class I industrial landfill which has the following components, at a minium:	X						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					Issued for Construction Drawings	Minimum of 450mm 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					- Issued for Construction Drawings - AEP Letter amending GCL to Geosynthetic	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					- Issued for Construction Drawings - AEP Letter amending GCL to Geosynthetic	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					Issued for Construction Drawings	1000 mm indicated as a minimum thickness of the underlying clay liner, GCL indicated above in detail 3 on 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 $1x10^{-9}$ m/s or less.		X					Clean Harbors Cell 4 Request for Quotation	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					Issued for Construction Drawings	Detail 11 of 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					Issued for Construction Drawings	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 $1x10^{-4} m^2/s$ placed over top of the primary layer.		X					Issued for Construction Drawings	Transmissivity is required to be $1x10^{-4} m^2/s$ at a minimum.
3.1.2 (c, iii, b)	Leachate collection system that consists of a network of perforated leachate collection pipes.		X					Issued for Construction Drawings	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					Issued for Construction Drawings	Drawing C-05 shows sump in both primary and secondary layer acting as one.

Audit Checklist

Approval Line Item		Action	Finding: Information	Compliant	Non-Compliant	Not applicable	Opportunity for Improvement	Pending	Documents Reviewed	Details
Part 3 - Construction										
	3.1.2 (d, i)	Leak detection system that is placed over the secondary layer.		X					Issued for Construction Drawings	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					Issued for Construction Drawings	Detail 3 on Drawing C-04 shows leak detection system under the primary layer.
	3.1.2 (d, iii, a)	Leak detection system that consists of a geo-composite drainage layer with a transmissivity of at least $1x10^{-4}m^2/s$ placed over the top of the secondary layer.		X					Issued for Construction Drawings	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					Issued for Construction Drawings	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					Issued for Construction Drawings	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	Not applicable	No existing plans for Cell 4 closure seeing as it is still in the construction phase. Other cells and capping procedures are in compliance.
	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					Issued for Construction Drawings	Perimeter berm is evident in 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					Issued for Construction Drawings	Leachate collections system will handle all stormwater which 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					Issued for Construction Drawings	1000mm 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	All deviations have to be reported per below after construction, anticipated for 2019.
	3.1.4 (a)	Detailed Construction Plan and Specifications		X					Correspondence with AEP	Submitted May 4, 2018, more than three months prior to August 21, 2018 letter from AEP approving construction.
	3.1.4 (b)	Construction Quality Assurance Plan					X		Correspondence with AEP	August 30, 2018 version viewed from Tetra Tech. Opportunity for Improvement observed - no change log for May 4 to Aug 30 versions.

Audit Checklist

Approval Line Item		Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 3 - Construction										
	3.1.4 (c)	Construction Quality Control Plan					X		Correspondence with AEP	August 30, 2018 version viewed from Tetra Tech. Opportunity for Improvement observed - no change log for May 4 to Aug 30 versions.
	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					Correspondence with AEP	From May 4, 2018, AEP supposed to provide approval within 3 months. However, deficiencies were corrected on a per item basis through these months 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					Site field observations	Observations for Cell 4 construction consistent with requirements in plans.
	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					Site field observations	No deviations being observed through the first half of construction
	3.1.7 (a)	The deviation results in a minor adjustment in order to suite field conditions encountered	X						Information only	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						Information only	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	Not applicable	Construction oversight and administration consulting, and consultant performing testing, has indicated compliance to date through regular progress meetings. Summary report to be provided following completion of construction, anticipated for 2019.
	3.1.9	The summary report in 3.1.9 shall contain the following information, at minimum:						X		
	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		
	3.1.9 (b)	Description of any minor deviations as per 3.1.7						X		
	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		
	3.1.9 (d)	"As-built" plans.						X		
	3.1.9 (e)	Photo-documentation of important stages of construction including any repair work or remediation activities to establish or maintain liner intergrity.						X		
	3.1.9 (f)	Any other information not listed or implied in 3.1.9 as required in writing by the Director.						X		

Audit Checklist

Approval Line Item		Action	Finding: Information	Compliant	Non-Compliant	Not applicable	Opportunity for Improvement	Pending	Documents Reviewed	Details
Part 3 - Construction										
	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		
	3.1.11	The approval holder shall construct the off-loading area as described in the application.						X		
	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		
Section 3.2 - Waste Stabilization Area										
	3.2.1 (a)	The waste stabilization area has been constructed in accordance with application No. 008-10348.		X					Correspondence between AEP and CH	- This has been completed within the constructed portions of Cell 4. - AEP required this to avoid tracking waste off-site. - Clean Harbors submitted specification for stabilization area, did not receive any amendment requests.
	3.2.1 (b)	The waste stabilization area has been constructed in accordance within a Class I landfill cell.		X						
Section 3.3 - Soil Conservation										
	3.3.1	The approval holder shall salvage and conserve all topsoil for land reclamation of the landfill.		X					Field observations 2017 Annual Report	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					Field observations 2017 Annual Report	
	3.3.3	The approval holder shall conserve and stockpile all topsoil separately from the upper subsoil.		X					Field observations 2017 Annual Report	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					Field observations 2017 Annual Report	Stockpiles placed within the landfill boundary.
	3.3.4 (b)	The approval holder shall place all upper subsoil stockpiles at the landfill.		X					Field observations 2017 Annual Report	
	3.3.5 (a)	The approval holder shall stockpile all topsoil on stable foundations.		X					Field observations 2017 Annual Report	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					Field observations 2017 Annual Report	
	3.3.6 (a)	The approval holder shall stockpile all upper subsoil on stable foundations.		X					Field observations 2017 Annual Report	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					Field observations 2017 Annual Report	
	3.3.7	The approval holder shall take all steps necessary to prevent any erosion due to wind or water.		X					Field observations 2017 Annual Report	Vegetation for closed stockpiles used for final closure of Cell 3. No other erosion measures required from AEP.

Audit Checklist

Approval Line Item		Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 3 - Construction										
	3.3.7 (a)	The approval holder shall revegetate stockpiles in order to prevent erosion.		X					Field observations 2017 Annual Report	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			Field observations 2017 Annual Report	Not applicable.
	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					Field observations 2017 Annual Report	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					Field observations 2017 Annual Report	
	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					Field observations 2017 Annual Report	
	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					Field observations 2017 Annual Report	
	3.3.9 (a)	The approval holder shall recommend conservation of topsoil when conditions in 3.3.8 no longer existed.	X						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	Information only.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
Section 4.1 - General									
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 4th Meridian.		X					- 2017 Annual Report - Site Maps	The Landfill appear to be within the approved boundary.
4.1.2	The waste elevation of the landfill has not exceeded the maximum designated waste elevation.		X					June 30, 2018 Survey	- Survey reviewed, max. point is 705.35 masl - Maximum elevation, per Part 1 (ggg) (definitions) is 714 masl
4.1.3	Access to the facility has been restricted to only authorized personnel.		X					Field observations	- 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	Hotline is posted on doors to office and scalehouse.
4.1.5	The approval owner shall operate and maintain the integrity of the following waste management facilities at the facility:	X						- 2017 Annual Report - Site field tour	To be reviewed in field.
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			Identified minor amounts of mud and standing water in roadways and near Cell 4 construction limit.
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						Confirmed during field inspection.
4.1.6 (i)	Composite liner		X						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						Changing with the construction of Cell 4 - still acceptable.
4.1.6 (v)	Run-off control system		X						Changing with the construction of Cell 4 - still acceptable.
4.1.6 (vi)	Groundwater monitoring wells			X					- Well MW-10 (near waste storage and HWRSP Facility) had casing damaged with exposed well cap and missing lock. - 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	Sign-in procedures in place, doors locked, etc.
Facility Audit									

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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					Not applicable	On-site portion: - Conducted starting September 19, 2018. - Completed September 20, 2018.
4.1.8	The approval holder shall submit the audit report required in 4.1.7 in the Annual Landfill Operations Report						X	Not applicable	To be included in annual report.
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	Information only.
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.	X						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	- No other sources not listed in the approval. - Temporary pilot project approval to do quenching emulsions, only if non-toxic gases are emitted. VOC detector purchased and doing bench and lab tests.
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					- Site field operations - Verbal confirmation	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					- Site field operations - Verbal confirmation	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.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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					Site field observations	Fugitive emissions are controlled per the HWRSFP SOPs and daily monitoring by site staff.
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						- Landfill Operations Plan - Appendix C (Fugitive Dust and Odour Best Management Plan)	- No fugitive emissions outside of what's permitted. - Odour complaints are received and managed per BMPs (report reviewed and contained in Operations Plan).
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	Fire occurred on property in 2017, for which AEP was notified. Not intentional 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					- Landfill Operations Plan Appendix C (Fugitive Dust and Odour Best Management Plan) - Environmental Management Program SOP #90RY-410-00 - Site field observations - Verbal confirmation	- Response is based on the type of complaint. - Material receipt may be suspended during high wind days. - Cover can be immediately placed for dust suppression and dispersion prevention. - Receive typically 3 odour complaints per year.
4.2.8 (a)	Conduct the following to reduce the release of those odours, or fugitive dust, or both by:		X						
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						
Limits									

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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					- Site field observations - Recorded weekly and daily data log books	- Weekly readings are taken and recorded in log book next to the scrubber. - 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					- Site field observations - Recorded weekly data log books	- Weekly readings are taken and recorded in log book next to the scrubber. - Carbon is replaced every 4-5 years or less frequency.
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					- Monitoring records - Site field observations	- Weekly readings are taken and recorded in log book next to the scrubber. - Data logger contains daily readings. - Available to AEP upon request, confirmed in report that recordings are compliant. - September 13, 2017 date 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: - 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					- Monitoring records - Site field observations	- 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						Calibration certificate from August 1, 2018	Accuracy is to 0.1 ppm, as observed on calibration certificate.
4.2.13 (a)	Have a detection limit of 1 ppm or lower for total petroleum hydrocarbons.		X					Calibration certificate from August 1, 2018	Calibrated August 1, 2018, expiry May, 2020.
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					- Site field observation - Verbal confirmation	Sampling location is on second story scaffolding within building.
4.2.13 (c)	Be calibrated regularly in accordance with the analyzer manufacturer's specifications.		X					Calibration certificate from August 1, 2018	Calibrated August 1, 2018, expiry May, 2020.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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	2017 Annual Report	New Directive forthcoming in 2019 (Chapter 9).
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: - 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					- 2017 Annual Report - Monthly Ambient Air - Monitoring Reports for 2017	Monthly and Annual Ambient Air Monitoring Reports.
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			Not applicable	No request from Director issued.
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			Not applicable	No deficiencies found by Director.
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			Not applicable	No request from Director issued.
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.	X						Not applicable	Information only.
4.3.2	The approval holder shall operate and maintain the integrity of:	X						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 a the facility.						X	Field observations	Run on/run off control systems are not completed for Cell 4 as construction is ongoing. Anticipated for completion in Spring 2019.

Audit Checklist

Approval Line Item	Action	Finding: Information	Compliant	Non-Compliant	Not applicable	Opportunity for Improvement	Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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	Run on/run off control systems are not completed for Cell 4 as construction is ongoing. Anticipated for completion in Spring 2019.
4.3.3	All runoff from the facility developed area shall be directed to the runoff control system as described in:				X			Not applicable	The old surface water detention pond was decommissioned in August, 2018 prior to this audit.
4.3.3 (a)	Application No. 012-10348, prior to decommissioning and reclamation of the old surface water detention pond.				X				
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					2017 Annual Report Cell 4 construction plan Site field observations	Decommissioning of the old surface water detention pond done in August 2018. Observations made of the new surface water detention pond, drainage ditch, and discharge point.
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						
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					2017 Annual Report Site field observations Verbal confirmation	- 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 (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						
4.3.5 (b)	Through a pump and a release hose over the east berm into the culvert under Highway 854.		X						

Audit Checklist

Approval Line Item	Action	Finding: Information	Compliant	Non-Compliant	Not applicable	Opportunity for Improvement	Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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			2017 Annual Report Site field observations Verbal confirmation	- Not applicable to facility. All stormwaters are discharged through pond with testing prior to discharge. - No non-compliant discharges have occured. - When TSS exceeds limits, further settling time is done prior to re-testing and discharge, or flocculant is added.
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				
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						Not applicable	Information only.
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	- Tank farm bermed area goes into landifll. - They do not test to Table 4.3C for placing in pond, not enough voluma and could be too expensive.
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					Field observations	Facility operators were conscientious of impact Cell 4 construction was having on runoff system.
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					Annual Report	Monitoring findings reported to AEP.
4.3.11	For the purpose of Table 4.3-D:	X						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	Old surface water detention pond has been decomissioned.
4.3.11 (b)	Sampling location A2 is defined as the old surface water detention pond.				X			Field observations	Old surface water detention pond has been decomissioned.
4.3.11 (c)	Sampling location B1 is defined as the new surface water detention pond release point.		X					Field observations	Facility actively monitors releases.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
4.3.11 (d)	Sampling location B2 is defined as the new surface water detention pond.		X					Field observations	Facility actively monitors detention pond.
4.3.11 (e)	Sampling location C is defined as the tank farm bermed area.				X			Field observations	Adequate water volume for sampling purposes was not present at the time of the 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	The old surface water detention pond was decommissioned in August, 2018 prior to this audit.
4.3.13	The monitoring and reporting required in Table 4.3-D for the acute lethality tests shall comply with:	X						Not applicable	Information only.
4.3.13 (a)	The Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, Environment Canada, Environmenta Protection Series 1/RM/13, December2000, as amended.		X					Monitoring and reporting documents	Facility appears to be following governing regulations.
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					Monitoring and reporting documents	Facility appears to be following governing regulations.
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	No deviation from corresponding test method has occurred.
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	No deviation from corresponding test method has occurred.
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	Verbal confirmation from multiple parties confirming the reports are forwarded to AEP.
4.3.17	The Monthly Runoff and Industrial Wastewater Report shall include, at a minimum, all of the following information:	X						Not applicable	Monthly reports contained in annual report, but only need to be submitted with discharges.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
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	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.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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.
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	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	Old surface water detention pond has been decomissioned.
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.
Section 4.4 - Leachate Collection and Leak Detection									
Operations									

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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	Information only.
4.4.1 (a)	To facilities holding a current Act authorization to accept such waste.				X			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	Option not used by the facility.
4.4.1 (c)	To a disposal well approved by AER.		X					AER approval for deep well 2017 Annual Report	- Leachate is hauled to Class I deep well in Calmar. - Volume summary for 2017 in annual report; August 2018 volumes observed with manifests. - AER approval for deepwell (leased from Seller's Oilfield Services to CH) observed. Approval No. WM 077 A, dated July 25, 2011.
4.4.1 (d)	As per 4.6.51.				X			Not applicable	Option not used by the facility.
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	Information only
4.4.2 (a)	To facilities holding a current Act authorization to accept such waste.				X			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	Option not used by the facility.
4.4.2 (c)	To a disposal well approved by AER.		X					AER approval for deep well 2017 Annual Report	- Leachate is hauled to Class I deep well in Calmar. - Volume summary for 2017 in annual report; August 2018 volumes observed with manifests. - AER approval for deepwell (leased from Seller's Oilfield Services to CH) observed. Approval No. WM 077 A, dated July 25, 2011.
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 level logs	Leachate levels recorded daily. Field logs for 2017-2018 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 level logs	Leachate pumping infrastructure on timers in most cells, automatic in one. Infrastructure is capable of removing leachate generated from a storm even in fewer than 14 days.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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					Leachate level logs	Leachate levels recorded daily. Field logs for 2017-2018 observed, contain following parameters: - Date, time, condition, level status, personnel initial
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					Leachate level logs	Leachate levels recorded daily. Field logs for 2017-2018 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					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	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	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						Not applicable	Information only.
Section 4.5 - Dugouts and Water Wells in Surrounding Area									
Monitoring and Reporting									
4.5.1	The approval holder shall, unless the approval holder is not granted access by the landowner:	X						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					Dugout sampling report	Details included in Report.
4.5.1 (b)	Analyze the sample for the parameters listed in Table 4.5-A.		X					Dugout sampling report	Details included in Report.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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					Annual Dugout and Water Well Sampling Program Report	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					Annual Dugout and Water Well Sampling Program Report	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					Annual Dugout and Water Well Sampling Program Report	Details included in Report.
Section 4.6 - HWRSP Facility and Landfill									
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					Verbal confirmation Site field observations	Site field observations and verbal confirmation were received regarding materials receipt. Cross checked against Facility Operations Plan and SOPs for individual waste materials.
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 Opreations (SOPL001)	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.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
4.6.3 (a)	To facilities holding a current Act authorization.		X					Verbal confirmation by Site personnel	Regulations are being followed.
4.6.3 (b)	To facilities approved by a local environmental authority outside of Alberta.		X					Verbal confirmation by Site personnel	Regulations are being followed.
4.6.3 (c)	As otherwise authorized in writing by the Director.		X					Verbal confirmation by Site personnel	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					- Facility Standard Operating Procedures (SOPs) - Landfill Operations Plan (includes HWRSP)	Most recently dated as February 2016, with annual updates required. In 2017, Section 14 was added to address the operations of the HWRSP.
4.6.5	The approval holder shall:	X						Not applicable	Information only.
4.6.5 (a)	Review the HWRSP Facility Operations Plan annually, at a minimum.		X					2017 Annual Report	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					2017 Annual Report	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					2017 Annual Report Landfill 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					2017 Annual Report	Submitted in the 2017 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	No response received from AEP on 2017 Annual Report.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
4.6.9	The approval holder shall implement the latest HWRSP Facility Operations Plan, unless otherwise authorized in writing by the Director.		X					HWRSP Facility 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 transfering 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	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)	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)	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)	Confirmed during Site visit.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
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)	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)	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)	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)	Confirmed during Site visit.
4.6.13	All containers and unrinsed empty containers shall be stored in the waste storage area.		X					Field observation	Confirmed during Site visit.
4.6.14	The approval holder shall:	X						Not applicable	Information only.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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					Site field operations	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					Site field operations	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	Information only.
4.6.15 (a)	Sensors for detecting the level in each tank.		X					Site field operations	Sensors, alarms, and shut-off devices observed and active for each tank.
4.6.15 (b)	High level alarms that activate when a tank overfill is imminent.		X					Site field operations	
4.6.15 (c)	Automatic shut-off devices or sufficient free board space above the high level sensor to allow operators time to prevent overfill from occurring.		X					Site field operations	
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					Site field operations	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						- Site 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. - All other requirements met.
4.6.16 (a)	Sensors or gauges for detecting the level in each tank.		X					Site field observation	Sensors observed and active for tanks.
4.6.16 (b)	A written operating procedure to prevent tank overfill.			X				- Site 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					- Site field observation	Secondary containment structures observed in the field.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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					- Site field observation - 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 HWRSP Facility in relation to hazardous waste or hazardous recyclables or both:		X					- Site field observation - Landfill Operations Report (Section 14) - Facility SOPs	Field observations reviewed the activities that occur on site; which was confirmed through review of the Landfill Operations Report (Seciton 14 for HWRSP) and Facility SOPs.
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						
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						
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, unles 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			Not applicable	No waste incineration equipment exists 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.		X					WINWEB inventory management software	Maximum capacity not exceeded as of September 20, 2018, per the below volumes.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
4.6.21	In addition to the storage limits in 4.6.20, the approval holder shall not exceed th waste storage limits as specified in TABLE 4.6-A.		X					WINWEB inventory management software	Observations of inventory software made on September 20, 2018: - 164,000 L of containers - 18,350 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					WINWEB 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	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	Information only.
4.6.23 (b)	Total filled capacities of all tanks.	X						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	Information only.
4.6.24 (i)	Industrial Waste Identification and Management Options, Alberta Environment, May 1996, as amended.					X		Landfill Operations Report, Section 2	Not referenced specifically in Landfill Operations Plan, although 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					Landfill Operations Report, Section 2	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					Annual 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					Field observations Inventory logs	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					Field observations Inventory logs	Available at the time of the audit.
4.6.28	The approval holder shall submit a Monthly Waste Management Report to the Director.		X					July 2018 Monthly Waste Inventory Report and verbal confirmation	Verbal confirmation that the monthly reports are submitted to AEP. Different documents for internal use and sumission confirms submission.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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	Information only.
4.6.29 (a)	An opening waste and hazardous recyclables inventory balance in kilograms or litres by waste class or material type.		X					July 2018 Monthly Waste Inventory Report	Included in Report.
4.6.29 (b)	The amount and type of waste and hazardous recyclables received: - Within the province. - From outside of the province.		X					July 2018 Monthly Waste Inventory Report	Included in Report.
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					July 2018 Monthly Waste Inventory Report	Included in Report.
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					July 2018 Monthly Waste Inventory Report	Included in Report.
4.6.29 (e)	Closing balance in kilograms or litres.		X					July 2018 Monthly Waste Inventory Report	Included in Report.
4.6.29 (f)	A summary of contraventions reported pursuant to 2. 1. 1 related to waste and hazardous recyclables.		X					July 2018 Monthly Waste Inventory Report	No Contraventions identified in monthly report.
4.6.29 (g)	Any other information as required in writing by the Director.				X			July 2018 Monthly Waste Inventory Report	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	Information only.
4.6.30 (a)	As specified in Table 4.6-C.		X					Annual Operations Report	Addressed 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		Annual Operations Report	Not referenced specifically in Landfill Operations Plan, although 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					Annual Operations Report	Submitted as part of the Annual Report for the facility.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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					Landfill Operations Plan	Approval requirements are being examined in this checklist.
4.6.33	The approval holder shall:	X						Not applicable	Information only.
4.6.33 (a)	Review the Landfill Operations Plan annually, at a minimum.		X					Landfill Operations Plan	2 dates observed on 2 seperate copies, in 2016 and in 2017.
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					2017 Annual Report	The Landfill Operations Plan is updated annually, as required. Changes to facility operations and expansions are reviewed annually, as are the Landfill Standards.
4.6.34	The Landfill Operations Plan shall include, at a minimum, all of the following:	X						Not applicable	Information only.
4.6.34 (a)	SOP for keeping and maintaining an Operating Record.		X					Landfill Operations Plan	Addressed in 1.0 of Operations Plan.
4.6.34 (b)	SOP for waste control, run-on and runoff controls, and nuisance controls.		X					Landfill Operations Plan	Included in Operation Plan.
4.6.34 (c)	SOP for the waste stabilization area operations.						X	Landfill Operations Plan	Document exists for Cell 3 operations, to be amended to include Cell 4 in spring-summer of 2019.
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					Landfill Operations Plan	Addressed in Sections 3.0, 3.1, 3.2, 3.3 of Operations Plan.
4.6.34 (e)	SOP for detecting, preventing and disposal of unauthorized wastes.		X					Landfill Operations Plan	Addressed in 3.2 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					Landfill Operations Plan	Addressed in 6.1 of Operations Plan.

Audit Checklist

Approval Line Item	Action	Finding: Information	Compliant	Non-Compliant	Not applicable	Opportunity for Improvement	Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
4.6.34 (g)	SOP for managing contaminated sulphur and sulphur containing wastes.		X					Landfill Operations Plan	Addressed in 4.2 of Operations Plan.
4.6.34 (h)	SOP for managing asbestos wastes.		X					Landfill Operations Plan	Addressed in 4.1 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					Landfill Operations Plan	Addressed in 9.3 of Operations Plan.
4.6.34 (j)	An Odour and Fugitive Dust Response Program.		X					Landfill Operations Plan	Included in Operations Plan.
4.6.34 (k)	A Fugitive Dust and Odour Best Management Plan.		X					Landfill Operations Plan	Addressed in Appendix C of Operations Plan.
4.6.34 (l)	A runoff and industrial wastewater monitoring and management program.						X	Landfill Operations Plan	Document exists for Cell 3 operations, to be amended to include Cell 4 in spring-summer of 2019.
4.6.34 (m)	A leachate monitoring and management program.		X					SOPL002-003 Landfill Leachate System	Procedures in place for monitoring of leachate and overall management.
4.6.34 (n)	A leak detection liquid monitoring and management program.		X					SOPL002-003 Landfill Leachate System	Details outlining procedures in case of exceedences outlined as well as overall management.
4.6.34 (o)	A groundwater monitoring program.		X					Groundwater Monitoring Program	Included in Operations Plan.
4.6.34 (p)	A Remediation Plan to deal with groundwater quality deterioration.		X					Groundwater Remediation Plan	Has not been required during the audit period.
4.6.34 (q)	A soil monitoring program.						X	Not applicable	Completed in draft form, to be submitted in late 2019.
4.6.34 (r)	A soil management program.						X	Not applicable	Completed in draft form, to be submitted in late 2019.
4.6.34 (s)	A landfill cell cover system.		X					Design drawings	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					Maintenance Dashboard and Scale maintenance records	Scales calibrated twice per year, maintenance program in place.
4.6.34 (u)	A health and safety program.		X					Health and Safety Program	Health and Safety program in place, training records kept accounted for, notifications when training comes due. Employees sign off on h&s program.
4.6.34 (v)	An emergency response program, including SOP for handling fires, substance releases to the environment, and health concerns.		X					Emergency Response Program	Additionally, a system exists to track each employees training and provides management with information such as: training expiring, which training each employee requires, etc.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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		Landfill Operations Plan, Figure 2	2 Surveys conducted each year, 2016 operations plan includes a landfill layout plan from 2013. Should be updated each year with current landfill survey data.
4.6.35	The approval holder shall retain a copy of the most recent Landfill Operations Plan at the facility.					X		Landfill Operations Plan	Both 2017 and 2016 available - 2016 should be removed.
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					Landfill Operations Plan	Submitted yearly.
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	No deficiencies ever recorded.
4.6.38	The approval holder shall implement the latest Landfill Operations Plan, unless otherwise authorized in writing by the Director.		X					Landfill Operations Plan	2017 Operations Plan observed.
Operations									
4.6.39	The approval holder shall classify all materials entering the landfill in accordance with the:	X						Not applicable	Information only.
4.6.39 (a)	Waste Control Regulation (AR 192196).		X					Landfill Operations Plan, Section 2	Referenced in Landfill Operations Plan.
4.6.39 (b)	Industrial Waste Identification and Management Options, Alberta Environment, May 1996, as amended.					X		Landfill Oparations Plan	Not referenced specifically in Landfill Operations Plan, although 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					Landfill Operations Plan	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	Information only
4.6.40 (a)	The first time a waste is received from a new generator.		X					Landfill Operations Plan, Sections 2-4	Procedures and acceptance criteria in the Landifll Operations Plan are compliant with Approval.
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						

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Part 4 - Operations, Limits, Monitoring, and Reporting									
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	The site is not a Class II landfill.
4.6.42	The approval holder shall:	X						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	Information only.
4.6.43 (a)	To facilities holding a current Act authorization to accept such waste.				X			Not applicable	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	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 deepwell (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	Information only.
4.6.44 (a)	Annually, in-house visual inspections for corrosion.		X					Audible confirmation and inspection report	Yearly visual inspections.
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 reports	Performed yearly.
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		Landfill Operations Plan, Section 4.1	Not referenced specifically in Landfill Operations Plan, although documentation indicates adherence to this standard. Recommended that this be included in the Operations Plan as a specific reference.

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Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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					Landfill Operations Plan, Section 4.2	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	Information only.
4.6.47 (a)	To facilities holding a current Act authorization.		X					Verbal confirmation	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 observed during the audit.
4.6.49	The approval holder shall restrict the working face of each landfill cell to the smallest practical area.	X						Not applicable	Not observed during the audit.
4.6.50	For any waste disposed of at the landfill that is subject to wind dispersal, the approval holder shall:	X						Not applicable	Information only.
4.6.50 (a)	Wet the waste to prevent dispersal of particulate matter.or		X					Landfill 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						
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						Not applicable	Information only.
4.6.51 (a)	Specified runoff.	X						Not applicable	Information only.
4.6.51 (b)	Leachate.	X						Not applicable	Information only.
4.6.51 (c)	Leak detection liquid.	X						Not applicable	Information only.
4.6.51 (d)	Sump waste of car wash bays or similar operations.	X						Not applicable	Information only.
4.6.51 (e)	Waste from hydrovac excavation operations.	X						Not applicable	Information only.

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Approval Line Item	Action	Finding: Information	Compliant	Non-Compliant	Not applicable	Opportunity for Improvement	Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
4.6.51 (f)	Any other waste authorized by the Alberta User Guide for Waste Managers, May 1995, as amended.	X						Not applicable	Information only.
4.6.52	The approval holder shall inspect the landfill, at a minimum:	X						Not applicable	Information only.
4.6.52 (a)	Weekly.		X					Verbal confirmation	Daily landfill inspection.
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					Verbal confirmation	Daily landfill inspection.
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	Information only.
4.6.53 (a)	Keep a record of inspections conducted pursuant to 4.6.52.		X					Landfill inspection records	Made available electronically.
4.6.53 (b)	Have the record of inspections available for review upon written request from the Director.		X					Landfill inspection records	Made available electronically.
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 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					June 30, 2018 Site Survey	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					Verbal confirmation	Wheel wash for trucks carrying asbestos installed on the outbound road from where asbestos is deposited.
Monitoring and Reporting									
4.6.56	The approval holder shall monitor the landfill operations as required in Table 4.6-D.		X					Annual Landfill Operations 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					Annual Landfill Operations Report	Submitted to AEP.

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Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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	Information only.
4.6.58 (a)	the name and contact information of the person responsible for the facility.		X					Annual Landfill Operations 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					Annual Landfill Operations Report	All criteria in Table 4.6-D is included.
4.6.58 (c)	A summary of the results of any audit conducted in accordance with 4.1.7.				X			Not applicable	Audit not yet completed for reports which are available.
4.6.58 (d)	A summary of the operations of the waste stabilization area.		X					Annual Landfill Operations Report	Addressed in Section 5.0 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					Annual Landfill Operations 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					Annual Landfill Operations 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					Annual Landfill Operations 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					Annual Landfill Operations Report	Addressed in Section 9.0 of Annual Report.
4.6.58 (i)	The Annual Dugout and Water Well Sampling Program Report pursuant to 4.5.4.		X					Annual Landfill Operations Report	Addressed in Section 10.0 of Annual Report.
4.6.58 (j)	A summary of all revisions to the Landfill Operations Plan pursuant to 4.6.33(b).		X					Annual Landfill Operations Report	Addressed in Section 11.0 of Annual Report.
4.6.58 (k)	Any groundwater remedial action taken pursuant to 4.6.34(p).		X					Annual Landfill Operations 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					Annual Landfill Operations Report	Addressed in Section 13.0 of Annual Report.
4.6.58 (m)	A summary of: - Operational issues encountered. - Emergencies occurred. - Measures or actions taken.		X					Annual Landfill Operations Report	Addressed in Section 14.0 of Annual Report.

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Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
4.6.58 (n)	A summary of records of: - Public complaints. - The approval holder's responses		X					Annual Landfill Operations Report	Addressed in Section 15.0 of Annual Report.
4.6.58 (o)	An up-to-date financial security estimate pursuant to 5.1.2.		X					Annual Landfill Operations Report	Addressed in Section 16.0 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					Annual Landfill Operations Report	Addressed in Section 17.0 of Annual Report.
4.6.58 (q)	The Annual Landfill Cell Closure Report pursuant to 7.1.7.		X					Annual Landfill Operations Report	Addressed in Section 18.0 of Annual Report.
4.6.58 (r)	A summary of contraventions reported pursuant to 2.1.1 related to landfill operations.		X					Annual Landfill Operations Report	Addressed in Section 19.0 of Annual Report.
4.6.58 (s)	Any other information as required in writing by the Director.				X			Not applicable	No additional requirements from AEP.
4.6.59	The approval holder shall submit the Annual Landfill Operations Report to the Director.		X					Verbal confirmation	Confirmation of submission prior to deadline.
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.		X					Verbal confirmation	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					Verbal confirmation	Wastewater is directed to an isolated holding tank.
4.7.3	The approval holder shall only dispose of substances from the domestic wastewater system:	X						Not applicable	Information only.
4.7.3 (a)	To facilities holding a current Act authorization.		X					Verbal confirmation	Wastewater from holding tank taken across the street to authorized treatment lagoon.
4.7.3 (b)	To facilities approved by a local environmental authority outside of Alberta.or		X					Verbal confirmation	Wastewater from holding tank taken across the street to authorized treatment lagoon.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
4.7.3 (c)	As otherwise authorized in writing by the Director.		X					Verbal confirmation	Wastewater from holding tank taken across the street to authorized treatment lagoon.
Section 4.8 - Waterworks									
Not used at this time.					X			Not applicable	No Waterworks 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.		X					2017 GW Monitoring Report	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					Verbal Confirmation	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			Verbal confirmation	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					Verbal confirmation	Implemented after submittal.
4.9.5	The approval holder shall:	X						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					2017 GW Monitoring Report	All wells in monitoring program have been sampled.
4.9.5 (b)	Analyze each sample for the parameters listed in Table 4.9-A.		X					2017 GW Monitoring Report	All parameters in Table 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	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					2017 GW Monitoring Report	Groundwater is monitored once per year.

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Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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			Verbal confirmation	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	Information only.
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					2017 GW Monitoring Report	Several exceedences 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					2017 GW Monitoring Report	Several exceedences noted in GW report, however these are due to the natural composition of the groundwater in the area.
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			2017 GW Monitoring Report	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					2017 GW Monitoring Report	Acceptable procedures are being followed.
4.9.10	The approval holder shall for all groundwater monitoring wells:	X						Not applicable	Information only.
4.9.10 (a)	Protect from damage.			X				Site field observations	- Well MW-10 (near waste storage and HWRSP Facility) had casing damaged with exposed well cap and missing lock. - All other 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	Information only.
4.9.11 (a)	Clean, repair or replace the groundwater monitoring well.						X	Site field observations	As per above, MW-10 requires repair.
4.9.11 (b)	Collect and analyse a representative groundwater sample prior to the next scheduled sampling event.		X					2017 GW Monitoring Report	Groundwater monitoring consistent with schedule.

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Part 4 - Operations, Limits, Monitoring, and Reporting									
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	Information only.
4.9.12 (a)	A description of purging and sampling procedures.		X					2017 GW Monitoring Report	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					2017 GW Monitoring Report	Groundwater levels were recorded.
4.9.12 (c)	The temperature of each sample at the time of sampling.		X					2017 GW Monitoring Report	Temperature was recorded at the time of sampling.
4.9.12 (d)	The pH of each sample at the time of sampling.		X					2017 GW Monitoring Report	pH was recorded at the time of sampling.
4.9.12 (e)	The specific conductance of each sample at the time of sampling.		X					2017 GW Monitoring Report	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	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			Not applicable	Groundwater remediation has not been deemed necessary.
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	Information only.
4.9.14 (a)	A completed Record of Site Condition Form, Alberta Environment, 2009, as amended.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (b)	A legal land description of the facility and a map illustrating the facility boundaries.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (c)	A topographic map of the facility.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (d)	A description of the industrial activity and processes.		X					2017 GW Monitoring Report	Included in Report.

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Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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					2017 GW Monitoring Report	Included in Report.
4.9.14 (f)	A general hydrogeological characterization of the region within a five kilometre radius of the facility.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (g)	A detailed hydrogeological characterization of the facility, including an interpretation of groundwater flow patterns.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (h)	Cross-sections showing depth to water table, patterns of groundwater movement and hydraulic gradients at the facility.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (i)	Borehole logs and completion details for groundwater monitoring wells.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (j)	A map showing locations of all known buried channels within at least five kilometre of the facility.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (k)	A map of surface drainage within the facility and surrounding area to include nearby water bodies.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (l)	A map of groundwater monitoring well locations and a table summarizing the existing groundwater monitoring program for the facility.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (m)	A summary of any changes to the groundwater monitoring program made since the last groundwater monitoring report.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (n)	Analytical data recorded as required in 4.9.5 and 4.9.11(b).		X					2017 GW Monitoring Report	Included in Report.
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					2017 GW Monitoring Report	Included in Report.
4.9.14 (p)	An interpretation of QA/QC program results.		X					2017 GW Monitoring Report	Included in Report.
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					2017 GW Monitoring Report	Included in Report.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
4.9.14 (r)	A summary and interpretation of the data collected since the groundwater monitoring program began including: - Control charts which indicate trends in concentrations of parameters. - The migration of contaminants.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (s)	A description of the following: - Contaminated groundwater remediation techniques employed. - Source elimination measures employed. - Risk assessment studies undertaken. - Risk management studies undertaken.		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (t)	A proposed sampling schedule for the following year(s).		X					2017 GW Monitoring Report	Included in Report.
4.9.14 (u)	A description of any contaminant remediation, risk assessment or risk management action conducted at the facility.		X					2017 GW Monitoring Report	Included in Report.
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					2017 GW Monitoring Report	Included in Report.
4.9.15	The approval holder shall submit the Annual Groundwater Monitoring Program Report to the Director.		X					2017 GW Monitoring Report	Submitted to AEP.
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	AEP did not identify any deficiencies.
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:		X					Soil Management Program Proposal, including Soil Monitoring Program (Tetra Tech, 2017)	- Mar. 21, 2017 - Soil Management Program Proposal (incl. monitoring program submitted to AEP. - Sept. 11, 2017 - Supplemental Information to Soil Management Program Proposal (revisions), submitted to AEP. - Sept. 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						

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Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
4.10.1 (c)	All other actions, including sampling, analysing, and reporting, associated with the Soil Monitoring Program.						X	Not applicable	To be completed in the summer of 2019.
4.10.1 (d)	All other actions, including sampling, analysing and reporting, associated with the Soil Management Program.						X	Not applicable	To be completed in the summer of 2019.
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					Soil Management Program Proposal, including Soil Monitoring Program (Tetra Tech, 2017)	- Mar. 21, 2017 - Soil Management Program Proposal (incl. monitoring program submitted to AEP. - Sept. 11, 2017 - Supplemental Information to Soil Management Program Proposal (revisions), submitted to AEP. - Sept. 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	Not applicable	To be completed in the summer of 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	Not applicable	To be completed in the summer of 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	Not applicable	To be completed in the summer of 2019.
4.10.6 (a)	For the first Soil Monitoring Program Report on or before January 31, 2020.						X	Not applicable	To be completed in the summer of 2019.
4.10.6 (b)	For the second Soil Monitoring Program Report on or before January 31, 2025.						X	Not applicable	To be completed in the summer of 2019.
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	Not applicable	To be completed in the summer of 2019.
Soil Management Program									

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 4 - Operations, Limits, Monitoring, and Reporting									
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	Not applicable	To be completed in the summer of 2019.
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	To be completed in the summer of 2019.
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	Not applicable	To be completed in the summer of 2019.
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	Not applicable	To be completed in the summer of 2019.
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	To be completed in the summer of 2019.
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	Not applicable	To be completed in the summer of 2019.
4.10.11	The approval holder shall implement the Soil Management Program as authorized in writing by the Director.						X	Not applicable	To be completed in the summer of 2019.
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	Not applicable	To be completed in the summer of 2019.
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	To be completed in the summer of 2019.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
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.		X					2017 and 2018 Cost Spreadsheets	Financial security is reviewed annually in-line with the documents specified.
5.1.2	The annual revised cost estimate for the facility shall be submitted to the Director by March 31 of each year.		X					CHUBB insurance Bond letter	Received bond on March 6, 2018 - Cost estimate must have been submitted on or before this date.
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:	X						Not applicable	Information only.
5.1.3 (a)	The cost estimate of future conservation and reclamation of the facility changes.				X			Not applicable	No changes to future conservation/reclamation activities have been expected in the timeframe of this audit period.
5.1.3 (b)	The extent of the operation of the facility is increased or reduced.		X					2017 Cell 4 Amendment Spreadsheet	Costs were recalculated based on the facility expanding its operations to a new cell.
5.1.3 (c)	The facility or any portion of it is conserved and reclaimed.				X			Not applicable	Although some cells have been fully reclaimed, and some are in the process of being capped (Cell 3A ~50%) none have been reclaimed in the examination period of this audit.
5.1.3 (d)	The conservation and reclamation plan required by this approval is changed.				X			Not applicable	No changes to the conservation and reclamation plan were made upon the issuance of the amended approval in 2017.
5.1.3 (e)	The activities conducted at the facility for which security is required is increased or decreased.		X					2017 Cell 4 Amendment Spreadsheet	Costs were recalculated based on the facility expanding its operations to include Cell 4.
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.		X					Submission for Cell 4 construction.	Submission dates were reviewed and found to be witihn this timeline.
5.1.5	The approval holder shall provide additional financial security as required in writing by the Director.				X			Not applicable	AEP has not asked for the facility to increase it's financial security.

Audit Checklist

Approval Line Item	Action	Finding						Documents Reviewed	Details
		Information	Compliant	Non-Compliant	Not applicable	Opportunity for Improvement	Pending		
Part 5 - Financial Security Requirements									
5.1.6	The approval holder shall renew the financial security for the facility at least 30 days prior to the date it expires.		X					Financial security communications	Financial security does not expire. Amendments to financial security are conducted at least annually.
5.1. 7	The approval holder shall maintain the financial security for the facility until returned in accordance with the Act or the regulations.		X					Financial security communications	Financial security does not expire. Amendments to financial security are conducted at least annually.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
Part 6 - Decommissioning and Land Reclamation									
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 Decommissioning Plan. - A Land Reclamation Plan.				X			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			Not applicable	Facility is still operational and expanding.
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:				X			Not applicable	Facility is still operational and expanding.
6.2.1 (a)	A plan for dismantling the HWRSP Facility.				X			Not applicable	Facility is still operational and expanding.
6.2.1 (b)	A comprehensive study to determine the nature, degree and extent of contamination at the HWRSP Facility and affected lands.				X			Not applicable	Facility is still operational and expanding.
6.2.1 (c)	A plan to manage all wastes at the HWRSP Facility.				X			Not applicable	Facility is still operational and expanding.
6.2.1 (d)	Evaluation of remediation technologies proposed to be used at the HWRSP Facility and affected lands.				X			Not applicable	Facility is still operational and expanding.
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			Not applicable	Facility is still operational and expanding.
6.2.1 (f)	Confirmatory testing to indicate compliance with the remediation objectives.				X			Not applicable	Facility is still operational and expanding.
6.2.1 (g)	A plan for maintaining and operating contaminant monitoring systems.				X			Not applicable	Facility is still operational and expanding.
6.2.1 (h)	A schedule for activities (a) through (g) above.				X			Not applicable	Facility is still operational and expanding.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
6.2.1 (i)	Any other information as required in writing by the Director.				X			Not applicable	Facility is still operational and expanding.
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			Not applicable	Facility is still operational and expanding.
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:				X			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			Not applicable	Facility is still operational and expanding.
6.3.1 (b)	Removal of infrastructure.				X			Not applicable	Facility is still operational and expanding.
6.3.1 (c)	Restoration of drainag.				X			Not applicable	Facility is still operational and expanding.
6.3.1 (d)	Soil replacement.				X			Not applicable	Facility is still operational and expanding.
6.3.1 (e)	Erosion control.				X			Not applicable	Facility is still operational and expanding.
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			Not applicable	Facility is still operational and expanding.
6.3.1 (g)	Reclamation schedule.				X			Not applicable	Facility is still operational and expanding.
6.3.1 (h)	Any other information as required in writing by the Director.				X			Not applicable	Facility is still operational and expanding.
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			Not applicable	Facility is still operational and expanding.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
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.				X			Not applicable	Last closure was performed in 2016 for Cell 3. To be monitored for next closure.
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			Not applicable	Last closure was performed in 2016 for Cell 3. To be monitored for next closure.
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	Last closure was performed in 2016 for Cell 3. To be monitored for next closure.
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	Last closure was performed in 2016 for Cell 3. To be monitored for next closure.
7.1.5	The approval holder shall maintain the closed landfill cells to:		X					Field observations	- 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 (a)	Protect and maintain the integrity of the final cover and surface water drainage systems.		X						
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	Last closure was performed in 2016 for Cell 3. To be monitored for next closure.
7.1.6 (a)	As-built plans and details on the location of landfill cells that have been closed.				X			Not applicable	Last closure was performed in 2016 for Cell 3. To be monitored for next closure.
7.1.6 (b)	Certified construction QA/QC procedures employed during cover construction and installation.				X			Not applicable	Last closure was performed in 2016 for Cell 3. To be monitored for next closure.

Audit Checklist

Approval Line Item	Action	Finding: Information	Compliant	Non-Compliant	Not applicable	Opportunity for Improvement	Pending	Documents Reviewed	Details
7.1.6 (c)	Survey reports showing the final cover depths.				X			Not applicable	Last closure was performed in 2016 for Cell 3. To be monitored for next closure.
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			Not applicable	Last closure was performed in 2016 for Cell 3. To be monitored for next closure.
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 Detailed Final Landfill Closure Plan. - A Landfill Post-Closure Plan.				X			Not applicable	The landfill is still operational and expanding.
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.

Audit Checklist

Approval Line Item	Action	Finding: Information	Finding: Compliant	Finding: Non-Compliant	Finding: Not applicable	Finding: Opportunity for Improvement	Finding: Pending	Documents Reviewed	Details
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.
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.

Audit Checklist

Approval Line Item		Action	Finding						Documents Reviewed	Details
			Information	Compliant	Non-Compliant	Not applicable	Opportunity for Improvement	Pending		
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					Verbal confirmation by multiple parties, submitted documentation	Old surface water detention pond did not exist at the time of the audit.
	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		Verbal confirmation by multiple parties, submitted documentation	Appropriate documentation submitted and approved by AEP, but documentation is not specifically referenced as a "Decommissioning and Land Reclamation Plan" for the old pond, and is instead included in the Soil Management Program and Sampling Proposal. This could be split out as a standalone document for better tracking in future.
	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

Integrity Testing SERVICES INC.

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	08/17/20	24.70	0.2045	0.0991	100.00
04	SOUTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/17/20	25.00	0	0.0506	100.00
06	WEST WALL T-B	N/S	N/S	N/S	N/S	N/S	08/17/20	24.50	0	0.0910	100.00
08	WEST WALL T-B	N/S	N/S	N/S	N/S	N/S	08/17/20	24.60	0.1022	0.1274	100.00
10	WEST WALL T-B	N/S	N/S	N/S	N/S	N/S	08/17/20	24.50	0	0.1041	100.00
12	NORTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/17/20	25.20	0	0.0637	100.00
14	NORTH WALL T-B	N/S	N/S	N/S	N/S	N/S	08/17/20	25.20	0	0.0283	100.00
16	EAST WALL T-B	N/S	N/S	N/S	N/S	N/S	08/17/20	24.30	**0.4090**	0.1092	100.00
18	EAST WALL T-B	N/S	N/S	N/S	N/S	N/S	08/17/20	24.30	**0.3067**	0.1112	100.00
20	EAST WALL T-B	N/S	N/S	N/S	N/S	N/S	08/17/20	24.40	0	0.1143	100.00
22	SOUTH FLOOR N-S	N/S	N/S	N/S	N/S	N/S	08/17/20	23.50	**0.8179**	0.2022	100.00
24	MID FLOOR N-S	N/S	N/S	N/S	N/S	N/S	08/17/20	23.80	0.1537	0.0000	100.00
26	NORTH FLOOR N-S	N/S	N/S	N/S	N/S	N/S	08/17/20	23.90	0.1598	0.0000	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.**).

Integrity Testing SERVICES INC.

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	08/17/20	17.70	**0.5112**	0.1840	100.00
Comments: 2020/08 - PITTING/CORROSION NOTED.											
24	MID FLOOR E-W	N/S	N/S	N/S	N/S	N/S	08/17/20	17.60	**0.2863**	0.0000	100.00
Comments: 2020/08 - PITTING/CORROSION NOTED.											
26	EAST FLOOR E-W	N/S	N/S	N/S	N/S	N/S	08/17/20	17.50	0.2454	0.0000	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.**).

Report No.: VI-1-4373-02-MRM

Integrity Testing Services Inc.
Tel.: (780) 417-0340
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TANK INTERNAL INSPECTION REPORT

Customer:	Clean Harbors	**ITS Job No.:**	1-4373
District:	Central	**Date:**	17-Aug-2020
Facility:	Ryley Fac.	**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
☐ Adequate Cleaning	☑ Internal Inspection	☑ Not Applicable	☑ Not Applicable
☐ No Action Required	☐ Part. Internal Inspection	☐ Good Condition	☐ Good Condition
☐ Paint/Coating Repairs	NDE Examination	☐ Coated ☐ Full ☐ Partial	☐ Corrosion
☐ Further Assessment Required	☑ UT	☐ Holidays/Cracking	☐ Pitting: (max depth)
	☐ MT	☐ Blisters/Bulges	☐ Cracked
☐ Condition Damage	☐ PT	☐ Flaking	☐ Scaled
☐ Does not comply with applicable code/safe operating requirement.	☐ RT	☐ See Comments	☐ Worn
	☐ BH	**Internal Supports**	☐ Loose
	☐ MFL	☑ Not Applicable	☐ Poor Installation
☐ Repairs Required	☐ Other	☐ Good Condition	☐ See Comments
☑ See Comments	☐ Double Walled	☐ Distorted	**Bolted Tanks**
Manway	☐ See Comments	☐ Cracked	☑ Not Applicable
☑ Not Applicable	**Internal Components**	☐ Broken	☐ Good Condition
☐ Good Condition	☐ Anodes Present	☐ Poor Installation	☐ Missing Bolts
☐ Coating Damage	☐ Level Gauge Float in Good Condition	☐ Bolts Missing/ Loose/ Damage	☐ Gasket in Good Condition
☐ Internal Corrosion			
☐ Mechanical Damage	☐ Level Gauge Float or Lower Support Attachment Damaged	☐ See Comments	☐ Gasket Damaged
☐ Seal Face Corrosion			☐ Seepage at Seams
☐ Pitting: (max depth)	☐ Level Gauge Float Wires Damaged		☐ Leakage at Seams
☐ See Comments			☐ See Comments
	☑ See Comments		

Shell Internal	Floor (Internal)	Nozzle Internal	Firetube(s)
☐ Good Condition	☑ Good Condition	☐ RF ☐ NPT	☑ Not Applicable
☑ Internal Corrosion	☐ Internal Corrosion	☐ Good Condition	☐ Good Condition
☐ Pitting: (max depth)	☐ Pitting: (max depth)	☐ Nozzles are Gusseted	☐ Corrosion
☐ Scale	☐ Scale	☐ Nozzles Plugged	☐ Pitting: (max depth)
☐ Blistered	☐ Blistered	☐ Internal Corrosion	☐ Wear/Erosion
☐ Mechanical Damage	☐ Mechanical Damage	☐ Damaged/Cracked	☐ Cracked
☐ Deformation/Distortion	☐ Deformation/Distortion	☐ Deflection/Distortion	☐ Scaled
☑ Weld(s) in Good Condition	☑ Weld(s) in Good Condition	☐ Partial Internal Inspection	☐ Coated
☐ Weld(s) Corroded	☐ Weld(s) Corroded	☐ Weld(s) in Good Condition	☐ Heat Impinged
☐ Weld(s) Poor Quality	☐ Weld(s) Poor Quality	☐ Weld(s) Corroded	☐ Burner Misalignment
☐ Weld(s) Cracked	☐ Weld(s) Cracked	☐ Weld(s) Poor Quality	☐ Damaged Supports
☐ Previous Repairs	☐ Previous Repairs	☐ Weld(s) Cracked	☐ Damaged Guides/Tracks
☑ See Comments	☑ See Comments	☑ See Comments	
			☐ See Comments

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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 approx. depth of 0.070” – 0.100”.
- 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:

- Continue to monitor the internal surface and soil side corrosion.
- Consider repairing / replacing the lifting lugs.

Non-Conformance Conditions and Corrective Actions:

Note: Reference any and all Non-Conformance Report (NCR) numbers and Corrective Action Report (CAR) numbers.

- None at this time.

Recommended Inspection Interval:

Recommended Maximum Inspection Interval: 12 Months

Pictures:

(Photo 1) Overview

(Photo 2) North wall

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Pictures:

(Photo 3) East wall

(Photo 4) South wall

(Photo 5) West wall

(Photo 6) Floor

(Photo 7) Lifting lug

(Photo 8) Lifting lug (2)

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Pictures:

(Photo 9) Lifting lug (3)

(Photo 10) Lifting lug (4)

(Photo 11) Corrosion pitting

(Photo 12) Corrosion pitting (2)

(Photo 13) Corrosion pitting (2) depth

(Photo 14) Mechanical damage

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Pictures:

(Photo 15) Mechanical damage (2)

Internal Inspection Performed By:

Print Name: Michael Ryan Michielin

Certification No.: ABSA IPV PESL: 001039
API 510: 61449

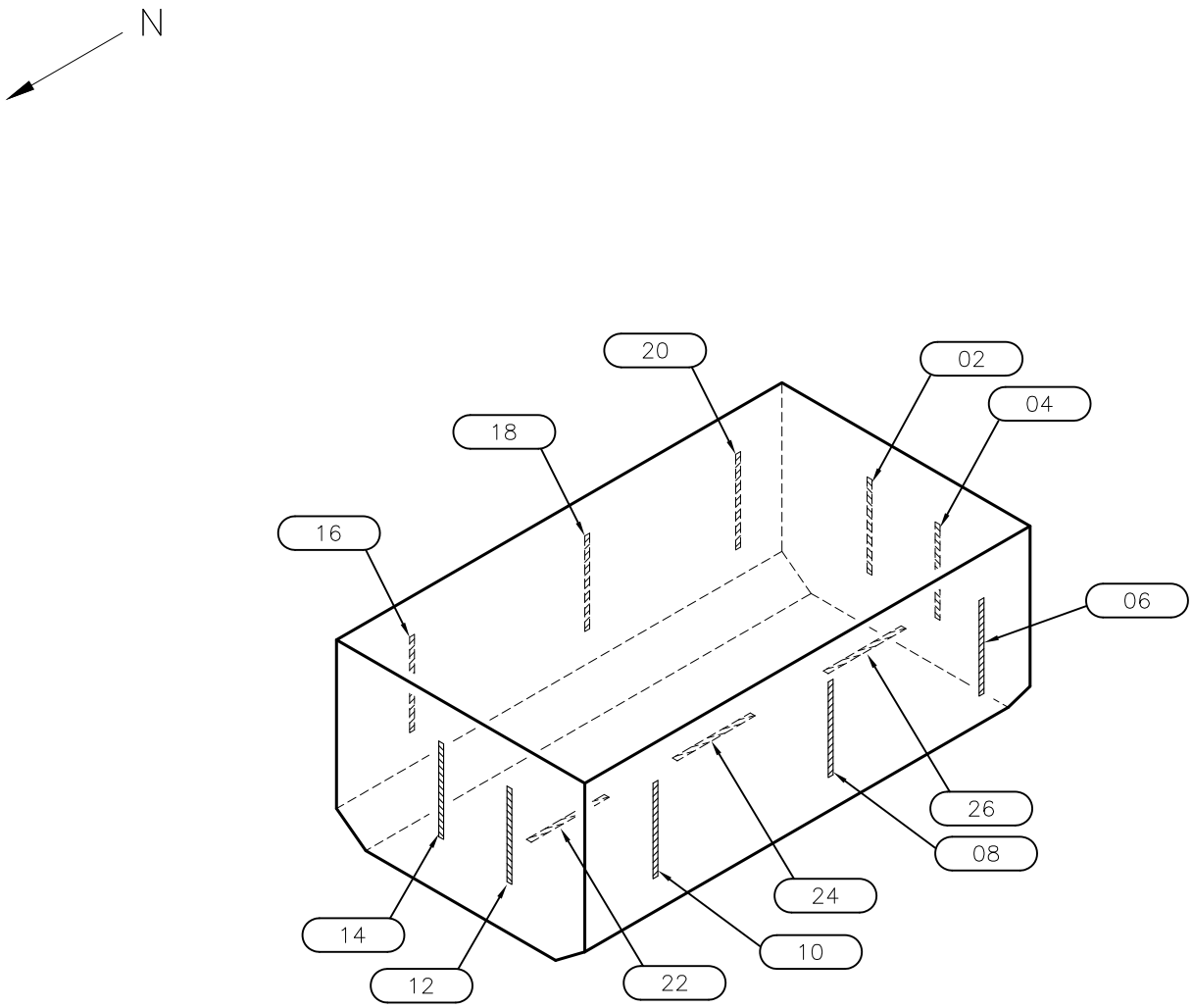
Signature:

Report Reviewed: Initial

Chief Inspector / Client Representative:

Name (Print) | Signature | Date:

Integrity Testing SERVICES INC.



☐ Column ☐ Cooler ☐ Exchanger ☐ Furnace ☐ Heater ☐ Plate Exchanger ☐ Reboiler ☐ Vessel ☒ Other

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	C.A.:	N/S
HEAD Material:		Nominal:			
SHELL Material:	N/S	Nominal:	N/S	C.A.:	N/S
SHELL Material:		Nominal:			
MAWP S.Side @TEMP:	N/S	MAWP T.Side @TEMP:			

Comments: NO NAMEPLATE.

Client:, District:, LSD:, Etc.:

CLEAN HARBORS
RYLEY FACILITY

LSD 04-09-050-17W4M

Tech.: MRM	Date: 08/2020
ITS Job No.: 1-4373	DWG No.: 006

Integrity Testing SERVICES INC.

Unit: 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		

EQUIPMENT INSPECTION SUMMARY:

NO DATA PLATE
2020/08 - ALL READINGS CONFIRMED.

Description: **SOUTH WALL T-B** **CML: 006-02**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**24.70 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	25.01 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY	09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	25.50	25.40	25.50	25.50	24.90	24.90	25.20		0.0000	0.0303	100.00
2	25.48	25.50	25.40	25.40	25.00	25.00	25.30		0.0000	0.0182	100.00
3	25.48	25.50	25.30	25.30	25.00	25.00	25.10		0.0000	0.0384	100.00
4	25.27	25.50	25.40	25.20	25.10	25.10	25.10		0.0000	0.0172	100.00
5	25.68	25.40	25.50	25.10	24.90	24.90	24.70		0.2045	0.0991	100.00
6	25.40	25.30	25.30	25.20	24.10	24.10	24.80		0.0000	0.0607	100.00
7	25.83	25.40	25.30	25.40	25.00	25.00	25.00		0.0000	0.0839	100.00
8	25.55	25.40	25.30	25.40	25.00	25.00	24.90		0.1022	0.0657	100.00

Description: **SOUTH WALL T-B** **CML: 006-04**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**25.00 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	25.00 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY	09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	25.50	25.50	25.30	25.00	24.80	24.80	25.00		0.0000	0.0506	100.00
2	25.76	25.30	25.40	25.00	24.70	24.70	25.00		0.0000	0.0768	100.00
3	25.48	25.40	25.50	25.20	24.90	24.80	25.00		0.0000	0.0485	100.00
4	25.58	25.40	25.60	25.30	24.50	24.50	25.00		0.0000	0.0586	100.00
5	25.50	25.30	25.40	25.10	24.50	24.50	25.00		0.0000	0.0506	100.00
6	25.71	25.30	25.50	25.00	24.50	24.50	25.00		0.0000	0.0718	100.00
7	25.68	25.30	25.30	25.00	24.10	24.10	25.00		0.0000	0.0688	100.00
8	25.68	25.20	25.20	25.00	24.10	24.10	25.00		0.0000	0.0688	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.**).

Integrity Testing SERVICES INC.

Unit: 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		

Description: **WEST WALL T-B** **CML: 006-06**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**24.50 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	24.80 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	25.50	25.00	25.10	25.30	25.00	25.00	25.00	0.0000	0.0506	100.00
2	25.65	25.10	25.10	25.10	24.90	24.90	24.80	0.1022	0.0859	100.00
3	25.40	25.10	25.00	25.20	24.90	24.90	24.90	0.0000	0.0506	100.00
4	25.50	25.10	25.10	24.80	24.90	25.00	25.00	0.0000	0.0506	100.00
5	25.40	25.00	25.10	25.00	24.50	24.50	24.50	0.0000	0.0910	100.00
6	25.27	25.00	25.10	24.80	25.00	24.90	24.80	0.1022	0.0475	100.00
7	25.48	25.10	25.00	24.80	25.00	24.70	24.70	0.0000	0.0789	100.00
8	25.88	25.00	25.00	25.10	25.00	25.00	24.70	**0.3067**	0.1193	100.00

Description: **WEST WALL T-B** **CML: 006-08**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**24.60 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	24.83 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	25.86	24.80	25.10	25.20	24.70	24.70	24.60	0.1022	0.1274	100.00
2	25.48	25.00	25.10	25.00	24.70	24.90	25.00	0.0000	0.0485	100.00
3	25.53	24.90	25.10	25.10	24.70	24.70	24.90	0.0000	0.0637	100.00
4	25.43	25.00	25.00	25.00	24.80	24.80	24.80	0.0000	0.0637	100.00
5	25.40	24.90	25.00	25.10	24.70	24.80	24.80	0.0000	0.0607	100.00
6	25.71	24.90	25.10	25.10	24.80	24.80	24.80	0.0000	0.0920	100.00
7	25.45	24.80	24.90	25.10	24.90	24.90	24.90	0.0000	0.0556	100.00
8	25.50	24.80	25.10	25.00	25.00	24.80	24.80	0.0000	0.0708	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.**).

Integrity Testing SERVICES INC.

Unit: 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		

Description: **WEST WALL T-B** **CML: 006-10**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**24.50 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	24.81 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	25.45	25.10	25.30	25.00	24.90	24.90	24.90	0.0000	0.0556	100.00
2	25.32	25.10	25.40	25.00	24.70	24.80	24.80	0.0000	0.0526	100.00
3	25.45	25.10	25.20	25.00	24.70	24.70	24.90	0.0000	0.0556	100.00
4	25.78	25.10	24.90	25.00	24.70	24.70	24.90	0.0000	0.0890	100.00
5	25.38	25.00	25.10	25.00	24.70	24.70	24.70	0.0000	0.0688	100.00
6	25.68	25.10	25.30	24.90	24.80	24.70	24.90	0.0000	0.0789	100.00
7	25.40	25.10	25.20	25.00	24.60	24.60	24.90	0.0000	0.0506	100.00
8	25.53	25.10	25.30	24.90	24.50	24.50	24.50	0.0000	0.1041	100.00

Description: **NORTH WALL T-B** **CML: 006-12**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**25.20 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	25.23 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	25.78	25.40	25.50	25.10	25.10	25.10	25.30	0.0000	0.0485	100.00
2	25.83	25.60	25.40	25.30	25.10	25.10	25.20	0.0000	0.0637	100.00
3	25.58	25.60	25.30	25.30	25.00	25.00	25.30	0.0000	0.0283	100.00
4	25.50	25.80	24.90	25.40	25.10	25.10	25.20	0.0000	0.0303	100.00
5	25.45	25.90	25.00	25.30	25.10	25.10	25.20	0.0000	0.0253	100.00
6	25.43	25.50	25.20	25.30	25.10	25.10	25.20	0.0000	0.0233	100.00
7	25.50	25.60	25.10	25.40	25.10	25.10	25.20	0.0000	0.0303	100.00
8	25.58	25.50	25.20	25.40	25.10	25.10	25.20	0.0000	0.0384	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.**).

Integrity Testing SERVICES INC.

Unit: 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		

Description: **NORTH WALL T-B** **CML: 006-14**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**25.20 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	25.29 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	25.48	25.40	25.50	25.10	25.00	25.00	25.20	0.0000	0.0283	100.00
2	25.48	25.40	25.40	25.00	25.00	25.00	25.20	0.0000	0.0283	100.00
3	25.50	25.50	25.30	25.40	25.00	25.00	25.20	0.0000	0.0303	100.00
4	25.55	25.50	25.40	25.30	25.00	24.90	25.20	0.0000	0.0354	100.00
5	25.43	25.50	25.40	25.30	24.90	24.90	25.30	0.0000	0.0131	100.00
6	25.53	25.40	25.20	25.10	25.00	25.00	25.40	0.0000	0.0131	100.00
7	25.60	25.40	25.30	25.20	25.00	25.00	25.40	0.0000	0.0202	100.00
8	25.58	25.40	25.30	25.20	24.90	24.90	25.40	0.0000	0.0182	100.00

Description: **EAST WALL T-B** **CML: 006-16**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**24.30 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	24.60 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	25.48	25.20	25.50	24.40	24.80	24.80	24.70	0.1022	0.0789	100.00
2	25.38	25.10	25.30	24.90	24.80	24.70	24.30	**0.4090**	0.1092	100.00
3	25.40	25.10	25.00	24.90	24.80	24.70	24.70	0.0000	0.0708	100.00
4	25.50	25.10	25.10	25.00	24.90	24.80	24.80	0.0000	0.0708	100.00
5	25.63	25.00	25.50	24.90	24.80	24.80	24.50	**0.3067**	0.1143	100.00
6	25.60	25.20	25.40	25.10	24.80	24.70	24.60	0.1022	0.1011	100.00
7	25.76	25.00	25.40	25.00	24.80	24.70	24.70	0.0000	0.1072	100.00
8	25.71	25.10	25.30	25.10	24.80	24.70	24.50	0.2045	0.1223	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.**).

Integrity Testing SERVICES INC.

Unit: 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		

Description: **EAST WALL T-B** **CML: 006-18**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**24.30 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	24.59 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY	09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1		25.53	25.50	25.10	24.30	24.70	24.70	24.70	0.0000	0.0839	100.00
2		25.43	25.20	25.30	24.60	24.70	24.70	24.50	0.2045	0.0940	100.00
3		25.48	25.40	25.20	24.90	24.60	24.60	24.50	0.1022	0.0991	100.00
4		25.71	25.20	25.10	24.90	24.50	24.50	24.60	0.0000	0.1122	100.00
5		25.40	25.10	24.90	24.90	24.60	24.60	24.30	**0.3067**	0.1112	100.00
6		25.40	25.10	25.00	25.00	24.60	24.60	24.70	0.0000	0.0708	100.00
7		25.71	25.10	25.00	24.90	24.60	24.70	24.80	0.0000	0.0920	100.00
8		26.01	25.00	25.00	24.90	24.60	24.70	24.60	0.1022	0.1426	100.00

Description: **EAST WALL T-B** **CML: 006-20**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**24.40 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	24.59 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY	09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1		25.55	25.10	25.10	25.00	24.70	24.70	24.80	0.0000	0.0758	100.00
2		25.55	25.10	25.10	25.00	24.70	24.80	24.70	0.1022	0.0859	100.00
3		25.50	25.00	25.00	25.20	24.50	24.50	24.50	0.0000	0.1011	100.00
4		25.53	25.00	25.00	25.10	24.40	24.40	24.40	0.0000	0.1143	100.00
5		25.50	24.70	24.90	25.10	24.40	24.40	24.50	0.0000	0.1011	100.00
6		25.73	25.00	24.90	25.10	24.50	24.70	24.80	0.0000	0.0940	100.00
7		25.86	25.10	24.90	25.10	24.50	24.30	24.50	0.0000	0.1375	100.00
8		25.58	24.90	24.90	25.10	24.50	24.10	24.50	0.0000	0.1092	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.**).

Integrity Testing SERVICES INC.

Unit: 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		

Description: **SOUTH FLOOR N-S** **CML: 006-22**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**23.50 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	23.85 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	25.40	24.60	24.20	24.50	24.50	24.50	24.00	**0.5112**	0.1416	100.00
2	25.38	24.80	24.20	24.50	24.40	24.30	24.00	**0.3067**	0.1395	100.00
3	25.76	24.50	24.10	24.50	24.30	24.30	23.90	**0.4090**	0.1881	100.00
4	25.48	24.40	24.10	24.60	24.20	24.30	23.60	**0.7157**	0.1901	100.00
5	25.60	24.40	23.90	24.50	24.20	24.40	23.80	**0.6134**	0.1820	100.00
6	25.38	24.40	23.70	24.50	24.20	24.30	24.00	**0.3067**	0.1395	100.00
7	25.40	24.30	23.60	24.50	24.50	24.30	24.00	**0.3067**	0.1416	100.00
8	25.50	24.30	23.60	24.40	24.50	24.30	23.50	**0.8179**	0.2022	100.00

Description: **MID FLOOR N-S** **CML: 006-24**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**23.80 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	23.81 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	25.38	24.40	24.30	24.30	23.80	No Access	23.90	0.0000	0.1496	100.00
2	25.32	24.50	24.10	24.20	23.80		23.80	0.0000	0.1537	100.00
3	25.40	24.40	24.00	24.20	23.90		23.80	0.0433	0.1618	100.00
4	25.38	24.60	23.90	24.20	24.10		23.80	0.1299	0.1598	100.00
5	25.38	24.40	24.10	24.20	24.10		23.80	0.1299	0.1598	100.00
6	25.38	24.50	24.10	24.40	24.10		23.80	0.1299	0.1598	100.00
7	25.35	24.40	24.10	24.30	24.00		23.80	0.0866	0.1567	100.00
8	25.38	24.40	24.10	24.30	24.00		23.80	0.0866	0.1598	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.**).

Integrity Testing SERVICES INC.

Unit: 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		

Description: **NORTH FLOOR N-S** **CML: 006-26**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**23.90 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	24.06 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY	09/29/10	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	25.48	25.00	24.10	24.50	24.50	No Access		24.30	0.0866	0.1193	100.00
2	25.50	25.20	24.10	24.40	24.40			24.20	0.0866	0.1314	100.00
3	25.71	25.00	24.20	24.50	24.40			24.00	0.1732	0.1729	100.00
4	25.58	25.20	24.30	24.40	24.30			24.10	0.0866	0.1496	100.00
5	25.55	24.90	24.10	24.50	24.40			24.00	0.1732	0.1567	100.00
6	25.53	24.90	24.20	24.50	24.50			24.00	0.2165	0.1547	100.00
7	25.48	24.20	24.20	24.50	24.50			23.90	**0.2598**	0.1598	100.00
8	25.50	24.20	24.30	24.50	24.60			24.00	**0.2598**	0.1517	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.**).

Report No.: VI-1-4373-01-MRM

Integrity Testing Services Inc.
Tel.: (780) 417-0340
Fax: (780) 417-0348
www.integrity-testing.com

TANK INTERNAL INSPECTION REPORT

Customer:	Clean Harbors	**ITS Job No.:**	1-4373
District:	Central	**Date:**	17-Aug-2020
Facility:	Ryley Fac.	**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
☐ Adequate Cleaning	☑ Internal Inspection	☑ Not Applicable	☑ Not Applicable
☐ No Action Required	☐ Part. Internal Inspection	☐ Good Condition	☐ Good Condition
☐ Paint/Coating Repairs	NDE Examination	☐ Coated ☐ Full ☐ Partial	☐ Corrosion
☐ Further Assessment Required	☑ UT	☐ Holidays/Cracking	☐ Pitting: (max depth)
	☐ MT	☐ Blisters/Bulges	☐ Cracked
☐ Condition Damage	☐ PT	☐ Flaking	☐ Scaled
☐ Does not comply with applicable code/safe operating requirement.	☐ RT	☐ See Comments	☐ Worn
	☐ BH	**Internal Supports**	☐ Loose
	☐ MFL	☑ Not Applicable	☐ Poor Installation
☐ Repairs Required	☐ Other	☐ Good Condition	☐ See Comments
☑ See Comments	☐ Double Walled	☐ Distorted	**Bolted Tanks**
Manway	☐ See Comments	☐ Cracked	☑ Not Applicable
☑ Not Applicable	**Internal Components**	☐ Broken	☐ Good Condition
☐ Good Condition	☐ Anodes Present	☐ Poor Installation	☐ Missing Bolts
☐ Coating Damage	☐ Level Gauge Float in Good Condition	☐ Bolts Missing/ Loose/ Damage	☐ Gasket in Good Condition
☐ Internal Corrosion			
☐ Mechanical Damage	☐ Level Gauge Float or Lower Support Attachment Damaged	☐ See Comments	☐ Gasket Damaged
☐ Seal Face Corrosion			☐ Seepage at Seams
☐ Pitting: (max depth)	☐ Level Gauge Float Wires Damaged		☐ Leakage at Seams
☐ See Comments			☐ See Comments
	☑ See Comments		

Shell Internal	Floor (Internal)	Nozzle Internal	Firetube(s)
☐ Good Condition	☑ Good Condition	☐ RF ☐ NPT	☑ Not Applicable
☑ Internal Corrosion	☐ Internal Corrosion	☐ Good Condition	☐ Good Condition
☐ Pitting: (max depth)	☐ Pitting: (max depth)	☐ Nozzles are Gusseted	☐ Corrosion
☐ Scale	☐ Scale	☐ Nozzles Plugged	☐ Pitting: (max depth)
☐ Blistered	☐ Blistered	☐ Internal Corrosion	☐ Wear/Erosion
☐ Mechanical Damage	☐ Mechanical Damage	☐ Damaged/Cracked	☐ Cracked
☐ Deformation/Distortion	☐ Deformation/Distortion	☐ Deflection/Distortion	☐ Scaled
☑ Weld(s) in Good Condition	☑ Weld(s) in Good Condition	☐ Partial Internal Inspection	☐ Coated
☐ Weld(s) Corroded	☐ Weld(s) Corroded	☐ Weld(s) in Good Condition	☐ Heat Impinged
☐ Weld(s) Poor Quality	☐ Weld(s) Poor Quality	☐ Weld(s) Corroded	☐ Burner Misalignment
☐ Weld(s) Cracked	☐ Weld(s) Cracked	☐ Weld(s) Poor Quality	☐ Damaged Supports
☐ Previous Repairs	☐ Previous Repairs	☐ Weld(s) Cracked	☐ Damaged Guides/Tracks
☑ See Comments	☑ See Comments	☑ See Comments	
			☐ See Comments

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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 approx. 0.070” - 0.100”.
- 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:

- Continue to monitor the internal surface and soil side corrosion/pitting.

Non-Conformance Conditions and Corrective Actions:

Note: Reference any and all Non-Conformance Report (NCR) numbers and Corrective Action Report (CAR) numbers.

- None at this time.

Recommended Inspection Interval:

Recommended Maximum Inspection Interval: 12 Months

Pictures:

(Photo 1) Overview

(Photo 2) North wall

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Pictures:

(Photo 3) East wall

(Photo 4) South wall

(Photo 5) West wall

(Photo 6) Internal corrosion and pitting

(Photo 7) Internal corrosion and pitting (2)

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Internal Inspection Performed By:

Print Name: Michael Ryan Michielin

Certification No.: ABSA IPV PESL: 001039
API 510: 61449

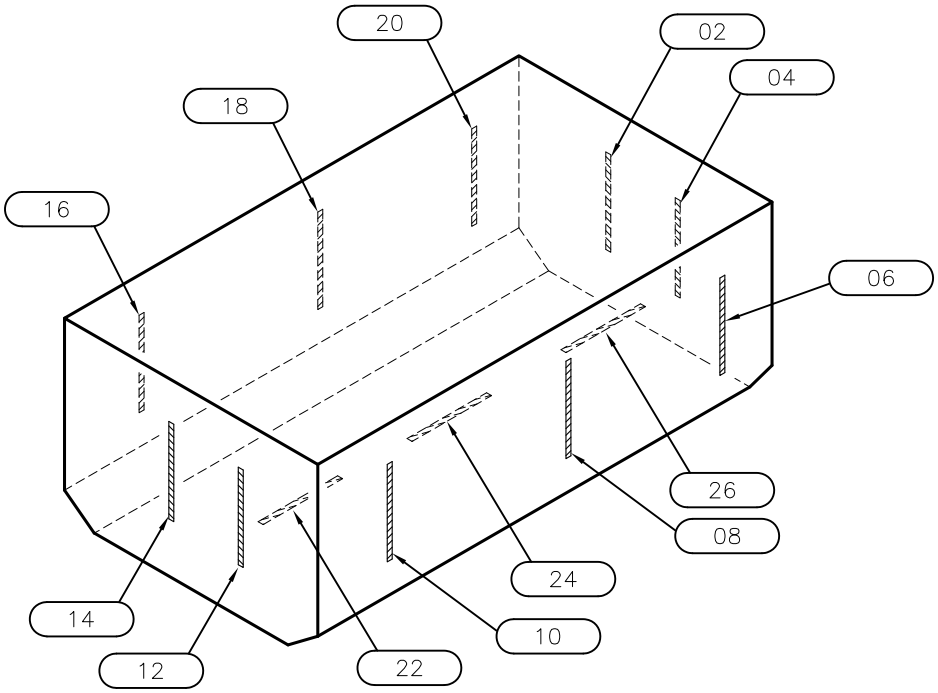
Signature:

Report Reviewed: Initial

Chief Inspector / Client Representative:

Name (Print) | Signature | Date:

Integrity Testing SERVICES INC.



☐ Column ☐ Cooler ☐ Exchanger ☐ Furnace ☐ Heater ☐ Plate Exchanger ☐ Reboiler ☐ Vessel ☒ Other

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	C.A.:	N/S
HEAD Material:		Nominal:			
SHELL Material:	N/S	Nominal:	N/S	C.A.:	N/S
SHELL Material:		Nominal:			
MAWP S.Side @TEMP:	N/S	MAWP T.Side @TEMP:			

Comments: NO NAMEPLATE.

Client:, District:, LSD:, Etc.:

CLEAN HARBORS
RYLEY FACILITY

LSD 04-09-050-17W4M

Tech.: MRM	Date: 08/2020
ITS Job No.: 1-4373	DWG No.: 017

Integrity Testing SERVICES INC.

Unit: 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		

EQUIPMENT INSPECTION SUMMARY:

NO DATA PLATE

Description: **EAST WALL (1) T-B** **CML: 017-02**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**18.00 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	18.25 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	19.30	18.90	19.00	18.80	18.80	18.60		0.2045	0.1431	100.00
2	19.30	18.90	18.90	18.80	18.80	18.30		**0.5112**	0.2045	100.00
3	19.40	18.90	18.90	18.60	18.60	18.40		0.2045	0.2045	100.00
4	19.40	18.70	18.90	18.30	18.30	18.20		0.1022	0.2454	100.00
5	19.30	18.90	19.00	17.40	17.40	18.00		0.0000	**0.2658**	100.00
6	19.40	19.20	18.90	17.40	17.30	18.00		0.0000	**0.2863**	100.00

Description: **EAST WALL (2) T-B** **CML: 017-04**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**17.50 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	18.15 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	19.30	19.40	18.70	18.50	18.50	18.30		0.2045	0.2045	100.00
2	19.40	19.10	18.90	18.80	18.80	18.10		**0.7157**	**0.2658**	100.00
3	19.50	19.10	18.00	17.60	17.50	17.50		0.0000	**0.4090**	100.00
4	19.50	19.00	17.50	18.00	18.00	18.00		0.0000	**0.3067**	100.00
5	19.60	18.90	17.90	18.70	18.70	18.70		0.0000	0.1840	100.00
6	19.50	18.80	19.10	18.70	18.50	18.30		0.2045	0.2454	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.**).

Integrity Testing SERVICES INC.

Unit: 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		

Description: **EAST SOUTH WALL T-B** **CML: 017-06**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**16.20 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	17.05 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	18.90	18.40	18.00	18.50	18.50	16.40	**2.1471**	**0.5112**	100.00
2	18.90	18.50	18.10	18.50	18.50	16.80	**1.7381**	**0.4294**	100.00
3	18.80	18.50	18.10	18.10	18.10	16.20	**1.9426**	**0.5317**	100.00
4	18.80	18.10	18.80	18.30	18.30	16.80	**1.5336**	**0.4090**	100.00
5	18.90	18.30	18.50	18.40	18.40	18.10	**0.3067**	0.1636	100.00
6	18.90	18.40	18.50	18.20	18.10	18.00	0.1022	0.1840	100.00

COMMENTS:
2020/08 - PITTING/CORROSION NOTED.

Description: **MID SOUTH WALL T-B** **CML: 017-08**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**17.80 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	18.10 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	18.90	18.80	18.90	18.60	18.60	17.80	**0.8179**	0.2249	100.00
2	18.90	18.60	17.60	18.70	18.50	18.20	**0.3067**	0.1431	100.00
3	18.80	18.60	18.70	18.60	18.50	18.10	**0.4090**	0.1431	100.00
4	18.70	18.70	17.90	18.40	18.20	18.10	0.1022	0.1227	100.00
5	18.80	18.80	18.60	18.60	18.20	18.00	0.2045	0.1636	100.00
6	18.90	18.80	18.80	18.60	18.40	18.40	0.0000	0.1022	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.**).

Integrity Testing SERVICES INC.

Unit: 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		

Description: **WEST SOUTH WALL T-B** **CML: 017-10**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**17.90 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	18.23 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	18.80	18.80	19.00	18.50	18.50	18.10	**0.4090**	0.1431	100.00
2	18.80	18.80	18.90	18.50	18.30	18.30	0.0000	0.1022	100.00
3	18.90	18.80	18.80	18.50	18.40	17.90	**0.5112**	0.2045	100.00
4	18.90	18.90	18.90	18.60	18.40	18.30	0.1022	0.1227	100.00
5	18.90	18.80	18.80	18.30	18.50	18.50	0.0000	0.0818	100.00
6	18.90	18.80	18.80	18.40	18.30	18.30	0.0000	0.1227	100.00

COMMENTS:
2020/08 - PITTING/CORROSION NOTED.

Description: **WEST WALL (1) T-B** **CML: 017-12**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**18.50 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	18.68 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	19.10	18.40	19.20	19.30	19.30	18.70	**0.6134**	0.0818	100.00
2	19.20	19.40	19.20	19.30	19.30	18.60	**0.7157**	0.1227	100.00
3	19.40	19.90	19.30	19.20	19.20	18.80	**0.4090**	0.1227	100.00
4	19.30	19.40	19.30	18.60	18.60	18.80	0.0000	0.1022	100.00
5	19.30	19.50	19.50	18.70	18.50	18.50	0.0000	0.1636	100.00
6	19.20	19.60	19.10	18.80	18.70	18.70	0.0000	0.1022	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.**).

Integrity Testing SERVICES INC.

Unit: 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		

Description: **WEST WALL (2) T-B** **CML: 017-14**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**18.70 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	18.87 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	19.60	19.30	19.10	19.10	19.10	19.00	0.1022	0.1227	100.00
2	19.70	19.20	19.10	18.80	18.80	18.80	0.0000	0.1840	100.00
3	19.50	19.20	19.10	18.90	18.90	19.00	0.0000	0.1022	100.00
4	19.70	19.00	19.10	18.70	18.70	18.70	0.0000	0.2045	100.00
5	19.50	19.10	19.00	18.80	18.80	18.80	0.0000	0.1431	100.00
6	19.20	19.20	19.00	18.90	18.90	18.90	0.0000	0.0613	100.00

Description: **WEST NORTH WALL T-B** **CML: 017-16**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**17.40 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	17.98 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	19.20	19.20	19.00	18.90	18.90	18.10	**0.8179**	0.2249	100.00
2	19.00	19.00	19.10	17.90	18.00	18.00	0.0000	0.2045	100.00
3	19.30	19.00	18.90	18.60	18.30	17.90	**0.4090**	**0.2863**	100.00
4	18.90	18.90	18.90	18.20	18.20	18.20	0.0000	0.1431	100.00
5	18.70	19.00	16.20	18.30	18.30	18.30	0.0000	0.0818	100.00
6	18.60	19.00	17.70	17.40	17.40	17.40	0.0000	0.2454	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.**).

Integrity Testing SERVICES INC.

Unit: 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		

Description: **MID NORTH WALL T-B** **CML: 017-18**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**17.00 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	17.97 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	18.90	18.80	18.90	18.90	18.90	18.20	**0.7157**	0.1431	100.00
2	18.80	18.80	18.90	17.50	17.70	17.70	0.0000	0.2249	100.00
3	18.90	18.70	18.80	17.00	17.00	17.00	0.0000	**0.3885**	100.00
4	18.80	18.70	18.70	18.50	18.20	18.20	0.0000	0.1227	100.00
5	18.90	18.50	18.70	18.80	18.50	18.30	0.2045	0.1227	100.00
6	18.80	18.60	18.70	18.60	18.40	18.40	0.0000	0.0818	100.00

COMMENTS:
2020/08 - PITTING/CORROSION NOTED.

Description: **EAST NORTH WALL T-B** **CML: 017-20**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**13.40 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	16.70 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	19.10	18.70	18.80	18.20	18.20	13.40	**4.9076**	**1.1655**	100.00
2	19.10	18.80	18.90	18.00	18.00	17.80	0.2045	**0.2658**	100.00
3	19.00	18.90	18.80	15.90	15.90	16.50	0.0000	**0.5112**	100.00
4	19.00	18.80	17.80	18.00	17.50	17.50	0.0000	**0.3067**	100.00
5	18.90	18.70	16.90	17.80	17.30	17.50	0.0000	**0.2863**	100.00
6	18.90	18.80	18.00	18.20	17.80	17.50	**0.3067**	**0.2863**	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.**).

Integrity Testing SERVICES INC.

Unit: 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		

Description: **WEST FLOOR E-W** **CML: 017-22**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**17.70 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	17.80 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	18.70	18.60	18.50	18.30	18.30	17.80	**0.5112**	0.1840	100.00
2	18.60	18.60	18.40	18.30	18.20	17.70	**0.5112**	0.1840	100.00
3	18.50	18.50	18.40	18.30	18.00	17.90	0.1022	0.1227	100.00
4	18.50	18.50	18.50	18.40	18.40	17.70	**0.7157**	0.1636	100.00
5	18.60	18.60	18.50	18.20	18.00	17.80	0.2045	0.1636	100.00
6	18.70	18.70	18.40	18.30	18.00	17.90	0.1022	0.1636	100.00

COMMENTS:
2020/08 - PITTING/CORROSION NOTED.

Description: **MID FLOOR E-W** **CML: 017-24**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**17.60 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	17.73 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY 09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	18.80	18.70	18.60	18.20	No Access	17.70	0.2165	0.2249	100.00
2	18.70	18.60	18.60	18.20		17.80	0.1732	0.1840	100.00
3	18.80	18.60	18.60	18.20		17.80	0.1732	0.2045	100.00
4	19.00	18.60	18.60	18.20		17.60	**0.2598**	**0.2863**	100.00
5	18.90	18.70	18.60	18.10		17.70	0.1732	0.2454	100.00
6	18.80	18.70	18.60	18.20		17.80	0.1732	0.2045	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.**).

Integrity Testing SERVICES INC.

Unit: 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		

Description: **EAST FLOOR E-W** **CML: 017-26**

NOM. THICK.:	Not Stated	MATERIAL:	
MILL. TOL.:	Not Stated	MINIMUM THICKNESS MEASURED:	**17.50 mm**
CA:	Not Stated	AVERAGE THICKNESS MEASURED:	17.67 mm
MIN. NOM.:	Not Stated	CALCULATED T-MIN:	Not Stated

Rdg.	B/L Thick. MM/DD/YY	09/28/15	05/09/16	05/12/17	04/27/18	08/26/19	08/17/20	Short Term mm/yr	Long Term mm/yr	Rem. Half Life
1	18.60	18.60	18.70	18.30	No Access		17.70	**0.2598**	0.1840	100.00
2	18.60	18.60	18.80	18.20			17.80	0.1732	0.1636	100.00
3	18.70	18.70	18.70	18.30			17.60	**0.3031**	0.2249	100.00
4	18.90	18.70	18.60	18.20			17.70	0.2165	0.2454	100.00
5	18.80	18.60	18.20	18.30			17.70	**0.2598**	0.2249	100.00
6	18.70	18.60	18.50	18.30			17.50	**0.3464**	0.2454	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

July 2, 2020

Environmental Response Centre
Alberta Environment and Parks
111, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta T6B 2X3

To Whom It May Concern:

Re: Response Action Plan – Action Leakage Rate Exceedance
Reference Number 367436
Clean Harbors Approval No. 10348-03-00

On June 9th, 2020 Clean Harbors Canada Inc., Ryley Facility, reported an exceedance of the action leakage rate for cell 3A. The calculated limit for cell 3A using the formula 790 L per hectare per day is 1678 liters per day. On June 9th we pumped 2457 liters from cell 3A leak detection layer. This occurred soon after a significant rainfall event. A sample of leak detection liquid was compared to a sample from the primary and found to be different, leading us to believe the increase was due to rain water and not coming from the primary system.

Last July we experienced similar exceedances with Cell 2, Cell 3B and Cell 3C soon after significant rainfall events. The Reference numbers for those occurrences were 355912 and 356485. Our Response Action Plan included removing the concrete slabs and excavating the capping material to inspect the liner welds to the leachate pipes. Unfortunately, due to the extensive amount of rain fall received last year, it was never safe to complete the task due to the slippery slope the equipment would be working on. Clean Harbors will continue with plans for removal of the old concrete slabs and have the leachate pipe boots inspected for any faults, cracks or damage.

There was no impact on the environment as a result of this exceedance.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

Stan Yuha

Stan Yuha
General Manager

July 2, 2020

Environmental Response Centre
Alberta Environment and Parks
111, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta T6B 2X3

To Whom It May Concern:

Re: Response Action Plan – Action Leakage Rate Exceedance
Reference Number 367478
Clean Harbors Approval No. 10348-03-00

On June 10th, 2020 Clean Harbors Canada Inc., Ryley Facility, reported an exceedance of the action leakage rate for cell 3B. The calculated limit for cell 3B using the formula 790 L per hectare per day is 1678 liters per day. On June 10th we pumped 2356 liters from cell 3B leak detection layer. This occurred soon after a significant rainfall event. A sample of leak detection liquid was compared to a sample from the primary and found to be different, leading us to believe the increase was due to rain water and not coming from the primary system.

Last July we experienced similar exceedances with Cell 2, Cell 3B and Cell 3C soon after significant rainfall events. The Reference numbers for those occurrences were 355912 and 356485. Our Response Action Plan included removing the concrete slabs and excavating the capping material to inspect the liner welds to the leachate pipes. Unfortunately, due to the extensive amount of rain fall received last year, it was never safe to complete the task due to the slippery slope the equipment would be working on. Clean Harbors will continue with plans for removal of the old concrete slabs and have the leachate pipe boots inspected for any faults, cracks or damage.

There was no impact on the environment as a result of this exceedance.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

Stan Yuha

Stan Yuha
General Manager

July 20, 2020

Environmental Response Centre
Alberta Environment and Parks
111, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta T6B 2X3

To Whom It May Concern:

Re: Response Action Plan – Action Leakage Rate Exceedance
Reference Number 368458
Clean Harbors Approval No. 10348-03-00

On July 2nd, 2020 Clean Harbors Canada Inc., Ryley Facility, reported an exceedance of the action leakage rate for cell 2. The calculated limit for cell 2 using the formula 790 L per hectare per day is 1068 liters per day. On July 2nd we pumped 2168 liters from cell 2 leak detection layer. This occurred soon after a significant rainfall event. A sample of leak detection liquid was compared to a sample from the primary and found to be different, leading us to believe the increase was due to rain water and not coming from the primary system.

Last July we experienced similar exceedances with Cell 2, Cell 3B and Cell 3C soon after significant rainfall events. The Reference numbers for those occurrences were 355912 and 356485. Our Response Action Plan included removing the concrete slabs and excavating the capping material to inspect the liner welds to the leachate pipes. Unfortunately, due to the extensive amount of rain fall received last year, it was never safe to complete the task due to the slippery slope the equipment would be working on. Clean Harbors has hired a contractor and will continue with the removal of the old concrete slabs and have the leachate pipe boots inspected for any faults, cracks or damage.

There was no impact on the environment as a result of this exceedance.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

Stan Yuha

Stan Yuha
General Manager

July 20, 2020

Environmental Response Centre
Alberta Environment and Parks
111, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta T6B 2X3

To Whom It May Concern:

Re: Response Action Plan – Action Leakage Rate Exceedance
Reference Number 368820
Clean Harbors Approval No. 10348-03-00

On July 9th, 2020 Clean Harbors Canada Inc., Ryley Facility, reported an exceedance of the action leakage rate for cell 3C. The calculated limit for cell 3C using the formula 790 L per hectare per day is 2011 liters per day. On July 9th we pumped 2937 liters from cell 3C leak detection layer. This occurred soon after a significant rainfall event. A sample of leak detection liquid was compared to a sample from the primary and found to be different, leading us to believe the increase was due to rain water and not coming from the primary system.

Last July we experienced similar exceedances with Cell 2, Cell 3B and Cell 3C soon after significant rainfall events. The Reference numbers for those occurrences were 355912 and 356485. Our Response Action Plan included removing the concrete slabs and excavating the capping material to inspect the liner welds to the leachate pipes. Unfortunately, due to the extensive amount of rain fall received last year, it was never safe to complete the task due to the slippery slope the equipment would be working on. Clean Harbors has hired a contractor and will continue with the removal of the old concrete slabs and have the leachate pipe boots inspected for any faults, cracks or damage.

There was no impact on the environment as a result of this exceedance.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

Stan Yuha

Stan Yuha
General Manager

APPENDIX K

Annual Dugout and Water Well

Sampling Program Report

2020 Dugout Sampling Program
Class 1 Waste Management Facility
Ryley, Alberta

PRESENTED TO

Clean Harbors Canada Inc.

MARCH 2, 2021
ISSUED FOR USE
FILE: 704-SWM.SWOP04269-01

Tetra Tech Canada Inc.
14940 - 123 Avenue
Edmonton, AB T5V 1B4 CANADA
Tel 780.451.2121 Fax 780.454.5688

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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.

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 subsequent annual reviews. The permit to operate defines "in-use" as 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 boundary and defined as "in-use."

Twenty-one (21) dugouts were sampled during the 2020 dugout sampling program, which is the 24th annual sampling event, including the baseline event. The baseline sampling program is detailed in the report titled *Water Sampling and Testing Program*[1]. All sampling has taken place annually in October.

Discussion

In general, the concentrations of most parameters analyzed in 2020 were similar, had no trend or were on a downward trend compared to past years with the exceptions as described below and in Section 3.2. The following discussion focuses on parameters with upwards trends and with 2020 results that were greater than past results.

The higher upward trend concentrations of ammonia (dugout 3), phosphorus (dugouts 1, 3, 5, 21), sulphate (dugout 5) may be attributed to elevated levels of nutrients in the surface water draining into these dugouts, which contained run-off from cattle manure and fertilizers applied at the nearby farms. During fieldwork, livestock were also observed near these dugouts.

The higher upward trend concentrations of calcium (dugouts 5, 10, 19, 20, 22), chloride (dugouts 2, 3, 4, 10, 19, 20, 22), EC (dugout 3 was 1.5 times higher than previous highest results, 4 and 20), hardness (dugouts 3, 5, 10, 19, 20, 22), potassium (dugouts 3, 14, 22) and TDS (dugouts 3 and 4) may be attributed to the naturally saline and sodic soils in the area (solonetzic soils). Salt precipitate was observed on surficial soils near most of these dugouts.

The remaining higher upwards trends were arsenic (dugout 3), alkalinity (dugouts 2, 3, 4, 8, 16), cobalt (dugouts 12 and 22), manganese (dugouts 3, 6, 10), magnesium (dugouts 16, 20, 22), titanium (dugouts 20, 21), and vanadium (dugout 4). Tetra Tech notes that the increases are very minor in these dugouts and suggests that they be observed closely in the future to see if this is a temporary natural spike or an actual upward trend in concentrations. The assessment of parameters analyzed does not indicate off-site release from the landfill site to dugouts through groundwater, surface water or air pathways within a 1.6 km radius study area.

Recommendations

Analytical results of the dugout sampling program conducted in October 2020 indicates that the Ryley Class I Hazardous Waste Facility does not appear to be adversely impacting dugouts within a 1.6 km radius.

Approximately half of the parameters analyzed in 2020 exhibited an upward trend in concentrations in one or more dugouts relative to historical baseline values, but the majority of parameters were within the historical range for that parameter.

A select few parameters exhibited elevated concentrations in 2020 relative to historical concentrations, and these parameters should be closely monitored in the future. A similar sampling program is recommended for October 2021, as part of the ongoing site permit compliance process.

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

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LIMITATIONS OF REPORT

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

1.0 INTRODUCTION

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

The sampling program is required by Alberta's *Environmental Protection and Enhancement Act* (EPEA). The facility operates under Alberta Environment and 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 subsequent annual reviews. The permit to operate defines "in-use" as 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 boundary and defined as "in-use."

Twenty-one (21) dugouts were sampled during the 2020 dugout sampling program, which is the 24th annual sampling event, including the baseline event. The baseline sampling program is detailed in the report titled *Water Sampling and Testing Program*[2]. All sampling has taken place annually in October.

This report presents the field observations and analytical water quality results of the 2020 sampling program with reference to recently collected data.

2.0 FIELD SAMPLING

The water samples were collected on October 15, 2020 by two Tetra Tech personnel. The contact information for each landowner is presented in Table A. Landowners were contacted prior to sampling, where possible. The location of each sampled water source is indicated on Figure 1.

Table A: Landowner Information

Landowner	Contact Name	Mailing Address	Telephone Number
D. Booth	Doyle Booth	Box 185, Ryley, Alberta T0B 4A0	780.999.4577
Ewert Farms Ltd.	Mark Ewert	Box 355, Ryley, Alberta T0B 4A0	780.914.5766
B.L. Lyons	Brian Lyons	Box 222, Ryley, Alberta T0B 4A0	780.984.5026
T. Magneson	Terry Magneson	Box 239, Ryley, Alberta T0B 4A0	780.603.1537
County of Beaver	c/o Bob Beck	Box 140, Ryley, Alberta T0B 4A0	780.663.3730
W. Winsnes	William Winsnes	Box 74, Ryley, Alberta T0B 4A0	780.663.2343
Noregaard	Not Applicable	Out of the country	Not Applicable

The 21 dugouts were sampled at seven properties, and 23 samples were collected, one from each dugout, including 2 duplicate samples. Subsamples were collected from the four corners of the respective dugouts at 0.20 m to 0.30 m depths and about 2 metres from the dugout edge and submitted as an equal-weighted composite sample.

All samples were obtained using standard procedures that minimized 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.

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

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 centre barn
3	Ewert D.2	SW ¼ 15-50-17	Extreme west dugout
4	Ewert D.3	SW ¼ 15-50-17	Extreme east dugout
5	Ewert D.4	SW ¼ 15-50-17	Southeast corner of southwest quarter of Section 15
6	Lyons D.1	SE ¼ 16-50-17	Northeast dugout on southeast quarter of Section 16
7	Lyons D.2	SE ¼ 16-50-17	Northwest dugout on southeast quarter of Section 16
8	Lyons D.3	SE ¼ 16-50-17	Southwest dugout on southeast quarter of Section 16
9	Lyons D.4	SW ¼ 16-50-17	Southwest dugout on southwest quarter of Section 16
10	Magneson D.1	SW ¼ 9-50-17	Dugout with windmill on northeast end of yard
11	Magneson D.2	SW ¼ 9-50-17	Southeast corner of northwest quarter of Section 9
12	Magneson D.3 (now on Clean Harbors' 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 D.1	NW ¼ 3-50-17	Dugout south of house, northwest quarter of Section 3
18	Norgaard D.1	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	Winsnes D.2	NE ¼ 5-50-17	Dugout south of west approach, northeast quarter of Section 5
21	Winsnes D.3	SE ¼ 8-50-17	Dugout on southeast quarter of Section 8
22	Winsnes D.4	SE ¼ 8-50-17	Dugout is west of Winsnes D.3

3.0 RESULTS

ALS Laboratory Group (ALS) of Edmonton was the laboratory selected to perform the sample analysis, similar to past years. ALS prepared sampling kits with bottles for each dugout to be tested. These kits 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, 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
- Phenols

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

The analytical reports for each sample collected were forwarded to Tetra Tech once the analysis was completed. The 2020 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 2020 sampling program for each dugout. Appendix D contains the historical dugout chemical analytical results from 1996 up to and including the 2020 data.

3.1 Quality Control and Quality Assurance

To evaluate field sampling reproducibility, duplicate water samples were collected during the 2020 sampling event at an approximate rate of 10%. In October 2020, the duplicates were sampled from Dugout 18 (Duplicate 1) and Dugout 16 (Duplicate 2) and submitted for laboratory analysis for the same suite of parameters.

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

Equation 1

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

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

Surface water quality parameters were considered as having passed the quality assurance (QA)/quality control (QC) reproducibility procedure if the RPD was less than or equal to 20%, indicating a close correlation between the sample-duplicate pair. RPD is usually used for 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. The QA/QC reproducibility guidelines were not satisfied for the following parameters:

- Duplicate 1: Dissolved aluminum (62%)
- Duplicate 2: Dissolved iron (44%) and dissolved manganese (167%)

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 indicates otherwise. 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.

3.2 Trend Analysis

The chemical analysis results from the dugout sampling program are reviewed for significant changes in parameters and compared to the results of all previous sampling events. 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 expected. In addition, parameters at some locations have exceeded provincial water quality objectives since 1996 and are characteristic of natural conditions in the area or agricultural land use. The objective of this work is to identify elevated and/or upward trends in parameters that might be sourced from the landfill through a groundwater 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 flow may also flow towards the north. A summary of the recent years' data follows.

The 2020 dugout water levels appeared similar to those observed in previous years. Environment Canada's and Alberta Agriculture and Forestry's monthly and annual precipitation data from the Elk Island National Park meteorological station are summarized in Table 5 of the Tables Section of this report. The total annual precipitation in 2020 was 101.7 mm higher than the precipitation mean since 1996. The 2014, 2015, 2019 and 2020 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. The Alberta Agriculture precipitation website[3] was updated to include more station data, so in 2016-2018, the Holden Alberta Government Drought Monitoring (AGDM) meteorological station data was utilized. These shifts in the reporting station over the years are not expected to have a material impact on annual averages but may affect monthly data.

A Mann-Kendall test was used as a statistical means of investigating possible trends in water quality[4] for parameters analyzed for the past 3 to 24 years. The analysis indicates whether there is an upward or downward trend or, in the case where results are similar, no trend at all. 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	2, 3, 4, 8, 10, 14, 16	The dugout concentrations are within the historical range
Aluminum	6, 7	All dugout concentrations are within the historical range
Ammonia (Ammonia N)	1, 2, 3, 6, 7, 9, 10, 20	The dugout 3 concentration is approximately double the previous highest concentration since 1996
Arsenic	3, 10, 14, 20, 22	The dugout concentrations are within the historical range

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

[4] 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
Bicarbonate	1, 2, 3, 4, 8, 10, 12, 14, 16, 19, 21	The dugout concentrations are within the historical range
Calcium	2, 3, 4, 5, 8, 10, 12, 14, 19, 20, 21, 22	The concentrations of dugouts 5, 10, 19, 20 and 22 are gradually increasing since 1996
Chemical Oxygen Demand (COD)	1, 3, 6, 8, 9, 10, 14, 20, 22	All dugout concentrations are within the historical range
Chloride	2, 3, 4, 10, 14, 19, 20, 21, 22	The concentrations of dugouts 2, 3, 4, 10, 19, 20, 22 are gradually increasing since 1996
Cobalt	8, 10	All dugout concentrations are within the historical range
Copper	8	The concentration is within the historical range
DOC	3, 4, 9, 10, 14, 20	All dugout concentrations are within the historical range
EC	2, 3, 4, 5, 8, 10, 12, 14, 20, 21, 22	All dugout concentrations are within the historical range
Hardness as CaCO3	2, 3, 4, 5, 8, 10, 12, 14, 19, 20, 21, 22	The dugout concentrations are within the historical range
Iron	1, 4, 6, 18, 19, 20	All concentrations are within the historical range.
Lithium	3, 4, 8	All concentrations are within the historical range
Magnesium	2, 3, 4, 5, 8, 10, 12, 14, 15, 16, 19, 20, 21, 22	The concentrations of dugouts 2, 3, 5, 10, 12, and 22 are gradually increasing since 1996.
Manganese	2, 3, 4, 6, 10, 14, 18, 20	The concentration of dugout 6 is approximately seven times greater than the previous highest concentration, and dugout 10 is gradually increasing since 2008
Molybdenum	8, 12	All dugout concentrations are within the historical range
Nickel	10, 12, 19	All dugout concentrations are within the historical range
Nitrate (as NO_3-N)	9	All dugout concentrations are within the historical range
Nitrate and Nitrite (as N)	9	All dugout concentrations are within the historical range
pH	8	The concentration is within the historical range
Phosphorus	1, 3, 5, 16, 21	The concentrations of dugouts 1, 3, and 21 are approximately double the next highest concentration from the past five years
Potassium	1, 2, 3, 4, 5, 8, 9, 10,12, 14, 19, 22	The concentrations of dugouts 1, 5, 10, 12, 14, 19, and 22 are gradually increasing since 1996
Sodium	3, 4, 5, 8, 10, 14, 20	All dugout concentrations are within the historical range
Sulphate	5, 8, 10, 21, 22	The concentration of dugout 5 is double the highest previous result
Titanium	4, 6, 7, 20, 21	The concentration of dugout 20 has gradually increased since 1996, while dugout 21 is double the highest previous result
TDS	2, 3, 4, 5, 8, 10, 12, 14, 21, 22	The concentration in dugout 4 has gradually increased since 1996
TKN	1, 2, 3, 8, 10, 12, 14, 20	The concentrations of all dugouts are within the historical range
Uranium	8	The concentrations of all dugouts are within the historical range
Vanadium	2, 3, 4, 6, 14, 20	The concentration of dugout 4 has gradually increased since 2008.

The pH in Dugout 8 exhibited an upward trend in 2020, while previously exhibiting no trend in 2019. Antimony, cadmium, chromium, lead, mercury, nitrite and selenium exhibited upward trends in 2019 and downward/no trend in 2020. Dugouts 11 and 13 have no upward concentration trends. Results of the Mann Kendall trend analysis are presented in Table 4 in the Tables Section of this report.

4.0 DISCUSSION

The dugout water levels were similar to those observed in recent years.

In general, the concentrations of most parameters analyzed in 2020 were similar, had no trend or were on a downward trend compared to past years with the exceptions as described below and in Section 3.2. The following discussion focuses on parameters with upwards trends and with 2020 results that were greater than past results.

The higher upward trend concentrations of ammonia (dugout 3), phosphorus (dugouts 1, 3, 5, 16, and 21), and sulphate (dugout 5) may be attributed to elevated levels of nutrients in the surface water draining into these dugouts, which was observed to contain run-off from cattle manure at the nearby farms. During fieldwork, livestock were observed near these dugouts.

The gradually increasing concentrations of calcium (dugouts 5, 10, 19, 20, 22), chloride (dugouts 2, 3, 4, 10, 19, 20, 22), potassium (dugouts 1, 5, 10, 12, 14, 19, and 22) and TDS (dugout 4) may be attributed to the naturally saline and sodic soils in the area (solonetzic soils). Salt precipitate was observed on surficial soils near most of these dugouts.

The upwards trends of note were manganese (dugouts 6 and 10), magnesium (dugouts 2, 3, 5, 10, 12, and 22), titanium (dugouts 20 and 21), and vanadium (dugout 4). Tetra Tech notes that the gradual increases are minor in these dugouts and suggests that they be observed closely in the future.

Ammonia, manganese, phosphorus, sulphate, and titanium have historical highs in 2020. The results of these parameters will be closely observed in the future.

The assessment of parameters analyzed does not indicate off-site impacts from the landfill site to dugouts through groundwater, surface water or air pathways within a 1.6 km radius study area.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Analytical results of the dugout sampling program conducted in October 2020 indicates that the Ryley Class I Hazardous Waste Facility does not appear to be adversely impacting dugouts within a 1.6 km radius.

Approximately half of the parameters analyzed in 2020 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, manganese, phosphorus, sulphate, and titanium) exhibited elevated concentrations in 2020 relative to historical concentrations, and these parameters should be closely monitored in the future.

A similar sampling program is recommended for October 2021, as part of the ongoing site permit compliance process.

Each landowner should be forwarded a copy of the water analysis report pertaining to the dugouts sampled from their property once the 2020 report is finalized.

6.0 CLOSURE

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

Respectfully submitted,
Tetra Tech Canada Inc.

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March 2, 2021

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TETRA TECH CANADA INC.
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DATE: March 2, 2021
PERMIT NUMBER: P013774
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

TABLES

Table 1.1 to Table 1.22	Chemical Analytical Results
Table 2	Duplicate 1 Chemical Analytical Results
Table 3	Duplicate 2 Chemical Analytical Results
Table 4	Trend Analysis Using Mann Kendall
Table 5	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**
Chem. O_2 Demand	mg/L	68	77	98	84	82
Ammonia-N	mg/L	1.21	<0.050	0.565	<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	3.09	2.58	4.70	2.51	2.75
Dissolved Organic Carbon	mg/L	21.4	77	29.9	22.9	19.9
Phenols	mg/L	-	-	0.0019	0.0075	0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	10.6
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.0016	0.0031	0.0056	0.0021	0.0036
Antimony	mg/L	0.0002	0.00024	0.00029	0.00020	0.00016
Arsenic	mg/L	-	-	0.00703	0.00484	0.00583
Barium	mg/L	0.0883	0.0594	0.0714	0.0614	0.0612
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.064	0.045	0.049	0.047	0.025
Cadmium	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt	mg/L	0.00023	0.00034	0.00045	0.00035	0.00030
Copper	mg/L	0.00045	0.00054	0.00049	0.00053	0.00040
Iron	mg/L	0.021	0.033	0.028	0.121	0.179
Lead	mg/L	<0.000050	0.000077	<0.000050	0.000072	0.000055
Lithium	mg/L	-	-	0.0446	0.0327	0.0335
Manganese	mg/L	0.00071	0.00744	0.00864	0.00250	0.00783
Mercury	mg/L	0.0000095	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00125	0.00111	0.000989	0.000853	0.000611
Nickel	mg/L	0.0043	0.0034	0.00279	0.00353	0.00304
Selenium	mg/L	0.000114	0.000115	0.000143	0.000115	0.000156
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000016	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00032	0.00049	0.00059	0.00089
Uranium	mg/L	-	-	0.000784	0.000578	0.000578
Vanadium	mg/L	0.00087	0.00112	0.00135	0.00076	0.00072
Zinc	mg/L	<0.0010	0.0021	<0.0010	<0.0010	<0.0010
Routine Water						
Ion Balance	%	107	95.5	107	103	94.7
Bicarbonate	mg/L	357	396	345	328	358
Chloride	mg/L	61.7	59.7	54.6	46.3	40.2
Carbonate	mg/L	<5.0	10.7	7.6	<5.0	6.4
Conductivity (EC)	uS/cm	885	893	845	714	712
Calcium	mg/L	29	14.8	14.7	21.5	20.4
Potassium	mg/L	13.9	12.3	15.1	12.5	13.2
Magnesium	mg/L	13.9	12.5	11.7	10.8	9.69
Sodium	mg/L	154	167	156	128	120
Sulfate	mg/L	70.6	59.6	43.0	43.4	26.6
Phosphorus	mg/L	0.155	0.128	0.276	0.211	0.466
pH in H_20	pH	8.37	8.53	8.49	8.36	8.42
TDS (Calculated)	mg/L	524	531	472	428	413
Nitrate	mg/L	0.312	<0.020	<0.020	<0.020	<0.020
Nitrite	mg/L	0.026	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	<0.022	<0.022
Hardness as $CaCO_3$	mg/L	-	-	84.9	98.2	90.8
Alkalinity (total as $CaCO_3$)	mg/L	-	-	295	276	304
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.146	0.284	0.270
Field Data						
pH in H_20	pH	8.7	9.1	11.1	8.4	8.27
Conductivity (EC)	uS/cm	893	980	858	80	758

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**
Chem. O_2 Demand	mg/L	83	122	53	79	78
Ammonia-N	mg/L	0.052	1.11	3.79	<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	3.06	7.29	5.64	2.70	3.08
Dissolved Organic Carbon	mg/L	24.3	122	21.6	22.2	21.1
Phenols	mg/L	-	-	0.0018	0.0101	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	10.6
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.0025	0.0151	0.0303	0.0349	0.0059
Antimony	mg/L	0.00013	0.0003	<0.00010	0.00025	0.00021
Arsenic	mg/L	-	-	0.00165	0.0137	0.00823
Barium	mg/L	0.0699	0.0642	0.118	0.0449	0.0508
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.073	0.053	0.046	0.040	0.028
Cadmium	mg/L	0.0000059	0.0000083	<0.0000050	0.0000070	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	0.00011	<0.00010	<0.00010
Cobalt	mg/L	0.00025	0.00064	0.00065	0.00062	0.00046
Copper	mg/L	0.00360	0.00193	0.00081	0.00271	0.00065
Iron	mg/L	0.012	0.052	0.166	0.077	0.032
Lead	mg/L	<0.000050	0.000098	0.000113	0.000076	<0.000050
Lithium	mg/L	-	-	0.0263	0.0222	0.0236
Manganese	mg/L	0.00161	0.0116	0.192	0.0138	0.00492
Mercury	mg/L	0.0000081	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00142	0.000884	0.00136	0.00198	0.000868
Nickel	mg/L	0.00424	0.00243	0.00389	0.00321	0.00290
Selenium	mg/L	0.000248	0.00025	0.000169	0.000258	0.000172
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000017	<0.000010	<0.000010
Tin	mg/L	<0.00010	0.00011	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00044	0.0029	0.00517	0.00055
Uranium	mg/L	-	-	0.00123	0.00138	0.00101
Vanadium	mg/L	<0.00050	0.00228	0.00067	0.00299	0.00158
Zinc	mg/L	<0.0010	0.0057	<0.0010	0.0011	<0.0010
Routine Water						
Ion Balance	%	111	88.7	102	100	96.9
Bicarbonate	mg/L	354	456	319	304	367
Chloride	mg/L	31.5	31.3	30.8	32.9	34.5
Carbonate	mg/L	6.6	12.7	8.2	38.3	16.4
Conductivity (EC)	uS/cm	759	851	758	675	732
Calcium	mg/L	24.8	13.3	26.0	21.5	22.6
Potassium	mg/L	19.2	18.5	19.9	16.0	20.3
Magnesium	mg/L	12.9	12	12.8	10.2	12.0
Sodium	mg/L	134	144	109	124	121
Sulfate	mg/L	39.6	30.2	65.3	24.3	28.9
Phosphorus	mg/L	0.28	0.403	0.065	0.628	0.745
pH in H20	pH	8.45	8.54	8.49	9.16	8.69
TDS (Calculated)	mg/L	444	491	429	417	436
Nitrate	mg/L	<0.020	0.024	0.072	0.047	<0.020
Nitrite	mg/L	<0.010	0.103	<0.010	0.013	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	0.072	0.06	<0.022
Hardness as $CaCO_3$	mg/L	-	-	118	95.7	106
Alkalinity (total as $CaCO_3$)	mg/L	-	-	275	313	328
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.154	0.372	0.276
Field Data						
pH in H_20	pH	8.8	9.0	8.7	EF	8.94
Conductivity (EC)	uS/cm	778	900	776	829	777

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**
Chem. O_2 Demand	mg/L	61	88	127	92	119
Ammonia-N	mg/L	<0.05	<0.05	0.113	0.254	1.13
Total Kjeldahl Nitrogen	mg/L	1.94	3.09	5.07	3.01	4.86
Dissolved Organic Carbon	mg/L	21	88	44.0	28.2	31.3
Phenols	mg/L	-	-	0.0018	0.0068	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	13.6
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.0011	0.0045	0.0317	0.0334	0.0316
Antimony	mg/L	0.00015	0.00017	0.00038	0.00020	0.00025
Arsenic	mg/L	-	-	0.00803	0.00619	0.00841
Barium	mg/L	0.041	0.0501	0.0439	0.0364	0.0509
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.05	0.039	0.039	0.034	0.011
Cadmium	mg/L	<0.0000050	<0.0000050	0.0000154	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	0.00011	0.00013	0.00019
Cobalt	mg/L	0.00014	0.00053	0.00063	0.00061	0.00125
Copper	mg/L	0.00797	0.00111	0.00234	0.00127	0.00082
Iron	mg/L	0.045	0.056	0.054	0.256	0.545
Lead	mg/L	<0.000050	<0.000050	0.00010	0.000164	0.000215
Lithium	mg/L	-	-	0.0323	0.0261	0.0291
Manganese	mg/L	0.00125	0.107	0.0131	0.00377	0.264
Mercury	mg/L	0.0000066	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000744	0.000491	0.0010	0.000761	0.000587
Nickel	mg/L	0.00457	0.00417	0.00423	0.00630	0.00565
Selenium	mg/L	0.000245	0.000184	0.000319	0.000366	0.000326
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.00001	<0.000010	0.000016	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.0003	0.00062	0.00375	0.00694	0.00693
Uranium	mg/L	-	-	0.00159	0.000775	0.000892
Vanadium	mg/L	0.00072	0.00136	0.00513	0.00218	0.00226
Zinc	mg/L	0.0020	0.0085	<0.0010	<0.0010	<0.0010
Routine Water						
Ion Balance	%	100	96.1	107	105	94.9
Bicarbonate	mg/L	355	496	433	407	498
Chloride	mg/L	31.3	36.3	35.7	33.3	45.9
Carbonate	mg/L	5	15.8	11.9	<5.0	12.6
Conductivity (EC)	uS/cm	723	964	885	844	1220
Calcium	mg/L	28.2	28.6	17.1	25.8	30.1
Potassium	mg/L	15.5	21.4	20.5	19.0	23.5
Magnesium	mg/L	11.90	14.00	11.2	13.4	16.6
Sodium	mg/L	118	168	179	157	222
Sulfate	mg/L	48.4	55.8	46.2	77.3	193
Phosphorus	mg/L	0.262	0.442	0.542	0.576	1.19
pH in H20	pH	8.41	8.56	8.57	8.29	8.49
TDS (Calculated)	mg/L	434	584	535	531	789
Nitrate	mg/L	<0.02	<0.020	<0.020	0.388	0.099
Nitrite	mg/L	<0.01	<0.010	<0.010	0.029	0.057
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	0.416	0.156
Hardness as $CaCO_3$	mg/L	-	-	88.8	120	144
Alkalinity (total as $CaCO_3$)	mg/L	-	-	375	339	429
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.194	0.292	0.274
Field Data						
pH in H_20	pH	8.9	8.8	11.3	6.49	8.17
Conductivity (EC)	uS/cm	740	1062	950	104.3	1322

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**
Chem. O_2 Demand	mg/L	74	51	78	106	116
Ammonia-N	mg/L	0.641	<0.050	0.655	<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	3.84	2.55	3.31	3.22	3.45
Dissolved Organic Carbon	mg/L	27.2	51	38.0	28.3	29.0
Phenols	mg/L	-	-	0.0018	0.0058	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	7.6
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.0473	0.0052	0.0673	0.0107	0.0155
Antimony	mg/L	0.0001	0.0001	0.00016	0.00016	0.00018
Arsenic	mg/L	-	-	0.0032	0.0031	0.00513
Barium	mg/L	0.0433	0.0288	0.0656	0.0418	0.0342
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.044	0.018	0.035	0.039	0.025
Cadmium	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	0.00014	<0.00010	0.00018	0.00017	0.00023
Cobalt	mg/L	0.00024	0.00046	0.00095	0.00036	0.00075
Copper	mg/L	0.00661	0.0013	0.00163	0.00163	0.0010
Iron	mg/L	1.79	0.659	0.848	1.01	1.66
Lead	mg/L	0.000132	0.000168	0.000389	0.000211	0.000278
Lithium	mg/L	-	-	0.0153	0.0125	0.0142
Manganese	mg/L	0.00451	0.0477	0.194	0.00879	0.0441
Mercury	mg/L	0.0000069	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000389	0.00046	0.000956	0.000489	0.000407
Nickel	mg/L	0.00222	0.00281	0.00396	0.00281	0.00314
Selenium	mg/L	0.000153	0.000151	0.000192	0.000188	0.000206
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000032	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00264	0.00083	0.00499	0.00168	0.00266
Uranium	mg/L	-	-	0.000531	0.000262	0.000262
Vanadium	mg/L	0.00102	0.00102	0.00193	0.00144	0.00194
Zinc	mg/L	0.0024	0.0151	<0.0010	<0.0010	<0.0010
Routine Water						
Ion Balance	%	106	95.1	105	103	94.7
Bicarbonate	mg/L	247	326	308	290	338
Chloride	mg/L	51	55.8	64.6	56.2	73.5
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	5.3
Conductivity (EC)	uS/cm	549	679	708	622	750
Calcium	mg/L	25.7	21.5	23.4	22.5	19.5
Potassium	mg/L	15	14.9	22.0	14.2	15.7
Magnesium	mg/L	10.5	9.48	10.9	10.7	10.2
Sodium	mg/L	76.3	108	114	103	126
Sulfate	mg/L	3.93	11.9	19.1	14.3	15.8
Phosphorus	mg/L	0.596	0.437	0.523	0.605	1.08
pH in H_20	pH	8.23	8.37	8.05	7.98	8.39
TDS (Calculated)	mg/L	304	391	406	364	432
Nitrate	mg/L	0.083	<0.020	0.198	0.027	<0.020
Nitrite	mg/L	0.039	<0.010	<0.010	0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	0.198	0.037	<0.022
Hardness as $CaCO_3$	mg/L	-	-	103	100	90.7
Alkalinity (total as $CaCO_3$)	mg/L	-	-	252	238	286
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.102	0.169	0.178
Field Data						
pH in H_20	pH	8.4	8.6	9.9	EF	8.34
Conductivity (EC)	uS/cm	522	754	971	803	793

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**
Chem. O_2 Demand	mg/L	30	102	86	92	75
Ammonia-N	mg/L	<0.050	<0.050	0.120	<0.050	0.235
Total Kjeldahl Nitrogen	mg/L	2.88	3.48	2.91	3.61	3.64
Dissolved Organic Carbon	mg/L	29.4	102	38.0	22.7	23.0
Phenols	mg/L	-	-	0.0015	0.0076	0.0012
Total Suspended Solids (TSS)	mg/L	-	-	-	-	33.8
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.77	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0013	0.0062	0.0194	0.0015	0.0425
Antimony	mg/L	0.00018	0.00022	0.00025	0.00015	0.00035
Arsenic	mg/L	-	-	0.0114	0.00313	0.00692
Barium	mg/L	0.0524	0.0903	0.0588	0.0528	0.0823
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.046	0.04	0.050	0.042	0.018
Cadmium	mg/L	<0.0000050	<0.0000050	0.0000196	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00013
Cobalt	mg/L	0.00035	0.00051	0.00094	0.00043	0.00113
Copper	mg/L	0.00084	0.00095	0.00102	0.00054	0.00123
Iron	mg/L	0.04	0.12	0.087	0.026	0.353
Lead	mg/L	<0.000050	0.000096	0.00010	<0.000050	0.000273
Lithium	mg/L	-	-	0.0247	0.016	0.0128
Manganese	mg/L	0.00066	0.00532	0.00626	0.00080	0.0246
Mercury	mg/L	0.0000108	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00216	0.00196	0.0019	0.00118	0.00177
Nickel	mg/L	0.00606	0.00687	0.00569	0.00406	0.00732
Selenium	mg/L	0.000302	0.000271	0.000299	0.000217	0.00037
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000015	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00069	0.00219	<0.00030	0.00991
Uranium	mg/L	-	-	0.001	0.000602	0.00121
Vanadium	mg/L	<0.00050	<0.00050	0.00251	<0.00050	0.0018
Zinc	mg/L	0.001	0.0031	<0.0010	<0.0010	<0.0010
Routine Water						
Ion Balance	%	114	92.9	115	102	96.8
Bicarbonate	mg/L	324	442	398	356	312
Chloride	mg/L	17.5	19.4	21.7	18	12.9
Carbonate	mg/L	<5.0	7.2	<5.0	6.6	<5.0
Conductivity (EC)	uS/cm	599	742	713	624	796
Calcium	mg/L	21.9	22	19.1	23.9	28.5
Potassium	mg/L	13.3	15.5	14.8	14.5	15.3
Magnesium	mg/L	12	13.4	13.3	13.3	13.4
Sodium	mg/L	105	125	141	103	118
Sulfate	mg/L	15.1	26.8	15.1	20.2	136
Phosphorus	mg/L	0.248	0.251	0.493	0.225	0.591
pH in H_20	pH	8.38	8.4	8.32	8.44	8.37
TDS (Calculated)	mg/L	349	448	424	375	482
Nitrate	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	0.011
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	<0.022	<0.022
Hardness as $CaCO_3$	mg/L	-	-	102	114	126
Alkalinity (total as $CaCO_3$)	mg/L	-	-	331	303	263
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.396	0.499	0.379
Field Data						
pH in H_20	pH	8.5	8.9	10.4	EF	8.10
Conductivity (EC)	uS/cm	623	810	780	788	829

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**
Chem. O_2 Demand	mg/L	71	70	78	89	98
Ammonia-N	mg/L	1.35	<0.050	0.063	0.575	0.191
Total Kjeldahl Nitrogen	mg/L	3.62	2.55	2.89	3.01	3.13
Dissolved Organic Carbon	mg/L	25	70	28.0	24.7	25.0
Phenols	mg/L	-	-	0.0013	0.0087	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	5.2
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.0962	0.0097	0.015	0.0306	0.0366
Antimony	mg/L	0.00013	0.00014	0.00022	0.00017	0.00017
Arsenic	mg/L	-	-	0.00522	0.00531	0.00537
Barium	mg/L	0.0448	0.032	0.0495	0.0421	0.0372
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.042	0.04	0.050	0.029	<0.010
Cadmium	mg/L	<0.0000050	<0.0000050	0.0000172	<0.0000050	<0.0000050
Chromium	mg/L	0.0002	<0.00010	0.00011	0.0002	0.00028
Cobalt	mg/L	0.0003	0.0004	0.00063	0.00038	0.00065
Copper	mg/L	0.00066	0.0006	0.00071	0.00063	0.00060
Iron	mg/L	0.629	0.121	0.136	0.958	0.677
Lead	mg/L	0.000189	0.000056	0.000112	0.000229	0.000149
Lithium	mg/L	-	-	0.0136	0.0074	0.0076
Manganese	mg/L	0.00338	0.00586	0.0135	0.00866	0.223
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000596	0.000817	0.00112	0.00076	0.000751
Nickel	mg/L	0.00337	0.00397	0.00414	0.00361	0.00335
Selenium	mg/L	0.000194	0.000194	0.000273	0.000212	0.000251
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000017	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00568	0.00088	0.00113	0.00329	0.00355
Uranium	mg/L	-	-	0.000909	0.000234	0.00025
Vanadium	mg/L	0.00241	0.0021	0.00256	0.00205	0.00227
Zinc	mg/L	0.0012	0.0021	<0.0010	0.0016	<0.0010
Routine Water						
Ion Balance	%	104	94.3	110	101	95.7
Bicarbonate	mg/L	277	281	270	217	210
Chloride	mg/L	19.4	17.7	20.6	12.9	13.1
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	523	510	519	405	439
Calcium	mg/L	21.2	20.1	22.3	18.6	16.9
Potassium	mg/L	19.3	17.5	21.7	17.1	13.6
Magnesium	mg/L	8.52	7.74	8.55	8.46	7.41
Sodium	mg/L	75.3	75.3	84.3	51	59.0
Sulfate	mg/L	11.6	27.2	22.3	15	36.4
Phosphorus	mg/L	0.931	0.555	0.520	1.38	1.23
pH in H_20	pH	8.26	8.31	8.17	7.91	8.06
TDS (Calculated)	mg/L	295	307	313	232	250
Nitrate	mg/L	0.588	<0.020	<0.020	0.429	<0.020
Nitrite	mg/L	0.077	<0.010	<0.010	0.045	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	0.474	<0.022
Hardness as $CaCO_3$	mg/L	-	-	90.9	81.3	72.7
Alkalinity (total as $CaCO_3$)	mg/L	-	-	222	178	172
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.104	0.155	0.140
Field Data						
pH in H_20	pH	8.2	8.7	10.4	EF	7.69
Conductivity (EC)	uS/cm	517	568	566	496	953

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**
Chem. O_2 Demand	mg/L	80	64	70	83	76
Ammonia-N	mg/L	0.685	<0.050	1.17	0.414	0.236
Total Kjeldahl Nitrogen	mg/L	3.69	2.45	4.37	2.58	2.67
Dissolved Organic Carbon	mg/L	26.9	64	25.0	23.4	20.8
Phenols	mg/L	-	-	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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.0058	0.0096	0.0643	0.0613	0.0189
Antimony	mg/L	0.00013	0.00015	0.00021	0.00012	0.00014
Arsenic	mg/L	-	-	0.00407	0.00497	0.00461
Barium	mg/L	0.0263	0.0364	0.0655	0.0649	0.0240
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.026	0.037	0.044	0.022	<0.010
Cadmium	mg/L	<0.0000050	0.0000098	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	0.00017	<0.00010	0.00028	0.00018	0.00016
Cobalt	mg/L	0.00029	0.00048	0.00079	0.00049	0.00025
Copper	mg/L	0.00073	0.00091	0.00116	0.00083	0.00095
Iron	mg/L	0.268	0.083	0.275	1.51	0.472
Lead	mg/L	<0.000050	0.00015	0.000218	0.000281	0.000087
Lithium	mg/L	-	-	0.0137	0.0071	0.0070
Manganese	mg/L	0.00297	0.0198	0.122	0.0361	0.0155
Mercury	mg/L	0.000007	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000696	0.000893	0.00102	0.00063	0.000745
Nickel	mg/L	0.00433	0.00483	0.00453	0.00341	0.00326
Selenium	mg/L	0.000252	0.000205	0.00023	0.000212	0.000249
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	<0.0001	0.00018	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.0013	0.00052	0.00545	0.00488	0.00214
Uranium	mg/L	-	-	0.000787	0.000266	0.000275
Vanadium	mg/L	0.00253	0.00196	0.0023	0.00206	0.00214
Zinc	mg/L	0.0026	0.0122	<0.0010	0.0018	<0.0010
Routine Water						
Ion Balance	%	101	94.1	109	97.4	98.6
Bicarbonate	mg/L	222	296	278	232	202
Chloride	mg/L	11.8	20	21.4	15.6	13.0
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	408	525	536	435	409
Calcium	mg/L	19.3	22.5	24.9	17.4	16.9
Potassium	mg/L	15.2	18.9	21.8	18.5	15.5
Magnesium	mg/L	7.55	7.81	8.34	7.74	6.42
Sodium	mg/L	51.6	76.2	79.7	56.5	54.3
Sulfate	mg/L	12.5	23	15.7	14.5	24.9
Phosphorus	mg/L	0.954	0.351	0.580	1.13	1.09
pH in H_20	pH	8.15	8.22	8.24	8.11	8.12
TDS (Calculated)	mg/L	227	315	310	246	230
Nitrate	mg/L	0.02	<0.020	0.316	0.396	<0.020
Nitrite	mg/L	0.017	<0.010	<0.010	0.042	0.013
Nitrate and Nitrite (as N)	mg/L	-	-	0.316	0.437	<0.022
Hardness as $CaCO_3$	mg/L	-	-	96.5	75.3	68.6
Alkalinity (total as $CaCO_3$)	mg/L	-	-	228	190	165
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.118	0.176	0.139
Field Data						
pH in H_20	pH	8.2	8.6	9.3	10.73	7.81
Conductivity (EC)	uS/cm	397	581	589	529	923

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**
Chem. O_2 Demand	mg/L	149	232	171	105	116
Ammonia-N	mg/L	0.099	0.082	0.186	<0.050	0.286
Total Kjeldahl Nitrogen	mg/L	6.45	9.34	8.83	3.66	4.93
Dissolved Organic Carbon	mg/L	35.8	232	41.4	30.9	30.8
Phenols	mg/L	-	-	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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.0166	0.0196	0.0563	0.0192	0.0175
Antimony	mg/L	0.00043	0.00054	0.00096	0.0003	0.00046
Arsenic	mg/L	-	-	0.00277	0.00261	0.00407
Barium	mg/L	0.0567	0.0797	0.108	0.0461	0.0697
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.068	0.079	0.035	0.027	0.014
Cadmium	mg/L	0.0000078	0.0000064	0.000031	0.0000068	<0.0000050
Chromium	mg/L	0.00015	<0.00010	0.00058	0.00010	0.00011
Cobalt	mg/L	0.00123	0.00182	0.00183	0.00161	0.00247
Copper	mg/L	0.0046	0.00427	0.00582	0.00484	0.00425
Iron	mg/L	0.025	0.021	0.046	0.064	0.050
Lead	mg/L	<0.000005	<0.000050	0.000076	0.000051	<0.000050
Lithium	mg/L	-	-	0.028	0.0166	0.015
Manganese	mg/L	0.00127	0.00254	0.00185	0.00279	0.0179
Mercury	mg/L	0.0000051	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00669	0.00966	0.0144	0.00452	0.00583
Nickel	mg/L	0.0135	0.0133	0.0151	0.0112	0.0125
Selenium	mg/L	0.000916	0.00106	0.00113	0.000684	0.000967
Silver	mg/L	<0.000001	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000001	<0.000010	0.000021	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00098	0.00045	0.0040	0.00244	0.00282
Uranium	mg/L	-	-	0.01	0.00318	0.00422
Vanadium	mg/L	0.0016	0.00149	0.00126	0.00110	0.00171
Zinc	mg/L	<0.0010	<0.0010	<0.0010	0.0017	<0.0010
Routine Water						
Ion Balance	%	112	95.2	113	103	97.1
Bicarbonate	mg/L	353	516	409	413	426
Chloride	mg/L	25.7	34.7	48.4	22.3	17.5
Carbonate	mg/L	7.7	24.6	12.7	14.5	15.7
Conductivity (EC)	uS/cm	855	1230	1420	978	816
Calcium	mg/L	42.4	33.3	37.6	41.3	31.8
Potassium	mg/L	27.6	30.2	29.2	22.2	20.9
Magnesium	mg/L	21.2	25.8	23.1	24.6	17.1
Sodium	mg/L	118	198	270	149	126
Sulfate	mg/L	89.4	167	280	138	60.5
Phosphorus	mg/L	0.721	0.741	0.737	0.290	0.447
pH in H_20	pH	8.45	8.73	8.57	8.60	8.60
TDS (Calculated)	mg/L	507	771	906	615	500
Nitrate	mg/L	<0.020	<0.020	0.689	<0.020	0.079
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	0.020
Nitrate and Nitrite (as N)	mg/L	-	-	0.689	<0.022	0.099
Hardness as $CaCO_3$	mg/L	-	-	189	204	150
Alkalinity (total as $CaCO_3$)	mg/L	-	-	357	362	376
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.478	0.472	0.616
Field Data						
pH in H_20	pH	9.0	9.2	10.1	7.24	8.54
Conductivity (EC)	uS/cm	876	1346	1488	1198	861

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**
Chem. O_2 Demand	mg/L	120	202	221	137	137
Ammonia-N	mg/L	0.111	3.04	1.82	0.397	0.888
Total Kjeldahl Nitrogen	mg/L	6.87	11.1	10.3	4.26	4.02
Dissolved Organic Carbon	mg/L	49.2	202	74.0	42.9	43.2
Phenols	mg/L	-	-	0.0019	0.0088	0.0013
Total Suspended Solids (TSS)	mg/L	-	-	-	-	61.0
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.0755	0.0785	0.0911	0.0764	0.125
Antimony	mg/L	0.00024	0.00047	0.00058	0.00024	0.00024
Arsenic	mg/L	-	-	0.00685	0.00314	0.00702
Barium	mg/L	0.0338	0.0643	0.0935	0.0406	0.0370
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	<0.010	0.026	0.040	0.024	0.011
Cadmium	mg/L	0.0000097	0.0000079	0.0000297	0.0000099	<0.0000050
Chromium	mg/L	0.00042	0.00025	0.00033	0.00031	0.00035
Cobalt	mg/L	0.00063	0.00197	0.0022	0.00060	0.00092
Copper	mg/L	0.00152	0.00243	0.00383	0.00123	0.00083
Iron	mg/L	0.995	0.108	0.168	0.922	1.32
Lead	mg/L	0.00028	0.000059	0.000125	0.000283	0.000366
Lithium	mg/L	-	-	0.0339	0.016	0.0156
Manganese	mg/L	0.00355	0.147	0.0927	0.00266	0.0884
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00113	0.00311	0.00662	0.00164	0.000964
Nickel	mg/L	0.00526	0.00965	0.0132	0.00455	0.00468
Selenium	mg/L	0.000393	0.000497	0.000795	0.000262	0.000408
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000019	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.0061	0.00269	0.0104	0.00661	0.0117
Uranium	mg/L	-	-	0.00446	0.000924	0.000664
Vanadium	mg/L	0.00334	0.00415	0.00393	0.00222	0.00294
Zinc	mg/L	0.0027	0.0017	<0.0010	0.0024	<0.0010
Routine Water						
Ion Balance	%	110	97.7	112	101	102
Bicarbonate	mg/L	356	619	564	442	375
Chloride	mg/L	29.8	47.5	48.6	22.9	21.0
Carbonate	mg/L	<5	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	675	1050	1050	734	639
Calcium	mg/L	23.5	28.8	28.6	22.2	23.5
Potassium	mg/L	35.6	45.2	43.5	26.8	28.1
Magnesium	mg/L	12.4	16.1	16.5	12.7	11.6
Sodium	mg/L	101	175	197	121	94.5
Sulfate	mg/L	6.68	14.9	28.9	5.32	3.99
Phosphorus	mg/L	2.2	0.98	1.89	0.614	2.71
pH in H_20	pH	8.4	8.06	8.29	8.23	8.39
TDS (Calculated)	mg/L	389	640	644	431	373
Nitrate	mg/L	<0.020	0.243	0.157	0.336	0.141
Nitrite	mg/L	<0.010	0.086	<0.010	0.030	0.058
Nitrate and Nitrite (as N)	mg/L	-	-	0.157	0.365	0.20
Hardness as $CaCO_3$	mg/L	-	-	139	108	106
Alkalinity (total as $CaCO_3$)	mg/L	-	-	466	363	316
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.39	0.369	0.307
Field Data						
pH in H_20	pH	8.5	8.6	10.2	6.14	8.08
Conductivity (EC)	uS/cm	703	1170	1133	897	666

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**
Chem. O_2 Demand	mg/L	320	323	268	339	280
Ammonia-N	mg/L	0.571	0.200	0.123	0.104	0.166
Total Kjeldahl Nitrogen	mg/L	12.3	11.7	10.4	11.0	9.55
Dissolved Organic Carbon	mg/L	106	323	91.0	102	85.6
Phenols	mg/L	-	-	0.0017	0.0084	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	4.4
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.168	0.0146	0.302	0.039	0.187
Antimony	mg/L	0.00045	0.00057	0.00059	0.0005	0.00054
Arsenic	mg/L	-	-	0.0181	0.0175	0.0169
Barium	mg/L	0.0623	0.0562	0.0720	0.0701	0.0728
Beryllium	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Boron	mg/L	0.107	0.091	0.091	0.091	0.097
Cadmium	mg/L	0.00005	0.000038	0.000056	0.00005	0.000024
Chromium	mg/L	0.00114	0.00096	0.00115	0.00092	0.00097
Cobalt	mg/L	0.00442	0.00637	0.00608	0.0051	0.00494
Copper	mg/L	0.094	0.0532	0.0521	0.0255	0.0184
Iron	mg/L	1.41	0.822	1.41	1.08	1.40
Lead	mg/L	0.00134	0.00076	0.00118	0.00105	0.00131
Lithium	mg/L	-	-	0.0639	0.0537	0.0541
Manganese	mg/L	0.179	0.451	0.333	0.587	0.621
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000086	<0.0000050
Molybdenum	mg/L	0.00523	0.00447	0.00457	0.00327	0.00339
Nickel	mg/L	0.0287	0.0288	0.0293	0.0243	0.0200
Selenium	mg/L	0.00077	0.00096	0.00099	0.00080	0.00087
Silver	mg/L	0.000034	<0.000020	<0.000020	<0.000020	<0.000020
Thallium	mg/L	<0.000020	<0.000020	0.000023	<0.000020	<0.000020
Tin	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Titanium	mg/L	0.0135	0.00819	0.0552	0.00886	0.0281
Uranium	mg/L	-	-	0.00196	0.00185	0.00221
Vanadium	mg/L	0.0152	0.0155	0.0154	0.0131	0.0122
Zinc	mg/L	0.0123	0.0091	0.0071	0.0076	0.0063
Routine Water						
Ion Balance	%	108	91.7	103	102	98.1
Bicarbonate	mg/L	540	688	617	609	578
Chloride	mg/L	174	200	197	202	217
Carbonate	mg/L	15	<5.0	17.9	16.1	22.7
Conductivity (EC)	uS/cm	2030	2190	2150	2150	2230
Calcium	mg/L	48.8	46.1	51.1	51.7	56.8
Potassium	mg/L	131	132	127	135	116
Magnesium	mg/L	25.1	24	26.9	31.0	31.9
Sodium	mg/L	304	305	327	326	347
Sulfate	mg/L	250	250	252	284	363
Phosphorus	mg/L	7.1	7.43	8.88	8.91	7.55
pH in H_20	pH	8.54	8.3	8.54	8.52	8.60
TDS (Calculated)	mg/L	1220	1330	1310	1350	1440
Nitrate	mg/L	0.43	1.4	0.958	1.12	0.85
Nitrite	mg/L	0.034	<0.050	<0.020	<0.020	0.062
Nitrate and Nitrite (as N)	mg/L	-	-	0.958	1.12	0.91
Hardness as $CaCO_3$	mg/L	-	-	238	257	273
Alkalinity (total as $CaCO_3$)	mg/L	-	-	536	526	512
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.129	0.297	0.310
Field Data						
pH in H_20	pH	8.8	8.1	10.2	9.73	8.63
Conductivity (EC)	uS/cm	2030	2360	2290	2.66	2390

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**
Chem. O_2 Demand	mg/L	126	188	160	114	196
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
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
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
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_20	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_20	pH	8.8	8.8	11.4	10.3	8.42
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**
Chem. O_2 Demand	mg/L	37	57	Not analyzed	119	48
Ammonia-N	mg/L	<0.050	<0.050		<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	1.29	1.79		3.49	2.02
Dissolved Organic Carbon	mg/L	17.3	57		17.9	15.1
Phenols	mg/L	-	-		0.0136	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-		-	19.2
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	Not analyzed	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050		<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050		<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-		<0.00050	<0.00050
Xylene (o)	mg/L	-	-		<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071		<0.00071	<0.00071
Styrene	mg/L	-	-		<0.00050	<0.00050
F1 (C6-C10)	mg/L	<0.10	<0.10		<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10		<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.13	<0.10		<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0023	0.0149	Not analyzed	0.0033	0.0088
Antimony	mg/L	0.00031	0.00027		0.00029	0.00029
Arsenic	mg/L	-	-		0.00194	0.00169
Barium	mg/L	0.0264	0.0913		0.0773	0.053
Beryllium	mg/L	<0.00010	<0.00010		<0.00010	<0.00010
Boron	mg/L	0.061	0.071		0.060	0.062
Cadmium	mg/L	0.0000249	0.0000585		0.0000188	<0.0000050
Chromium	mg/L	<0.00010	<0.00010		0.00016	<0.00010
Cobalt	mg/L	0.00018	0.00039		0.00052	0.00022
Copper	mg/L	0.0013	0.00283		0.00242	0.0011
Iron	mg/L	<0.010	0.019		0.015	0.013
Lead	mg/L	<0.000050	0.000087		<0.000050	<0.000050
Lithium	mg/L	-	-		0.0409	0.0411
Manganese	mg/L	0.00027	0.0211		0.00123	0.00125
Mercury	mg/L	<0.0000050	<0.0000050		<0.0000050	<0.0000050
Molybdenum	mg/L	0.0302	0.0206		0.0254	0.0234
Nickel	mg/L	0.0172	0.0121		0.0203	0.0146
Selenium	mg/L	0.000322	0.000233		0.000304	0.000259
Silver	mg/L	<0.000010	<0.000010		<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010		<0.000010	<0.000010
Tin	mg/L	<0.00010	0.00033		<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00144		<0.00030	0.00105
Uranium	mg/L	-	-		0.00247	0.00265
Vanadium	mg/L	0.0164	0.00285		0.00262	0.00154
Zinc	mg/L	0.0015	0.0057		0.0028	<0.0010
Routine Water						
Ion Balance	%	99.8	94.8	Not analyzed	102	95.2
Bicarbonate	mg/L	256	334		268	282
Chloride	mg/L	18.2	18.3		14.7	13.6
Carbonate	mg/L	<5.0	6.4		<5.0	5.0
Conductivity (EC)	uS/cm	943	1020		960	947
Calcium	mg/L	27.9	29.1		49.1	41.3
Potassium	mg/L	10.4	11.1		13.6	12.2
Magnesium	mg/L	15.5	15.3		17.4	16.1
Sodium	mg/L	153	162		139	144
Sulfate	mg/L	234	209		252	253
Phosphorus	mg/L	0.038	0.051		0.185	0.081
pH in H_20	pH	8.23	8.44		8.38	8.40
TDS (Calculated)	mg/L	585	616		623	625
Nitrate	mg/L	<0.020	<0.020		0.029	<0.020
Nitrite	mg/L	<0.010	<0.010		<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-		0.029	<0.022
Hardness as CaCO3	mg/L	-	-		194	169
Alkalinity (total as CaCO3)	mg/L	-	-		227	240
Hydroxide	mg/L	-	-		<5.0	<5.0
Fluoride	mg/L	-	-		0.465	0.450
Field Data						
pH in H_20	pH	8.8	8.8	Not analyzed	11.68	8.36
Conductivity (EC)	uS/cm	930	1116		1203	1017

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**
Chem. O_2 Demand	mg/L	1300	1930	960	1370	1300
Ammonia-N	mg/L	3.13	1.37	0.409	2.85	2.02
Total Kjeldahl Nitrogen	mg/L	56.1	62	39.4	43.7	42.6
Dissolved Organic Carbon	mg/L	507	1930	329	415	295
Phenols	mg/L	-	-	<0.01	0.0116	0.0013
Total Suspended Solids (TSS)	mg/L	-	-	-	-	24.4
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.273	0.149	0.145	0.080	0.0915
Antimony	mg/L	0.00082	0.00088	0.00082	0.00064	0.00074
Arsenic	mg/L	-	-	0.0327	0.0275	0.0310
Barium	mg/L	0.188	0.236	0.383	0.166	0.195
Beryllium	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005
Boron	mg/L	0.289	0.302	0.267	0.204	0.223
Cadmium	mg/L	0.000094	0.000061	0.000064	0.000079	0.000036
Chromium	mg/L	0.00483	0.00492	0.00482	0.00285	0.00373
Cobalt	mg/L	0.0128	0.0108	0.00594	0.00794	0.00817
Copper	mg/L	0.0138	0.0093	0.0069	0.0093	0.0103
Iron	mg/L	3.92	2.86	3.26	1.99	3.63
Lead	mg/L	0.00385	0.00305	0.00422	0.00304	0.00391
Lithium	mg/L	-	-	0.128	0.0902	0.0902
Manganese	mg/L	0.945	1.06	1.39	0.748	0.882
Mercury	mg/L	<0.000050	<0.0000050	<0.000050	<0.000050	<0.0000050
Molybdenum	mg/L	0.00911	0.00492	0.00333	0.00193	0.00371
Nickel	mg/L	0.0497	0.045	0.0350	0.0350	0.0394
Selenium	mg/L	0.00192	0.00218	0.00159	0.00142	0.00184
Silver	mg/L	0.000092	0.000075	0.00009	<0.000050	<0.000050
Thallium	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Tin	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Titanium	mg/L	0.0677	0.0592	0.0716	0.0444	0.0700
Uranium	mg/L	-	-	0.00295	0.00214	0.00303
Vanadium	mg/L	0.0336	0.0351	0.0277	0.0286	0.0276
Zinc	mg/L	0.0421	0.0297	0.0247	0.032	0.0233
Routine Water						
Ion Balance	%	114	98.6	101	110	96.9
Bicarbonate	mg/L	1080	1830	1580	1310	1430
Chloride	mg/L	615	932	894	603	668
Carbonate	mg/L	65.1	94.1	87.5	47.6	64.6
Conductivity (EC)	uS/cm	4620	6910	6470	4570	4960
Calcium	mg/L	89.2	105	118	84.2	82.2
Potassium	mg/L	610	870	717	634	602
Magnesium	mg/L	60.3	90	84.4	71.6	69.2
Sodium	mg/L	560	881	844	596	655
Sulfate	mg/L	308	659	637	361	530
Phosphorus	mg/L	34.8	44.7	31.3	26.9	26.8
pH in H_20	pH	8.74	8.74	8.73	8.64	8.68
TDS (Calculated)	mg/L	2840	4580	4160	3040	3380
Nitrate	mg/L	<0.10	1.35	0.33	0.570	0.26
Nitrite	mg/L	<0.050	<0.050	<0.050	0.083	0.073
Nitrate and Nitrite (as N)	mg/L	-	-	0.33	0.65	0.33
Hardness as $CaCO_3$	mg/L	-	-	642	505	490
Alkalinity (total as $CaCO_3$)	mg/L	-	-	1440	1150	1280
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	<0.1	<0.10	1.19
Field Data						
pH in H_20	pH	9.2	8.7	10.4	9.81	8.59
Conductivity (EC)	uS/cm	4480	7210	2230	6.83	5430

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**
Chem. O_2 Demand	mg/L	184	268	243	370	380
Ammonia-N	mg/L	0.138	2.42	0.455	0.600	0.210
Total Kjeldahl Nitrogen	mg/L	6.84	11.6	10.0	13.9	14.6
Dissolved Organic Carbon	mg/L	62.4	268	88.0	100	100
Phenols	mg/L	-	-	0.0025	0.0071	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	73.0
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.0636	0.297	0.0245	0.0182	0.0145
Antimony	mg/L	0.00049	0.00045	0.00101	0.00073	0.00059
Arsenic	mg/L	-	-	0.019	0.0155	0.0168
Barium	mg/L	0.0324	0.0255	0.0764	0.0337	0.0317
Beryllium	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Boron	mg/L	0.038	<0.020	<0.020	0.048	0.059
Cadmium	mg/L	<0.000010	<0.000010	0.000019	0.000012	<0.000010
Chromium	mg/L	0.00043	0.00068	0.00025	0.00055	0.00051
Cobalt	mg/L	0.00169	0.00234	0.00364	0.00428	0.00328
Copper	mg/L	0.00214	0.00112	0.0052	0.00527	0.00426
Iron	mg/L	0.322	0.223	0.070	0.277	0.178
Lead	mg/L	0.00024	0.00021	0.00011	0.00037	0.00017
Lithium	mg/L	-	-	0.0576	0.0533	0.050
Manganese	mg/L	0.0381	0.633	0.00515	0.220	0.218
Mercury	mg/L	0.0000118	<0.0000050	<0.0000050	0.0000063	<0.0000050
Molybdenum	mg/L	0.00595	0.00653	0.0110	0.00592	0.00596
Nickel	mg/L	0.0165	0.0168	0.0232	0.0225	0.0181
Selenium	mg/L	0.00067	0.00062	0.00078	0.00088	0.00096
Silver	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Thallium	mg/L	<0.000020	<0.000020	<0.00002	<0.000020	<0.000020
Tin	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Titanium	mg/L	0.00805	0.0116	0.00511	0.00459	0.00431
Uranium	mg/L	-	-	0.00351	0.0023	0.00191
Vanadium	mg/L	0.0178	0.018	0.0188	0.0269	0.0142
Zinc	mg/L	0.0028	0.0033	<0.0020	0.004	0.0039
Routine Water						
Ion Balance	%	107	94.4	99.5	104	99.7
Bicarbonate	mg/L	589	1100	932	850	795
Chloride	mg/L	71.4	143	145	175	207
Carbonate	mg/L	22.4	18.7	37.6	21.7	40.1
Conductivity (EC)	uS/cm	1520	2080	2030	2120	2230
Calcium	mg/L	38.5	43.4	35.6	50.3	45.7
Potassium	mg/L	54.5	83.8	67.2	119	122
Magnesium	mg/L	20.4	26.1	18.2	35.9	30.6
Sodium	mg/L	263	375	391	353	370
Sulfate	mg/L	144	45.4	71.6	162	185
Phosphorus	mg/L	5.4	5.82	2.99	10.1	12.5
pH in H_20	pH	8.64	8.45	8.66	8.53	8.78
TDS (Calculated)	mg/L	904	1300	1230	1340	1390
Nitrate	mg/L	<0.040	0.19	<0.040	0.557	0.19
Nitrite	mg/L	<0.020	0.053	<0.020	<0.020	0.065
Nitrate and Nitrite (as N)	mg/L	-	-	<0.045	0.557	0.25
Hardness as $CaCO_3$	mg/L	-	-	164	273	240
Alkalinity (total as $CaCO_3$)	mg/L	-	-	827	733	719
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.512	0.180	0.480
Field Data						
pH in H_20	pH	8.9	8.8	10.6	11.75	8.81
Conductivity (EC)	uS/cm	1509	2310	2140	2.78	2300

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**
Chem. O_2 Demand	mg/L	106	127	125	125	88
Ammonia-N	mg/L	0.056	0.27	<0.050	<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	4.16	4.05	4.58	4.16	3.27
Dissolved Organic Carbon	mg/L	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
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	0.0167	<0.0050	0.0151	0.0051	0.0136
Antimony	mg/L	0.0007	0.00103	0.00113	0.00086	0.00067
Arsenic	mg/L	-	-	0.019	0.0134	0.0139
Barium	mg/L	0.0266	0.0375	0.0302	0.0512	0.0370
Beryllium	mg/L	<0.00050	<0.00050	<0.00020	<0.00020	<0.00020
Boron	mg/L	0.279	0.337	0.301	0.237	0.230
Cadmium	mg/L	<0.000025	<0.000025	0.000018	0.000012	<0.000010
Chromium	mg/L	<0.0005	<0.00050	<0.00020	<0.00020	<0.00020
Cobalt	mg/L	0.00086	0.00133	0.00089	0.00075	0.0011
Copper	mg/L	0.0016	<0.0010	0.00103	0.00174	0.00085
Iron	mg/L	<0.050	0.063	0.037	0.023	0.082
Lead	mg/L	<0.00025	<0.00025	<0.00010	<0.00010	<0.00010
Lithium	mg/L	-	-	0.13	0.0978	0.088
Manganese	mg/L	0.00561	0.532	0.00962	0.00599	0.172
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00254	0.0016	0.00211	0.00179	0.00128
Nickel	mg/L	0.0069	0.0086	0.0067	0.0082	0.0059
Selenium	mg/L	0.00037	<0.00025	0.00032	0.00029	0.00027
Silver	mg/L	<0.000050	<0.000050	<0.000020	<0.000020	<0.000020
Thallium	mg/L	<0.000050	<0.000050	<0.00002	<0.000020	<0.000020
Tin	mg/L	<0.00050	<0.00050	<0.00020	<0.00020	<0.00020
Titanium	mg/L	<0.0015	<0.0015	0.00146	0.00134	0.00232
Uranium	mg/L	-	-	0.00442	0.00507	0.0040
Vanadium	mg/L	0.0052	0.0044	0.0042	0.0063	0.0026
Zinc	mg/L	<0.0050	<0.0050	0.0020	<0.0020	<0.0020
Routine Water						
Ion Balance	%	106	94.3	98.7	101	101
Bicarbonate	mg/L	343	694	538	520	427
Chloride	mg/L	235	340	359	286	294
Carbonate	mg/L	13.1	20	14.5	16.6	11.2
Conductivity (EC)	uS/cm	2790	4020	4070	3120	3050
Calcium	mg/L	40.2	70.2	41.7	97.9	91.4
Potassium	mg/L	27.1	29.6	29.8	34.1	26.6
Magnesium	mg/L	42.5	56.4	58.5	56.6	57.8
Sodium	mg/L	528	729	794	558	510
Sulfate	mg/L	711	1030	1120	818	772
Phosphorus	mg/L	0.385	0.963	0.486	0.745	0.582
pH in H_20	pH	8.56	8.52	8.47	8.52	8.48
TDS (Calculated)	mg/L	1770	2620	2680	2120	1970
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
Nitrate and Nitrite (as N)	mg/L	-	-	<0.11	<0.101	<0.11
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_20	pH	9.5	8.5	10.9	9.48	8.37
Conductivity (EC)	uS/cm	2730	4300	4140	3.82	3170

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**
Chem. O_2 Demand	mg/L	74	56	66	93	84
Ammonia-N	mg/L	<0.05	1.00	1.10	0.071	0.200
Total Kjeldahl Nitrogen	mg/L	2.67	2.78	4.27	2.46	3.01
Dissolved Organic Carbon	mg/L	22.5	56.0	25.6	28.1	26.2
Phenols	mg/L	-	-	0.0023	0.0099	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	8.0
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.0011	0.008	0.0064	0.0036	0.0039
Antimony	mg/L	0.00024	0.00023	0.00024	0.00022	0.00027
Arsenic	mg/L	-	-	0.00455	0.00586	0.00534
Barium	mg/L	0.0581	0.0707	0.0833	0.0489	0.0504
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.058	0.037	0.051	0.039	0.020
Cadmium	mg/L	<0.0000050	0.000005	<0.0000050	0.0000056	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	<0.00010	0.00013	0.00014
Cobalt	mg/L	0.0003	0.00078	0.00094	0.00038	0.00050
Copper	mg/L	0.00034	0.00101	0.00057	0.00071	0.00037
Iron	mg/L	0.011	0.033	0.026	0.049	0.125
Lead	mg/L	<0.000050	0.000075	<0.000050	<0.000050	<0.000050
Lithium	mg/L	-	-	0.0329	0.0308	0.0262
Manganese	mg/L	0.00062	0.182	0.387	0.00491	0.134
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000986	0.00105	0.00153	0.00067	0.00047
Nickel	mg/L	0.00521	0.00592	0.00697	0.00493	0.00347
Selenium	mg/L	0.000194	0.000206	0.000284	0.000205	0.000184
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000015	<0.000010	<0.000010
Tin	mg/L	<0.00010	0.00016	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00044	0.00086	0.00069	0.00114
Uranium	mg/L	-	-	0.00225	0.00115	0.000827
Vanadium	mg/L	0.00328	0.00439	0.00363	0.00324	0.00251
Zinc	mg/L	<0.0010	0.0098	<0.0010	<0.0010	<0.0010
Routine Water						
Ion Balance	%	100	104	103	109	98.5
Bicarbonate	mg/L	396	566	451	464	479
Chloride	mg/L	137	203	237	182	150
Carbonate	mg/L	8.4	<5.0	7.9	6.7	7.4
Conductivity (EC)	uS/cm	1230	1660	1780	1490	1400
Calcium	mg/L	49.4	58.5	67.2	53.7	45.5
Potassium	mg/L	16.8	20.6	19.6	19.1	15.3
Magnesium	mg/L	20.4	26.6	28.5	28.2	21.0
Sodium	mg/L	185	279	275	266	233
Sulfate	mg/L	93.7	98	163	131	116
Phosphorus	mg/L	0.612	0.82	0.464	1.41	1.68
pH in H_20	pH	8.44	8.08	8.39	8.37	8.42
TDS (Calculated)	mg/L	705	967	1020	915	824
Nitrate	mg/L	<0.020	<0.10	0.299	<0.020	<0.020
Nitrite	mg/L	<0.010	<0.050	<0.010	<0.010	0.017
Nitrate and Nitrite (as N)	mg/L	-	-	0.299	<0.022	<0.022
Hardness as $CaCO_3$	mg/L	-	-	285	250	200
Alkalinity (total as $CaCO_3$)	mg/L	-	-	383	392	405
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.129	0.208	0.179
Field Data						
pH in H_20	pH	8.5	8.1	9.6	10.32	8.15
Conductivity (EC)	uS/cm	1225	1863	1875	1940	1458

Notes:

"-" Not required under previous permit

Table 1.18: Chemical Analytical Results

Sample ID:		**Norgaard D.1**				
Site Number:		**18**				
Date Sampled:	**Units**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**
Chem. O_2 Demand	mg/L	80	78	35	158	106
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
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
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
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_20	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_20	pH	8.8	8.3	8.3	9.89	7.95
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**
Chem. O_2 Demand	mg/L	69	83	92	75	83
Ammonia-N	mg/L	<0.05	1.08	0.058	<0.050	0.251
Total Kjeldahl Nitrogen	mg/L	3.52	4.11	4.01	2.52	3.99
Dissolved Organic Carbon	mg/L	27	83	27.3	24.2	21.7
Phenols	mg/L	-	-	0.0026	0.0077	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	13.0
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	<0.0010	0.0038	0.0085	0.0017	0.0022
Antimony	mg/L	0.00021	0.00023	0.00030	0.0002	0.00029
Arsenic	mg/L	-	-	0.00574	0.00471	0.00454
Barium	mg/L	0.0633	0.0359	0.0623	0.0412	0.0729
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.046	0.034	0.037	0.039	0.029
Cadmium	mg/L	<0.0000050	<0.0000050	0.0000168	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	0.00011	<0.00010	<0.00010
Cobalt	mg/L	0.00022	0.00065	0.00055	0.00035	0.00062
Copper	mg/L	0.00021	0.00033	0.00043	0.00027	0.00026
Iron	mg/L	0.019	0.054	0.038	0.011	0.041
Lead	mg/L	<0.000050	0.000055	0.000061	<0.000050	<0.000050
Lithium	mg/L	-	-	0.0279	0.0235	0.0169
Manganese	mg/L	0.00088	0.276	0.0371	0.00135	0.0111
Mercury	mg/L	0.000006	0.0000058	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00036	0.000554	0.000512	0.000602	0.000589
Nickel	mg/L	0.00214	0.0035	0.00316	0.00287	0.00304
Selenium	mg/L	0.000232	0.00021	0.000206	0.000204	0.000192
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000015	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00078	0.00093	<0.0003	<0.00030
Uranium	mg/L	-	-	0.00159	0.00116	0.00136
Vanadium	mg/L	0.00107	0.00167	0.00163	0.00094	0.00166
Zinc	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Routine Water						
Ion Balance	%	100	96.3	107	104	107
Bicarbonate	mg/L	446	563	469	416	359
Chloride	mg/L	38.3	59.3	58.7	71.6	76.8
Carbonate	mg/L	9.3	<5.0	<5.0	10.8	7.6
Conductivity (EC)	uS/cm	997	1190	1070	1060	1020
Calcium	mg/L	32.4	43.8	26.8	39.2	44.7
Potassium	mg/L	13.7	16.4	15.8	15.7	12.7
Magnesium	mg/L	18.7	22.9	21.3	23.7	24.1
Sodium	mg/L	168	190	197	174	164
Sulfate	mg/L	99.6	111	92.4	106	123
Phosphorus	mg/L	0.515	0.419	0.339	0.263	0.425
pH in H_20	pH	8.48	8.22	8.36	8.51	8.46
TDS (Calculated)	mg/L	600	725	648	646	630
Nitrate	mg/L	<0.020	<0.020	<0.020	0.025	0.064
Nitrite	mg/L	<0.010	<0.010	<0.010	0.014	0.025
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	0.039	0.089
Hardness as $CaCO_3$	mg/L	-	-	155	195	211
Alkalinity (total as $CaCO_3$)	mg/L	-	-	393	359	307
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.16	0.292	0.229
Field Data						
pH in H_20	pH	8.6	8.6	10.7	10.44	8.50
Conductivity (EC)	uS/cm	1004	1295	1123	1306	1049

Notes:

"-" Not required under previous permit

Table 1.20: Chemical Analytical Results

Sample ID:		**Winsnes D.2**				
Site Number:		**20**				
Date Sampled:	**Units**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**
Chem. O_2 Demand	mg/L	81	77	61	79	75
Ammonia-N	mg/L	0.618	0.67	<0.050	0.824	0.356
Total Kjeldahl Nitrogen	mg/L	3.93	2.06	1.73	3.35	3.20
Dissolved Organic Carbon	mg/L	20.9	77	21.5	25.3	24.1
Phenols	mg/L	-	-	0.0018	0.0052	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	34.8
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.0018	0.004	0.0046	0.0052	0.0128
Antimony	mg/L	<0.00010	0.00013	0.00016	0.00013	0.00017
Arsenic	mg/L	-	-	0.00218	0.00283	0.00274
Barium	mg/L	0.104	0.0911	0.104	0.0997	0.0979
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.04	0.023	0.033	0.028	<0.010
Cadmium	mg/L	<0.0000050	<0.0000050	0.0000237	0.0000063	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	0.00013	0.00012	0.00016
Cobalt	mg/L	0.00012	0.0004	0.00053	0.00031	0.00027
Copper	mg/L	0.00027	0.00037	0.00027	0.00026	0.00023
Iron	mg/L	0.878	0.526	0.185	0.815	0.739
Lead	mg/L	<0.000050	0.000111	0.000067	0.000071	0.000138
Lithium	mg/L	-	-	0.0237	0.0178	0.017
Manganese	mg/L	0.00173	0.104	0.0629	0.00851	0.0070
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000584	0.00068	0.00061	0.00039	0.000304
Nickel	mg/L	0.00267	0.00373	0.00305	0.00293	0.00282
Selenium	mg/L	0.000212	0.00019	0.00018	0.000188	0.000245
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000024	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00074	0.00053	0.00095	0.00216
Uranium	mg/L	-	-	0.000372	0.000199	0.000235
Vanadium	mg/L	<0.00050	0.00059	0.00071	0.00095	0.00087
Zinc	mg/L	<0.0010	0.0027	<0.0010	<0.0010	<0.0010
Routine Water						
Ion Balance	%	109	91.1	108	106	105
Bicarbonate	mg/L	227	294	269	277	259
Chloride	mg/L	19.8	38.5	37.6	43.9	55.5
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	431	634	569	574	654
Calcium	mg/L	32.7	39.1	35.2	43.6	45.2
Potassium	mg/L	13.6	15.8	17.8	14.8	10.6
Magnesium	mg/L	12.5	15.8	16.3	15.8	16.8
Sodium	mg/L	43.4	61.8	66.1	57.3	74.3
Sulfate	mg/L	12.4	40	23.8	12.1	47.5
Phosphorus	mg/L	0.396	0.27	0.106	0.463	0.552
pH in H_20	pH	8.04	8.15	8.19	8.13	8.09
TDS (Calculated)	mg/L	246	366	329	324	378
Nitrate	mg/L	<0.020	<0.020	<0.020	0.037	0.053
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	0.037	0.053
Hardness as $CaCO_3$	mg/L	-	-	155	174	182
Alkalinity (total as $CaCO_3$)	mg/L	-	-	220	227	213
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.101	0.199	0.154
Field Data						
pH in H_20	pH	8.1	8.3	10.3	9.26	7.73
Conductivity (EC)	uS/cm	4.53	689	600	714	681

Notes:

"-" Not required under previous permit

Table 1.21: Chemical Analytical Results

Sample ID:				**Winsnes D.3**		
Site Number:				**21**		
Date Sampled:	**Units**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**
Chem. O_2 Demand	mg/L	81	97	112	93	130
Ammonia-N	mg/L	<0.05	0.059	0.090	<0.050	0.072
Total Kjeldahl Nitrogen	mg/L	2.92	3.91	4.39	2.75	4.86
Dissolved Organic Carbon	mg/L	26.8	97	32.4	29.5	35.3
Phenols	mg/L	-	-	0.0018	0.0093	<0.0010
Total Suspended Solids (TSS)	mg/L	-	-	-	-	29.6
BTEX, F1 (C6-C10) and F2(>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.002	0.003	0.0177	0.0071	0.0118
Antimony	mg/L	0.00031	0.00044	0.00061	0.00024	0.0003
Arsenic	mg/L	-	-	0.00898	0.00575	0.0064
Barium	mg/L	0.101	0.107	0.114	0.0766	0.0595
Beryllium	mg/L	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.094	<0.020	0.021	0.05	<0.010
Cadmium	mg/L	<0.0000050	<0.000010	0.0000199	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00020	0.00014	<0.00010	0.00014
Cobalt	mg/L	0.00053	0.00124	0.00158	0.00056	0.00090
Copper	mg/L	0.00132	0.00141	0.00202	0.00071	0.00061
Iron	mg/L	0.011	0.03	0.037	0.038	0.138
Lead	mg/L	<0.000050	<0.00010	0.00006	<0.000050	0.000061
Lithium	mg/L	-	-	0.0595	0.0419	0.0311
Manganese	mg/L	0.00076	0.0129	0.00528	0.00437	0.0204
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00303	0.00251	0.00298	0.000719	0.000283
Nickel	mg/L	0.00722	0.0057	0.0072	0.00398	0.00343
Selenium	mg/L	0.000239	0.00027	0.000366	0.000201	0.000239
Silver	mg/L	<0.000010	<0.000020	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000020	0.000017	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00132	0.00333	0.00134	0.00587
Uranium	mg/L	-	-	0.00437	0.0021	0.00127
Vanadium	mg/L	0.0016	0.0048	0.00433	0.0018	0.00266
Zinc	mg/L	0.0014	<0.0020	<0.0010	<0.0010	<0.0010
Routine Water						
Ion Balance	%	105	98.9	105	106	115
Bicarbonate	mg/L	396	504	429	435	472
Chloride	mg/L	238	357	304	244	311
Carbonate	mg/L	<5.0	10.9	<5.0	<5.0	8.3
Conductivity (EC)	uS/cm	1420	2020	1710	1580	1800
Calcium	mg/L	52.4	52.3	46.7	69.8	61.4
Potassium	mg/L	27.8	30.3	28.5	22.6	37.7
Magnesium	mg/L	41.4	54.1	45.7	47.4	47.2
Sodium	mg/L	195	281	254	210	295
Sulfate	mg/L	62.2	73.9	67.1	104	57.2
Phosphorus	mg/L	0.287	0.641	0.654	0.755	1.50
pH in H_20	pH	8.29	8.43	8.30	8.22	8.41
TDS (Calculated)	mg/L	812	1110	960	912	1050
Nitrate	mg/L	<0.020	<0.10	<0.020	<0.020	<0.020
Nitrite	mg/L	<0.010	<0.050	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	<0.022	<0.022
Hardness as $CaCO_3$	mg/L	-	-	305	369	348
Alkalinity (total as $CaCO_3$)	mg/L	-	-	356	357	400
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.188	0.184	0.131
Field Data						
pH in H_20	pH	8.60	9.10	10.7	9.22	8.07
Conductivity (EC)	uS/cm	1476	2100	1198	1960	1869

Notes:

"-" Not required under previous permit

Table 1.22: Chemical Analytical Results

Sample ID:		**Winsnes D.4**				
Site Number:		**22**				
Date Sampled:	**Units**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**	**8-Oct-2020**
Chem. O_2 Demand	mg/L	70	112	101	535	127
Ammonia-N	mg/L	<0.050	0.120	0.055	0.075	0.059
Total Kjeldahl Nitrogen	mg/L	2.33	3.4	3.57	17.0	4.78
Dissolved Organic Carbon	mg/L	25.3	112	34.2	31.2	44.0
Phenols	mg/L	-	-	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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	<0.0005	<0.00050	<0.00050
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	0.0017	0.0114	0.0455	0.0165	0.0065
Antimony	mg/L	0.00017	0.00026	0.00029	0.00019	0.00022
Arsenic	mg/L	-	-	0.00555	0.0057	0.00519
Barium	mg/L	0.0559	0.0462	0.0659	0.0437	0.0434
Beryllium	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	0.041	0.036	0.031	0.033	<0.010
Cadmium	mg/L	<0.0000050	<0.0000050	0.0000172	<0.0000050	<0.0000050
Chromium	mg/L	<0.00010	<0.00010	0.00012	0.00014	0.00014
Cobalt	mg/L	0.00027	0.00085	0.00099	0.00101	0.00050
Copper	mg/L	0.00052	0.0008	0.00118	0.00101	<0.00020
Iron	mg/L	0.021	0.088	0.130	0.898	0.182
Lead	mg/L	<0.000050	0.000068	0.00012	0.000139	<0.000050
Lithium	mg/L	-	-	0.0158	0.013	0.023
Manganese	mg/L	0.00054	0.0158	0.0104	0.410	0.00827
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00197	0.00135	0.00183	0.000865	0.000193
Nickel	mg/L	0.00391	0.00359	0.00364	0.00233	0.00188
Selenium	mg/L	0.000227	0.000222	0.000252	0.000201	0.000168
Silver	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L	<0.000010	<0.000010	0.000017	<0.000010	<0.000010
Tin	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00030	0.00067	0.00854	0.00139	0.00118
Uranium	mg/L	-	-	0.00247	0.000959	0.000561
Vanadium	mg/L	<0.00050	0.00144	0.00229	0.0018	0.00107
Zinc	mg/L	0.001	0.0015	<0.0010	0.0012	<0.0010
Routine Water						
Ion Balance	%	107	101	110	107	117
Bicarbonate	mg/L	216	350	290	264	408
Chloride	mg/L	170	238	222	246	294
Carbonate	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	889	1330	1190	1230	1640
Calcium	mg/L	27.9	40.2	37.5	45.1	53.5
Potassium	mg/L	22.9	32.3	32.8	26.0	37.1
Magnesium	mg/L	18.5	29	26.7	29.2	40.4
Sodium	mg/L	129	182	177	173	269
Sulfate	mg/L	9.21	24.2	20.6	37.4	43.3
Phosphorus	mg/L	0.111	0.312	0.283	2.55	1.28
pH in H_20	pH	8.05	8.15	8.25	7.99	8.32
TDS (Calculated)	mg/L	484	718	660	687	941
Nitrate	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L	-	-	<0.022	<0.022	<0.022
Hardness as $CaCO_3$	mg/L	-	-	204	233	300
Alkalinity (total as $CaCO_3$)	mg/L	-	-	238	217	339
Hydroxide	mg/L	-	-	<5	<5.0	<5.0
Fluoride	mg/L	-	-	0.113	0.028	0.117
Field Data						
pH in H_20	pH	8.9	9.1	10.5	9.67	8.01
Conductivity (EC)	uS/cm	862	1429	1274	1545	1687

Notes:

"-" Not required under previous permit

Table 2: Duplicate 1 Chemical Analytical Results

		Sample ID:	Norgaard D.1			
		Site Number:	18	DUPLICATE 1	% RPD	Pass/ Fail (>20%)
		Date Sampled:	8-Oct-2020	8-Oct-2020		
Parameter	**Units**	**RDL**				
Chem. O_2 Demand	mg/L	10	106	101	5%	Pass
Ammonia-N	mg/L	0.05	0.183	0.179	-	Pass
Total Kjeldahl Nitrogen	mg/L	0.2	3.29	3.27	1%	Pass
Dissolved Organic Carbon	mg/L	1	27.5	30.0	9%	Pass
Phenols	mg/L	0.001	0.0018	0.0014	-	Pass
Total Suspended Solids (TSS)	mg/L	3	12.4	14.8	-	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	0.0195	0.0103	62%	Fail
Antimony	mg/L	0.0001	0.00015	0.00014	-	Pass
Arsenic	mg/L	0.0001	0.00172	0.00164	5%	Pass
Barium	mg/L	0.0001	0.0934	0.0900	4%	Pass
Beryllium	mg/L	0.0001	<0.00010	<0.00010	-	Pass
Boron	mg/L	0.01	0.017	0.014	-	Pass
Cadmium	mg/L	0.000005	<0.0000050	<0.0000050	-	Pass
Chromium	mg/L	0.0001	0.00019	0.00019	-	Pass
Cobalt	mg/L	0.0001	0.00062	0.00060	3%	Pass
Copper	mg/L	0.0002	0.00027	<0.00020	-	Pass
Iron	mg/L	0.01	0.505	0.422	18%	Pass
Lead	mg/L	0.00005	0.000172	0.000084	-	Pass
Lithium	mg/L	0.001	0.0294	0.0317	8%	Pass
Manganese	mg/L	0.0001	0.713	0.706	1%	Pass
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	-	Pass
Molybdenum	mg/L	0.00005	0.000111	0.000104	-	Pass
Nickel	mg/L	0.0005	0.00261	0.00262	0.4%	Pass
Selenium	mg/L	0.00005	0.000429	0.000382	12%	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	0.00065	0.00046	-	Pass
Uranium	mg/L	0.00001	0.000385	0.000394	2%	Pass
Vanadium	mg/L	0.0005	<0.00050	0.00055	-	Pass
Zinc	mg/L	0.001	0.0028	0.0017	-	Pass
Routine Water						
Ion Balance	%	N/A	97.1	109	12%	Pass
Bicarbonate	mg/L	5	598	589	2%	Pass
Chloride	mg/L	0.5	235	234	0%	Pass
Carbonate	mg/L	5	5.0	7.1	-	Pass
Conductivity (EC)	uS/cm	2	1690	1720	2%	Pass
Calcium	mg/L	0.5	75.3	75.1	0%	Pass
Potassium	mg/L	0.5	15.2	14.8	3%	Pass
Magnesium	mg/L	0.1	25.2	27.8	10%	Pass
Sodium	mg/L	1	256	298	15%	Pass
Sulfate	mg/L	0.3	61.2	60.6	1%	Pass
Phosphorus	mg/L	0.02	0.732	0.684	7%	Pass
pH in H_20	pH	0.1	8.33	8.36	0%	Pass
TDS (Calculated)	mg/L	N/A	968	1010	4%	Pass
Nitrate	mg/L	0.02	<0.020	<0.020	-	Pass
Nitrite	mg/L	0.01	0.013	0.013	-	Pass
Nitrate and Nitrite (as N)	mg/L	0.02	<0.022	<0.022	-	Pass
Hardness as $CaCO_3$	mg/L	N/A	292	302	3%	Pass
Alkalinity (total as $CaCO_3$)	mg/L	2	499	495	1%	Pass
Hydroxide	mg/L	5	<5.0	<5.0	-	Pass
Fluoride	mg/L	0.02	0.229	0.222	3%	Pass

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

Table 3: Duplicate 2 Chemical Analytical Results

		Sample ID:	Beaver D.1			
		Site Number:	16	DUPLICATE 2	% RPD	Pass/ Fail (>20%)
		Date Sampled:	8-Oct-2020	8-Oct-2020		
Parameter	**Units**	**RDL**				
Chem. O_2 Demand	mg/L	10	84	82	2%	Pass
Ammonia-N	mg/L	0.05	0.200	0.202	-	Pass
Total Kjeldahl Nitrogen	mg/L	0.2	3.01	3.08	2%	Pass
Dissolved Organic Carbon	mg/L	1	26.2	24.2	8%	Pass
Phenols	mg/L	0.001	<0.0010	0.0016	-	Pass
Total Suspended Solids (TSS)	mg/L	3	8.0	8.2	-	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	0.0039	0.0023	-	Pass
Antimony	mg/L	0.0001	0.00027	0.00027	-	Pass
Arsenic	mg/L	0.0001	0.00534	0.00501	6%	Pass
Barium	mg/L	0.0001	0.0504	0.0509	1%	Pass
Beryllium	mg/L	0.0001	<0.00010	<0.00010	-	Pass
Boron	mg/L	0.01	0.020	0.017	-	Pass
Cadmium	mg/L	0.000005	<0.0000050	<0.0000050	-	Pass
Chromium	mg/L	0.0001	0.00014	0.00011	-	Pass
Cobalt	mg/L	0.0001	0.00050	0.00041	-	Pass
Copper	mg/L	0.0002	0.00037	0.00024	-	Pass
Iron	mg/L	0.01	0.125	0.080	44%	Fail
Lead	mg/L	0.00005	<0.000050	<0.000050	-	Pass
Lithium	mg/L	0.001	0.0262	0.028	7%	Pass
Manganese	mg/L	0.0001	0.134	0.012	167%	Fail
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	-	Pass
Molybdenum	mg/L	0.00005	0.00047	0.000414	13%	Pass
Nickel	mg/L	0.0005	0.00347	0.00346	0%	Pass
Selenium	mg/L	0.00005	0.000184	0.000204	10%	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	0.00114	0.00070	-	Pass
Uranium	mg/L	0.00001	0.000827	0.000808	2%	Pass
Vanadium	mg/L	0.0005	0.00251	0.00262	4%	Pass
Zinc	mg/L	0.001	<0.0010	<0.0010	-	Pass
Routine Water						
Ion Balance	%	N/A	98.5	112	13%	Pass
Bicarbonate	mg/L	5	479	472	1%	Pass
Chloride	mg/L	0.5	150	150	0%	Pass
Carbonate	mg/L	5	7.4	8.8	17%	Pass
Conductivity (EC)	uS/cm	2	1400	1410	1%	Pass
Calcium	mg/L	0.5	45.5	46.3	2%	Pass
Potassium	mg/L	0.5	15.3	15.4	1%	Pass
Magnesium	mg/L	0.1	21.0	23.1	10%	Pass
Sodium	mg/L	1	233	272	15%	Pass
Sulfate	mg/L	0.3	116	115	1%	Pass
Phosphorus	mg/L	0.02	1.68	1.66	1%	Pass
pH in H_20	pH	0.1	8.42	8.44	0%	Pass
TDS (Calculated)	mg/L	N/A	824	863	5%	Pass
Nitrate	mg/L	0.02	<0.020	<0.020	-	Pass
Nitrite	mg/L	0.01	0.017	<0.010	-	Pass
Nitrate and Nitrite (as N)	mg/L	0.02	<0.022	<0.022	-	Pass
Hardness as $CaCO_3$	mg/L	N/A	200	211	5%	Pass
Alkalinity (total as $CaCO_3$)	mg/L	2	405	401	1%	Pass
Hydroxide	mg/L	5	<5.0	<5.0	-	Pass
Fluoride	mg/L	0.02	0.179	0.169	6%	Pass

Notes:

RDL - Reportable detection limit

RPD - Relative Percentage Difference calculated as RPD(%)=(|V1-V2|)/[(V1+V2)/2])*100 where V1,V2 = concentrations of parent and duplicate sample, respectively.

"-" Indicates RPD not calculated. RPDs have only been calculated where a concentration is greater than 5 times the RDL

N/A - Not applicable

Shaded- RPD value greater than 20%

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
	Alkalinity (total as $CaCO_3$)	T	No	No Trend	15
	Aluminum	F	No	Down	14
	Ammonia	T	No	Up	15
	Antimony	F	No	Down	15
	Arsenic	F	No	No Trend	13
	Barium	F	No	No Trend	15
	Benzene	T	No	No Trend	14
	Beryllium	F	No	Down	14
	Bicarbonate	T	No	Up	15
	Boron	F	No	No Trend	14
	Cadmium	F	No	Down	15
	Calcium	F	No	No Trend	15
	Carbonate	T	No	Down	15
	Chemical Oxygen Demand (COD)	T	No	Up	15
	Chloride	T	No	Down	15
	Chromium	F	No	Down	15
	Cobalt	F	No	Down	15
	Copper	F	No	Down	15
	Dissolved Organic Carbon (DOC)	F	No	No Trend	14
	Electrical Conductivity (EC)	T	No	Down	15
	Ethylbenzene	T	No	No Trend	14
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	14
	F1 (C_6-C_{10})	T	No	No Trend	14
	F2 (C_{10}-C_{16})	T	No	Down	14
	Fluoride	T	No	Down	8
	Hardness as $CaCO_3$	T	No	No Trend	15
	Hydroxide	T	No	No Trend	15
	Ionic Balance	T	No	No Trend	15
	Iron	F	Yes	Up	15
1	Lead	F	No	Down	15
	Lithium	F	No	Down	13
	Magnesium	F	No	Down	15
	Manganese	F	No	No Trend	14
	Mercury	F	No	Down	15
	Molybdenum	F	No	Down	15
	Nickel	F	No	No Trend	15
	Nitrate (as NO_3-N)	T	No	Down	15
	Nitrate and Nitrite (as N)	T	No	Down	15
	Nitrite (as NO_2-N)	T	No	Down	15
	pH	T	No	Down	15
	Phosphorus	T	Yes	Up	6
	Potassium	F	No	Up	15
	Selenium	F	No	Down	14
	Silver	F	No	Down	14
	Sodium	F	No	Down	15
	Styrene	T	No	Down	7
	Sulphate	T	No	Down	15
	Thallium	F	No	Down	14
	Tin	F	No	Down	14
	Titanium	F	No	No Trend	14
	Toluene	T	No	No Trend	14
	Total Dissolved Solids (TDS)	T	No	Down	15
	Total Kjeldahl Nitrogen (TKN)	T	No	Up	15
	Uranium	F	No	Down	13
	Vanadium	F	No	No Trend	14
	Xylene (o)	T	No	No Trend	12
	Xylenes (m & p)	T	No	No Trend	12
	Xylenes Total	T	No	No Trend	14
	Zinc	F	No	Down	15

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
2	Alkalinity (total as $CaCO_3$)	T	No	Up	14
	Aluminum	F	No	No Trend	13
	Ammonia	T	No	Up	14
	Antimony	F	No	Down	14
	Arsenic	F	No	No Trend	12
	Barium	F	No	No Trend	14
	Benzene	T	No	No Trend	13
	Beryllium	F	No	Down	13
	Bicarbonate	T	No	Up	14
	Boron	F	No	Down	13
	Cadmium	F	No	Down	14
	Calcium	F	No	Up	14
	Carbonate	T	No	No Trend	14
	Chemical Oxygen Demand (COD)	T	No	No Trend	14
	Chloride	T	Yes	Up	14
	Chromium	F	No	Down	14
	Cobalt	F	No	Down	14
	Copper	F	No	No Trend	14
	Dissolved Organic Carbon (DOC)	F	No	No Trend	13
	Electrical Conductivity (EC)	T	No	Up	14
	Ethylbenzene	T	No	No Trend	13
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	13
	F1 (C_6-C_{10})	T	No	No Trend	13
	F2 (C_{10}-C_{16})	T	No	Down	13
	Fluoride	T	No	Down	6
	Hardness as $CaCO_3$	T	No	Up	14
	Hydroxide	T	No	No Trend	14
	Ionic Balance	T	No	No Trend	14
	Iron	F	No	No Trend	14
	Lead	F	No	Down	14
	Lithium	F	No	Down	12
	Magnesium	F	No	Up	14
	Manganese	F	No	Up	13
	Mercury	F	No	Down	14
	Molybdenum	F	No	Down	14
	Nickel	F	No	Down	14
	Nitrate (as NO_3-N)	T	No	Down	14
	Nitrate and Nitrite (as N)	T	No	No Trend	14
	Nitrite (as NO_2-N)	T	No	Down	14
	pH	T	No	Down	14
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	Yes	No Trend	5
	Potassium	F	Yes	Up	14
	Selenium	F	No	Down	13
	Silver	F	No	Down	13
	Sodium	F	No	No Trend	14
	Styrene	T	No	Down	6
	Sulphate	T	No	Down	14
	Thallium	F	No	Down	13
	Tin	F	No	Down	13
	Titanium	F	No	No Trend	13
	Toluene	T	No	No Trend	13
	Total Dissolved Solids (TDS)	T	No	Up	14
	Total Kjeldahl Nitrogen (TKN)	T	No	Up	14
	Uranium	F	No	No Trend	12
	Vanadium	F	No	Up	13
	Xylene (o)	T	No	No Trend	11
	Xylenes (m & p)	T	No	No Trend	11
	Xylenes Total	T	No	No Trend	13
	Zinc	F	No	Down	14

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
3	Alkalinity (total as $CaCO_3$)	T	No	Up	14
	Aluminum	F	No	No Trend	13
	Ammonia	T	Yes	Up	14
	Antimony	F	No	Down	14
	Arsenic	F	Yes	Up	12
	Barium	F	No	No Trend	14
	Benzene	T	No	No Trend	13
	Beryllium	F	No	Down	13
	Bicarbonate	T	Yes	Up	14
	Boron	F	No	No Trend	13
	Cadmium	F	No	Down	14
	Calcium	F	Yes	Up	14
	Carbonate	T	No	No Trend	14
	Chemical Oxygen Demand (COD)	T	No	Up	14
	Chloride	T	Yes	Up	14
	Chromium	F	No	Down	14
	Cobalt	F	Yes	Down	14
	Copper	F	No	No Trend	14
	Dissolved Organic Carbon (DOC)	F	No	Up	13
	Electrical Conductivity (EC)	T	Yes	Up	14
	Ethylbenzene	T	No	No Trend	13
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	13
	F1 (C_6-C_{10})	T	No	No Trend	13
	F2 (C_{10}-C_{16})	T	No	Down	13
	Fluoride	T	No	No Trend	6
	Hardness as $CaCO_3$	T	Yes	Up	14
	Hydroxide	T	No	No Trend	14
	Ionic Balance	T	No	No Trend	14
	Iron	F	No	No Trend	14
	Lead	F	No	No Trend	14
	Lithium	F	No	Up	12
	Magnesium	F	Yes	Up	14
	Manganese	F	Yes	Up	13
	Mercury	F	No	Down	14
	Molybdenum	F	No	Down	14
	Nickel	F	No	Down	14
	Nitrate (as NO_3-N)	T	No	Down	14
	Nitrate and Nitrite (as N)	T	No	Down	14
	Nitrite (as NO_2-N)	T	Yes	No Trend	14
	pH	T	No	Down	14
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	Yes	Up	5
	Potassium	F	Yes	Up	14
	Selenium	F	No	No Trend	13
	Silver	F	No	Down	13
	Sodium	F	Yes	Up	14
	Styrene	T	No	Down	6
	Sulphate	T	Yes	No Trend	14
	Thallium	F	No	Down	13
	Tin	F	No	Down	13
	Titanium	F	No	No Trend	13
	Toluene	T	No	No Trend	13
	Total Dissolved Solids (TDS)	T	Yes	Up	14
	Total Kjeldahl Nitrogen (TKN)	T	No	Up	14
	Uranium	F	No	No Trend	12
	Vanadium	F	No	Up	13
	Xylene (o)	T	No	No Trend	11
	Xylenes (m & p)	T	No	No Trend	11
	Xylenes Total	T	No	No Trend	13
	Zinc	F	No	Down	14

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
4	Alkalinity (total as $CaCO_3$)	T	Yes	Up	14
	Aluminum	F	No	No Trend	13
	Ammonia	T	No	No Trend	14
	Antimony	F	No	Down	14
	Arsenic	F	Yes	No Trend	12
	Barium	F	No	No Trend	14
	Benzene	T	No	No Trend	13
	Beryllium	F	No	Down	13
	Bicarbonate	T	Yes	Up	14
	Boron	F	No	Down	13
	Cadmium	F	No	Down	14
	Calcium	F	No	Up	14
	Carbonate	T	No	No Trend	14
	Chemical Oxygen Demand (COD)	T	No	No Trend	14
	Chloride	T	Yes	Up	14
	Chromium	F	No	Down	14
	Cobalt	F	No	Down	14
	Copper	F	No	No Trend	14
	Dissolved Organic Carbon (DOC)	F	No	Up	13
	Electrical Conductivity (EC)	T	Yes	Up	14
	Ethylbenzene	T	No	No Trend	13
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	13
	F1 (C_6-C_{10})	T	No	No Trend	13
	F2 (C_{10}-C_{16})	T	No	Down	13
	Fluoride	T	No	No Trend	6
	Hardness as $CaCO_3$	T	No	Up	14
	Hydroxide	T	No	No Trend	14
	Ionic Balance	T	No	No Trend	14
	Iron	F	No	Up	14
	Lead	F	No	No Trend	14
	Lithium	F	No	Up	12
	Magnesium	F	No	Up	14
	Manganese	F	No	Up	13
	Mercury	F	No	Down	14
	Molybdenum	F	No	Down	14
	Nickel	F	No	No Trend	14
	Nitrate (as NO_3-N)	T	No	Down	14
	Nitrate and Nitrite (as N)	T	No	Down	14
	Nitrite (as NO_2-N)	T	No	Down	14
	pH	T	No	Down	14
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	Yes	No Trend	5
	Potassium	F	No	Up	14
	Selenium	F	No	Down	13
	Silver	F	No	Down	13
	Sodium	F	Yes	Up	14
	Styrene	T	No	Down	6
	Sulphate	T	No	No Trend	14
	Thallium	F	No	Down	13
	Tin	F	No	Down	13
	Titanium	F	No	Up	13
	Toluene	T	No	No Trend	13
	Total Dissolved Solids (TDS)	T	Yes	Up	14
	Total Kjeldahl Nitrogen (TKN)	T	No	No Trend	14
	Uranium	F	No	No Trend	12
	Vanadium	F	Yes	Up	13
	Xylene (o)	T	No	No Trend	11
	Xylenes (m & p)	T	No	No Trend	11
	Xylenes Total	T	No	No Trend	13
	Zinc	F	No	Down	14

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
5	Alkalinity (total as $CaCO_3$)	T	No	No Trend	15
	Aluminum	F	No	No Trend	14
	Ammonia	T	Yes	No Trend	15
	Antimony	F	No	Down	15
	Arsenic	F	No	No Trend	13
	Barium	F	No	Down	15
	Benzene	T	No	No Trend	14
	Beryllium	F	No	Down	14
	Bicarbonate	T	No	No Trend	15
	Boron	F	No	No Trend	14
	Cadmium	F	No	Down	15
	Calcium	F	Yes	Up	15
	Carbonate	T	No	Down	15
	Chemical Oxygen Demand (COD)	T	No	No Trend	15
	Chloride	T	No	Down	15
	Chromium	F	No	Down	15
	Cobalt	F	Yes	Down	15
	Copper	F	No	Down	15
	Dissolved Organic Carbon (DOC)	F	No	No Trend	14
	Electrical Conductivity (EC)	T	Yes	Up	15
	Ethylbenzene	T	No	No Trend	14
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	14
	F1 (C_6-C_{10})	T	No	No Trend	14
	F2 (C_{10}-C_{16})	T	No	No Trend	14
	Fluoride	T	No	Down	8
	Hardness as $CaCO_3$	T	Yes	Up	15
	Hydroxide	T	No	No Trend	15
	Ionic Balance	T	No	No Trend	15
	Iron	F	No	Down	15
	Lead	F	No	No Trend	15
	Lithium	F	No	Down	13
	Magnesium	F	No	Up	15
	Manganese	F	Yes	No Trend	14
	Mercury	F	No	Down	15
	Molybdenum	F	No	Down	15
	Nickel	F	No	Down	15
	Nitrate (as NO_3-N)	T	No	Down	15
	Nitrate and Nitrite (as N)	T	No	Down	15
	Nitrite (as NO_2-N)	T	No	Down	15
	pH	T	No	Down	15
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	Yes	Up	7
	Potassium	F	No	Up	15
	Selenium	F	No	Down	14
	Silver	F	No	Down	14
	Sodium	F	No	Up	15
	Styrene	T	No	Down	8
	Sulphate	T	Yes	Up	15
	Thallium	F	No	Down	14
	Tin	F	No	Down	14
	Titanium	F	Yes	No Trend	14
	Toluene	T	No	No Trend	14
	Total Dissolved Solids (TDS)	T	Yes	Up	15
	Total Kjeldahl Nitrogen (TKN)	T	No	No Trend	15
	Uranium	F	No	Down	13
	Vanadium	F	No	No Trend	14
	Xylene (o)	T	No	No Trend	12
	Xylenes (m & p)	T	No	No Trend	12
	Xylenes Total	T	No	No Trend	14
	Zinc	F	No	Down	15

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
6	Alkalinity (total as $CaCO_3$)	T	No	Down	14
	Aluminum	F	No	Up	13
	Ammonia	T	No	Up	14
	Antimony	F	No	Down	14
	Arsenic	F	No	No Trend	12
	Barium	F	No	Down	14
	Benzene	T	No	No Trend	13
	Beryllium	F	No	Down	13
	Bicarbonate	T	No	No Trend	14
	Boron	F	No	Down	13
	Cadmium	F	No	Down	14
	Calcium	F	No	Down	14
	Carbonate	T	No	No Trend	14
	Chemical Oxygen Demand (COD)	T	No	Up	14
	Chloride	T	No	Down	14
	Chromium	F	No	Down	14
	Cobalt	F	No	Down	14
	Copper	F	No	No Trend	14
	Dissolved Organic Carbon (DOC)	F	No	No Trend	13
	Electrical Conductivity (EC)	T	No	Down	14
	Ethylbenzene	T	No	No Trend	13
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	13
	F1 (C_6-C_{10})	T	No	No Trend	13
	F2 (C_{10}-C_{16})	T	No	Down	13
	Fluoride	T	No	Down	6
	Hardness as $CaCO_3$	T	No	Down	14
	Hydroxide	T	No	No Trend	14
	Ionic Balance	T	No	No Trend	14
	Iron	F	No	Up	14
	Lead	F	No	No Trend	14
	Lithium	F	No	Down	12
	Magnesium	F	No	Down	14
	Manganese	F	Yes	Up	13
	Mercury	F	No	Down	14
	Molybdenum	F	No	Down	14
	Nickel	F	No	Down	14
	Nitrate (as NO_3-N)	T	No	Down	14
	Nitrate and Nitrite (as N)	T	No	Down	14
	Nitrite (as NO_2-N)	T	No	Down	14
	pH	T	No	No Trend	14
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	No	No Trend	5
	Potassium	F	No	No Trend	14
	Selenium	F	No	No Trend	13
	Silver	F	No	Down	13
	Sodium	F	No	Down	14
	Styrene	T	No	Down	6
	Sulphate	T	No	Down	14
	Thallium	F	No	Down	13
	Tin	F	No	Down	13
	Titanium	F	No	Up	13
	Toluene	T	No	No Trend	13
	Total Dissolved Solids (TDS)	T	No	Down	14
	Total Kjeldahl Nitrogen (TKN)	T	No	No Trend	14
	Uranium	F	No	Down	12
	Vanadium	F	No	Up	13
	Xylene (o)	T	No	No Trend	11
	Xylenes (m & p)	T	No	No Trend	11
	Xylenes Total	T	No	No Trend	13
	Zinc	F	No	Down	14

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
7	Alkalinity (total as $CaCO_3$)	T	No	Down	15
	Aluminum	F	No	Up	14
	Ammonia	T	No	Up	15
	Antimony	F	No	Down	15
	Arsenic	F	No	Down	13
	Barium	F	No	Down	15
	Benzene	T	No	No Trend	14
	Beryllium	F	No	Down	14
	Bicarbonate	T	No	Down	15
	Boron	F	No	Down	14
	Cadmium	F	No	Down	15
	Calcium	F	No	Down	15
	Carbonate	T	No	Down	15
	Chemical Oxygen Demand (COD)	T	No	No Trend	15
	Chloride	T	No	No Trend	15
	Chromium	F	No	Down	15
	Cobalt	F	No	Down	15
	Copper	F	No	No Trend	15
	Dissolved Organic Carbon (DOC)	F	No	No Trend	14
	Electrical Conductivity (EC)	T	No	Down	15
	Ethylbenzene	T	No	No Trend	14
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	14
	F1 (C_6-C_{10})	T	No	No Trend	14
	F2 (C_{10}-C_{16})	T	No	Down	14
	Fluoride	T	No	Down	7
	Hardness as $CaCO_3$	T	No	Down	15
	Hydroxide	T	No	No Trend	15
	Ionic Balance	T	No	No Trend	15
	Iron	F	No	No Trend	15
	Lead	F	No	No Trend	15
	Lithium	F	No	Down	13
	Magnesium	F	No	Down	15
	Manganese	F	No	No Trend	14
	Mercury	F	No	Down	15
	Molybdenum	F	No	Down	15
	Nickel	F	No	No Trend	15
	Nitrate (as NO_3-N)	T	No	Down	15
	Nitrate and Nitrite (as N)	T	No	Down	15
	Nitrite (as NO_2-N)	T	No	Down	15
	pH	T	No	Down	15
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	No	No Trend	5
	Potassium	F	No	Down	15
	Selenium	F	No	No Trend	14
	Silver	F	No	Down	14
	Sodium	F	No	Down	15
	Styrene	T	No	Down	6
	Sulphate	T	No	Down	15
	Thallium	F	No	Down	14
	Tin	F	No	Down	14
	Titanium	F	No	Up	14
	Toluene	T	No	No Trend	14
	Total Dissolved Solids (TDS)	T	No	Down	15
	Total Kjeldahl Nitrogen (TKN)	T	No	No Trend	15
	Uranium	F	No	Down	13
	Vanadium	F	No	No Trend	14
	Xylene (o)	T	No	No Trend	12
	Xylenes (m & p)	T	No	No Trend	12
	Xylenes Total	T	No	No Trend	14
	Zinc	F	No	Down	15

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
8	Alkalinity (total as $CaCO_3$)	T	No	Up	14
	Aluminum	F	No	Down	13
	Ammonia	T	No	No Trend	14
	Antimony	F	No	No Trend	14
	Arsenic	F	No	Down	12
	Barium	F	No	No Trend	14
	Benzene	T	No	No Trend	13
	Beryllium	F	No	Down	13
	Bicarbonate	T	No	Up	14
	Boron	F	No	Down	13
	Cadmium	F	No	Down	14
	Calcium	F	No	Up	14
	Carbonate	T	No	No Trend	14
	Chemical Oxygen Demand (COD)	T	No	Up	14
	Chloride	T	No	No Trend	14
	Chromium	F	No	Down	14
	Cobalt	F	No	Up	14
	Copper	F	No	Up	14
	Dissolved Organic Carbon (DOC)	F	No	No Trend	13
	Electrical Conductivity (EC)	T	No	Up	14
	Ethylbenzene	T	No	No Trend	13
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	13
	F1 (C_6-C_{10})	T	No	No Trend	13
	F2 (C_{10}-C_{16})	T	No	Down	13
	Fluoride	T	No	No Trend	6
	Hardness as $CaCO_3$	T	No	Up	14
	Hydroxide	T	No	No Trend	14
	Ionic Balance	T	No	Up	14
	Iron	F	No	Down	14
	Lead	F	No	Down	14
	Lithium	F	No	Up	12
	Magnesium	F	No	Up	14
	Manganese	F	No	Down	13
	Mercury	F	No	Down	14
	Molybdenum	F	No	Up	14
	Nickel	F	No	No Trend	14
	Nitrate (as NO_3-N)	T	No	Down	14
	Nitrate and Nitrite (as N)	T	No	Down	14
	Nitrite (as NO_2-N)	T	No	Down	14
	pH	T	No	Up	14
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	No	No Trend	5
	Potassium	F	No	Up	14
	Selenium	F	No	No Trend	13
	Silver	F	No	Down	13
	Sodium	F	No	Up	14
	Styrene	T	No	Down	6
	Sulphate	T	No	Up	14
	Thallium	F	No	Down	13
	Tin	F	No	Down	13
	Titanium	F	No	Down	13
	Toluene	T	No	No Trend	13
	Total Dissolved Solids (TDS)	T	No	Up	14
	Total Kjeldahl Nitrogen (TKN)	T	No	Up	14
	Uranium	F	No	Up	12
	Vanadium	F	No	Down	13
	Xylene (o)	T	No	No Trend	11
	Xylenes (m & p)	T	No	No Trend	11
	Xylenes Total	T	No	No Trend	13
	Zinc	F	No	Down	14

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
9	Alkalinity (total as $CaCO_3$)	T	No	No Trend	16
	Aluminum	F	No	No Trend	15
	Ammonia	T	No	Up	16
	Antimony	F	No	No Trend	16
	Arsenic	F	No	No Trend	14
	Barium	F	No	Down	16
	Benzene	T	No	No Trend	15
	Beryllium	F	No	Down	15
	Bicarbonate	T	No	No Trend	16
	Boron	F	No	Down	15
	Cadmium	F	No	Down	16
	Calcium	F	No	No Trend	16
	Carbonate	T	No	Down	16
	Chemical Oxygen Demand (COD)	T	No	Up	16
	Chloride	T	No	No Trend	16
	Chromium	F	No	Down	16
	Cobalt	F	No	Down	16
	Copper	F	No	Down	16
	Dissolved Organic Carbon (DOC)	F	No	Up	15
	Electrical Conductivity (EC)	T	No	No Trend	16
	Ethylbenzene	T	No	No Trend	15
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	15
	F1 (C_6-C_{10})	T	No	No Trend	15
	F2 (C_{10}-C_{16})	T	No	Down	15
	Fluoride	T	No	No Trend	7
	Hardness as $CaCO_3$	T	No	No Trend	16
	Hydroxide	T	No	No Trend	16
	Ionic Balance	T	No	Up	16
	Iron	F	No	No Trend	16
	Lead	F	No	Down	16
	Lithium	F	No	Down	14
	Magnesium	F	No	No Trend	16
	Manganese	F	No	No Trend	15
	Mercury	F	No	Down	16
	Molybdenum	F	No	Down	16
	Nickel	F	No	Down	16
	Nitrate (as NO_3-N)	T	No	Up	16
	Nitrate and Nitrite (as N)	T	No	Up	16
	Nitrite (as NO_2-N)	T	No	No Trend	16
	pH	T	No	Down	16
	Phenols	T	No	No Trend	4
	Phosphorus	T	Yes	No Trend	6
	Potassium	F	No	Up	16
	Selenium	F	No	No Trend	15
	Silver	F	No	Down	15
	Sodium	F	No	No Trend	16
	Strontium	F	No	Insufficient Data	3
	Styrene	T	No	Down	7
	Sulphate	T	No	Down	16
	Thallium	F	No	Down	15
	Tin	F	No	Down	15
	Titanium	F	Yes	No Trend	15
	Toluene	T	No	No Trend	15
	Total Dissolved Solids (TDS)	T	No	No Trend	16
	Total Kjeldahl Nitrogen (TKN)	T	No	No Trend	16
	Uranium	F	No	No Trend	14
	Vanadium	F	No	Down	15
	Xylene (o)	T	No	No Trend	13
	Xylenes (m & p)	T	No	No Trend	13
	Xylenes Total	T	No	No Trend	15
	Zinc	F	No	Down	16

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
	Alkalinity (total as $CaCO_3$)	T	No	Up	15
	Aluminum	F	No	Down	14
	Ammonia	T	No	Up	15
	Antimony	F	No	No Trend	15
	Arsenic	F	No	Up	13
	Barium	F	No	No Trend	15
	Benzene	T	No	No Trend	14
	Beryllium	F	No	Down	14
	Bicarbonate	T	No	Up	15
	Boron	F	No	No Trend	14
	Cadmium	F	No	Down	15
	Calcium	F	No	Up	15
	Carbonate	T	No	No Trend	15
	Chemical Oxygen Demand (COD)	T	No	Up	15
	Chloride	T	Yes	Up	15
	Chromium	F	No	Down	15
	Cobalt	F	No	Up	15
	Copper	F	No	Down	15
	Dissolved Organic Carbon (DOC)	F	No	Up	14
	Electrical Conductivity (EC)	T	No	Up	15
	Ethylbenzene	T	No	No Trend	14
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	14
	F1 (C_6-C_{10})	T	No	No Trend	14
	F2 (C_{10}-C_{16})	T	No	Down	14
	Fluoride	T	Yes	No Trend	6
	Hardness as $CaCO_3$	T	No	Up	15
	Hydroxide	T	No	No Trend	15
	Ionic Balance	T	No	No Trend	15
	Iron	F	No	No Trend	15
	Lead	F	No	No Trend	15
10	Lithium	F	No	No Trend	13
	Magnesium	F	No	Up	15
	Manganese	F	No	Up	14
	Mercury	F	No	Down	15
	Molybdenum	F	No	No Trend	15
	Nickel	F	No	Up	15
	Nitrate (as NO_3-N)	T	No	No Trend	15
	Nitrate and Nitrite (as N)	T	No	No Trend	15
	Nitrite (as NO_2-N)	T	No	Down	15
	pH	T	No	No Trend	15
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	No	No Trend	5
	Potassium	F	No	Up	15
	Selenium	F	No	No Trend	14
	Silver	F	No	Down	14
	Sodium	F	No	Up	15
	Strontium	F	Yes	Insufficient Data	3
	Styrene	T	No	Down	6
	Sulphate	T	No	Up	15
	Thallium	F	No	Down	14
	Tin	F	No	Down	14
	Titanium	F	No	No Trend	14
	Toluene	T	No	No Trend	14
	Total Dissolved Solids (TDS)	T	No	Up	15
	Total Kjeldahl Nitrogen (TKN)	T	No	Up	15
	Uranium	F	No	No Trend	13
	Vanadium	F	No	No Trend	14
	Xylene (o)	T	No	No Trend	12
	Xylenes (m & p)	T	No	No Trend	12
	Xylenes Total	T	No	No Trend	14
	Zinc	F	No	Down	15

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
11	Alkalinity (total as $CaCO_3$)	T	No	Down	14
	Aluminum	F	No	No Trend	13
	Ammonia	T	No	Down	14
	Antimony	F	No	Down	14
	Arsenic	F	No	No Trend	13
	Barium	F	No	Down	14
	Benzene	T	No	No Trend	13
	Beryllium	F	No	Down	13
	Bicarbonate	T	No	Down	14
	Boron	F	No	Down	13
	Cadmium	F	No	Down	14
	Calcium	F	No	Down	14
	Carbonate	T	No	No Trend	14
	Chemical Oxygen Demand (COD)	T	No	Down	14
	Chloride	T	No	Down	14
	Chromium	F	No	Down	14
	Cobalt	F	No	Down	14
	Copper	F	No	No Trend	14
	Dissolved Organic Carbon (DOC)	F	No	No Trend	13
	Electrical Conductivity (EC)	T	No	Down	14
	Ethylbenzene	T	No	No Trend	13
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	13
	F1 (C_6-C_{10})	T	No	No Trend	13
	F2 (C_{10}-C_{16})	T	No	Down	13
	Fluoride	T	No	No Trend	6
	Hardness as $CaCO_3$	T	No	Down	14
	Hydroxide	T	No	No Trend	14
	Ionic Balance	T	No	No Trend	14
	Iron	F	No	No Trend	14
	Lead	F	No	No Trend	14
	Lithium	F	No	Down	13
	Magnesium	F	No	Down	14
	Manganese	F	No	Down	13
	Mercury	F	No	Down	14
	Molybdenum	F	No	No Trend	14
	Nickel	F	No	Down	14
	Nitrate (as NO_3-N)	T	No	Down	14
	Nitrate and Nitrite (as N)	T	No	Down	14
	Nitrite (as NO_2-N)	T	No	Down	14
	pH	T	No	No Trend	14
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	Yes	No Trend	5
	Potassium	F	No	Down	14
	Selenium	F	No	Down	13
	Silver	F	No	Down	13
	Sodium	F	No	Down	14
	Strontium	F	No	Insufficient Data	3
	Styrene	T	No	No Trend	5
	Sulphate	T	No	Down	14
	Thallium	F	No	Down	13
	Tin	F	No	Down	13
	Titanium	F	No	No Trend	13
	Toluene	T	No	No Trend	13
	Total Dissolved Solids (TDS)	T	No	Down	14
	Total Kjeldahl Nitrogen (TKN)	T	No	Down	14
	Uranium	F	No	Down	13
	Vanadium	F	No	No Trend	13
	Xylene (o)	T	No	No Trend	12
	Xylenes (m & p)	T	No	No Trend	12
	Xylenes Total	T	No	No Trend	13
	Zinc	F	No	Down	14

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
12	Alkalinity (total as $CaCO_3$)	T	No	No Trend	12
	Aluminum	F	No	Down	11
	Ammonia	T	No	No Trend	12
	Antimony	F	No	No Trend	12
	Arsenic	F	No	Down	10
	Barium	F	No	No Trend	12
	Benzene	T	No	No Trend	11
	Beryllium	F	No	Down	11
	Bicarbonate	T	No	Up	12
	Boron	F	No	No Trend	11
	Cadmium	F	No	Down	12
	Calcium	F	No	Up	12
	Carbonate	T	No	No Trend	12
	Chemical Oxygen Demand (COD)	T	No	No Trend	12
	Chloride	T	No	No Trend	12
	Chromium	F	No	Down	12
	Cobalt	F	No	Down	12
	Copper	F	No	Down	12
	Dissolved Organic Carbon (DOC)	F	No	Down	11
	Electrical Conductivity (EC)	T	No	Up	12
	Ethylbenzene	T	No	No Trend	11
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	11
	F1 (C_6-C_{10})	T	No	No Trend	11
	F2 (C_{10}-C_{16})	T	No	Down	11
	Fluoride	T	No	Down	5
	Hardness as $CaCO_3$	T	No	Up	12
	Hydroxide	T	No	No Trend	12
	Ionic Balance	T	No	No Trend	12
	Iron	F	No	Down	12
	Lead	F	No	Down	12
	Lithium	F	No	No Trend	10
	Magnesium	F	No	Up	12
	Manganese	F	No	No Trend	11
	Mercury	F	No	Down	12
	Molybdenum	F	No	Up	12
	Nickel	F	No	Up	12
	Nitrate (as NO_3-N)	T	No	Down	12
	Nitrate and Nitrite (as N)	T	No	Down	12
	Nitrite (as NO_2-N)	T	No	Down	12
	pH	T	No	Down	12
	Phenols	T	No	Insufficient Data	2
	Phosphorus	T	No	No Trend	4
	Potassium	F	No	Up	12
	Selenium	F	No	No Trend	11
	Silver	F	No	Down	11
	Sodium	F	No	No Trend	12
	Styrene	T	No	No Trend	5
	Sulphate	T	No	No Trend	12
	Thallium	F	No	Down	11
	Tin	F	No	Down	11
	Titanium	F	No	No Trend	11
	Toluene	T	No	No Trend	11
	Total Dissolved Solids (TDS)	T	No	Up	12
	Total Kjeldahl Nitrogen (TKN)	T	No	Up	12
	Uranium	F	No	No Trend	10
	Vanadium	F	No	No Trend	11
	Xylene (o)	T	No	No Trend	9
	Xylenes (m & p)	T	No	No Trend	9
	Xylenes Total	T	No	No Trend	11
	Zinc	F	No	No Trend	12

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
13	Alkalinity (total as $CaCO_3$)	T	No	Down	12
	Aluminum	F	No	No Trend	11
	Ammonia	T	No	No Trend	12
	Antimony	F	No	Down	12
	Arsenic	F	No	Down	10
	Barium	F	No	No Trend	12
	Benzene	T	No	No Trend	11
	Beryllium	F	No	Down	11
	Bicarbonate	T	No	Down	12
	Boron	F	No	No Trend	11
	Cadmium	F	No	Down	12
	Calcium	F	No	Down	12
	Carbonate	T	No	Down	12
	Chemical Oxygen Demand (COD)	T	No	No Trend	12
	Chloride	T	No	Down	12
	Chromium	F	No	Down	12
	Cobalt	F	No	Down	12
	Copper	F	No	Down	12
	Dissolved Organic Carbon (DOC)	F	No	Down	11
	Electrical Conductivity (EC)	T	No	Down	12
	Ethylbenzene	T	No	No Trend	11
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	11
	F1 (C_6-C_{10})	T	No	No Trend	11
	F2 (C_{10}-C_{16})	T	No	Down	11
	Fluoride	T	Yes	No Trend	6
	Hardness as $CaCO_3$	T	No	Down	12
	Hydroxide	T	No	No Trend	12
	Ionic Balance	T	No	No Trend	12
	Iron	F	No	Down	12
	Lead	F	No	No Trend	12
	Lithium	F	No	Down	10
	Magnesium	F	No	No Trend	12
	Manganese	F	No	No Trend	11
	Mercury	F	No	Down	12
	Molybdenum	F	No	Down	12
	Nickel	F	No	Down	12
	Nitrate (as NO_3-N)	T	No	No Trend	12
	Nitrate and Nitrite (as N)	T	No	No Trend	12
	Nitrite (as NO_2-N)	T	No	Down	12
	pH	T	No	No Trend	12
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	No	Down	5
	Potassium	F	No	Down	12
	Selenium	F	No	Down	11
	Silver	F	No	Down	11
	Sodium	F	No	Down	12
	Styrene	T	No	Down	6
	Sulphate	T	No	No Trend	12
	Thallium	F	No	Down	11
	Tin	F	No	Down	11
	Titanium	F	No	No Trend	11
	Toluene	T	No	No Trend	11
	Total Dissolved Solids (TDS)	T	No	Down	12
	Total Kjeldahl Nitrogen (TKN)	T	No	Down	12
	Uranium	F	No	No Trend	10
	Vanadium	F	No	Down	11
	Xylene (o)	T	No	No Trend	10
	Xylenes (m & p)	T	No	No Trend	10
	Xylenes Total	T	No	No Trend	11
	Zinc	F	No	Down	12

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
	Alkalinity (total as $CaCO_3$)	T	No	Up	15
	Aluminum	F	No	Down	14
	Ammonia	T	No	No Trend	15
	Antimony	F	No	Down	15
	Arsenic	F	No	Up	13
	Barium	F	No	Down	15
	Benzene	T	No	No Trend	14
	Beryllium	F	No	Down	14
	Bicarbonate	T	No	Up	15
	Boron	F	No	No Trend	14
	Cadmium	F	No	Down	15
	Calcium	F	No	Up	15
	Carbonate	T	No	No Trend	15
	Chemical Oxygen Demand (COD)	T	Yes	Up	15
	Chloride	T	Yes	Up	15
	Chromium	F	No	Down	15
	Cobalt	F	No	No Trend	15
	Copper	F	No	Down	15
	Dissolved Organic Carbon (DOC)	F	No	Up	14
	Electrical Conductivity (EC)	T	No	Up	15
	Ethylbenzene	T	No	No Trend	14
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	14
	F1 (C_6-C_{10})	T	No	No Trend	14
	F2 (C_{10}-C_{16})	T	No	Down	14
	Fluoride	T	No	No Trend	6
	Hardness as $CaCO_3$	T	No	Up	15
	Hydroxide	T	No	No Trend	15
	Ionic Balance	T	No	No Trend	15
	Iron	F	No	No Trend	15
	Lead	F	No	No Trend	15
14	Lithium	F	No	Down	13
	Magnesium	F	No	Up	15
	Manganese	F	No	Up	14
	Mercury	F	No	Down	15
	Molybdenum	F	No	Down	15
	Nickel	F	No	Down	15
	Nitrate (as NO_3-N)	T	No	No Trend	15
	Nitrate and Nitrite (as N)	T	No	No Trend	15
	Nitrite (as NO_2-N)	T	Yes	Down	15
	pH	T	No	No Trend	15
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	Yes	No Trend	5
	Potassium	F	Yes	Up	15
	Selenium	F	No	Down	14
	Silver	F	No	Down	14
	Sodium	F	No	Up	15
	Strontium	F	Yes	Insufficient Data	3
	Styrene	T	No	Down	6
	Sulphate	T	No	No Trend	15
	Thallium	F	No	Down	14
	Tin	F	No	Down	14
	Titanium	F	No	No Trend	14
	Toluene	T	No	No Trend	14
	Total Dissolved Solids (TDS)	T	No	Up	15
	Total Kjeldahl Nitrogen (TKN)	T	Yes	Up	15
	Uranium	F	No	Down	13
	Vanadium	F	No	Up	14
	Xylene (o)	T	No	No Trend	12
	Xylenes (m & p)	T	No	No Trend	12
	Xylenes Total	T	No	No Trend	14
	Zinc	F	No	Down	15

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
15	Alkalinity (total as $CaCO_3$)	T	No	No Trend	6
	Aluminum	F	No	No Trend	6
	Ammonia	T	No	No Trend	6
	Antimony	F	No	No Trend	6
	Arsenic	F	No	No Trend	6
	Barium	F	No	No Trend	6
	Benzene	T	No	No Trend	6
	Beryllium	F	No	Down	6
	Bicarbonate	T	No	No Trend	6
	Boron	F	No	Down	6
	Cadmium	F	No	No Trend	6
	Calcium	F	No	No Trend	6
	Carbonate	T	No	No Trend	6
	Chemical Oxygen Demand (COD)	T	No	No Trend	6
	Chloride	T	No	No Trend	6
	Chromium	F	No	Down	6
	Cobalt	F	No	No Trend	6
	Copper	F	No	No Trend	6
	Dissolved Organic Carbon (DOC)	F	No	No Trend	6
	Electrical Conductivity (EC)	T	No	No Trend	6
	Ethylbenzene	T	No	No Trend	6
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	6
	F1 (C_6-C_{10})	T	No	No Trend	6
	F2 (C_{10}-C_{16})	T	No	No Trend	6
	Fluoride	T	No	No Trend	6
	Hardness as $CaCO_3$	T	No	No Trend	6
	Hydroxide	T	No	No Trend	6
	Ionic Balance	T	No	No Trend	6
	Iron	F	Yes	No Trend	6
	Lead	F	No	Down	6
	Lithium	F	No	No Trend	6
	Magnesium	F	No	Up	6
	Manganese	F	No	No Trend	6
	Mercury	F	No	No Trend	6
	Molybdenum	F	No	Down	6
	Nickel	F	No	No Trend	6
	Nitrate (as NO_3-N)	T	No	No Trend	6
	Nitrate and Nitrite (as N)	T	No	No Trend	6
	Nitrite (as NO_2-N)	T	No	No Trend	6
	pH	T	No	Down	6
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	No	No Trend	5
	Potassium	F	No	No Trend	6
	Selenium	F	No	No Trend	6
	Silver	F	No	Down	6
	Sodium	F	No	No Trend	6
	Styrene	T	No	No Trend	5
	Sulphate	T	No	No Trend	6
	Thallium	F	No	Down	6
	Tin	F	No	Down	6
	Titanium	F	Yes	No Trend	6
	Toluene	T	No	No Trend	6
	Total Dissolved Solids (TDS)	T	No	No Trend	6
	Total Kjeldahl Nitrogen (TKN)	T	No	No Trend	6
	Uranium	F	No	No Trend	6
	Vanadium	F	No	No Trend	6
	Xylene (o)	T	No	No Trend	6
	Xylenes (m & p)	T	No	No Trend	6
	Xylenes Total	T	No	No Trend	6
	Zinc	F	No	Down	6

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
16	Alkalinity (total as $CaCO_3$)	T	No	Up	15
	Aluminum	F	No	Down	14
	Ammonia	T	No	No Trend	15
	Antimony	F	No	Down	15
	Arsenic	F	No	No Trend	13
	Barium	F	No	Down	15
	Benzene	T	No	No Trend	14
	Beryllium	F	No	Down	14
	Bicarbonate	T	No	Up	15
	Boron	F	No	No Trend	14
	Cadmium	F	No	Down	15
	Calcium	F	No	No Trend	15
	Carbonate	T	No	No Trend	15
	Chemical Oxygen Demand (COD)	T	No	No Trend	15
	Chloride	T	No	Down	15
	Chromium	F	No	Down	15
	Cobalt	F	No	Down	15
	Copper	F	No	Down	15
	Dissolved Organic Carbon (DOC)	F	No	Down	14
	Electrical Conductivity (EC)	T	No	No Trend	15
	Ethylbenzene	T	No	No Trend	14
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	14
	F1 (C_6-C_{10})	T	No	No Trend	14
	F2 (C_{10}-C_{16})	T	No	Down	14
	Fluoride	T	No	No Trend	8
	Hardness as $CaCO_3$	T	No	No Trend	15
	Hydroxide	T	No	No Trend	15
	Ionic Balance	T	Yes	Up	15
	Iron	F	No	No Trend	15
	Lead	F	No	Down	15
	Lithium	F	No	No Trend	13
	Magnesium	F	No	Up	15
	Manganese	F	No	No Trend	14
	Mercury	F	No	Down	15
	Molybdenum	F	No	Down	15
	Nickel	F	No	No Trend	15
	Nitrate (as NO_3-N)	T	No	Down	15
	Nitrate and Nitrite (as N)	T	No	Down	15
	Nitrite (as NO_2-N)	T	No	Down	15
	pH	T	No	No Trend	15
	Phenols	T	No	No Trend	4
	Phosphorus	T	Yes	Up	7
	Potassium	F	No	No Trend	15
	Selenium	F	No	Down	14
	Silver	F	No	Down	14
	Sodium	F	No	No Trend	15
	Styrene	T	No	Down	8
	Sulphate	T	No	Down	15
	Thallium	F	No	Down	14
	Tin	F	No	Down	14
	Titanium	F	No	No Trend	14
	Toluene	T	No	No Trend	14
	Total Dissolved Solids (TDS)	T	No	No Trend	15
	Total Kjeldahl Nitrogen (TKN)	T	No	Down	15
	Uranium	F	No	No Trend	13
	Vanadium	F	No	Down	14
	Xylene (o)	T	No	No Trend	12
	Xylenes (m & p)	T	No	No Trend	12
	Xylenes Total	T	No	No Trend	14
	Zinc	F	No	Down	15

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
18	Alkalinity (total as $CaCO_3$)	T	No	Down	14
	Aluminum	F	No	No Trend	13
	Ammonia	T	No	No Trend	14
	Antimony	F	No	Down	14
	Arsenic	F	No	Down	12
	Barium	F	No	Down	14
	Benzene	T	No	No Trend	13
	Beryllium	F	No	Down	13
	Bicarbonate	T	No	No Trend	14
	Boron	F	No	No Trend	13
	Cadmium	F	No	Down	14
	Calcium	F	No	No Trend	14
	Carbonate	T	No	No Trend	14
	Chemical Oxygen Demand (COD)	T	No	No Trend	14
	Chloride	T	No	Down	14
	Chromium	F	No	Down	14
	Cobalt	F	No	Down	14
	Copper	F	No	Down	14
	Dissolved Organic Carbon (DOC)	F	No	Down	13
	Electrical Conductivity (EC)	T	No	Down	14
	Ethylbenzene	T	No	No Trend	13
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	13
	F1 (C_6-C_{10})	T	No	No Trend	13
	F2 (C_{10}-C_{16})	T	No	Down	13
	Fluoride	T	No	No Trend	7
	Hardness as $CaCO_3$	T	No	Down	14
	Hydroxide	T	No	No Trend	14
	Ionic Balance	T	No	Up	14
	Iron	F	No	Up	14
	Lead	F	No	Down	14
	Lithium	F	No	No Trend	12
	Magnesium	F	No	Down	14
	Manganese	F	No	Up	13
	Mercury	F	No	Down	14
	Molybdenum	F	No	Down	14
	Nickel	F	No	Down	14
	Nitrate (as NO_3-N)	T	No	Down	14
	Nitrate and Nitrite (as N)	T	No	Down	14
	Nitrite (as NO_2-N)	T	No	Down	14
	pH	T	No	Down	14
	Phenols	T	No	No Trend	4
	Phosphorus	T	No	No Trend	6
	Potassium	F	No	Down	14
	Selenium	F	No	Down	13
	Silver	F	No	Down	13
	Sodium	F	No	No Trend	14
	Styrene	T	No	Down	7
	Sulphate	T	No	Down	14
	Thallium	F	No	Down	13
	Tin	F	No	Down	13
	Titanium	F	No	Down	13
	Toluene	T	No	No Trend	13
	Total Dissolved Solids (TDS)	T	No	Down	14
	Total Kjeldahl Nitrogen (TKN)	T	No	No Trend	14
	Uranium	F	No	Down	12
	Vanadium	F	No	Down	13
	Xylene (o)	T	No	No Trend	11
	Xylenes (m & p)	T	No	No Trend	11
	Xylenes Total	T	No	No Trend	13
	Zinc	F	No	No Trend	14

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
19	Alkalinity (total as $CaCO_3$)	T	No	Down	13
	Aluminum	F	No	Down	12
	Ammonia	T	No	No Trend	13
	Antimony	F	No	Down	13
	Arsenic	F	No	Down	11
	Barium	F	No	No Trend	13
	Benzene	T	No	No Trend	12
	Beryllium	F	No	Down	12
	Bicarbonate	T	No	Up	13
	Boron	F	No	No Trend	12
	Cadmium	F	No	Down	13
	Calcium	F	Yes	Up	13
	Carbonate	T	No	Down	13
	Chemical Oxygen Demand (COD)	T	No	No Trend	13
	Chloride	T	Yes	Up	13
	Chromium	F	No	Down	13
	Cobalt	F	No	Down	13
	Copper	F	No	Down	13
	Dissolved Organic Carbon (DOC)	F	No	Down	12
	Electrical Conductivity (EC)	T	No	No Trend	13
	Ethylbenzene	T	No	No Trend	12
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	12
	F1 (C_6-C_{10})	T	No	No Trend	12
	F2 (C_{10}-C_{16})	T	No	Down	12
	Fluoride	T	No	No Trend	6
	Hardness as $CaCO_3$	T	Yes	Up	13
	Hydroxide	T	No	No Trend	13
	Ionic Balance	T	No	Up	13
	Iron	F	No	Up	13
	Lead	F	No	Down	13
	Lithium	F	No	Down	11
	Magnesium	F	Yes	Up	13
	Manganese	F	No	No Trend	12
	Mercury	F	No	Down	13
	Molybdenum	F	No	Down	13
	Nickel	F	No	Up	13
	Nitrate (as NO_3-N)	T	Yes	Down	13
	Nitrate and Nitrite (as N)	T	Yes	Down	13
	Nitrite (as NO_2-N)	T	No	Down	13
	pH	T	No	Down	13
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	No	No Trend	5
	Potassium	F	No	Up	13
	Selenium	F	No	Down	12
	Silver	F	No	Down	12
	Sodium	F	No	No Trend	13
	Styrene	T	No	Down	6
	Sulphate	T	No	Down	13
	Thallium	F	No	Down	12
	Tin	F	No	Down	12
	Titanium	F	No	No Trend	12
	Toluene	T	No	No Trend	12
	Total Dissolved Solids (TDS)	T	No	No Trend	13
	Total Kjeldahl Nitrogen (TKN)	T	No	No Trend	13
	Uranium	F	No	No Trend	11
	Vanadium	F	No	Down	12
	Xylene (o)	T	No	No Trend	10
	Xylenes (m & p)	T	No	No Trend	10
	Xylenes Total	T	No	No Trend	12
	Zinc	F	No	Down	13

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
20	Alkalinity (total as $CaCO_3$)	T	No	Down	14
	Aluminum	F	Yes	No Trend	13
	Ammonia	T	No	Up	14
	Antimony	F	No	Down	14
	Arsenic	F	No	Up	12
	Barium	F	No	Down	14
	Benzene	T	No	No Trend	13
	Beryllium	F	No	Down	13
	Bicarbonate	T	No	Down	14
	Boron	F	No	Down	13
	Cadmium	F	No	Down	14
	Calcium	F	Yes	Up	14
	Carbonate	T	No	No Trend	14
	Chemical Oxygen Demand (COD)	T	No	Up	14
	Chloride	T	Yes	Up	14
	Chromium	F	No	Down	14
	Cobalt	F	No	Down	14
	Copper	F	No	Down	14
	Dissolved Organic Carbon (DOC)	F	No	Up	13
	Electrical Conductivity (EC)	T	Yes	Up	14
	Ethylbenzene	T	No	No Trend	13
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	13
	F1 (C_6-C_{10})	T	No	No Trend	13
	F2 (C_{10}-C_{16})	T	No	Down	13
	Fluoride	T	No	No Trend	7
	Hardness as $CaCO_3$	T	Yes	Up	14
	Hydroxide	T	No	No Trend	14
	Ionic Balance	T	No	Up	14
	Iron	F	No	Up	14
	Lead	F	No	No Trend	14
	Lithium	F	No	Down	12
	Magnesium	F	Yes	Up	14
	Manganese	F	No	Up	13
	Mercury	F	No	Down	14
	Molybdenum	F	No	Down	14
	Nickel	F	No	Down	14
	Nitrate (as NO_3-N)	T	Yes	No Trend	14
	Nitrate and Nitrite (as N)	T	Yes	No Trend	14
	Nitrite (as NO_2-N)	T	No	Down	14
	pH	T	No	Down	14
	Phenols	T	No	No Trend	4
	Phosphorus	T	Yes	No Trend	6
	Potassium	F	No	No Trend	14
	Selenium	F	No	No Trend	13
	Silver	F	No	Down	13
	Sodium	F	Yes	Up	14
	Styrene	T	No	Down	7
	Sulphate	T	Yes	No Trend	14
	Thallium	F	No	Down	13
	Tin	F	No	Down	13
	Titanium	F	Yes	Up	13
	Toluene	T	No	No Trend	13
	Total Dissolved Solids (TDS)	T	Yes	No Trend	14
	Total Kjeldahl Nitrogen (TKN)	T	No	Up	14
	Uranium	F	No	Down	12
	Vanadium	F	No	Up	13
	Xylene (o)	T	No	No Trend	11
	Xylenes (m & p)	T	No	No Trend	11
	Xylenes Total	T	No	No Trend	13
	Zinc	F	No	Down	14

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
21	Alkalinity (total as $CaCO_3$)	T	No	No Trend	13
	Aluminum	F	No	No Trend	12
	Ammonia	T	No	Down	13
	Antimony	F	No	Down	13
	Arsenic	F	No	Down	11
	Barium	F	No	No Trend	13
	Benzene	T	No	No Trend	12
	Beryllium	F	No	Down	12
	Bicarbonate	T	No	Up	13
	Boron	F	No	No Trend	12
	Cadmium	F	No	Down	13
	Calcium	F	No	Up	13
	Carbonate	T	No	Down	13
	Chemical Oxygen Demand (COD)	T	No	No Trend	13
	Chloride	T	No	Up	13
	Chromium	F	No	Down	13
	Cobalt	F	No	No Trend	13
	Copper	F	No	No Trend	13
	Dissolved Organic Carbon (DOC)	F	No	Down	12
	Electrical Conductivity (EC)	T	No	Up	13
	Ethylbenzene	T	No	No Trend	12
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	12
	F1 (C_6-C_{10})	T	No	No Trend	12
	F2 (C_{10}-C_{16})	T	No	Down	12
	Fluoride	T	No	Down	6
	Hardness as $CaCO_3$	T	No	Up	13
	Hydroxide	T	No	No Trend	13
	Ionic Balance	T	Yes	Up	13
	Iron	F	No	No Trend	13
	Lead	F	No	Down	13
	Lithium	F	No	Down	11
	Magnesium	F	No	Up	13
	Manganese	F	No	No Trend	12
	Mercury	F	No	Down	13
	Molybdenum	F	No	No Trend	13
	Nickel	F	No	No Trend	13
	Nitrate (as NO_3-N)	T	No	Down	13
	Nitrate and Nitrite (as N)	T	No	Down	13
	Nitrite (as NO_2-N)	T	No	Down	13
	pH	T	No	Down	13
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	Yes	Up	5
	Potassium	F	No	No Trend	13
	Selenium	F	No	No Trend	12
	Silver	F	No	Down	12
	Sodium	F	Yes	No Trend	13
	Styrene	T	No	Down	6
	Sulphate	T	No	Up	13
	Thallium	F	No	Down	12
	Tin	F	No	Down	12
	Titanium	F	Yes	Up	12
	Toluene	T	No	No Trend	12
	Total Dissolved Solids (TDS)	T	No	Up	13
	Total Kjeldahl Nitrogen (TKN)	T	No	No Trend	13
	Uranium	F	No	No Trend	11
	Vanadium	F	No	Down	12
	Xylene (o)	T	No	No Trend	10
	Xylenes (m & p)	T	No	No Trend	10
	Xylenes Total	T	No	No Trend	12
	Zinc	F	No	Down	13

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Total or Filtered	Max Value Last	Mann Kendal Trend	Number of Points
22	Alkalinity (total as $CaCO_3$)	T	Yes	Down	13
	Aluminum	F	No	No Trend	12
	Ammonia	T	No	Down	13
	Antimony	F	No	Down	13
	Arsenic	F	No	Up	11
	Barium	F	No	Down	13
	Benzene	T	No	No Trend	12
	Beryllium	F	No	Down	12
	Bicarbonate	T	Yes	Down	13
	Boron	F	No	Down	12
	Cadmium	F	No	Down	13
	Calcium	F	Yes	Up	13
	Carbonate	T	No	Down	13
	Chemical Oxygen Demand (COD)	T	No	Up	13
	Chloride	T	Yes	Up	13
	Chromium	F	No	Down	13
	Cobalt	F	No	Down	13
	Copper	F	No	No Trend	13
	Dissolved Organic Carbon (DOC)	F	No	No Trend	12
	Electrical Conductivity (EC)	T	Yes	Up	13
	Ethylbenzene	T	No	No Trend	12
	F1 (C_6-C_{10}) - BTEX	T	No	No Trend	12
	F1 (C_6-C_{10})	T	No	No Trend	12
	F2 (C_{10}-C_{16})	T	No	Down	12
	Fluoride	T	No	No Trend	6
	Hardness as $CaCO_3$	T	Yes	Up	13
	Hydroxide	T	No	No Trend	13
	Ionic Balance	T	Yes	Up	13
	Iron	F	No	No Trend	13
	Lead	F	No	Down	13
	Lithium	F	Yes	No Trend	11
	Magnesium	F	Yes	Up	13
	Manganese	F	No	No Trend	12
	Mercury	F	No	Down	13
	Molybdenum	F	No	Down	13
	Nickel	F	No	Down	13
	Nitrate (as NO_3-N)	T	No	Down	13
	Nitrate and Nitrite (as N)	T	No	Down	13
	Nitrite (as NO_2-N)	T	No	Down	13
	pH	T	No	Down	13
	Phenols	T	No	Insufficient Data	3
	Phosphorus	T	No	No Trend	5
	Potassium	F	Yes	Up	13
	Selenium	F	No	Down	12
	Silver	F	No	Down	12
	Sodium	F	Yes	No Trend	13
	Styrene	T	No	Down	6
	Sulphate	T	Yes	Up	13
	Thallium	F	No	Down	12
	Tin	F	No	Down	12
	Titanium	F	No	No Trend	12
	Toluene	T	No	No Trend	12
	Total Dissolved Solids (TDS)	T	Yes	Up	13
	Total Kjeldahl Nitrogen (TKN)	T	No	No Trend	13
	Uranium	F	No	No Trend	11
	Vanadium	F	No	Down	12
	Xylene (o)	T	No	No Trend	10
	Xylenes (m & p)	T	No	No Trend	10
	Xylenes Total	T	No	No Trend	12
	Zinc	F	No	Down	13

Table 5: 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**
Mean	**22.0**	**11.8**	**19.6**	**31.5**	**47.2**	**78.4**	**99.9**	**48.6**	**38.5**	**20.5**	**21.2**	**19.8**	**454.9**

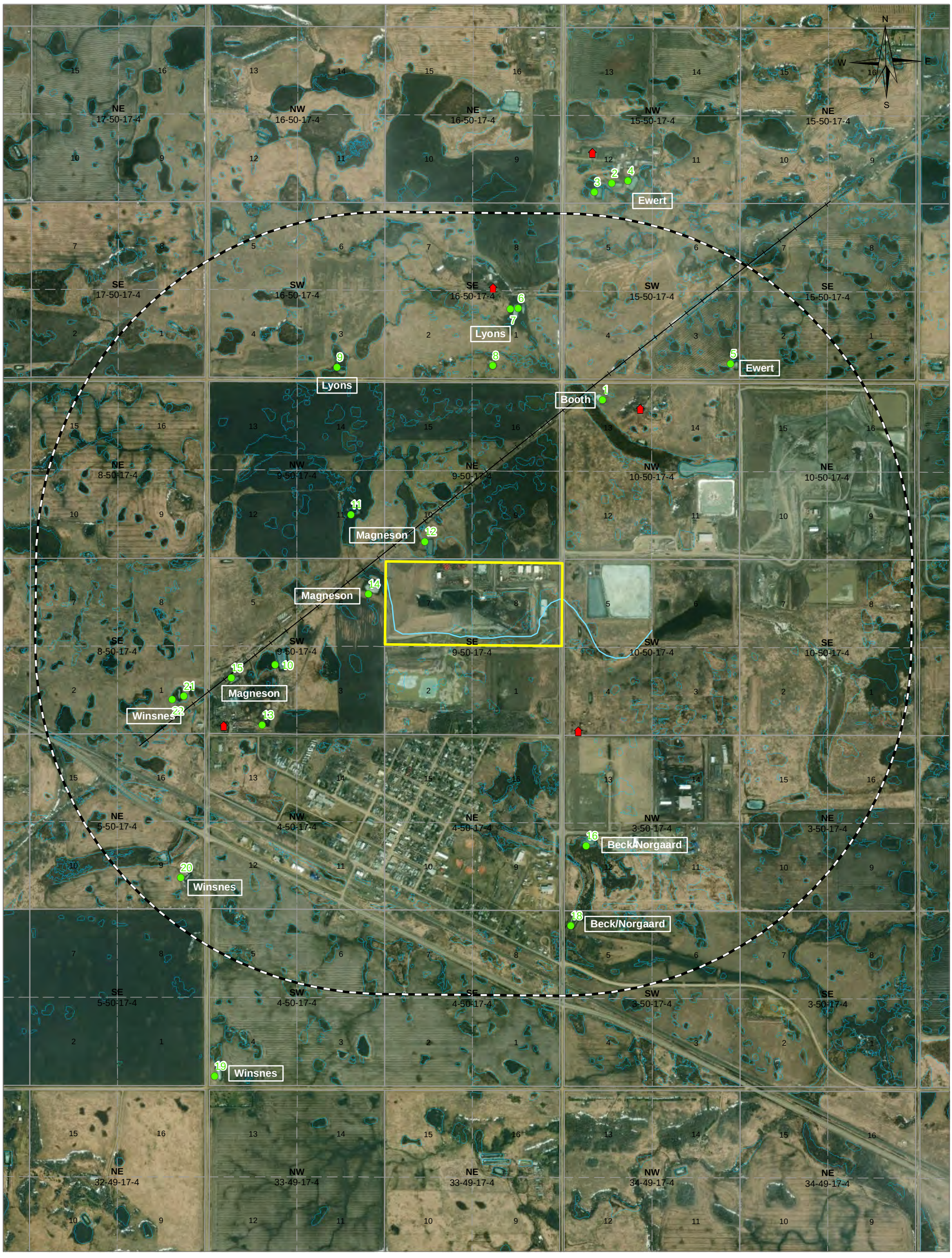
1. Denotes - Based on Incompleted Data
2. Data collected from Elk Island National Park Station (2014-2015, 2019-2020), Holden AGDM Stations (2016-2018) and Tofield North (1996-2013)
3. Link to 1996-2013, 2014-2015, 2019-2020 Data: http://climate.weather.gc.ca/historical_data/search_historic_data_e.html
4. Link to 2016-2018 data: http://agriculture.alberta.ca/acis/alberta-weather-data-viewer.jsp

TETRA TECH

FIGURE

Figure 1 Dugout Sampling Location Plan

Q:\Edmonton\GIS\SOLID_WASTE\SWOP\SWOP04269-01\Maps\SWOP04269-01_Figure1.mxd modified 12/6/2020 by megan.verburg



LEGEND

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

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

STATUS
ISSUED FOR USE

2020 DUGOUT SAMPLING PROGRAM
CLASS 1 WASTE MANAGEMENT FACILITY
RYLEY, AB

Dugout Sampling Location Plan

PROJECTION	DATUM	CLIENT
UTM Zone 12	NAD83	CleanHarbors

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

TETRA TECH

FILE NO. SWOP04269-01_Figure1.mxd

OFFICE	DWN	CKD	APVD	REV
Tt-EDM	RG	MS	CF	0

DATE	PROJECT NO.
December 6, 2020	SWM.SWOP04269-01

Figure 1

APPENDIX A

REGULATORY APPROVAL – ALBERTA ENVIRONMENT

Alberta Environment and Parks

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

April 19, 2017

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

Dear Mr. Parker:

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

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

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

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

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

Yours truly,

A Vawter

Annette Vawter
Application Coordinator

Enclosure

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

Alberta Environment and Parks

APPROVAL

PROVINCE OF ALBERTA

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

APPROVAL NO. 10348-03-00

APPLICATION NO. 014-10348

EFFECTIVE DATE: March 31, 2017

EXPIRY DATE: March 31, 2027

APPROVAL HOLDER: Clean Harbors Canada, Inc.

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

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

IS SUBJECT TO THE ATTACHED TERMS AND CONDITIONS.

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

Date Signed March 31, 2017

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PART 1: DEFINITIONS

SECTION 1.1: DEFINITIONS

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

1.1.2 In all PARTS of this approval:

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

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

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

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

(e) "AER" means Alberta Energy Regulator;

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

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

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

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

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

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

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

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

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

(o) "COD" means Chemical Oxygen Demand;

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

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

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

  (ii) 320 litre overpack drums, and

  (iii) 1000 litre tote tanks or sacks;

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

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

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

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

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

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

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

(x) "DOC" means Dissolved Organic Carbon;

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

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

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

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

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

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

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

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

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

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

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

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

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

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

(mm) "HDPE" means High Density Polyethylene;

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

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

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

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

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

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

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

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

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

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

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

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

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

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

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

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

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(eee) "major ions" means the following:

Calcium	Carbonate
Magnesium	Bicarbonate
Sodium	Chloride
Potassium	Sulfate

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

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

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

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

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

(hhh) "metals" means the following:

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

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

(jjj) "month" means calendar month;

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

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

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

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

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

(ppp) "nutrients" means the following:

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

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

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

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

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

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

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

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

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

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

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

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

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

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

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

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

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

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

are released to the atmosphere as described in the application;

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

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

(hhhh) "SOP" means Standard Operating Procedures;

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

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

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

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(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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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,

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

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

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

(c) a leachate collection system that:

(i) is placed over the primary liner;

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

(iii) consists of:

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

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

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

(d) a leak detection system that:

(i) is installed over the secondary liner;

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

(iii) consists of:

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

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

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

(e) a final cover:

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

(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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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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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:

(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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(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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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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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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(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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(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

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

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(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.

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LIMITS

4.3.7 Releases of runoff from:

(a) the old surface water detention pond;

(b) the new surface water detention pond; or

(c) both ponds

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

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

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

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

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

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

MONITORING AND REPORTING

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

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

4.3.11 For the purpose of TABLE 4.3-D:

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

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

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

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

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

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4.3-D: RUNOFF CONTROL SYSTEM MONITORING AND REPORTING

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

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

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

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

4.3.14 The approval holder shall:

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

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

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

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

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

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

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

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

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

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

(i) runoff control system,

(ii) pollution abatement equipment, and

(iii) monitoring equipment;

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

(i) industrial wastewaters, and

(ii) specified runoff

as per 4.3.6;

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

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

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

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

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

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

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

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

(i) runoff control system,

(ii) pollution abatement equipment, and

(iii) monitoring equipment;

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

(i) industrial wastewaters, and

(ii) specified runoff

as per 4.3.6;

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

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

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

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.3.20 The approval holder shall:

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

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

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

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

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

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

SECTION 4.4: LEACHATE COLLECTION AND LEAK DETECTION

OPERATIONS

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

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

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

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

(d) as per 4.6.51.

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

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

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

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

(d) as per 4.6.51.

LIMITS

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

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

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

MONITORING AND REPORTING

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

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

TABLE 4.4-A: LEACHATE AND LEAK DETECTION LIQUID MONITORING

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

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

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

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

SECTION 4.5: DUGOUTS AND WATER WELLS IN SURROUNDING AREA

MONITORING AND REPORTING

4.5.1 The approval holder shall:

(a) collect a representative sample from:

(i) each of the dugouts, and

(ii) each of the water wells

within an approximate 1.6 kilometre radius around the facility; and

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

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

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

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

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

TABLE 4.5-A: DUGOUT AND WATER WELL MONITORING

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

SECTION 4.6: HWRSP FACILITY AND LANDFILL

GENERAL

4.6.1 The approval holder shall not:

(a) receive;

(b) process;

(c) dispose of; or

(d) perform any combination of the above for

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

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

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

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

(iv) biomedical waste, at the facility;

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

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

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

(viii) NORM waste, at the facility.

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

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

(a) to facilities holding a current Act authorization;

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

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

HWRSP FACILITY

OPERATIONS PLAN

4.6.4 The approval holder shall:

(a) develop;

(b) keep up-to-date; and

(c) implement

an HWRSP Facility Operations Plan.

4.6.5 The approval holder shall:

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

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

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

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

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

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

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

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

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

OPERATIONS

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

TERMS AND CONDITIONS ATTACHED TO APPROVAL

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

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

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

(c) emergency shut-off valves;

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

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

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

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

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

4.6.14 The approval holder shall:

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

(i) inspection, and

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

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

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

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

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

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;

(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:

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										
TOTAL										XXXXX
							No. of Containers On site			XXXXX
							Total Litres in Bulk Tanks			XXXXX

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

Report Date: _____

* Provide a list of the recycling and disposal locations.

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

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.

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;

(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.

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.

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 t*he Alberta User Guide for Waste Managers*, May 1995, as amended;

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;

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

(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.

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

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.

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

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,

(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: Michele Crawford
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North Bldg.
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Date Received: 09-OCT-20
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Client Phone: 780-451-2121

Certificate of Analysis

Lab Work Order #: L2514848
Project P.O. #: NOT SUBMITTED
Job Reference: SWOP04269
C of C Numbers:
Legal Site Desc:

Comments: ADDITIONAL 03-DEC-20 10:38

Nicole Thibault, B.Sc. (Hons)
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2514848-1 1							
Sampled By: MC on 08-OCT-20 @ 10:35							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	12-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	12-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	96.7		70-130	%	12-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	73.8		70-130	%	12-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	85.3		70-130	%	12-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	13-OCT-20	13-OCT-20	R5254822
Surrogate: 2-Bromobenzotrifluoride	91.8		60-140	%	13-OCT-20	13-OCT-20	R5254822
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0036		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00016		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00583		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0612		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.025		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	20.4		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00030		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00040		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.179		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	0.000055		0.000050	mg/L		15-OCT-20	R5254359
Lithium (Li)-Dissolved	0.0335		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	9.69		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.00783		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.000611		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.00304		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	13.2		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000156		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	120		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00089		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.000578		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.00072		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		10-OCT-20	R5252887

* 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
L2514848-1 1							
Sampled By: MC on 08-OCT-20 @ 10:35							
Matrix: WATER							
Chemical Oxygen Demand	82		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	19.9		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	2.75		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	0.466		0.020	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	10.6		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	40.2		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.270		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	94.7			%		16-OCT-20	
TDS (Calculated)	413			mg/L		16-OCT-20	
Hardness (as CaCO3)	90.8			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	26.6		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.42		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	712		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	358		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	6.4		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	304		2.0	mg/L		09-OCT-20	R5252885
L2514848-2 2							
Sampled By: MC on 08-OCT-20 @ 11:16							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	12-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	12-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.7		70-130	%	12-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	73.1		70-130	%	12-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	86.4		70-130	%	12-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	13-OCT-20	13-OCT-20	R5254822
Surrogate: 2-Bromobenzotrifluoride	94.2		60-140	%	13-OCT-20	13-OCT-20	R5254822
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							

* 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
L2514848-2 2							
Sampled By: MC on 08-OCT-20 @ 11:16							
Matrix: WATER							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0059		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00021		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00823		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0508		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.028		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	22.6		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00046		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00065		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.032		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		15-OCT-20	R5254359
Lithium (Li)-Dissolved	0.0236		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	12.0		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.00492		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.000868		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.00290		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	20.3		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000172		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	121		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00055		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.00101		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.00158		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	78		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	21.1		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	3.08		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	0.745		0.020	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	10.6		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	34.5		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.276		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	96.9			%		16-OCT-20	
TDS (Calculated)	436			mg/L		16-OCT-20	
Hardness (as CaCO3)	106			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121

* 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
L2514848-2 2							
Sampled By: MC on 08-OCT-20 @ 11:16							
Matrix: WATER							
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	28.9		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.69		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	732		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	367		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	16.4		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	328		2.0	mg/L		09-OCT-20	R5252885
L2514848-3 3							
Sampled By: MC on 08-OCT-20 @ 11:07							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	12-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	12-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	12-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.2		70-130	%	12-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	70.7		70-130	%	12-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	81.5		70-130	%	12-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	13-OCT-20	13-OCT-20	R5254822
Surrogate: 2-Bromobenzotrifluoride	94.4		60-140	%	13-OCT-20	13-OCT-20	R5254822
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0316		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00025		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00841		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0509		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.011		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	30.1		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00019		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00125		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00082		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.545		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	0.000215		0.000050	mg/L		15-OCT-20	R5254359

* 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
L2514848-3 3							
Sampled By: MC on 08-OCT-20 @ 11:07							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.0291		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	16.6		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.264		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.000587		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.00565		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	23.5		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000326		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	222		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00693		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.000892		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.00226		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	1.13		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	119		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	31.3		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	4.86		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	1.19	DLHC	0.10	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	13.6		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	45.9		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.274		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	94.9			%		16-OCT-20	
TDS (Calculated)	789			mg/L		16-OCT-20	
Hardness (as CaCO3)	144			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	0.099		0.020	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.156		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	0.057		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	193		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.49		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	1220		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	498		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	12.6		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	429		2.0	mg/L		09-OCT-20	R5252885
L2514848-4 4							
Sampled By: MC on 08-OCT-20 @ 11:25							
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
L2514848-4 4							
Sampled By: MC on 08-OCT-20 @ 11:25							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	99.0		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	72.5		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	87.2		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	13-OCT-20	13-OCT-20	R5254822
Surrogate: 2-Bromobenzotrifluoride	98.1		60-140	%	13-OCT-20	13-OCT-20	R5254822
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0155		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00018		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00513		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0342		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.025		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	19.5		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00023		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00075		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00100		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	1.66		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	0.000278		0.000050	mg/L		15-OCT-20	R5254359
Lithium (Li)-Dissolved	0.0142		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	10.2		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.0441		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.000407		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.00314		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	15.7		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000206		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	126		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00266		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.000262		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.00194		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		10-OCT-20	R5252887

* 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
L2514848-4 4							
Sampled By: MC on 08-OCT-20 @ 11:25							
Matrix: WATER							
Chemical Oxygen Demand	116		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	29.0		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	3.45		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	1.08	DLHC	0.10	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	7.6		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	73.5		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.178		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	94.7			%		16-OCT-20	
TDS (Calculated)	432			mg/L		16-OCT-20	
Hardness (as CaCO3)	90.7			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	15.8		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.39		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	750		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	338		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	5.3		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	286		2.0	mg/L		09-OCT-20	R5252885
L2514848-5 5							
Sampled By: MC on 08-OCT-20 @ 10:47							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	97.1		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	71.0		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	92.2		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	13-OCT-20	13-OCT-20	R5254822
Surrogate: 2-Bromobenzotrifluoride	94.4		60-140	%	13-OCT-20	13-OCT-20	R5254822
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							

* 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
L2514848-5 5							
Sampled By: MC on 08-OCT-20 @ 10:47							
Matrix: WATER							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0425		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00035		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00692		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0823		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.018		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	28.5		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00013		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00113		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00123		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.353		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	0.000273		0.000050	mg/L		15-OCT-20	R5254359
Lithium (Li)-Dissolved	0.0128		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	13.4		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.0246		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.00177		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.00732		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	15.3		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000370		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	118		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00991		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.00121		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.00180		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	0.235		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	75		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	23.0		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	0.0012		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	3.64		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	0.591		0.020	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	33.8		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	12.9		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.379		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	96.8			%		16-OCT-20	
TDS (Calculated)	482			mg/L		16-OCT-20	
Hardness (as CaCO3)	126			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121

* 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
L2514848-5 5							
Sampled By: MC on 08-OCT-20 @ 10:47							
Matrix: WATER							
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	0.011		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	136		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.37		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	796		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	312		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	263		2.0	mg/L		09-OCT-20	R5252885
L2514848-6 6							
Sampled By: MC on 08-OCT-20 @ 11:54							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	99.0		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	72.5		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	93.7		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	13-OCT-20	13-OCT-20	R5254822
Surrogate: 2-Bromobenzotrifluoride	95.0		60-140	%	13-OCT-20	13-OCT-20	R5254822
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0366		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00017		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00537		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0372		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	<0.010		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	16.9		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00028		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00065		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00060		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.677		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	0.000149		0.000050	mg/L		15-OCT-20	R5254359

* 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
L2514848-6 6							
Sampled By: MC on 08-OCT-20 @ 11:54							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.0076		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	7.41		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.223		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.000751		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.00335		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	13.6		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000251		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	59.0		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00355		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.000250		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.00227		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	0.191		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	98		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	25.0		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	3.13		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	1.23	DLHC	0.10	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	5.2		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	13.1		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.140		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	95.7			%		16-OCT-20	
TDS (Calculated)	250			mg/L		16-OCT-20	
Hardness (as CaCO3)	72.7			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	36.4		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.06		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	439		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	210		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	172		2.0	mg/L		09-OCT-20	R5252885
L2514848-7 7							
Sampled By: MC on 08-OCT-20 @ 11:49							
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
L2514848-7 7							
Sampled By: MC on 08-OCT-20 @ 11:49							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.9		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	73.9		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	93.3		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	115.1		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0189		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00014		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00461		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0240		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	<0.010		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	16.9		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00016		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00025		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00095		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.472		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	0.000087		0.000050	mg/L		15-OCT-20	R5254359
Lithium (Li)-Dissolved	0.0070		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	6.42		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.0155		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.000745		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.00326		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	15.5		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000249		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	54.3		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00214		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.000275		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.00214		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	0.236		0.050	mg/L		10-OCT-20	R5252887

* 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
L2514848-7 7							
Sampled By: MC on 08-OCT-20 @ 11:49							
Matrix: WATER							
Chemical Oxygen Demand	76		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	20.8		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	0.0017		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	2.67		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	1.09	DLHC	0.10	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	3.4		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	13.0		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.139		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	98.6			%		16-OCT-20	
TDS (Calculated)	230			mg/L		16-OCT-20	
Hardness (as CaCO3)	68.6			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	0.013		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	24.9		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.12		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	409		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	202		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	165		2.0	mg/L		09-OCT-20	R5252885
L2514848-8 8							
Sampled By: MC on 08-OCT-20 @ 12:08							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.5		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	72.4		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	93.7		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	112.5		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							

* 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
L2514848-8 8							
Sampled By: MC on 08-OCT-20 @ 12:08							
Matrix: WATER							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0175		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00046		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00407		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0697		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.014		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	31.8		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00011		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00247		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00425		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.050		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		15-OCT-20	R5254359
Lithium (Li)-Dissolved	0.0150		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	17.1		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.0179		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.00583		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.0125		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	20.9		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000967		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	126		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00282		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.00422		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.00171		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	0.286		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	116		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	30.8		1.0	mg/L		16-OCT-20	R5256215
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	4.93		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	0.447		0.020	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	52.8		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	17.5		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.616		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	97.1			%		16-OCT-20	
TDS (Calculated)	500			mg/L		16-OCT-20	
Hardness (as CaCO3)	150			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	0.079		0.020	mg/L		09-OCT-20	R5254121

* 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
L2514848-8 8							
Sampled By: MC on 08-OCT-20 @ 12:08							
Matrix: WATER							
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.099		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	0.020		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	60.5		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.60		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	816		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	426		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	15.7		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	376		2.0	mg/L		09-OCT-20	R5252885
L2514848-9 9							
Sampled By: MC on 08-OCT-20 @ 13:06							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	97.9		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	73.2		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	89.1		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	115.7		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.125		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00024		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00702		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0370		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.011		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	23.5		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00035		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00092		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00083		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	1.32		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	0.000366		0.000050	mg/L		15-OCT-20	R5254359

* 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
L2514848-9 9							
Sampled By: MC on 08-OCT-20 @ 13:06							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.0156		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	11.6		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.0884		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.000964		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.00468		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	28.1		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000408		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	94.5		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.0117		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.000664		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.00294		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	0.888		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	137		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	43.2		1.0	mg/L		16-OCT-20	R5256215
Phenols (4AAP)	0.0013		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	4.02		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	2.71	DLHC	0.10	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	61.0		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	21.0		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.307		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	102			%		16-OCT-20	
TDS (Calculated)	373			mg/L		16-OCT-20	
Hardness (as CaCO3)	106			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	0.141		0.020	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.200		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	0.058		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	3.99		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.39		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	639		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	375		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	316		2.0	mg/L		09-OCT-20	R5252885
L2514848-10 10							
Sampled By: MC on 08-OCT-20 @ 13:54							
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
L2514848-10 10							
Sampled By: MC on 08-OCT-20 @ 13:54							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	96.9		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	71.4		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	84.0		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	103.1		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.187		0.0020	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00054		0.00020	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.0169		0.00020	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0728		0.00020	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00020	DLM	0.00020	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.097		0.020	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	0.000024		0.000010	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	56.8		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00097		0.00020	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00494		0.00020	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.0184		0.00040	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	1.40		0.020	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	0.00131		0.00010	mg/L		15-OCT-20	R5254359
Lithium (Li)-Dissolved	0.0541		0.0020	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	31.9		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.621		0.00020	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.00339		0.00010	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.0200		0.0010	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	116		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.00087		0.00010	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000020	DLM	0.000020	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	347		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000020	DLM	0.000020	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00020	DLM	0.00020	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.0281		0.00060	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.00221		0.000020	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.0122		0.0010	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	0.0063		0.0020	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	0.166		0.050	mg/L		10-OCT-20	R5252887

* 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
L2514848-10 10							
Sampled By: MC on 08-OCT-20 @ 13:54							
Matrix: WATER							
Chemical Oxygen Demand	280		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	85.6	DLHC	5.0	mg/L		18-OCT-20	R5256647
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	9.55		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	7.55	DLHC	0.40	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	4.4		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	217	DLDS	2.5	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.31	DLDS	0.10	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	98.1			%		16-OCT-20	
TDS (Calculated)	1440			mg/L		16-OCT-20	
Hardness (as CaCO3)	273			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	0.85	DLDS	0.10	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.91		0.11	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	0.062	DLDS	0.050	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	363	DLDS	1.5	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.60		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	2230		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	578		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	22.7		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	512		2.0	mg/L		09-OCT-20	R5252885
L2514848-11 11							
Sampled By: MC on 08-OCT-20 @ 12:25							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	97.2		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	70.2		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	85.3		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	102.3		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							

* 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
L2514848-11 11							
Sampled By: MC on 08-OCT-20 @ 12:25							
Matrix: WATER							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0606		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00026		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00542		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0423		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.031		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	0.0000129		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	21.0		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00035		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00124		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00224		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.683		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	0.000394		0.000050	mg/L		15-OCT-20	R5254359
Lithium (Li)-Dissolved	0.0118		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	9.13		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.0308		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.00138		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.00635		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	33.5		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000417		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	91.7		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00792		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.00203		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.00603		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	196		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	54.6		1.0	mg/L		16-OCT-20	R5256215
Phenols (4AAP)	0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	7.09		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	2.61	DLHC	0.10	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	345		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	27.6		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.252		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	100			%		16-OCT-20	
TDS (Calculated)	369			mg/L		16-OCT-20	
Hardness (as CaCO3)	90.0			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121

* 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
L2514848-11 11							
Sampled By: MC on 08-OCT-20 @ 12:25							
Matrix: WATER							
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	14.5		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.39		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	625		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	338		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	285		2.0	mg/L		09-OCT-20	R5252885
L2514848-12 12							
Sampled By: MC on 08-OCT-20 @ 10:22							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.9		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	70.8		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	88.4		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	103.7		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0088		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00029		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00169		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0530		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.062		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	41.3		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00022		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00110		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.013		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		15-OCT-20	R5254359

* 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
L2514848-12 12							
Sampled By: MC on 08-OCT-20 @ 10:22							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.0411		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	16.1		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.00125		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.0234		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.0146		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	12.2		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000259		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	144		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00105		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.00265		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.00154		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	48		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	15.1		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	2.02		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	0.081		0.020	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	19.2		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	13.6		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.450		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	95.2			%		16-OCT-20	
TDS (Calculated)	625			mg/L		16-OCT-20	
Hardness (as CaCO3)	169			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	253		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.40		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	947		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	282		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	5.0		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	240		2.0	mg/L		09-OCT-20	R5252885
L2514848-13 13							
Sampled By: MC on 08-OCT-20 @ 14:11							
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
L2514848-13 13							
Sampled By: MC on 08-OCT-20 @ 14:11							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.0		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	71.7		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	91.8		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	106.6		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0915		0.0050	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00074		0.00050	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.0310		0.00050	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.195		0.00050	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00050	DLM	0.00050	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.223		0.050	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	0.000036		0.000025	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	82.2		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00373		0.00050	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00817		0.00050	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.0103		0.0010	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	3.63		0.050	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	0.00391		0.00025	mg/L		15-OCT-20	R5254359
Lithium (Li)-Dissolved	0.0902		0.0050	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	69.2		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.882		0.00050	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.00371		0.00025	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.0394		0.0025	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	602		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.00184		0.00025	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000050	DLM	0.000050	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	655		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000050	DLM	0.000050	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00050	DLM	0.00050	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.0700		0.0015	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.00303		0.000050	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.0276		0.0025	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	0.0233		0.0050	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	2.02		0.050	mg/L		10-OCT-20	R5252887

* 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
L2514848-13 13							
Sampled By: MC on 08-OCT-20 @ 14:11							
Matrix: WATER							
Chemical Oxygen Demand	1300		10	mg/L		13-OCT-20	R5253659
Dissolved Organic Carbon	295	DLHC	5.0	mg/L		18-OCT-20	R5256647
Phenols (4AAP)	0.0013		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	42.6	DLHC	1.0	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	26.8	DLHC	2.0	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	24.4		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	668	DLDS	2.5	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	1.19	DLDS	0.10	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	96.9			%		16-OCT-20	
TDS (Calculated)	3380			mg/L		16-OCT-20	
Hardness (as CaCO3)	490			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	0.26	DLDS	0.10	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.33		0.11	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	0.073	DLDS	0.050	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	530	DLDS	1.5	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.68		0.10	pH		09-OCT-20	R5252885
Conductivity (EC)	4960		2.0	uS/cm		09-OCT-20	R5252885
Bicarbonate (HCO3)	1430		5.0	mg/L		09-OCT-20	R5252885
Carbonate (CO3)	64.6		5.0	mg/L		09-OCT-20	R5252885
Hydroxide (OH)	<5.0		5.0	mg/L		09-OCT-20	R5252885
Alkalinity, Total (as CaCO3)	1280		2.0	mg/L		09-OCT-20	R5252885
L2514848-14 14							
Sampled By: MC on 08-OCT-20 @ 12:34							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.5		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	71.3		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	72.2		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	103.9		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							

* 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
L2514848-14 14							
Sampled By: MC on 08-OCT-20 @ 12:34							
Matrix: WATER							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0145		0.0020	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00059		0.00020	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.0168		0.00020	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0317		0.00020	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00020	DLM	0.00020	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.059		0.020	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.000010	DLM	0.000010	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	45.7		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00051		0.00020	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00328		0.00020	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00426		0.00040	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.178		0.020	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	0.00017		0.00010	mg/L		15-OCT-20	R5254359
Lithium (Li)-Dissolved	0.0500		0.0020	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	30.6		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.218		0.00020	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.00596		0.00010	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.0181		0.0010	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	122		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.00096		0.00010	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000020	DLM	0.000020	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	370		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000020	DLM	0.000020	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00020	DLM	0.00020	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00431		0.00060	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.00191		0.000020	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.0142		0.0010	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	0.0039		0.0020	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	0.210		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	380		10	mg/L		13-OCT-20	R5253673
Dissolved Organic Carbon	100		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	14.6		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	12.5	DLHC	0.40	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	73.0		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	207	DLDS	2.5	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.48	DLDS	0.10	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	99.7			%		16-OCT-20	
TDS (Calculated)	1390			mg/L		16-OCT-20	
Hardness (as CaCO3)	240			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	0.19	DLDS	0.10	mg/L		09-OCT-20	R5254121

* 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
L2514848-14 14							
Sampled By: MC on 08-OCT-20 @ 12:34							
Matrix: WATER							
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.25		0.11	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	0.065	DLDS	0.050	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	185	DLDS	1.5	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.78		0.10	pH		10-OCT-20	R5252877
Conductivity (EC)	2230		2.0	uS/cm		10-OCT-20	R5252877
Bicarbonate (HCO3)	795		5.0	mg/L		10-OCT-20	R5252877
Carbonate (CO3)	40.1		5.0	mg/L		10-OCT-20	R5252877
Hydroxide (OH)	<5.0		5.0	mg/L		10-OCT-20	R5252877
Alkalinity, Total (as CaCO3)	719		2.0	mg/L		10-OCT-20	R5252877
L2514848-15 15							
Sampled By: MC on 08-OCT-20 @ 13:40							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.7		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	71.6		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	95.0		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	104.2		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0136		0.0020	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00067		0.00020	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.0139		0.00020	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0370		0.00020	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00020	DLM	0.00020	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.230		0.020	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.000010	DLM	0.000010	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	91.4		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	<0.00020	DLM	0.00020	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00110		0.00020	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00085		0.00040	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.082		0.020	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	<0.00010	DLM	0.00010	mg/L		15-OCT-20	R5254359

* 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
L2514848-15 15							
Sampled By: MC on 08-OCT-20 @ 13:40							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.0880		0.0020	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	57.8		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.172		0.00020	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.00128		0.00010	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.0059		0.0010	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	26.6		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.00027		0.00010	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000020	DLM	0.000020	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	510		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000020	DLM	0.000020	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00020	DLM	0.00020	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00232		0.00060	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.00400		0.000020	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.0026		0.0010	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0020	DLM	0.0020	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	88		10	mg/L		13-OCT-20	R5253673
Dissolved Organic Carbon	26.6		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	3.27		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	0.582		0.020	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	11.2		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	294	DLDS	2.5	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.29	DLDS	0.10	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	101			%		16-OCT-20	
TDS (Calculated)	1970			mg/L		16-OCT-20	
Hardness (as CaCO3)	466			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.11		0.11	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	772	DLDS	1.5	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.48		0.10	pH		10-OCT-20	R5252877
Conductivity (EC)	3050		2.0	uS/cm		10-OCT-20	R5252877
Bicarbonate (HCO3)	427		5.0	mg/L		10-OCT-20	R5252877
Carbonate (CO3)	11.2		5.0	mg/L		10-OCT-20	R5252877
Hydroxide (OH)	<5.0		5.0	mg/L		10-OCT-20	R5252877
Alkalinity, Total (as CaCO3)	369		2.0	mg/L		10-OCT-20	R5252877
L2514848-16 16							
Sampled By: MC on 08-OCT-20 @ 09:39							
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
L2514848-16 16							
Sampled By: MC on 08-OCT-20 @ 09:39							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	99.0		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	71.4		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	93.7		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	104.9		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0039		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00027		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00534		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0504		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.020		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	45.5		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00014		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00050		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00037		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.125		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		15-OCT-20	R5254359
Lithium (Li)-Dissolved	0.0262		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	21.0		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.134		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.000470		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.00347		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	15.3		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000184		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	233		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00114		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.000827		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	0.00251		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	0.200		0.050	mg/L		10-OCT-20	R5252887

* 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
L2514848-16 16							
Sampled By: MC on 08-OCT-20 @ 09:39							
Matrix: WATER							
Chemical Oxygen Demand	84		10	mg/L		13-OCT-20	R5253673
Dissolved Organic Carbon	26.2		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	3.01		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	1.68	DLHC	0.10	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	8.0		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	150		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.179		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	98.5			%		16-OCT-20	
TDS (Calculated)	824			mg/L		16-OCT-20	
Hardness (as CaCO3)	200			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	0.017		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	116		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.42		0.10	pH		10-OCT-20	R5252877
Conductivity (EC)	1400		2.0	uS/cm		10-OCT-20	R5252877
Bicarbonate (HCO3)	479		5.0	mg/L		10-OCT-20	R5252877
Carbonate (CO3)	7.4		5.0	mg/L		10-OCT-20	R5252877
Hydroxide (OH)	<5.0		5.0	mg/L		10-OCT-20	R5252877
Alkalinity, Total (as CaCO3)	405		2.0	mg/L		10-OCT-20	R5252877
L2514848-17 18							
Sampled By: MC on 08-OCT-20 @ 09:24							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.5		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	71.0		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	93.0		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	104.0		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							

* 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
L2514848-17 18							
Sampled By: MC on 08-OCT-20 @ 09:24							
Matrix: WATER							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255031
Aluminum (Al)-Dissolved	0.0195		0.0010	mg/L		15-OCT-20	R5254359
Antimony (Sb)-Dissolved	0.00015		0.00010	mg/L		15-OCT-20	R5254359
Arsenic (As)-Dissolved	0.00172		0.00010	mg/L		15-OCT-20	R5254359
Barium (Ba)-Dissolved	0.0934		0.00010	mg/L		15-OCT-20	R5254359
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Boron (B)-Dissolved	0.017		0.010	mg/L		15-OCT-20	R5254359
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		15-OCT-20	R5254359
Calcium (Ca)-Dissolved	75.3		0.50	mg/L		15-OCT-20	R5254359
Chromium (Cr)-Dissolved	0.00019		0.00010	mg/L		15-OCT-20	R5254359
Cobalt (Co)-Dissolved	0.00062		0.00010	mg/L		15-OCT-20	R5254359
Copper (Cu)-Dissolved	0.00027		0.00020	mg/L		15-OCT-20	R5254359
Iron (Fe)-Dissolved	0.505		0.010	mg/L		15-OCT-20	R5254359
Lead (Pb)-Dissolved	0.000172		0.000050	mg/L		15-OCT-20	R5254359
Lithium (Li)-Dissolved	0.0294		0.0010	mg/L		15-OCT-20	R5254359
Magnesium (Mg)-Dissolved	25.2		0.10	mg/L		15-OCT-20	R5254359
Manganese (Mn)-Dissolved	0.713		0.00010	mg/L		15-OCT-20	R5254359
Molybdenum (Mo)-Dissolved	0.000111		0.000050	mg/L		15-OCT-20	R5254359
Nickel (Ni)-Dissolved	0.00261		0.00050	mg/L		15-OCT-20	R5254359
Potassium (K)-Dissolved	15.2		0.50	mg/L		15-OCT-20	R5254359
Selenium (Se)-Dissolved	0.000429		0.000050	mg/L		15-OCT-20	R5254359
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Sodium (Na)-Dissolved	256		1.0	mg/L		15-OCT-20	R5254359
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		15-OCT-20	R5254359
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		15-OCT-20	R5254359
Titanium (Ti)-Dissolved	0.00065		0.00030	mg/L		15-OCT-20	R5254359
Uranium (U)-Dissolved	0.000385		0.000010	mg/L		15-OCT-20	R5254359
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L		15-OCT-20	R5254359
Zinc (Zn)-Dissolved	0.0028		0.0010	mg/L		15-OCT-20	R5254359
Miscellaneous Parameters							
Ammonia, Total (as N)	0.183		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	106		10	mg/L		13-OCT-20	R5253673
Dissolved Organic Carbon	27.5		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	0.0018		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	3.29		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	0.732		0.020	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	12.4		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	235		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.229		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	97.1			%		16-OCT-20	
TDS (Calculated)	968			mg/L		16-OCT-20	
Hardness (as CaCO3)	292			mg/L		16-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121

* 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
L2514848-17 18							
Sampled By: MC on 08-OCT-20 @ 09:24							
Matrix: WATER							
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	0.013		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	61.2		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.33		0.10	pH		10-OCT-20	R5252877
Conductivity (EC)	1690		2.0	uS/cm		10-OCT-20	R5252877
Bicarbonate (HCO3)	598		5.0	mg/L		10-OCT-20	R5252877
Carbonate (CO3)	5.0		5.0	mg/L		10-OCT-20	R5252877
Hydroxide (OH)	<5.0		5.0	mg/L		10-OCT-20	R5252877
Alkalinity, Total (as CaCO3)	499		2.0	mg/L		10-OCT-20	R5252877
L2514848-18 19							
Sampled By: MC on 08-OCT-20 @ 14:34							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	99.9		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	71.8		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	90.6		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	105.1		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255222
Aluminum (Al)-Dissolved	0.0022		0.0010	mg/L		18-OCT-20	R5256418
Antimony (Sb)-Dissolved	0.00029		0.00010	mg/L		18-OCT-20	R5256418
Arsenic (As)-Dissolved	0.00454		0.00010	mg/L		18-OCT-20	R5256418
Barium (Ba)-Dissolved	0.0729		0.00010	mg/L		18-OCT-20	R5256418
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Boron (B)-Dissolved	0.029		0.010	mg/L		18-OCT-20	R5256418
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		18-OCT-20	R5256418
Calcium (Ca)-Dissolved	44.7		0.50	mg/L		18-OCT-20	R5256418
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Cobalt (Co)-Dissolved	0.00062		0.00010	mg/L		18-OCT-20	R5256418
Copper (Cu)-Dissolved	0.00026		0.00020	mg/L		18-OCT-20	R5256418
Iron (Fe)-Dissolved	0.041		0.010	mg/L		18-OCT-20	R5256418
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		18-OCT-20	R5256418

* 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
L2514848-18 19							
Sampled By: MC on 08-OCT-20 @ 14:34							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.0169		0.0010	mg/L		18-OCT-20	R5256418
Magnesium (Mg)-Dissolved	24.1		0.10	mg/L		18-OCT-20	R5256418
Manganese (Mn)-Dissolved	0.0111		0.00010	mg/L		18-OCT-20	R5256418
Molybdenum (Mo)-Dissolved	0.000589		0.000050	mg/L		18-OCT-20	R5256418
Nickel (Ni)-Dissolved	0.00304		0.00050	mg/L		18-OCT-20	R5256418
Potassium (K)-Dissolved	12.7		0.50	mg/L		18-OCT-20	R5256418
Selenium (Se)-Dissolved	0.000192		0.000050	mg/L		18-OCT-20	R5256418
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		18-OCT-20	R5256418
Sodium (Na)-Dissolved	164		1.0	mg/L		18-OCT-20	R5256418
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		18-OCT-20	R5256418
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		18-OCT-20	R5256418
Uranium (U)-Dissolved	0.00136		0.000010	mg/L		18-OCT-20	R5256418
Vanadium (V)-Dissolved	0.00166		0.00050	mg/L		18-OCT-20	R5256418
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		18-OCT-20	R5256418
Miscellaneous Parameters							
Ammonia, Total (as N)	0.251		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	83		10	mg/L		13-OCT-20	R5253673
Dissolved Organic Carbon	21.7		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	3.99		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	0.425		0.020	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	13.0		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	76.8		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.229		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	107			%		18-OCT-20	
TDS (Calculated)	630			mg/L		18-OCT-20	
Hardness (as CaCO3)	211			mg/L		18-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	0.064		0.020	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.089		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	0.025		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	123		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.46		0.10	pH		10-OCT-20	R5252877
Conductivity (EC)	1020		2.0	uS/cm		10-OCT-20	R5252877
Bicarbonate (HCO3)	359		5.0	mg/L		10-OCT-20	R5252877
Carbonate (CO3)	7.6		5.0	mg/L		10-OCT-20	R5252877
Hydroxide (OH)	<5.0		5.0	mg/L		10-OCT-20	R5252877
Alkalinity, Total (as CaCO3)	307		2.0	mg/L		10-OCT-20	R5252877
L2514848-19 20							
Sampled By: MC on 08-OCT-20 @ 14:23							
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
L2514848-19 20							
Sampled By: MC on 08-OCT-20 @ 14:23							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.4		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	76.4		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	95.7		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	102.0		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255222
Aluminum (Al)-Dissolved	0.0128		0.0010	mg/L		18-OCT-20	R5256418
Antimony (Sb)-Dissolved	0.00017		0.00010	mg/L		18-OCT-20	R5256418
Arsenic (As)-Dissolved	0.00274		0.00010	mg/L		18-OCT-20	R5256418
Barium (Ba)-Dissolved	0.0979		0.00010	mg/L		18-OCT-20	R5256418
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Boron (B)-Dissolved	<0.010		0.010	mg/L		18-OCT-20	R5256418
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		18-OCT-20	R5256418
Calcium (Ca)-Dissolved	45.2		0.50	mg/L		18-OCT-20	R5256418
Chromium (Cr)-Dissolved	0.00016		0.00010	mg/L		18-OCT-20	R5256418
Cobalt (Co)-Dissolved	0.00027		0.00010	mg/L		18-OCT-20	R5256418
Copper (Cu)-Dissolved	0.00023		0.00020	mg/L		18-OCT-20	R5256418
Iron (Fe)-Dissolved	0.739		0.010	mg/L		18-OCT-20	R5256418
Lead (Pb)-Dissolved	0.000138		0.000050	mg/L		18-OCT-20	R5256418
Lithium (Li)-Dissolved	0.0170		0.0010	mg/L		18-OCT-20	R5256418
Magnesium (Mg)-Dissolved	16.8		0.10	mg/L		18-OCT-20	R5256418
Manganese (Mn)-Dissolved	0.00700		0.00010	mg/L		18-OCT-20	R5256418
Molybdenum (Mo)-Dissolved	0.000304		0.000050	mg/L		18-OCT-20	R5256418
Nickel (Ni)-Dissolved	0.00282		0.00050	mg/L		18-OCT-20	R5256418
Potassium (K)-Dissolved	10.6		0.50	mg/L		18-OCT-20	R5256418
Selenium (Se)-Dissolved	0.000245		0.000050	mg/L		18-OCT-20	R5256418
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		18-OCT-20	R5256418
Sodium (Na)-Dissolved	74.3		1.0	mg/L		18-OCT-20	R5256418
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		18-OCT-20	R5256418
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Titanium (Ti)-Dissolved	0.00216		0.00030	mg/L		18-OCT-20	R5256418
Uranium (U)-Dissolved	0.000235		0.000010	mg/L		18-OCT-20	R5256418
Vanadium (V)-Dissolved	0.00087		0.00050	mg/L		18-OCT-20	R5256418
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		18-OCT-20	R5256418
Miscellaneous Parameters							
Ammonia, Total (as N)	0.356		0.050	mg/L		10-OCT-20	R5252887

* 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
L2514848-19 20							
Sampled By: MC on 08-OCT-20 @ 14:23							
Matrix: WATER							
Chemical Oxygen Demand	75		10	mg/L		13-OCT-20	R5253673
Dissolved Organic Carbon	24.1		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	3.20		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	0.552		0.020	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	34.8		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	55.5		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.154		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	105			%		18-OCT-20	
TDS (Calculated)	378			mg/L		18-OCT-20	
Hardness (as CaCO3)	182			mg/L		18-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	0.053		0.020	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.053		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	47.5		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.09		0.10	pH		10-OCT-20	R5252877
Conductivity (EC)	654		2.0	uS/cm		10-OCT-20	R5252877
Bicarbonate (HCO3)	259		5.0	mg/L		10-OCT-20	R5252877
Carbonate (CO3)	<5.0		5.0	mg/L		10-OCT-20	R5252877
Hydroxide (OH)	<5.0		5.0	mg/L		10-OCT-20	R5252877
Alkalinity, Total (as CaCO3)	213		2.0	mg/L		10-OCT-20	R5252877
L2514848-20 21							
Sampled By: MC on 08-OCT-20 @ 13:18							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	96.9		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	72.2		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	87.0		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	104.3		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							

* 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
L2514848-20 21							
Sampled By: MC on 08-OCT-20 @ 13:18							
Matrix: WATER							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255222
Aluminum (Al)-Dissolved	0.0118		0.0010	mg/L		18-OCT-20	R5256418
Antimony (Sb)-Dissolved	0.00030		0.00010	mg/L		18-OCT-20	R5256418
Arsenic (As)-Dissolved	0.00640		0.00010	mg/L		18-OCT-20	R5256418
Barium (Ba)-Dissolved	0.0595		0.00010	mg/L		18-OCT-20	R5256418
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Boron (B)-Dissolved	<0.010		0.010	mg/L		18-OCT-20	R5256418
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		18-OCT-20	R5256418
Calcium (Ca)-Dissolved	61.4		0.50	mg/L		18-OCT-20	R5256418
Chromium (Cr)-Dissolved	0.00014		0.00010	mg/L		18-OCT-20	R5256418
Cobalt (Co)-Dissolved	0.00090		0.00010	mg/L		18-OCT-20	R5256418
Copper (Cu)-Dissolved	0.00061		0.00020	mg/L		18-OCT-20	R5256418
Iron (Fe)-Dissolved	0.138		0.010	mg/L		18-OCT-20	R5256418
Lead (Pb)-Dissolved	0.000061		0.000050	mg/L		18-OCT-20	R5256418
Lithium (Li)-Dissolved	0.0311		0.0010	mg/L		18-OCT-20	R5256418
Magnesium (Mg)-Dissolved	47.2		0.10	mg/L		18-OCT-20	R5256418
Manganese (Mn)-Dissolved	0.0204		0.00010	mg/L		18-OCT-20	R5256418
Molybdenum (Mo)-Dissolved	0.000283		0.000050	mg/L		18-OCT-20	R5256418
Nickel (Ni)-Dissolved	0.00343		0.00050	mg/L		18-OCT-20	R5256418
Potassium (K)-Dissolved	37.7		0.50	mg/L		18-OCT-20	R5256418
Selenium (Se)-Dissolved	0.000239		0.000050	mg/L		18-OCT-20	R5256418
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		18-OCT-20	R5256418
Sodium (Na)-Dissolved	295		1.0	mg/L		18-OCT-20	R5256418
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		18-OCT-20	R5256418
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Titanium (Ti)-Dissolved	0.00587		0.00030	mg/L		18-OCT-20	R5256418
Uranium (U)-Dissolved	0.00127		0.000010	mg/L		18-OCT-20	R5256418
Vanadium (V)-Dissolved	0.00266		0.00050	mg/L		18-OCT-20	R5256418
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		18-OCT-20	R5256418
Miscellaneous Parameters							
Ammonia, Total (as N)	0.072		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	130		10	mg/L		13-OCT-20	R5253673
Dissolved Organic Carbon	35.3		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	4.86		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	1.50	DLHC	0.10	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	29.6		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	311		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.131		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	115	BL:INT		%		18-OCT-20	
TDS (Calculated)	1050			mg/L		18-OCT-20	
Hardness (as CaCO3)	348			mg/L		18-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121

* 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
L2514848-20 21							
Sampled By: MC on 08-OCT-20 @ 13:18							
Matrix: WATER							
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	57.2		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.41		0.10	pH		10-OCT-20	R5252877
Conductivity (EC)	1800		2.0	uS/cm		10-OCT-20	R5252877
Bicarbonate (HCO3)	472		5.0	mg/L		10-OCT-20	R5252877
Carbonate (CO3)	8.3		5.0	mg/L		10-OCT-20	R5252877
Hydroxide (OH)	<5.0		5.0	mg/L		10-OCT-20	R5252877
Alkalinity, Total (as CaCO3)	400		2.0	mg/L		10-OCT-20	R5252877
L2514848-21 22							
Sampled By: MC on 08-OCT-20 @ 13:25							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.4		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	74.4		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	92.2		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	11-OCT-20	11-OCT-20	R5253960
Surrogate: 2-Bromobenzotrifluoride	105.7		60-140	%	11-OCT-20	11-OCT-20	R5253960
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255222
Aluminum (Al)-Dissolved	0.0065		0.0010	mg/L		18-OCT-20	R5256418
Antimony (Sb)-Dissolved	0.00022		0.00010	mg/L		18-OCT-20	R5256418
Arsenic (As)-Dissolved	0.00519		0.00010	mg/L		18-OCT-20	R5256418
Barium (Ba)-Dissolved	0.0434		0.00010	mg/L		18-OCT-20	R5256418
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Boron (B)-Dissolved	<0.010		0.010	mg/L		18-OCT-20	R5256418
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		18-OCT-20	R5256418
Calcium (Ca)-Dissolved	53.5		0.50	mg/L		18-OCT-20	R5256418
Chromium (Cr)-Dissolved	0.00014		0.00010	mg/L		18-OCT-20	R5256418
Cobalt (Co)-Dissolved	0.00050		0.00010	mg/L		18-OCT-20	R5256418
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L		18-OCT-20	R5256418
Iron (Fe)-Dissolved	0.182		0.010	mg/L		18-OCT-20	R5256418
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		18-OCT-20	R5256418

* 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
L2514848-21 22							
Sampled By: MC on 08-OCT-20 @ 13:25							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Lithium (Li)-Dissolved	0.0230		0.0010	mg/L		18-OCT-20	R5256418
Magnesium (Mg)-Dissolved	40.4		0.10	mg/L		18-OCT-20	R5256418
Manganese (Mn)-Dissolved	0.00827		0.00010	mg/L		18-OCT-20	R5256418
Molybdenum (Mo)-Dissolved	0.000193		0.000050	mg/L		18-OCT-20	R5256418
Nickel (Ni)-Dissolved	0.00188		0.00050	mg/L		18-OCT-20	R5256418
Potassium (K)-Dissolved	37.1		0.50	mg/L		18-OCT-20	R5256418
Selenium (Se)-Dissolved	0.000168		0.000050	mg/L		18-OCT-20	R5256418
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		18-OCT-20	R5256418
Sodium (Na)-Dissolved	269		1.0	mg/L		18-OCT-20	R5256418
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		18-OCT-20	R5256418
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Titanium (Ti)-Dissolved	0.00118		0.00030	mg/L		18-OCT-20	R5256418
Uranium (U)-Dissolved	0.000561		0.000010	mg/L		18-OCT-20	R5256418
Vanadium (V)-Dissolved	0.00107		0.00050	mg/L		18-OCT-20	R5256418
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		18-OCT-20	R5256418
Miscellaneous Parameters							
Ammonia, Total (as N)	0.059		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	127		10	mg/L		13-OCT-20	R5253673
Dissolved Organic Carbon	44.0		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	0.0014		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	4.78		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	1.28	DLHC	0.10	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	27.4		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	294		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.117		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	117	BL:INT		%		18-OCT-20	
TDS (Calculated)	941			mg/L		18-OCT-20	
Hardness (as CaCO3)	300			mg/L		18-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	43.3		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.32		0.10	pH		10-OCT-20	R5252877
Conductivity (EC)	1640		2.0	uS/cm		10-OCT-20	R5252877
Bicarbonate (HCO3)	408		5.0	mg/L		10-OCT-20	R5252877
Carbonate (CO3)	<5.0		5.0	mg/L		10-OCT-20	R5252877
Hydroxide (OH)	<5.0		5.0	mg/L		10-OCT-20	R5252877
Alkalinity, Total (as CaCO3)	339		2.0	mg/L		10-OCT-20	R5252877
L2514848-22 DUPLICATE 1							
Sampled By: MC on 08-OCT-20							
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
L2514848-22 DUPLICATE 1							
Sampled By: MC on 08-OCT-20							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.2		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	73.5		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	93.8		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	13-OCT-20	13-OCT-20	R5254822
Surrogate: 2-Bromobenzotrifluoride	95.1		60-140	%	13-OCT-20	13-OCT-20	R5254822
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255222
Aluminum (Al)-Dissolved	0.0103		0.0010	mg/L		18-OCT-20	R5256418
Antimony (Sb)-Dissolved	0.00014		0.00010	mg/L		18-OCT-20	R5256418
Arsenic (As)-Dissolved	0.00164		0.00010	mg/L		18-OCT-20	R5256418
Barium (Ba)-Dissolved	0.0900		0.00010	mg/L		18-OCT-20	R5256418
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Boron (B)-Dissolved	0.014		0.010	mg/L		18-OCT-20	R5256418
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		18-OCT-20	R5256418
Calcium (Ca)-Dissolved	75.1		0.50	mg/L		18-OCT-20	R5256418
Chromium (Cr)-Dissolved	0.00019		0.00010	mg/L		18-OCT-20	R5256418
Cobalt (Co)-Dissolved	0.00060		0.00010	mg/L		18-OCT-20	R5256418
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L		18-OCT-20	R5256418
Iron (Fe)-Dissolved	0.422		0.010	mg/L		18-OCT-20	R5256418
Lead (Pb)-Dissolved	0.000084		0.000050	mg/L		18-OCT-20	R5256418
Lithium (Li)-Dissolved	0.0317		0.0010	mg/L		18-OCT-20	R5256418
Magnesium (Mg)-Dissolved	27.8		0.10	mg/L		18-OCT-20	R5256418
Manganese (Mn)-Dissolved	0.706		0.00010	mg/L		18-OCT-20	R5256418
Molybdenum (Mo)-Dissolved	0.000104		0.000050	mg/L		18-OCT-20	R5256418
Nickel (Ni)-Dissolved	0.00262		0.00050	mg/L		18-OCT-20	R5256418
Potassium (K)-Dissolved	14.8		0.50	mg/L		18-OCT-20	R5256418
Selenium (Se)-Dissolved	0.000382		0.000050	mg/L		18-OCT-20	R5256418
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		18-OCT-20	R5256418
Sodium (Na)-Dissolved	298		1.0	mg/L		18-OCT-20	R5256418
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		18-OCT-20	R5256418
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Titanium (Ti)-Dissolved	0.00046		0.00030	mg/L		18-OCT-20	R5256418
Uranium (U)-Dissolved	0.000394		0.000010	mg/L		18-OCT-20	R5256418
Vanadium (V)-Dissolved	0.00055		0.00050	mg/L		18-OCT-20	R5256418
Zinc (Zn)-Dissolved	0.0017		0.0010	mg/L		18-OCT-20	R5256418
Miscellaneous Parameters							
Ammonia, Total (as N)	0.179		0.050	mg/L		10-OCT-20	R5252887

* 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
L2514848-22 DUPLICATE 1							
Sampled By: MC on 08-OCT-20							
Matrix: WATER							
Chemical Oxygen Demand	101		10	mg/L		13-OCT-20	R5253673
Dissolved Organic Carbon	30.0		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	0.0014		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	3.27		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	0.684		0.020	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	14.8		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	234		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.222		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	109			%		18-OCT-20	
TDS (Calculated)	1010			mg/L		18-OCT-20	
Hardness (as CaCO3)	302			mg/L		18-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	0.013		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	60.6		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.36		0.10	pH		10-OCT-20	R5252877
Conductivity (EC)	1720		2.0	uS/cm		10-OCT-20	R5252877
Bicarbonate (HCO3)	589		5.0	mg/L		10-OCT-20	R5252877
Carbonate (CO3)	7.1		5.0	mg/L		10-OCT-20	R5252877
Hydroxide (OH)	<5.0		5.0	mg/L		10-OCT-20	R5252877
Alkalinity, Total (as CaCO3)	495		2.0	mg/L		10-OCT-20	R5252877
L2514848-23 DUPLICATE 2							
Sampled By: MC on 08-OCT-20							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Toluene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
EthylBenzene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
m+p-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
o-Xylene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
Styrene	<0.00050		0.00050	mg/L	14-OCT-20	18-OCT-20	R5231702
F1(C6-C10)	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
F1-BTEX	<0.10		0.10	mg/L	14-OCT-20	18-OCT-20	R5231702
Xylenes	<0.00071		0.00071	mg/L	14-OCT-20	18-OCT-20	R5231702
Surrogate: 1,4-Difluorobenzene (SS)	98.1		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 4-Bromofluorobenzene (SS)	76.6		70-130	%	14-OCT-20	18-OCT-20	R5231702
Surrogate: 3,4-Dichlorotoluene (SS)	91.1		70-130	%	14-OCT-20	18-OCT-20	R5231702
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	13-OCT-20	13-OCT-20	R5254822
Surrogate: 2-Bromobenzotrifluoride	94.8		60-140	%	13-OCT-20	13-OCT-20	R5254822
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							

* 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
L2514848-23 DUPLICATE 2							
Sampled By: MC on 08-OCT-20							
Matrix: WATER							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-20	R5254062
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-20	R5254211
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					15-OCT-20	R5255222
Aluminum (Al)-Dissolved	0.0023		0.0010	mg/L		18-OCT-20	R5256418
Antimony (Sb)-Dissolved	0.00027		0.00010	mg/L		18-OCT-20	R5256418
Arsenic (As)-Dissolved	0.00501		0.00010	mg/L		18-OCT-20	R5256418
Barium (Ba)-Dissolved	0.0509		0.00010	mg/L		18-OCT-20	R5256418
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Boron (B)-Dissolved	0.017		0.010	mg/L		18-OCT-20	R5256418
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		18-OCT-20	R5256418
Calcium (Ca)-Dissolved	46.3		0.50	mg/L		18-OCT-20	R5256418
Chromium (Cr)-Dissolved	0.00011		0.00010	mg/L		18-OCT-20	R5256418
Cobalt (Co)-Dissolved	0.00041		0.00010	mg/L		18-OCT-20	R5256418
Copper (Cu)-Dissolved	0.00024		0.00020	mg/L		18-OCT-20	R5256418
Iron (Fe)-Dissolved	0.080		0.010	mg/L		18-OCT-20	R5256418
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		18-OCT-20	R5256418
Lithium (Li)-Dissolved	0.0280		0.0010	mg/L		18-OCT-20	R5256418
Magnesium (Mg)-Dissolved	23.1		0.10	mg/L		18-OCT-20	R5256418
Manganese (Mn)-Dissolved	0.0120		0.00010	mg/L		18-OCT-20	R5256418
Molybdenum (Mo)-Dissolved	0.000414		0.000050	mg/L		18-OCT-20	R5256418
Nickel (Ni)-Dissolved	0.00346		0.00050	mg/L		18-OCT-20	R5256418
Potassium (K)-Dissolved	15.4		0.50	mg/L		18-OCT-20	R5256418
Selenium (Se)-Dissolved	0.000204		0.000050	mg/L		18-OCT-20	R5256418
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		18-OCT-20	R5256418
Sodium (Na)-Dissolved	272		1.0	mg/L		18-OCT-20	R5256418
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		18-OCT-20	R5256418
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		18-OCT-20	R5256418
Titanium (Ti)-Dissolved	0.00070		0.00030	mg/L		18-OCT-20	R5256418
Uranium (U)-Dissolved	0.000808		0.000010	mg/L		18-OCT-20	R5256418
Vanadium (V)-Dissolved	0.00262		0.00050	mg/L		18-OCT-20	R5256418
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		18-OCT-20	R5256418
Miscellaneous Parameters							
Ammonia, Total (as N)	0.202		0.050	mg/L		10-OCT-20	R5252887
Chemical Oxygen Demand	82		10	mg/L		13-OCT-20	R5253673
Dissolved Organic Carbon	24.2		1.0	mg/L		18-OCT-20	R5256708
Phenols (4AAP)	0.0016		0.0010	mg/L		16-OCT-20	R5256426
Total Kjeldahl Nitrogen	3.08		0.20	mg/L	13-OCT-20	14-OCT-20	R5254312
Phosphorus (P)-Total	1.66	DLHC	0.10	mg/L	15-OCT-20	16-OCT-20	R5256060
Total Suspended Solids	8.2		3.0	mg/L		03-DEC-20	R5307357
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	150		0.50	mg/L		09-OCT-20	R5254121
Fluoride in Water by IC							
Fluoride (F)	0.169		0.020	mg/L		09-OCT-20	R5254121
Ion Balance Calculation							
Ion Balance	112	BL:INT		%		18-OCT-20	
TDS (Calculated)	863			mg/L		18-OCT-20	
Hardness (as CaCO3)	211			mg/L		18-OCT-20	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-OCT-20	R5254121

* 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
L2514848-23 DUPLICATE 2							
Sampled By: MC on 08-OCT-20							
Matrix: WATER							
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		14-OCT-20	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-OCT-20	R5254121
Sulfate in Water by IC							
Sulfate (SO4)	115		0.30	mg/L		09-OCT-20	R5254121
pH, Conductivity and Total Alkalinity							
pH	8.44		0.10	pH		10-OCT-20	R5252877
Conductivity (EC)	1410		2.0	uS/cm		10-OCT-20	R5252877
Bicarbonate (HCO3)	472		5.0	mg/L		10-OCT-20	R5252877
Carbonate (CO3)	8.8		5.0	mg/L		10-OCT-20	R5252877
Hydroxide (OH)	<5.0		5.0	mg/L		10-OCT-20	R5252877
Alkalinity, Total (as CaCO3)	401		2.0	mg/L		10-OCT-20	R5252877

* 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.

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-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.

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.

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.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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-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.

Quality Control Report

Workorder: L2514848 Report Date: 04-DEC-20

Client: TETRA TECH CANADA INC..
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4

Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED	**Water**							
Batch R5231702								
WG3423852-4 DUP		**L2514848-4**						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	18-OCT-20
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	18-OCT-20
EthylBenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	18-OCT-20
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	18-OCT-20
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	18-OCT-20
Styrene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	18-OCT-20
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	18-OCT-20
WG3422759-2 LCS								
Benzene			109.4		%		70-130	18-OCT-20
Toluene			105.3		%		70-130	18-OCT-20
EthylBenzene			99.4		%		70-130	18-OCT-20
m+p-Xylene			105.2		%		70-130	18-OCT-20
o-Xylene			106.8		%		70-130	18-OCT-20
Styrene			103.3		%		70-130	18-OCT-20
WG3422759-3 LCS								
F1(C6-C10)			93.2		%		70-130	18-OCT-20
WG3423852-2 LCS								
Benzene			109.3		%		70-130	18-OCT-20
Toluene			103.4		%		70-130	18-OCT-20
EthylBenzene			101.1		%		70-130	18-OCT-20
m+p-Xylene			106.5		%		70-130	18-OCT-20
o-Xylene			107.2		%		70-130	18-OCT-20
Styrene			101.4		%		70-130	18-OCT-20
WG3423852-3 LCS								
F1(C6-C10)			107.2		%		70-130	18-OCT-20
WG3422759-1 MB								
Benzene			<0.00050		mg/L		0.0005	18-OCT-20
Toluene			<0.00050		mg/L		0.0005	18-OCT-20
EthylBenzene			<0.00050		mg/L		0.0005	18-OCT-20
m+p-Xylene			<0.00050		mg/L		0.0005	18-OCT-20
o-Xylene			<0.00050		mg/L		0.0005	18-OCT-20
Styrene			<0.00050		mg/L		0.0005	18-OCT-20
F1(C6-C10)			<0.10		mg/L		0.1	18-OCT-20
Surrogate: 1,4-Difluorobenzene (SS)			98.2		%		70-130	18-OCT-20
Surrogate: 4-Bromofluorobenzene (SS)			71.2		%		70-130	18-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED	**Water**							
Batch R5231702								
WG3422759-1 MB								
Surrogate: 3,4-Dichlorotoluene (SS)			85.3		%		70-130	18-OCT-20
WG3423852-1 MB								
Benzene			<0.00050		mg/L		0.0005	18-OCT-20
Toluene			<0.00050		mg/L		0.0005	18-OCT-20
EthylBenzene			<0.00050		mg/L		0.0005	18-OCT-20
m+p-Xylene			<0.00050		mg/L		0.0005	18-OCT-20
o-Xylene			<0.00050		mg/L		0.0005	18-OCT-20
Styrene			<0.00050		mg/L		0.0005	18-OCT-20
F1(C6-C10)			<0.10		mg/L		0.1	18-OCT-20
Surrogate: 1,4-Difluorobenzene (SS)			99.0		%		70-130	18-OCT-20
Surrogate: 4-Bromofluorobenzene (SS)			70.4		%		70-130	18-OCT-20
Surrogate: 3,4-Dichlorotoluene (SS)			91.1		%		70-130	18-OCT-20
WG3422759-5 MS		**L2514848-3**						
Benzene			116.4		%		50-140	18-OCT-20
Toluene			105.1		%		50-140	18-OCT-20
EthylBenzene			94.5		%		50-140	18-OCT-20
m+p-Xylene			103.8		%		50-140	18-OCT-20
o-Xylene			106.6		%		50-140	18-OCT-20
Styrene			105.6		%		50-140	18-OCT-20
WG3423852-5 MS		**L2514848-23**						
Benzene			114.0		%		50-140	18-OCT-20
Toluene			107.4		%		50-140	18-OCT-20
EthylBenzene			101.5		%		50-140	18-OCT-20
m+p-Xylene			113.1		%		50-140	18-OCT-20
o-Xylene			111.1		%		50-140	18-OCT-20
Styrene			107.4		%		50-140	18-OCT-20
C-DIS-ORG-CL	**Water**							
Batch R5256215								
WG3426674-6 LCS								
Dissolved Organic Carbon			104.0		%		80-120	16-OCT-20
WG3426674-5 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	16-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-CL	**Water**							
Batch R5256647								
WG3427121-2 LCS								
Dissolved Organic Carbon			90.5		%		80-120	18-OCT-20
WG3427121-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	18-OCT-20
Batch R5256708								
WG3427206-11 DUP		**L2514848-7**						
Dissolved Organic Carbon		20.8	20.7		mg/L	0.1	20	18-OCT-20
WG3427206-10 LCS								
Dissolved Organic Carbon			88.2		%		80-120	18-OCT-20
WG3427206-6 LCS								
Dissolved Organic Carbon			91.3		%		80-120	18-OCT-20
WG3427206-5 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	18-OCT-20
WG3427206-9 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	18-OCT-20
WG3427206-12 MS		**L2514848-7**						
Dissolved Organic Carbon			83.9		%		70-130	18-OCT-20
CL-IC-N-ED	**Water**							
Batch R5254121								
WG3422146-5 DUP		**L2514848-9**						
Chloride (Cl)		21.0	21.8		mg/L	3.8	20	09-OCT-20
WG3422146-11 LCS								
Chloride (Cl)			102.2		%		90-110	09-OCT-20
WG3422146-13 LCS								
Chloride (Cl)			102.0		%		90-110	09-OCT-20
WG3422146-15 LCS								
Chloride (Cl)			102.0		%		90-110	09-OCT-20
WG3422146-17 LCS								
Chloride (Cl)			102.2		%		90-110	09-OCT-20
WG3422146-2 LCS								
Chloride (Cl)			101.7		%		90-110	09-OCT-20
WG3422146-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	09-OCT-20
WG3422146-12 MB								
Chloride (Cl)			<0.50		mg/L		0.5	09-OCT-20
WG3422146-14 MB								
Chloride (Cl)			<0.50		mg/L		0.5	09-OCT-20
WG3422146-16 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-N-ED	**Water**							
Batch R5254121								
WG3422146-16 MB								
Chloride (Cl)			<0.50		mg/L		0.5	09-OCT-20
WG3422146-18 MB								
Chloride (Cl)			<0.50		mg/L		0.5	09-OCT-20
WG3422146-6 MS		**L2514848-9**						
Chloride (Cl)			101.1		%		75-125	09-OCT-20
COD-T-COL-ED	**Water**							
Batch R5253659								
WG3423145-2 LCS								
Chemical Oxygen Demand			102.2		%		85-115	13-OCT-20
WG3423145-1 MB								
Chemical Oxygen Demand			<10		mg/L		10	13-OCT-20
Batch R5253673								
WG3423272-3 DUP		**L2514848-14**						
Chemical Oxygen Demand		380	376		mg/L	1.0	20	13-OCT-20
WG3423272-2 LCS								
Chemical Oxygen Demand			104.3		%		85-115	13-OCT-20
WG3423272-1 MB								
Chemical Oxygen Demand			<10		mg/L		10	13-OCT-20
WG3423272-4 MS		**L2514848-14**						
Chemical Oxygen Demand			N/A	MS-B	%		-	13-OCT-20
F-IC-N-ED	**Water**							
Batch R5254121								
WG3422146-5 DUP		**L2514848-9**						
Fluoride (F)		0.307	0.305		mg/L	0.7	20	09-OCT-20
WG3422146-11 LCS								
Fluoride (F)			105.2		%		90-110	09-OCT-20
WG3422146-13 LCS								
Fluoride (F)			101.4		%		90-110	09-OCT-20
WG3422146-15 LCS								
Fluoride (F)			100.9		%		90-110	09-OCT-20
WG3422146-17 LCS								
Fluoride (F)			101.7		%		90-110	09-OCT-20
WG3422146-2 LCS								
Fluoride (F)			100.7		%		90-110	09-OCT-20
WG3422146-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	09-OCT-20
WG3422146-12 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-ED	**Water**							
Batch R5254121								
WG3422146-12 MB								
Fluoride (F)			<0.020		mg/L		0.02	09-OCT-20
WG3422146-14 MB								
Fluoride (F)			<0.020		mg/L		0.02	09-OCT-20
WG3422146-16 MB								
Fluoride (F)			<0.020		mg/L		0.02	09-OCT-20
WG3422146-18 MB								
Fluoride (F)			<0.020		mg/L		0.02	09-OCT-20
WG3422146-6 MS		**L2514848-9**						
Fluoride (F)			106.6		%		75-125	09-OCT-20
F2-ED	**Water**							
Batch R5253960								
WG3422712-2 LCS		**DIESEL / MOTOR OIL**						
F2 (C10-C16)			89.1		%		70-130	11-OCT-20
WG3422712-4 LCS		**DIESEL / MOTOR OIL**						
F2 (C10-C16)			89.6		%		70-130	11-OCT-20
WG3422712-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	11-OCT-20
Surrogate: 2-Bromobenzotrifluoride			109.1		%		60-140	11-OCT-20
WG3422712-3 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	11-OCT-20
Surrogate: 2-Bromobenzotrifluoride			111.4		%		60-140	11-OCT-20
Batch R5254822								
WG3423081-2 LCS								
F2 (C10-C16)			95.1		%		70-130	13-OCT-20
WG3423081-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	13-OCT-20
Surrogate: 2-Bromobenzotrifluoride			92.1		%		60-140	13-OCT-20
HG-D-CVAA-ED	**Water**							
Batch R5254211								
WG3424090-7 DUP		**L2514848-21**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	14-OCT-20
WG3424090-2 LCS								
Mercury (Hg)-Dissolved			87.7		%		80-120	14-OCT-20
WG3424090-6 LCS								
Mercury (Hg)-Dissolved			88.2		%		80-120	14-OCT-20
WG3424090-1 MB								
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	14-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-ED	**Water**							
Batch R5254211								
WG3424090-5 MB								
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	14-OCT-20
WG3424090-8 MS		**L2514848-22**						
Mercury (Hg)-Dissolved			101.0		%		70-130	14-OCT-20
MET-D-CCMS-ED	**Water**							
Batch R5254359								
WG3425210-2 LCS								
Aluminum (Al)-Dissolved			97.7		%		80-120	15-OCT-20
Antimony (Sb)-Dissolved			95.3		%		80-120	15-OCT-20
Arsenic (As)-Dissolved			95.1		%		80-120	15-OCT-20
Barium (Ba)-Dissolved			98.5		%		80-120	15-OCT-20
Beryllium (Be)-Dissolved			95.4		%		80-120	15-OCT-20
Boron (B)-Dissolved			96.4		%		80-120	15-OCT-20
Cadmium (Cd)-Dissolved			96.2		%		80-120	15-OCT-20
Calcium (Ca)-Dissolved			94.6		%		80-120	15-OCT-20
Chromium (Cr)-Dissolved			96.4		%		80-120	15-OCT-20
Cobalt (Co)-Dissolved			95.1		%		80-120	15-OCT-20
Copper (Cu)-Dissolved			95.1		%		80-120	15-OCT-20
Iron (Fe)-Dissolved			97.9		%		80-120	15-OCT-20
Lead (Pb)-Dissolved			98.1		%		80-120	15-OCT-20
Lithium (Li)-Dissolved			93.6		%		80-120	15-OCT-20
Magnesium (Mg)-Dissolved			91.9		%		80-120	15-OCT-20
Manganese (Mn)-Dissolved			99.5		%		80-120	15-OCT-20
Molybdenum (Mo)-Dissolved			97.9		%		80-120	15-OCT-20
Nickel (Ni)-Dissolved			98.6		%		80-120	15-OCT-20
Potassium (K)-Dissolved			94.4		%		80-120	15-OCT-20
Selenium (Se)-Dissolved			97.7		%		80-120	15-OCT-20
Silver (Ag)-Dissolved			99.3		%		80-120	15-OCT-20
Sodium (Na)-Dissolved			96.3		%		80-120	15-OCT-20
Thallium (Tl)-Dissolved			98.5		%		80-120	15-OCT-20
Tin (Sn)-Dissolved			95.5		%		80-120	15-OCT-20
Titanium (Ti)-Dissolved			91.1		%		80-120	15-OCT-20
Uranium (U)-Dissolved			97.1		%		80-120	15-OCT-20
Vanadium (V)-Dissolved			96.2		%		80-120	15-OCT-20
Zinc (Zn)-Dissolved			92.0		%		80-120	15-OCT-20
WG3425210-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED	**Water**							
Batch R5254359								
WG3425210-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	15-OCT-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	15-OCT-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	15-OCT-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	15-OCT-20
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	15-OCT-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	15-OCT-20
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	15-OCT-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	15-OCT-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	15-OCT-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	15-OCT-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	15-OCT-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	15-OCT-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	15-OCT-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	15-OCT-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	15-OCT-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	15-OCT-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	15-OCT-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	15-OCT-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	15-OCT-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	15-OCT-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	15-OCT-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	15-OCT-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	15-OCT-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	15-OCT-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	15-OCT-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	15-OCT-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	15-OCT-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	15-OCT-20
Batch R5256418								
WG3425427-2 LCS								
Aluminum (Al)-Dissolved			94.0		%		80-120	18-OCT-20
Antimony (Sb)-Dissolved			96.8		%		80-120	18-OCT-20
Arsenic (As)-Dissolved			93.9		%		80-120	18-OCT-20
Barium (Ba)-Dissolved			102.0		%		80-120	18-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED	**Water**							
Batch R5256418								
WG3425427-2 LCS								
Beryllium (Be)-Dissolved			91.5		%		80-120	18-OCT-20
Boron (B)-Dissolved			97.5		%		80-120	18-OCT-20
Cadmium (Cd)-Dissolved			98.1		%		80-120	18-OCT-20
Calcium (Ca)-Dissolved			94.6		%		80-120	18-OCT-20
Chromium (Cr)-Dissolved			92.2		%		80-120	18-OCT-20
Cobalt (Co)-Dissolved			94.4		%		80-120	18-OCT-20
Copper (Cu)-Dissolved			91.2		%		80-120	18-OCT-20
Iron (Fe)-Dissolved			92.1		%		80-120	18-OCT-20
Lead (Pb)-Dissolved			94.6		%		80-120	18-OCT-20
Lithium (Li)-Dissolved			85.8		%		80-120	18-OCT-20
Magnesium (Mg)-Dissolved			90.0		%		80-120	18-OCT-20
Manganese (Mn)-Dissolved			98.0		%		80-120	18-OCT-20
Molybdenum (Mo)-Dissolved			93.2		%		80-120	18-OCT-20
Nickel (Ni)-Dissolved			96.8		%		80-120	18-OCT-20
Potassium (K)-Dissolved			94.8		%		80-120	18-OCT-20
Selenium (Se)-Dissolved			94.3		%		80-120	18-OCT-20
Silver (Ag)-Dissolved			97.0		%		80-120	18-OCT-20
Sodium (Na)-Dissolved			95.3		%		80-120	18-OCT-20
Thallium (Tl)-Dissolved			95.1		%		80-120	18-OCT-20
Tin (Sn)-Dissolved			98.9		%		80-120	18-OCT-20
Titanium (Ti)-Dissolved			91.9		%		80-120	18-OCT-20
Uranium (U)-Dissolved			93.8		%		80-120	18-OCT-20
Vanadium (V)-Dissolved			95.7		%		80-120	18-OCT-20
Zinc (Zn)-Dissolved			84.2		%		80-120	18-OCT-20
WG3425427-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	18-OCT-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	18-OCT-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	18-OCT-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	18-OCT-20
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	18-OCT-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	18-OCT-20
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	18-OCT-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	18-OCT-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	18-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED	**Water**							
Batch R5256418								
WG3425427-1 MB								
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	18-OCT-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	18-OCT-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	18-OCT-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	18-OCT-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	18-OCT-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	18-OCT-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	18-OCT-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	18-OCT-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	18-OCT-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	18-OCT-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	18-OCT-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	18-OCT-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	18-OCT-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	18-OCT-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	18-OCT-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	18-OCT-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	18-OCT-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	18-OCT-20
Batch R5256538								
WG3425427-1 MB								
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	19-OCT-20
NH3-COL-ED	**Water**							
Batch R5252887								
WG3422546-2 LCS								
Ammonia, Total (as N)			97.2		%		85-115	10-OCT-20
WG3422546-4 LCS								
Ammonia, Total (as N)			101.3		%		85-115	10-OCT-20
WG3422546-6 LCS								
Ammonia, Total (as N)			101.8		%		85-115	10-OCT-20
WG3422546-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	10-OCT-20
WG3422546-3 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	10-OCT-20
WG3422546-5 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	10-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-N-ED	**Water**							
Batch R5254121								
WG3422146-5 DUP		**L2514848-9**						
Nitrite (as N)		0.058	0.062		mg/L	6.1	20	09-OCT-20
WG3422146-11 LCS								
Nitrite (as N)			105.5		%		90-110	09-OCT-20
WG3422146-13 LCS								
Nitrite (as N)			104.6		%		90-110	09-OCT-20
WG3422146-15 LCS								
Nitrite (as N)			105.3		%		90-110	09-OCT-20
WG3422146-17 LCS								
Nitrite (as N)			107.8		%		90-110	09-OCT-20
WG3422146-2 LCS								
Nitrite (as N)			104.4		%		90-110	09-OCT-20
WG3422146-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	09-OCT-20
WG3422146-12 MB								
Nitrite (as N)			<0.010		mg/L		0.01	09-OCT-20
WG3422146-14 MB								
Nitrite (as N)			<0.010		mg/L		0.01	09-OCT-20
WG3422146-16 MB								
Nitrite (as N)			<0.010		mg/L		0.01	09-OCT-20
WG3422146-18 MB								
Nitrite (as N)			<0.010		mg/L		0.01	09-OCT-20
WG3422146-6 MS		**L2514848-9**						
Nitrite (as N)			105.8		%		75-125	09-OCT-20
NO3-IC-N-ED	**Water**							
Batch R5254121								
WG3422146-5 DUP		**L2514848-9**						
Nitrate (as N)		0.141	0.167		mg/L	17	20	09-OCT-20
WG3422146-11 LCS								
Nitrate (as N)			102.2		%		90-110	09-OCT-20
WG3422146-13 LCS								
Nitrate (as N)			102.1		%		90-110	09-OCT-20
WG3422146-15 LCS								
Nitrate (as N)			102.2		%		90-110	09-OCT-20
WG3422146-17 LCS								
Nitrate (as N)			102.5		%		90-110	09-OCT-20
WG3422146-2 LCS								
Nitrate (as N)			101.5		%		90-110	09-OCT-20
WG3422146-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-ED	**Water**							
Batch R5254121								
WG3422146-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	09-OCT-20
WG3422146-12 MB								
Nitrate (as N)			<0.020		mg/L		0.02	09-OCT-20
WG3422146-14 MB								
Nitrate (as N)			<0.020		mg/L		0.02	09-OCT-20
WG3422146-16 MB								
Nitrate (as N)			<0.020		mg/L		0.02	09-OCT-20
WG3422146-18 MB								
Nitrate (as N)			<0.020		mg/L		0.02	09-OCT-20
WG3422146-6 MS		**L2514848-9**						
Nitrate (as N)			102.8		%		75-125	09-OCT-20
P-T-COL-ED	**Water**							
Batch R5256060								
WG3425383-2 LCS		**KONELAB_TP**						
Phosphorus (P)-Total			97.3		%		80-120	16-OCT-20
WG3425383-8 LCS								
Phosphorus (P)-Total			99.1		%		70-130	16-OCT-20
WG3425383-1 MB								
Phosphorus (P)-Total			<0.020		mg/L		0.02	16-OCT-20
WG3425383-7 MB								
Phosphorus (P)-Total			<0.020		mg/L		0.02	16-OCT-20
PH/EC/ALK-ED	**Water**							
Batch R5252877								
WG3422465-12 LCS		**ED-PH6**						
pH			6.04		pH		5.8-6.2	10-OCT-20
WG3422465-13 LCS		**MID_1412**						
Conductivity (EC)			101.3		%		90-110	10-OCT-20
WG3422465-14 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			98.6		%		85-115	10-OCT-20
WG3422465-17 LCS		**ED-PH6**						
pH			6.04		pH		5.8-6.2	10-OCT-20
WG3422465-18 LCS		**MID_1412**						
Conductivity (EC)			100.9		%		90-110	10-OCT-20
WG3422465-19 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			99.5		%		85-115	10-OCT-20
WG3422465-2 LCS		**ED-PH6**						
pH			6.04		pH		5.8-6.2	10-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R5252877								
WG3422465-22 LCS		**ED-PH6**						
pH			6.05		pH		5.8-6.2	10-OCT-20
WG3422465-23 LCS		**MID_1412**						
Conductivity (EC)			102.3		%		90-110	10-OCT-20
WG3422465-24 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			99.2		%		85-115	10-OCT-20
WG3422465-27 LCS		**ED-PH6**						
pH			6.03		pH		5.8-6.2	10-OCT-20
WG3422465-28 LCS		**MID_1412**						
Conductivity (EC)			102.5		%		90-110	10-OCT-20
WG3422465-29 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			99.98		%		85-115	10-OCT-20
WG3422465-3 LCS		**MID_1412**						
Conductivity (EC)			102.1		%		90-110	10-OCT-20
WG3422465-4 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			98.5		%		85-115	10-OCT-20
WG3422465-7 LCS		**ED-PH6**						
pH			6.04		pH		5.8-6.2	10-OCT-20
WG3422465-8 LCS		**MID_1412**						
Conductivity (EC)			101.7		%		90-110	10-OCT-20
WG3422465-9 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			98.6		%		85-115	10-OCT-20
WG3422465-1 MB								
Conductivity (EC)			<2.0		uS/cm		2	10-OCT-20
Bicarbonate (HCO3)			<5.0		mg/L		5	10-OCT-20
Carbonate (CO3)			<5.0		mg/L		5	10-OCT-20
Hydroxide (OH)			<5.0		mg/L		5	10-OCT-20
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	10-OCT-20
WG3422465-11 MB								
Conductivity (EC)			<2.0		uS/cm		2	10-OCT-20
Bicarbonate (HCO3)			<5.0		mg/L		5	10-OCT-20
Carbonate (CO3)			<5.0		mg/L		5	10-OCT-20
Hydroxide (OH)			<5.0		mg/L		5	10-OCT-20
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	10-OCT-20
WG3422465-16 MB								
Conductivity (EC)			<2.0		uS/cm		2	10-OCT-20
Bicarbonate (HCO3)			<5.0		mg/L		5	10-OCT-20
Carbonate (CO3)			<5.0		mg/L		5	10-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R5252877								
WG3422465-16 MB								
Hydroxide (OH)			<5.0		mg/L		5	10-OCT-20
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	10-OCT-20
WG3422465-21 MB								
Conductivity (EC)			<2.0		uS/cm		2	10-OCT-20
Bicarbonate (HCO3)			<5.0		mg/L		5	10-OCT-20
Carbonate (CO3)			<5.0		mg/L		5	10-OCT-20
Hydroxide (OH)			<5.0		mg/L		5	10-OCT-20
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	10-OCT-20
WG3422465-26 MB								
Conductivity (EC)			<2.0		uS/cm		2	10-OCT-20
Bicarbonate (HCO3)			<5.0		mg/L		5	10-OCT-20
Carbonate (CO3)			<5.0		mg/L		5	10-OCT-20
Hydroxide (OH)			<5.0		mg/L		5	10-OCT-20
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	10-OCT-20
WG3422465-6 MB								
Conductivity (EC)			<2.0		uS/cm		2	10-OCT-20
Bicarbonate (HCO3)			<5.0		mg/L		5	10-OCT-20
Carbonate (CO3)			<5.0		mg/L		5	10-OCT-20
Hydroxide (OH)			<5.0		mg/L		5	10-OCT-20
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	10-OCT-20
Batch R5252885								
WG3421852-29 DUP		**L2514848-1**						
pH		8.42	8.43	J	pH	0.01	0.3	09-OCT-20
Conductivity (EC)		712	711		uS/cm	0.1	10	09-OCT-20
Bicarbonate (HCO3)		358	364		mg/L	1.5	25	09-OCT-20
Carbonate (CO3)		6.4	7.1		mg/L	11	25	09-OCT-20
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	09-OCT-20
Alkalinity, Total (as CaCO3)		304	310		mg/L	1.8	20	09-OCT-20
WG3421852-30 DUP		**L2514848-10**						
pH		8.60	8.61	J	pH	0.01	0.3	09-OCT-20
Conductivity (EC)		2230	2220		uS/cm	0.4	10	09-OCT-20
Bicarbonate (HCO3)		578	584		mg/L	0.9	25	09-OCT-20
Carbonate (CO3)		22.7	22.9		mg/L	1.1	25	09-OCT-20
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	09-OCT-20
Alkalinity, Total (as CaCO3)		512	517		mg/L	0.9	20	09-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R5252885								
WG3421852-11 LCS		**ED-PH6**						
pH			6.03		pH		5.8-6.2	09-OCT-20
WG3421852-12 LCS		**MID_1412**						
Conductivity (EC)			103.3		%		90-110	09-OCT-20
WG3421852-13 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			96.7		%		85-115	09-OCT-20
WG3421852-15 LCS		**ED-PH6**						
pH			6.03		pH		5.8-6.2	09-OCT-20
WG3421852-16 LCS		**MID_1412**						
Conductivity (EC)			101.3		%		90-110	09-OCT-20
WG3421852-17 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			101.0		%		85-115	09-OCT-20
WG3421852-19 LCS		**ED-PH6**						
pH			6.01		pH		5.8-6.2	09-OCT-20
WG3421852-2 LCS		**ED-PH6**						
pH			6.03		pH		5.8-6.2	09-OCT-20
WG3421852-20 LCS		**MID_1412**						
Conductivity (EC)			103.3		%		90-110	09-OCT-20
WG3421852-21 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			98.5		%		85-115	09-OCT-20
WG3421852-23 LCS		**ED-PH6**						
pH			6.02		pH		5.8-6.2	09-OCT-20
WG3421852-24 LCS		**MID_1412**						
Conductivity (EC)			98.6		%		90-110	09-OCT-20
WG3421852-25 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			99.3		%		85-115	09-OCT-20
WG3421852-3 LCS		**MID_1412**						
Conductivity (EC)			105.5		%		90-110	09-OCT-20
WG3421852-4 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			105.4		%		85-115	09-OCT-20
WG3421852-7 LCS		**ED-PH6**						
pH			6.03		pH		5.8-6.2	09-OCT-20
WG3421852-8 LCS		**MID_1412**						
Conductivity (EC)			100.6		%		90-110	09-OCT-20
WG3421852-9 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			99.1		%		85-115	09-OCT-20
WG3421852-1 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-OCT-20
Bicarbonate (HCO3)			<5.0		mg/L		5	09-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R5252885								
WG3421852-1 MB								
Carbonate (CO3)			<5.0		mg/L		5	09-OCT-20
Hydroxide (OH)			<5.0		mg/L		5	09-OCT-20
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-OCT-20
WG3421852-10 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-OCT-20
Bicarbonate (HCO3)			<5.0		mg/L		5	09-OCT-20
Carbonate (CO3)			<5.0		mg/L		5	09-OCT-20
Hydroxide (OH)			<5.0		mg/L		5	09-OCT-20
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-OCT-20
WG3421852-14 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-OCT-20
Bicarbonate (HCO3)			<5.0		mg/L		5	09-OCT-20
Carbonate (CO3)			<5.0		mg/L		5	09-OCT-20
Hydroxide (OH)			<5.0		mg/L		5	09-OCT-20
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-OCT-20
WG3421852-18 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-OCT-20
Bicarbonate (HCO3)			<5.0		mg/L		5	09-OCT-20
Carbonate (CO3)			<5.0		mg/L		5	09-OCT-20
Hydroxide (OH)			<5.0		mg/L		5	09-OCT-20
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-OCT-20
WG3421852-22 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-OCT-20
Bicarbonate (HCO3)			<5.0		mg/L		5	09-OCT-20
Carbonate (CO3)			<5.0		mg/L		5	09-OCT-20
Hydroxide (OH)			<5.0		mg/L		5	09-OCT-20
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-OCT-20
WG3421852-6 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-OCT-20
Bicarbonate (HCO3)			<5.0		mg/L		5	09-OCT-20
Carbonate (CO3)			<5.0		mg/L		5	09-OCT-20
Hydroxide (OH)			<5.0		mg/L		5	09-OCT-20
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-OCT-20
PHENOLS-4AAP-ED	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-ED	**Water**							
Batch R5256426								
WG3426478-24 DUP		**L2514848-15**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	16-OCT-20
WG3426478-18 LCS								
Phenols (4AAP)			101.5		%		85-115	16-OCT-20
WG3426478-22 LCS								
Phenols (4AAP)			98.7		%		85-115	16-OCT-20
WG3426478-17 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	16-OCT-20
WG3426478-21 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	16-OCT-20
WG3426478-23 MS		**L2514848-15**						
Phenols (4AAP)			101.7		%		75-125	16-OCT-20
SO4-IC-N-ED	**Water**							
Batch R5254121								
WG3422146-5 DUP		**L2514848-9**						
Sulfate (SO4)		3.99	4.28		mg/L	7.0	20	09-OCT-20
WG3422146-11 LCS								
Sulfate (SO4)			105.0		%		90-110	09-OCT-20
WG3422146-13 LCS								
Sulfate (SO4)			105.1		%		90-110	09-OCT-20
WG3422146-15 LCS								
Sulfate (SO4)			105.1		%		90-110	09-OCT-20
WG3422146-17 LCS								
Sulfate (SO4)			105.5		%		90-110	09-OCT-20
WG3422146-2 LCS								
Sulfate (SO4)			101.8		%		90-110	09-OCT-20
WG3422146-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	09-OCT-20
WG3422146-12 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	09-OCT-20
WG3422146-14 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	09-OCT-20
WG3422146-16 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	09-OCT-20
WG3422146-18 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	09-OCT-20
WG3422146-6 MS		**L2514848-9**						
Sulfate (SO4)			107.7		%		75-125	09-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TOTSUS-ED	**Water**							
Batch R5307357								
WG3456254-3 DUP		**L2514848-1**						
Total Suspended Solids		10.6	12.8		mg/L	19	20	03-DEC-20
WG3456254-6 DUP		**L2514848-21**						
Total Suspended Solids		27.4	28.8		mg/L	5.0	20	03-DEC-20
WG3456254-2 LCS								
Total Suspended Solids			96.0		%		85-115	03-DEC-20
WG3456254-5 LCS								
Total Suspended Solids			97.5		%		85-115	03-DEC-20
WG3456254-1 MB								
Total Suspended Solids			<3.0		mg/L		3	03-DEC-20
WG3456254-4 MB								
Total Suspended Solids			<3.0		mg/L		3	03-DEC-20
TKN-F-ED	**Water**							
Batch R5254312								
WG3423565-3 DUP		**L2514848-1**						
Total Kjeldahl Nitrogen		2.75	3.01		mg/L	8.9	20	14-OCT-20
WG3423565-2 LCS								
Total Kjeldahl Nitrogen			102		%		75-125	14-OCT-20
WG3423565-6 LCS								
Total Kjeldahl Nitrogen			103		%		75-125	14-OCT-20
WG3423565-1 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	14-OCT-20
WG3423565-5 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	14-OCT-20
WG3423565-4 MS		**L2514848-1**						
Total Kjeldahl Nitrogen			107		%		70-130	14-OCT-20

Quality Control Report

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.
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

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Total Suspended Solids							
	1	08-OCT-20 10:35	03-DEC-20 13:47	7	56	days	EHT
	2	08-OCT-20 11:16	03-DEC-20 13:47	7	56	days	EHT
	3	08-OCT-20 11:07	03-DEC-20 13:47	7	56	days	EHT
	4	08-OCT-20 11:25	03-DEC-20 13:47	7	56	days	EHT
	5	08-OCT-20 10:47	03-DEC-20 13:47	7	56	days	EHT
	6	08-OCT-20 11:54	03-DEC-20 13:47	7	56	days	EHT
	7	08-OCT-20 11:49	03-DEC-20 13:47	7	56	days	EHT
	8	08-OCT-20 12:08	03-DEC-20 13:47	7	56	days	EHT
	9	08-OCT-20 13:06	03-DEC-20 13:47	7	56	days	EHT
	10	08-OCT-20 13:54	03-DEC-20 13:47	7	56	days	EHT
	11	08-OCT-20 12:25	03-DEC-20 13:47	7	56	days	EHT
	12	08-OCT-20 10:22	03-DEC-20 13:47	7	56	days	EHT
	13	08-OCT-20 14:11	03-DEC-20 13:47	7	56	days	EHT
	14	08-OCT-20 12:34	03-DEC-20 13:47	7	56	days	EHT
	15	08-OCT-20 13:40	03-DEC-20 13:47	7	56	days	EHT
	16	08-OCT-20 09:39	03-DEC-20 13:47	7	56	days	EHT
	17	08-OCT-20 09:24	03-DEC-20 13:47	7	56	days	EHT
	18	08-OCT-20 14:34	03-DEC-20 13:47	7	56	days	EHT
	19	08-OCT-20 14:23	03-DEC-20 13:47	7	56	days	EHT
	20	08-OCT-20 13:18	03-DEC-20 13:47	7	56	days	EHT
	21	08-OCT-20 13:25	03-DEC-20 13:47	7	56	days	EHT
	22	08-OCT-20	03-DEC-20 13:47	7	56	days	EHT
	23	08-OCT-20	03-DEC-20 13:47	7	56	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 L2514848 were received on 09-OCT-20 12:24.

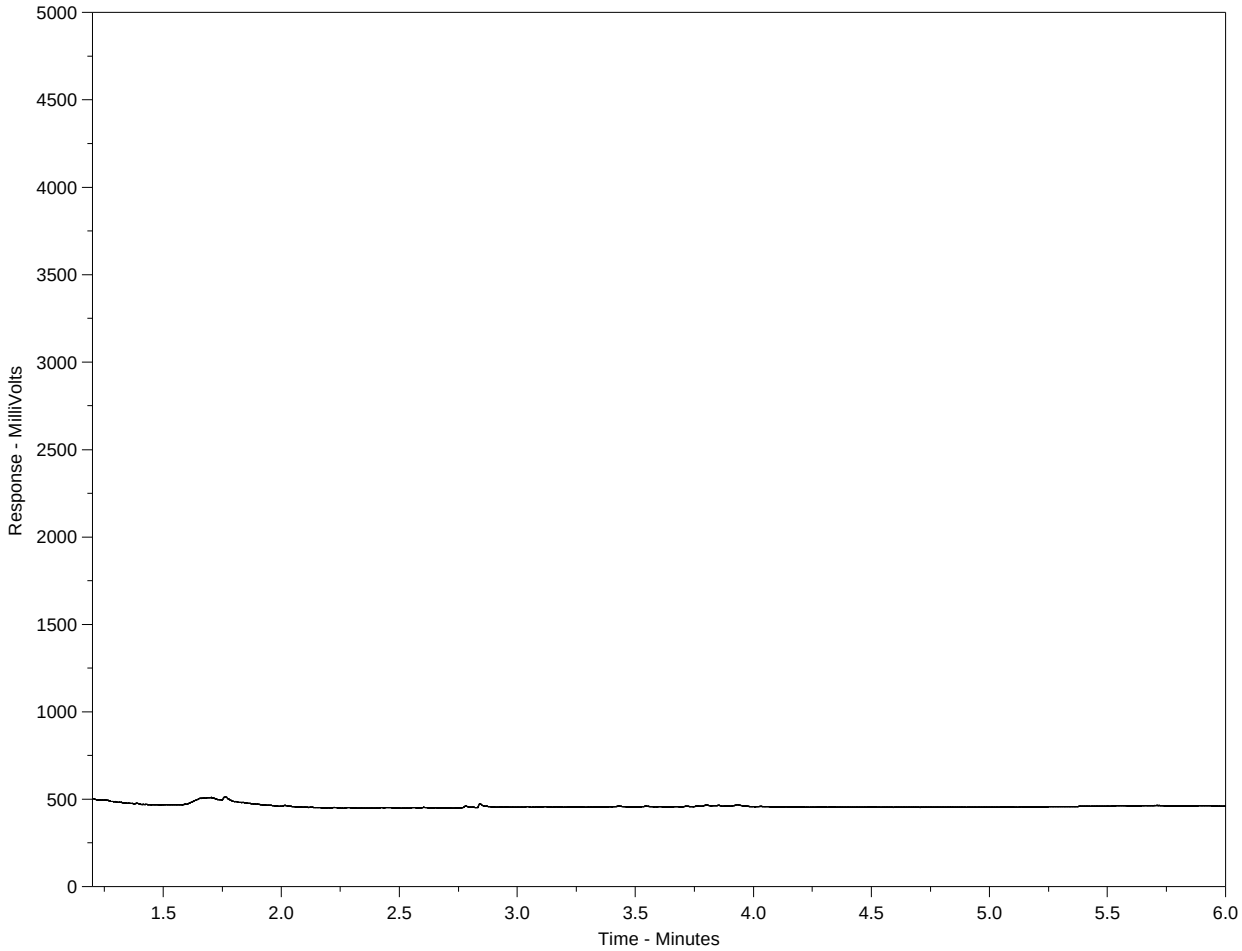
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where 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: L2514848-1
Client ID: 1



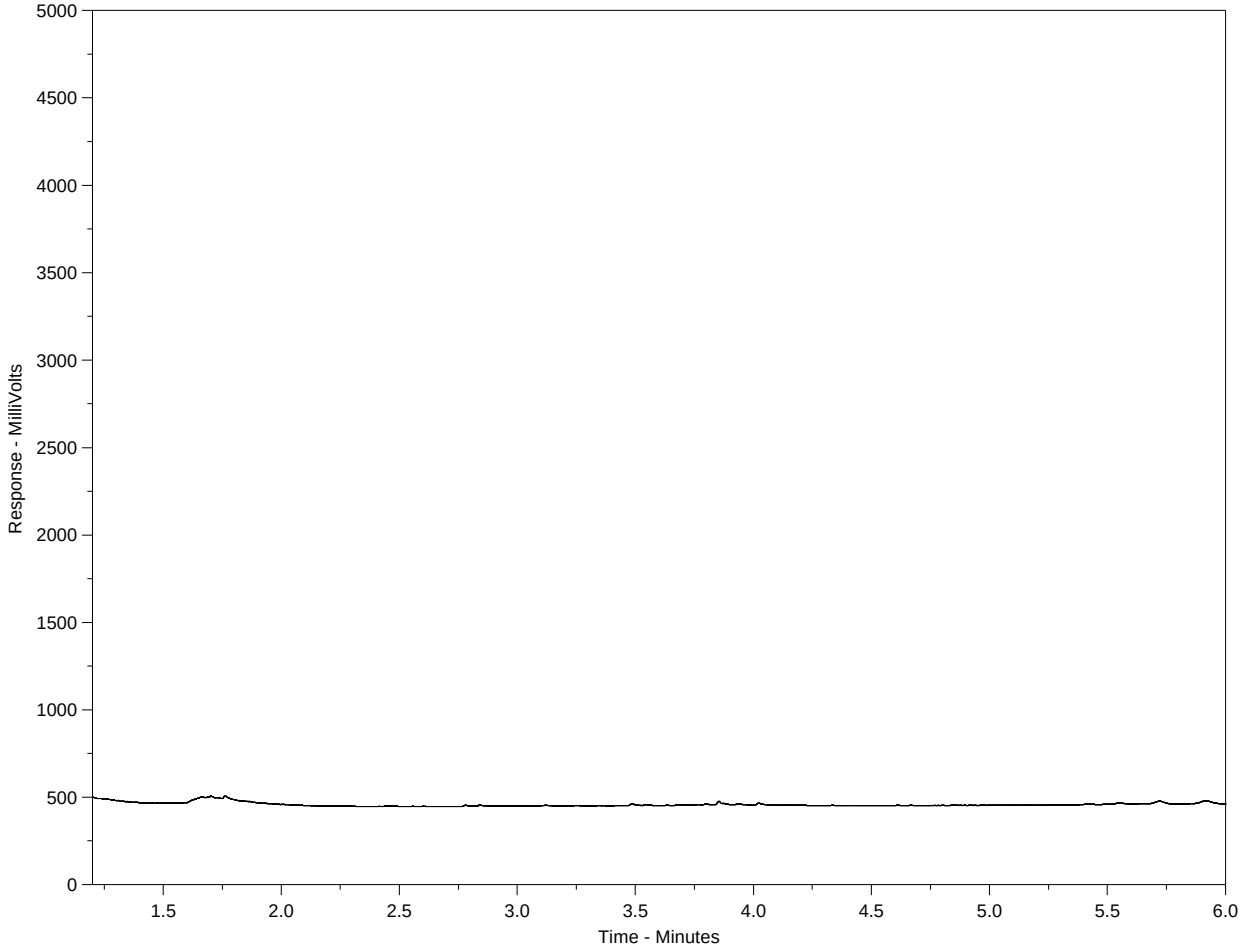
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-2
Client ID: 2



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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:
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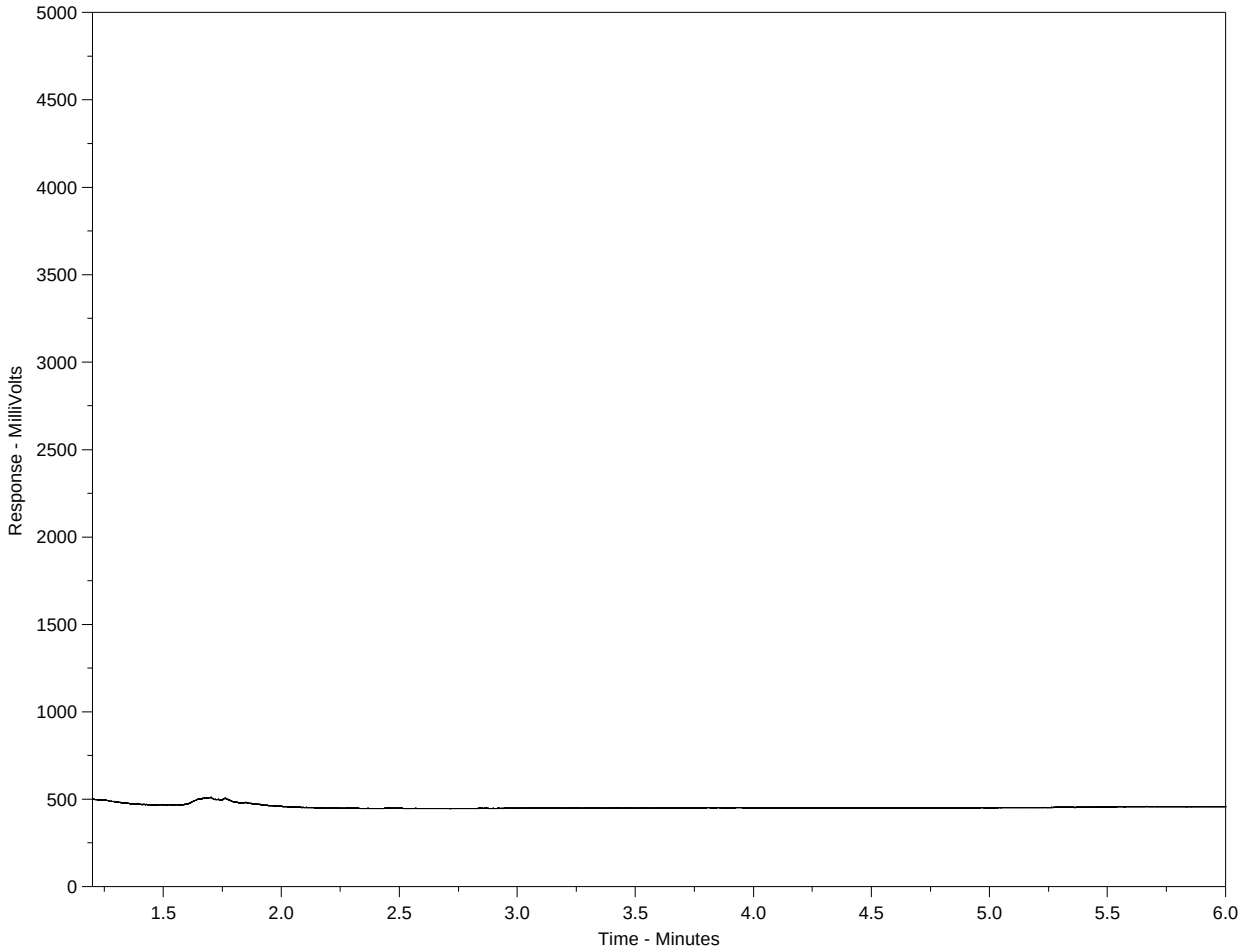
Hydrocarbon Distribution Report

ALS Sample ID: L2514848-3
Client ID: 3



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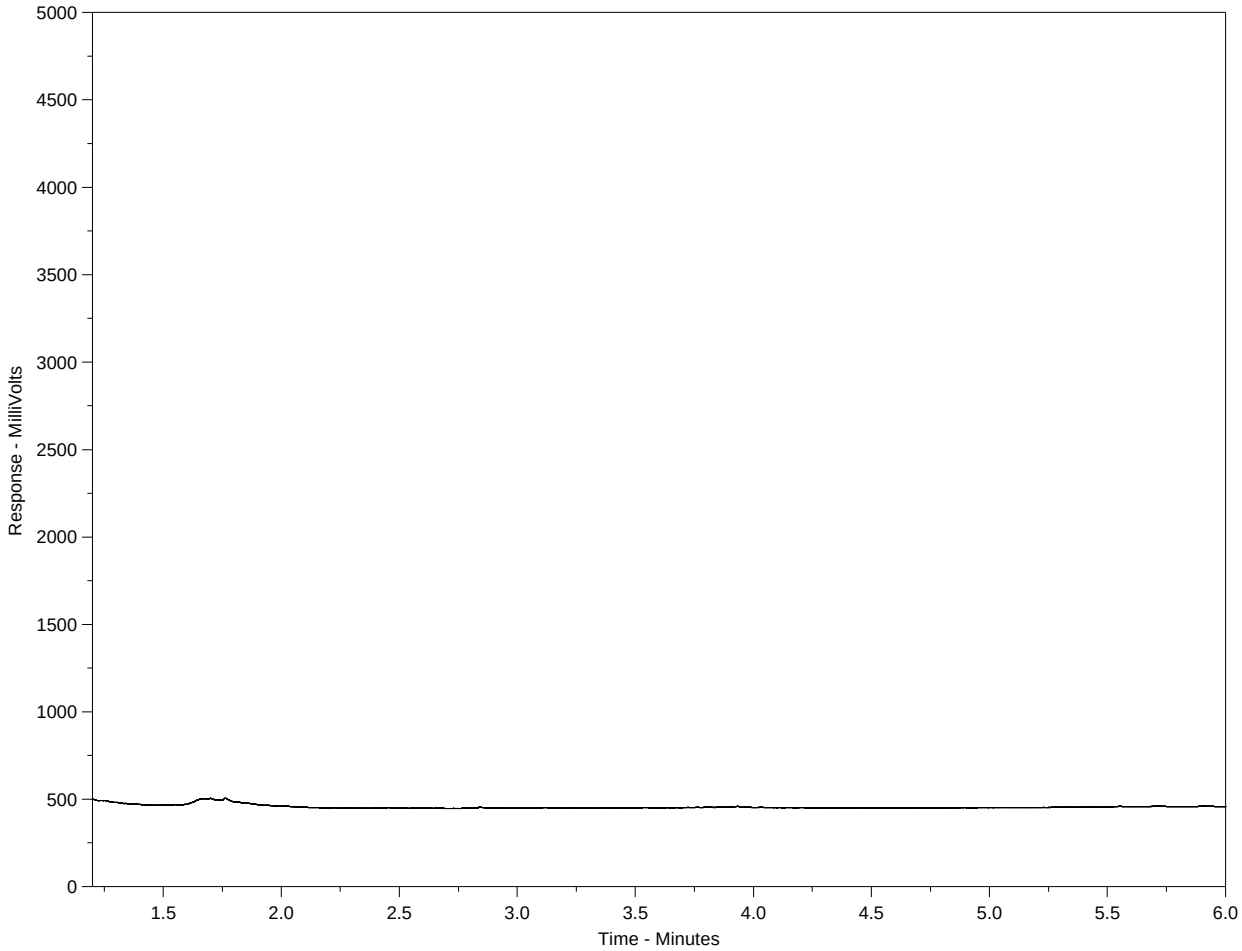
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2514848-4
Client ID: 4



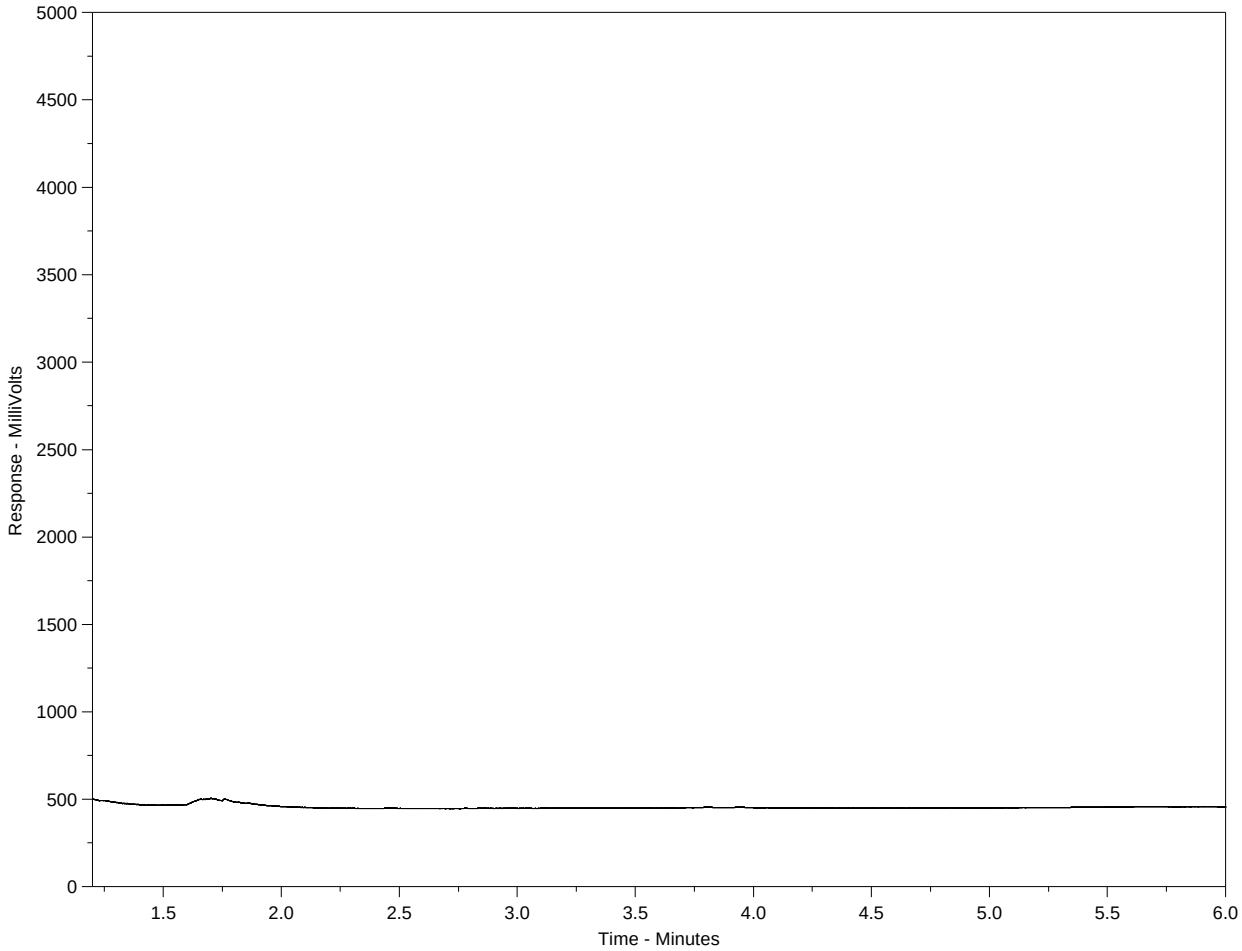
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-5
Client ID: 5



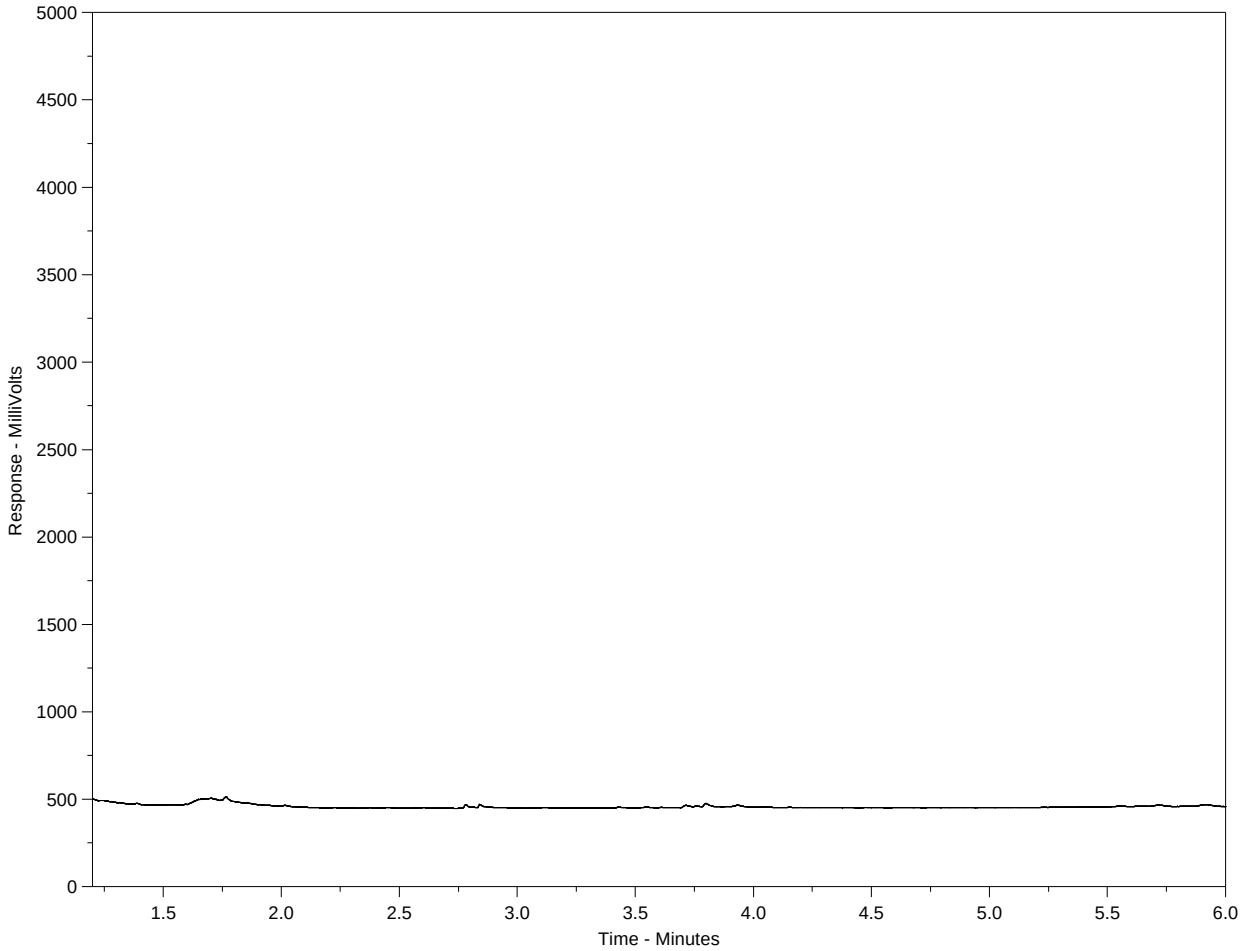
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-6
Client ID: 6



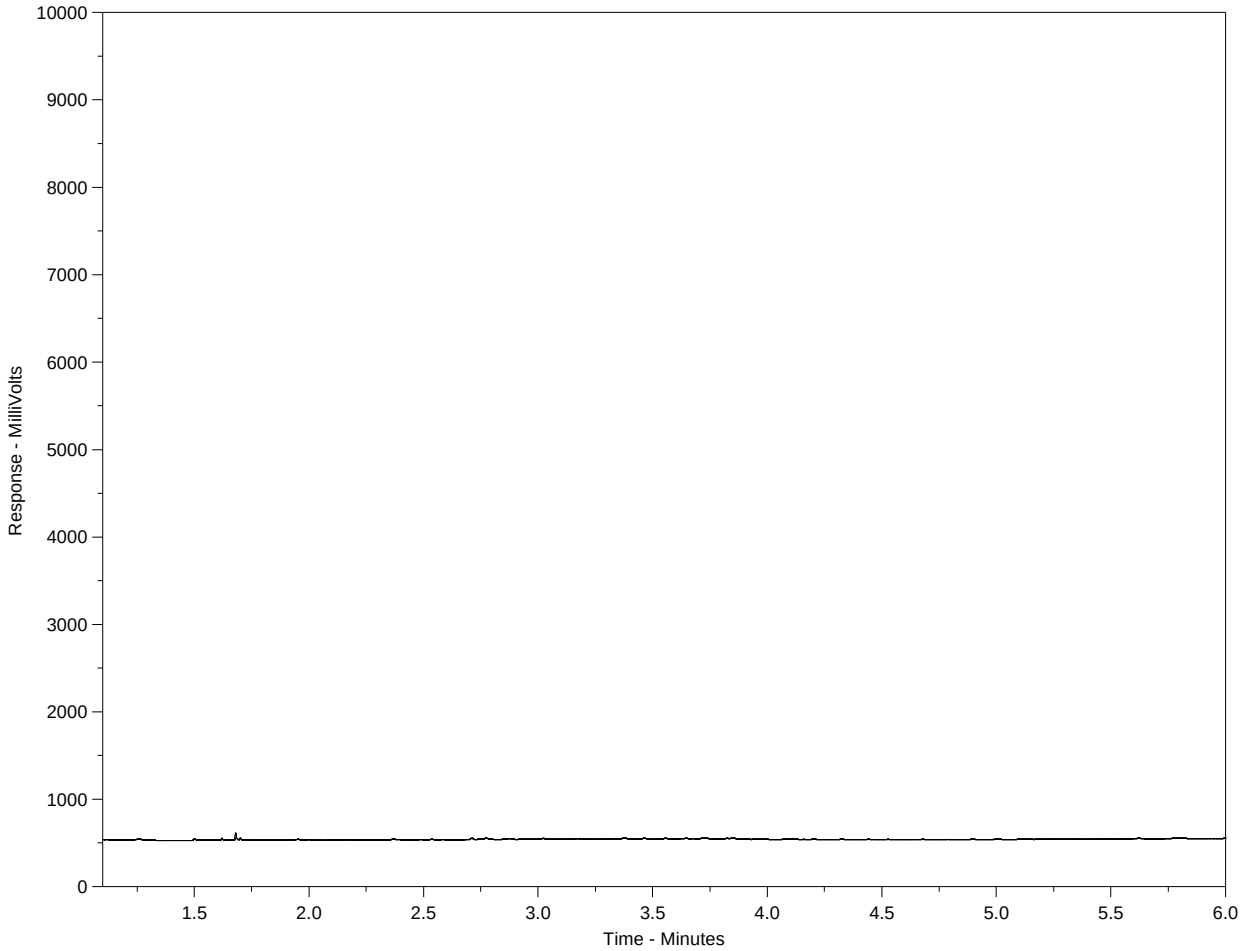
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-7
Client ID: 7



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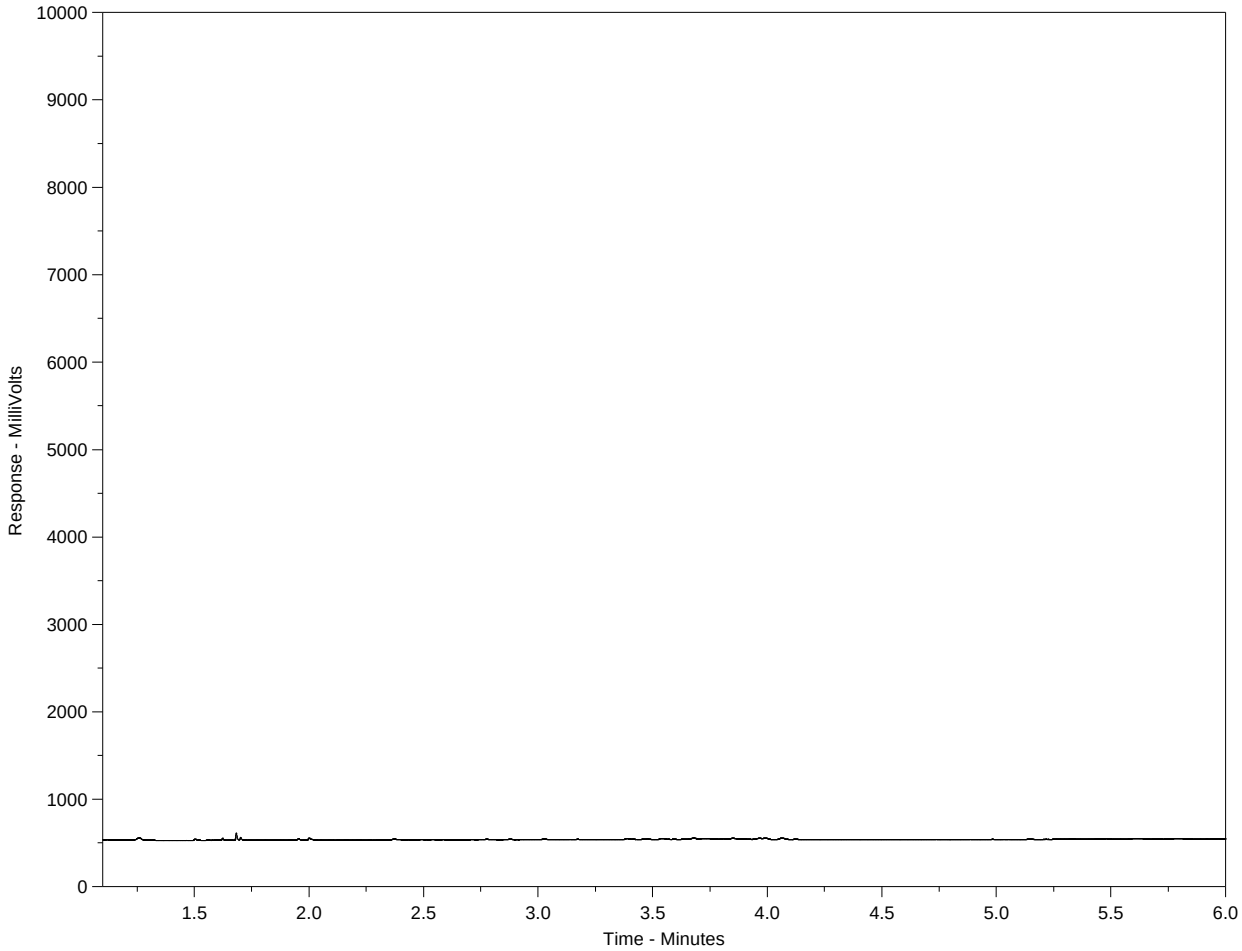
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2514848-8
Client ID: 8



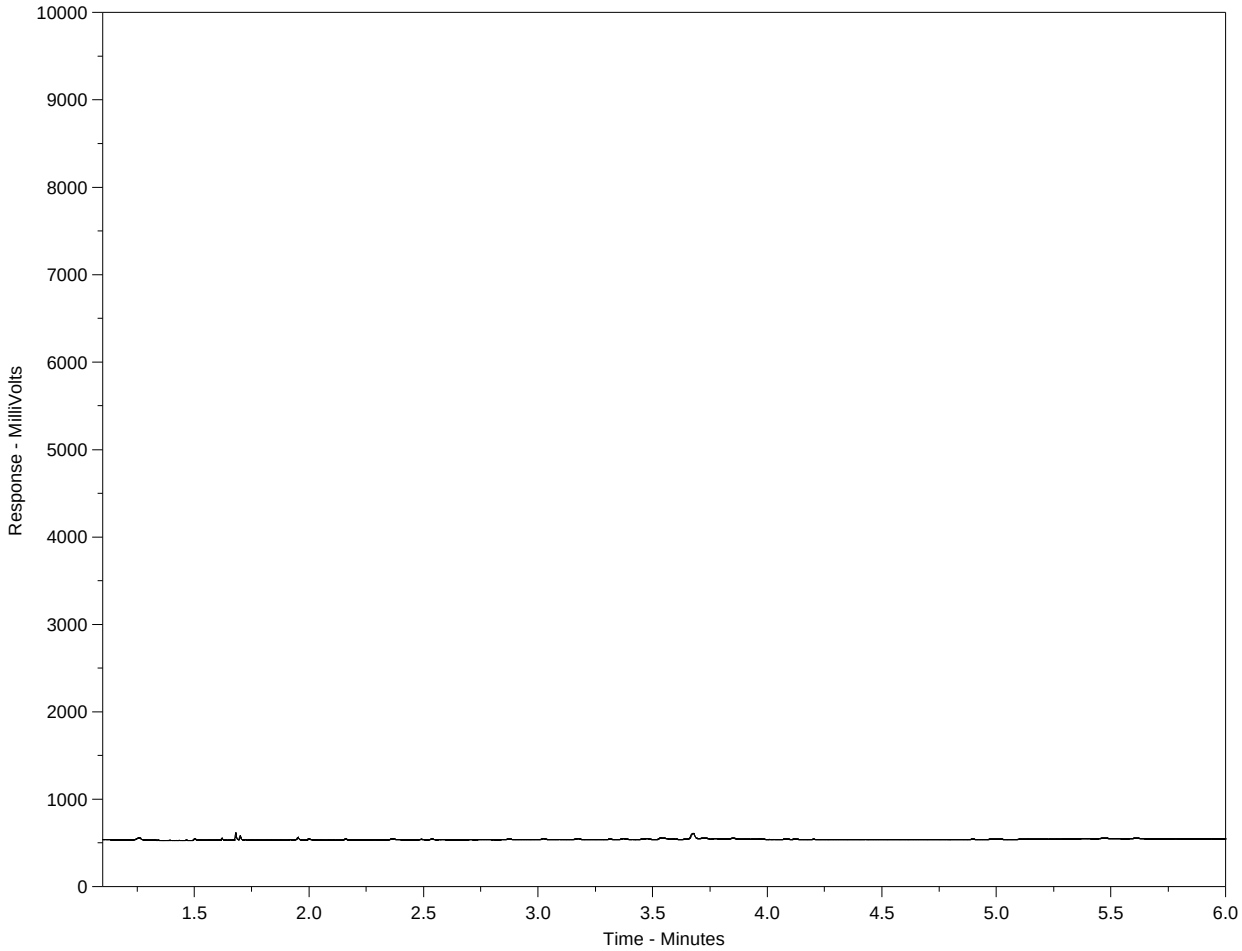
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-9
Client ID: 9



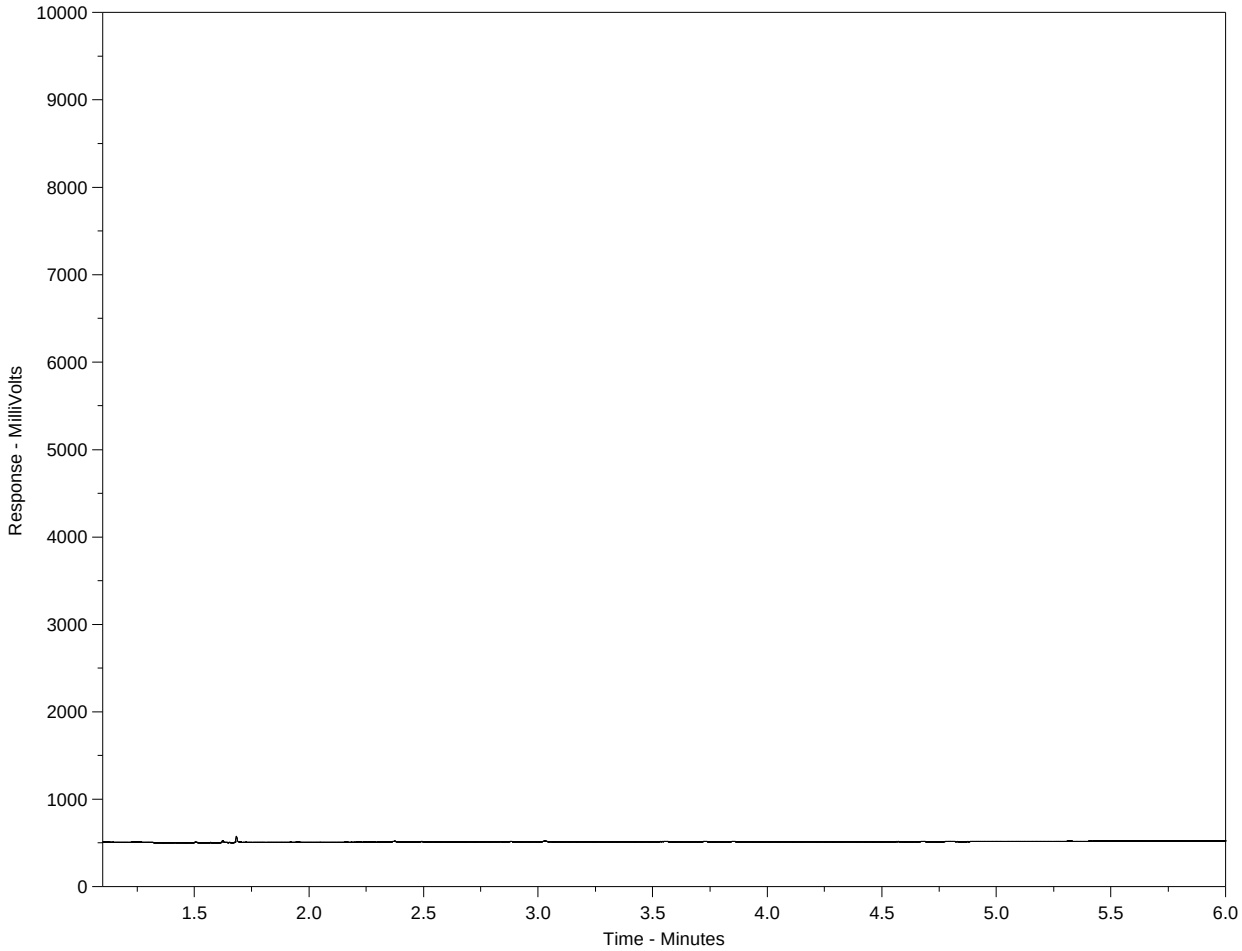
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-10
Client ID: 10



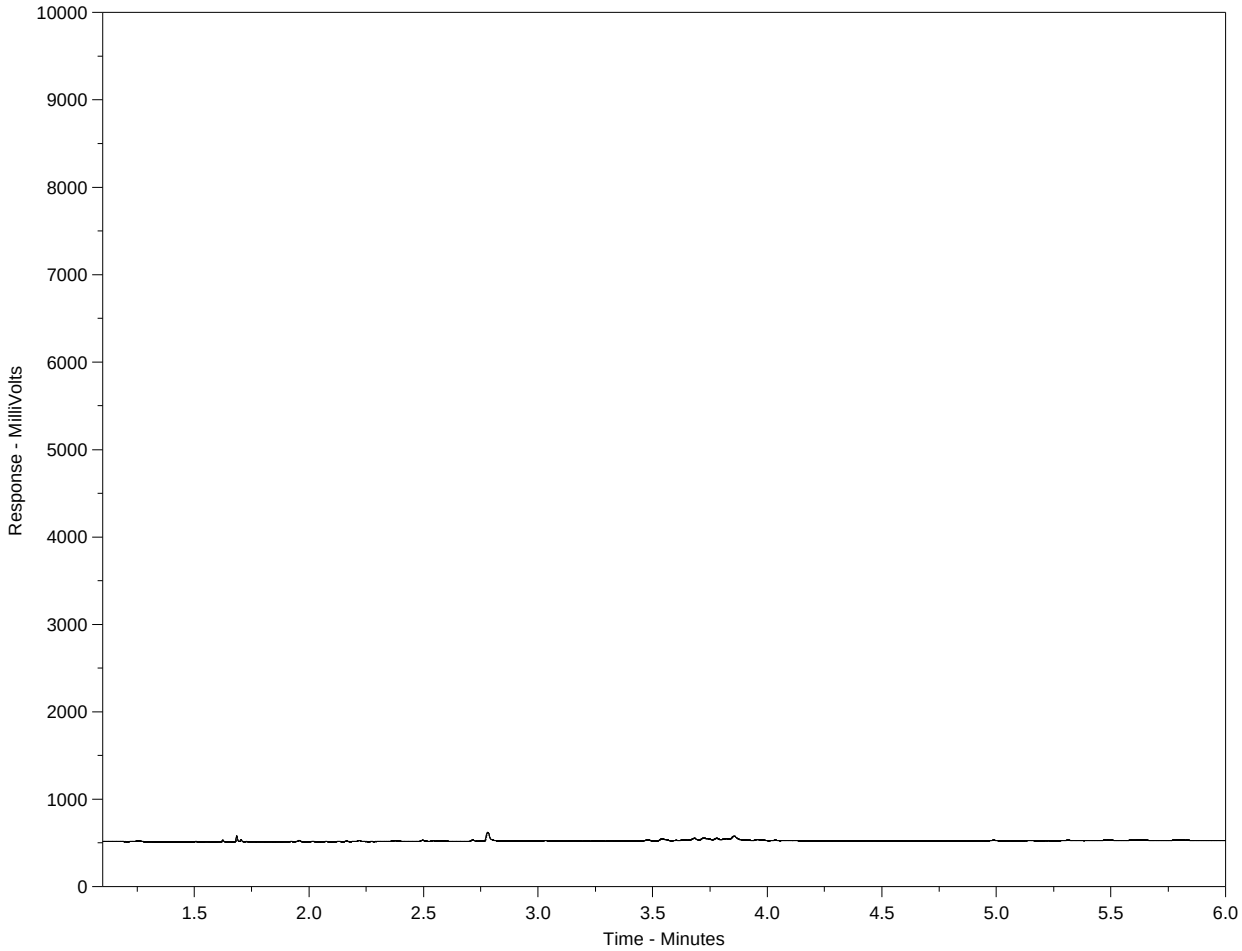
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-11
Client ID: 11



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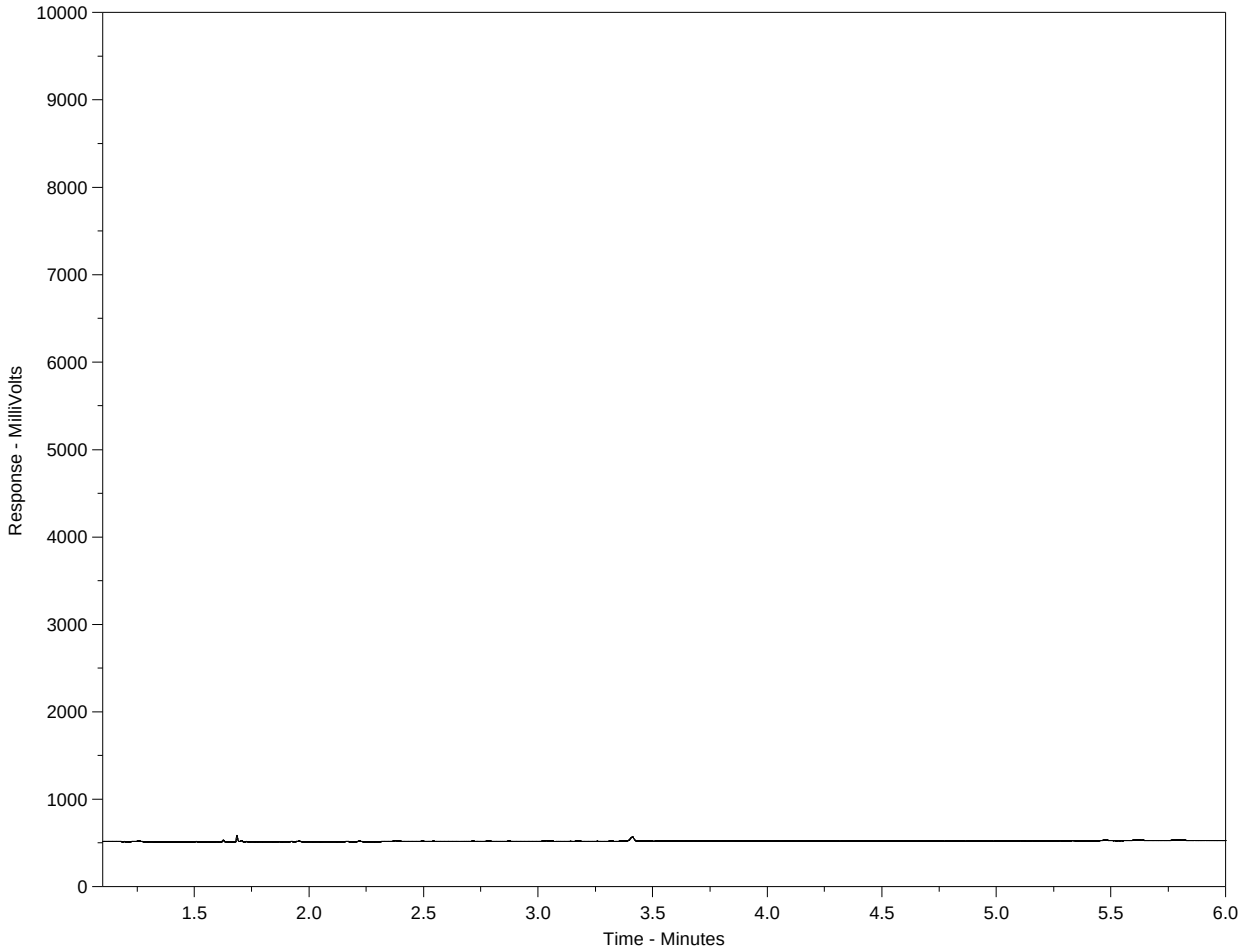
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2514848-12
Client ID: 12



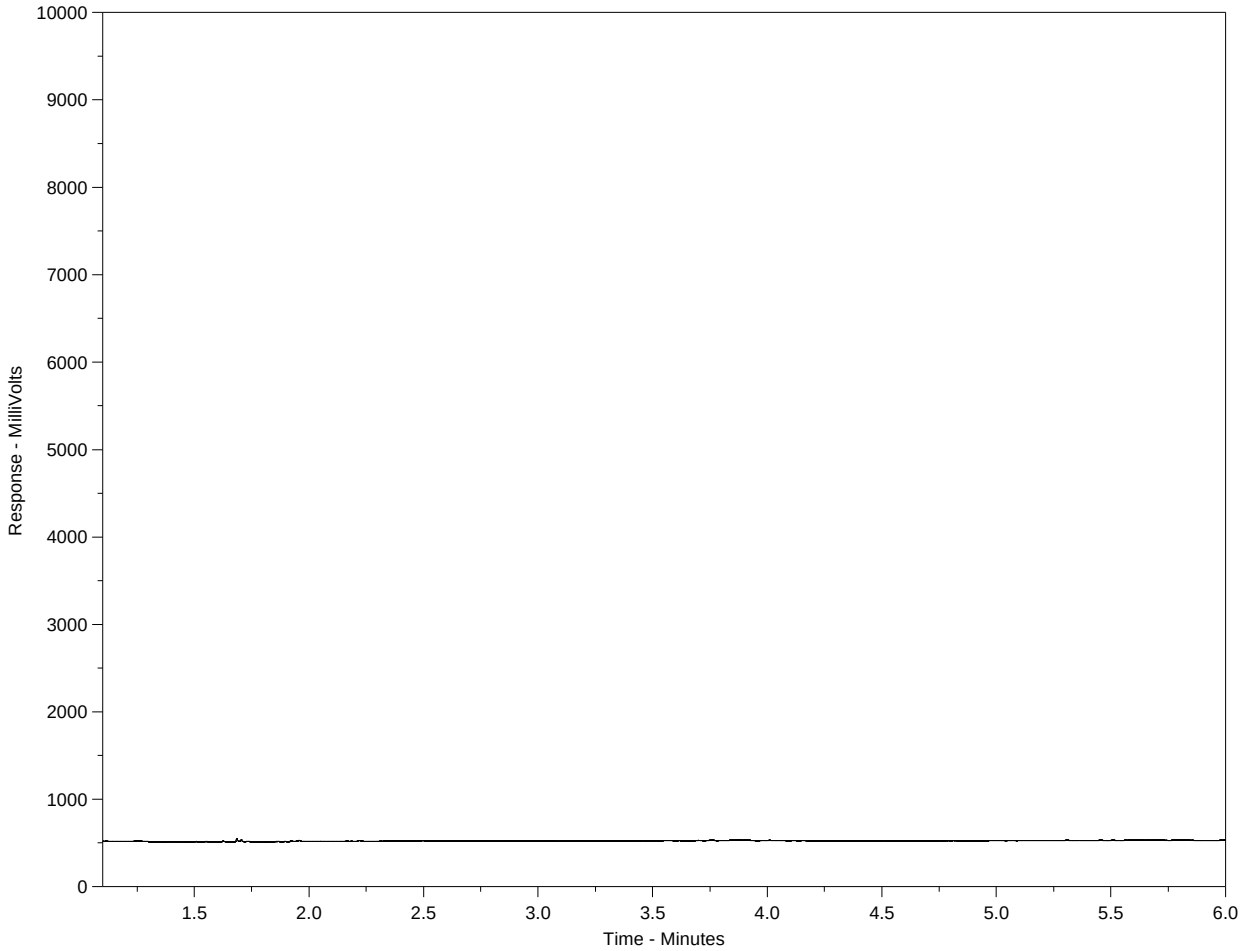
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-13
Client ID: 13



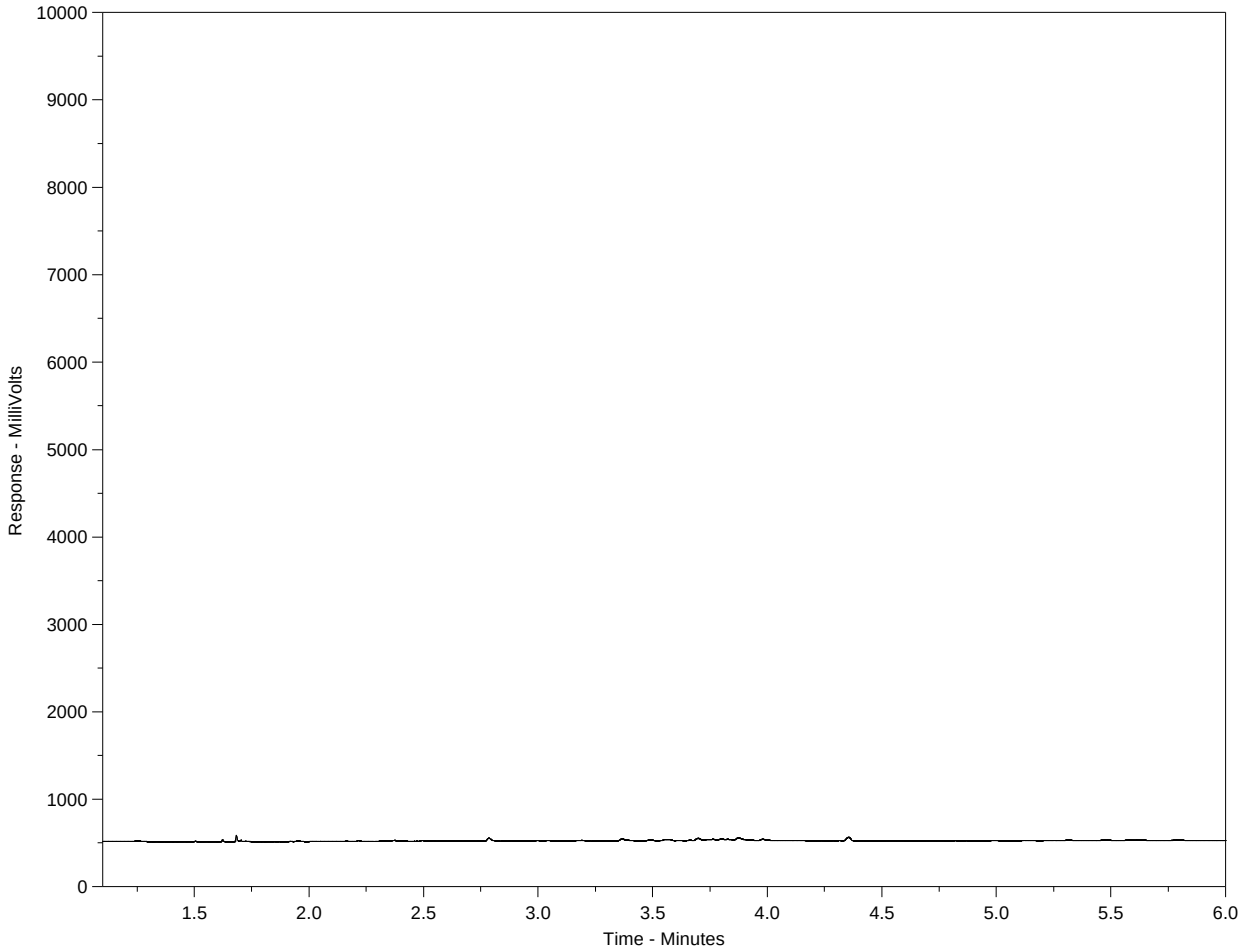
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-14
Client ID: 14



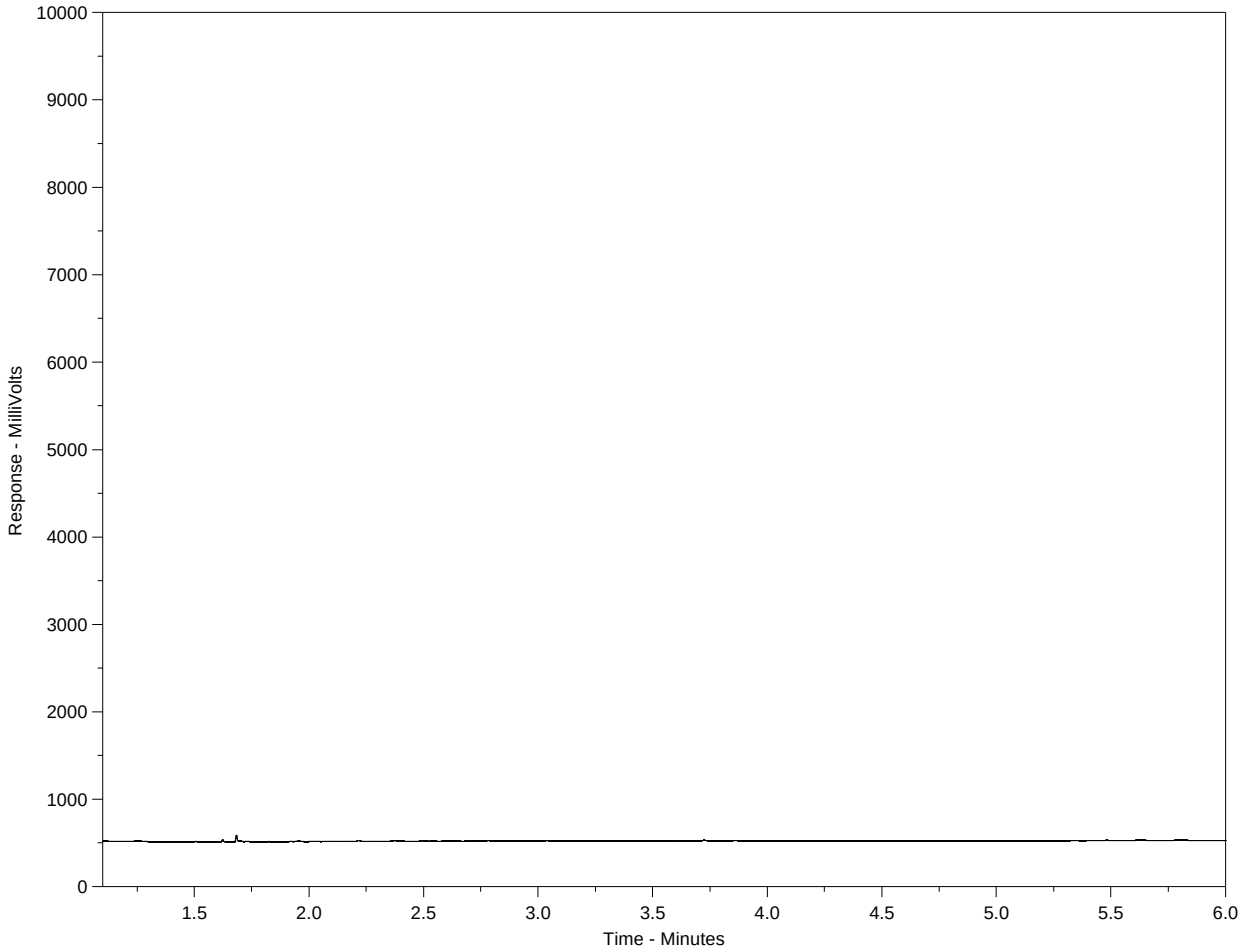
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-15
Client ID: 15



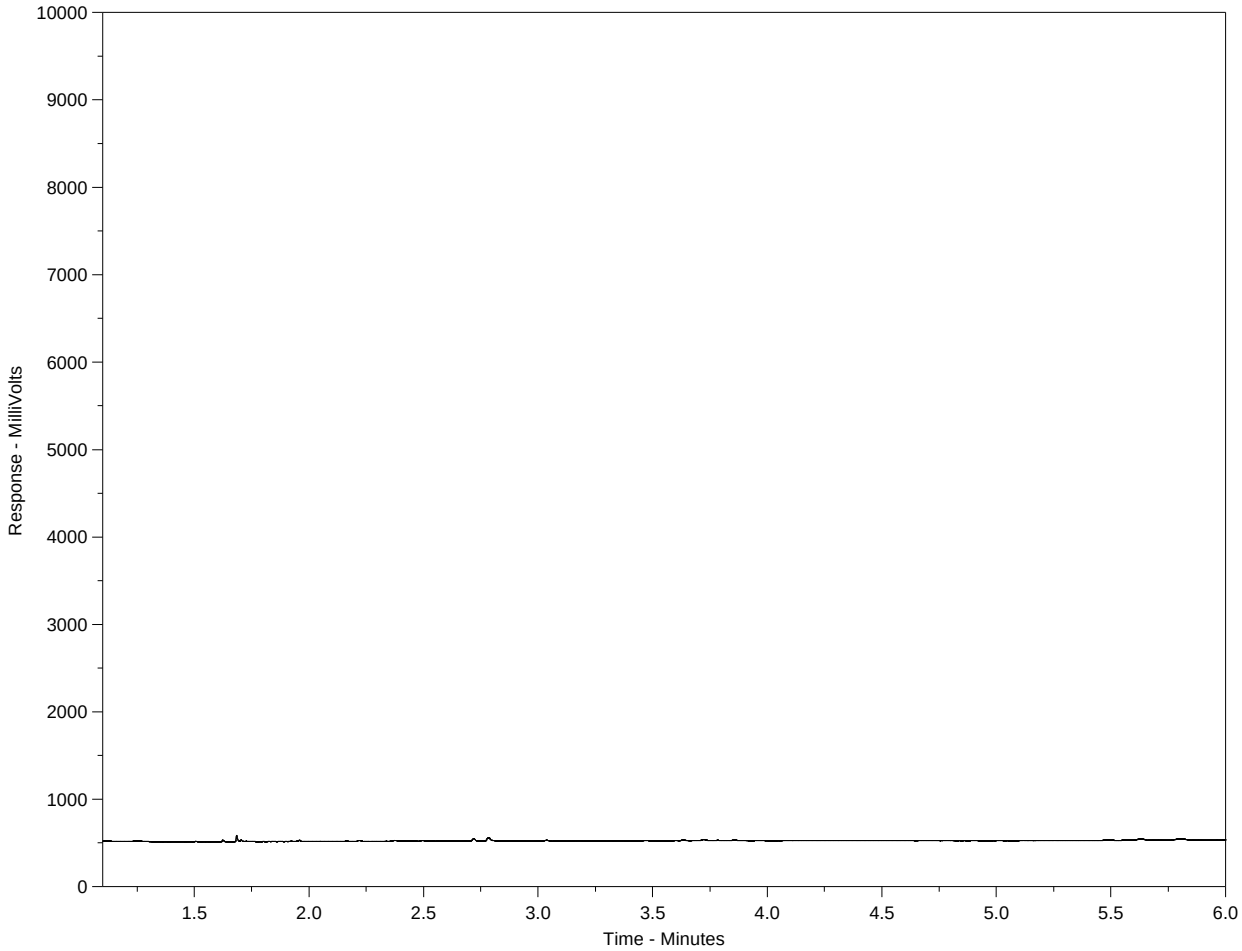
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-16
Client ID: 16



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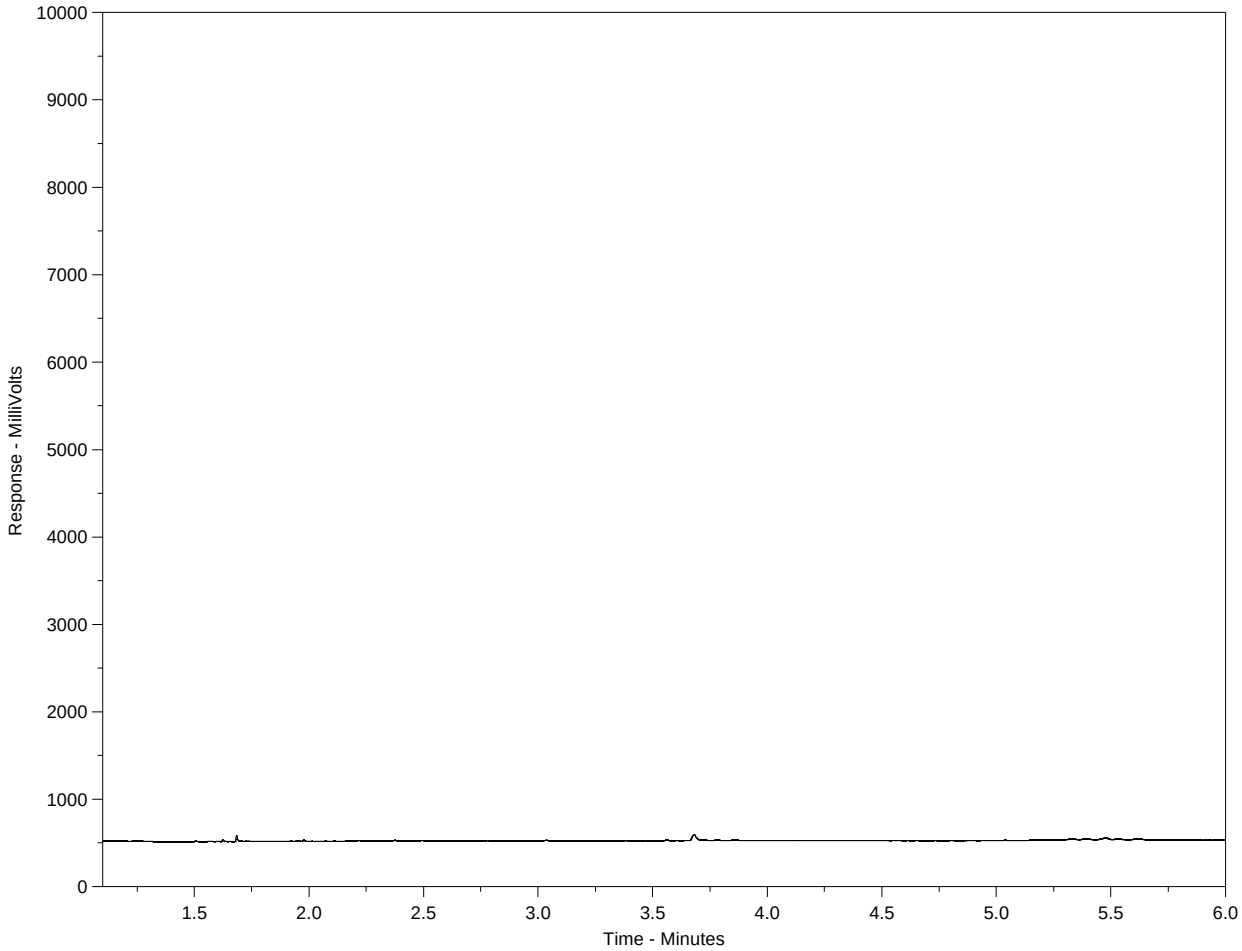
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2514848-17
Client ID: 18



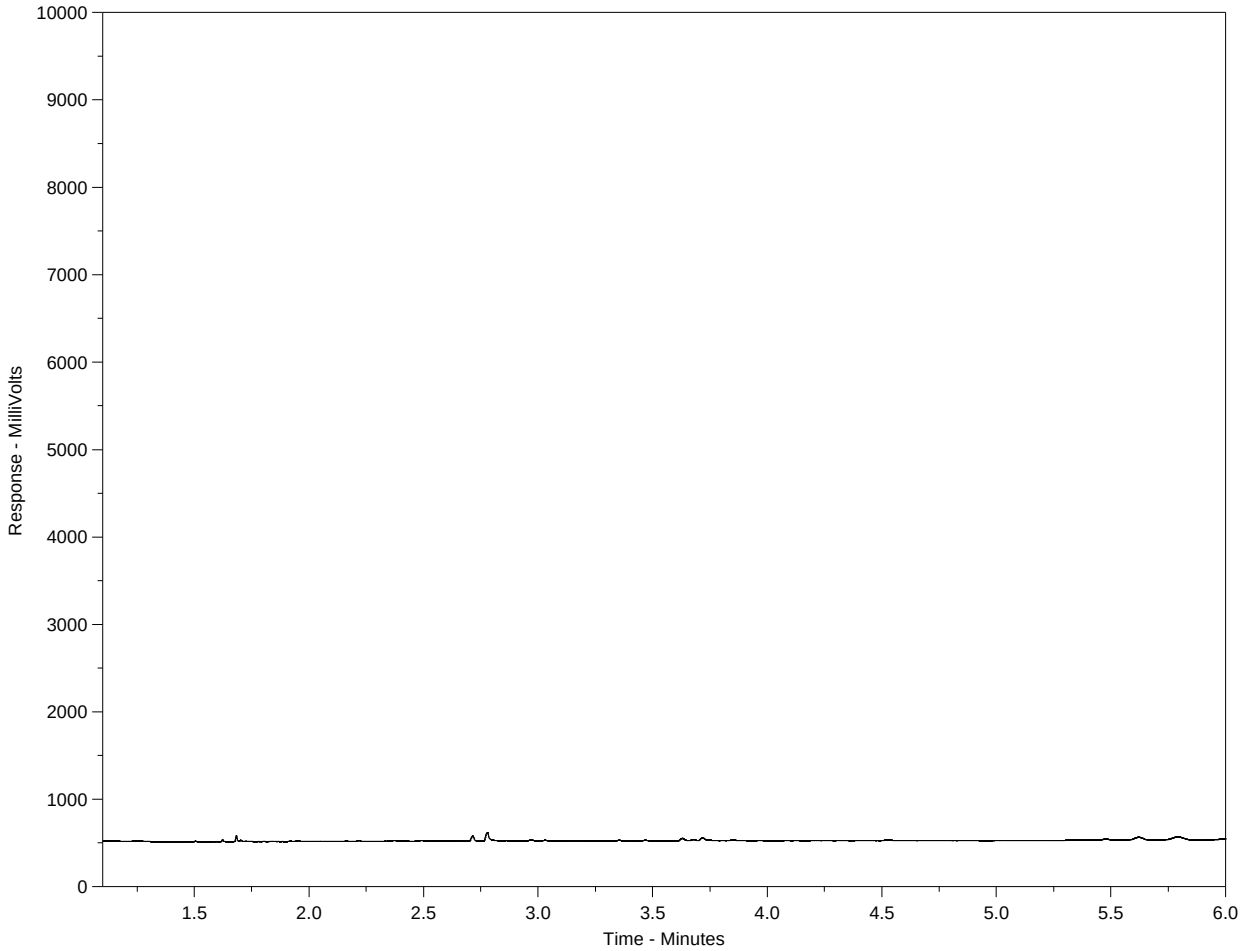
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-18
Client ID: 19



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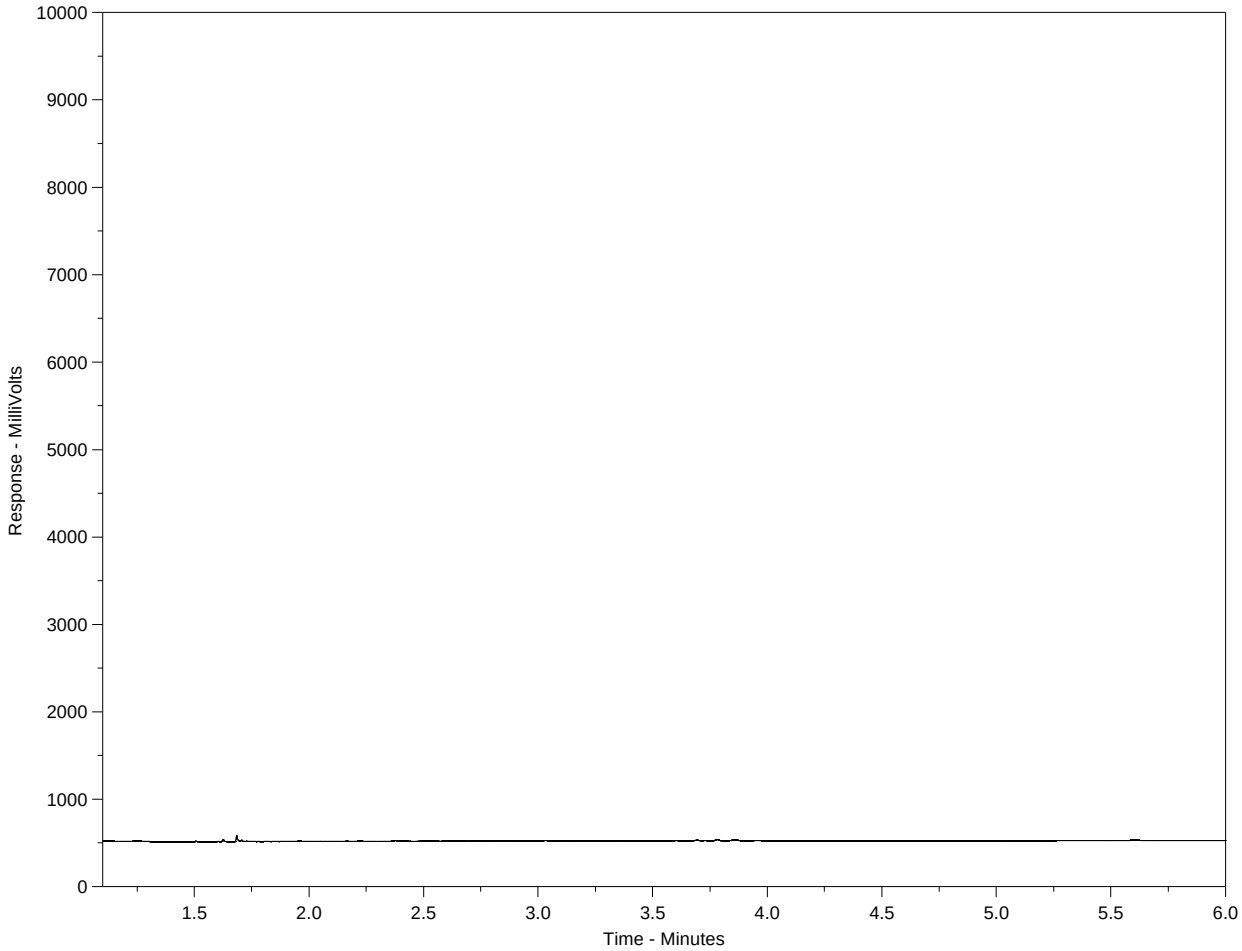
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2514848-19
Client ID: 20



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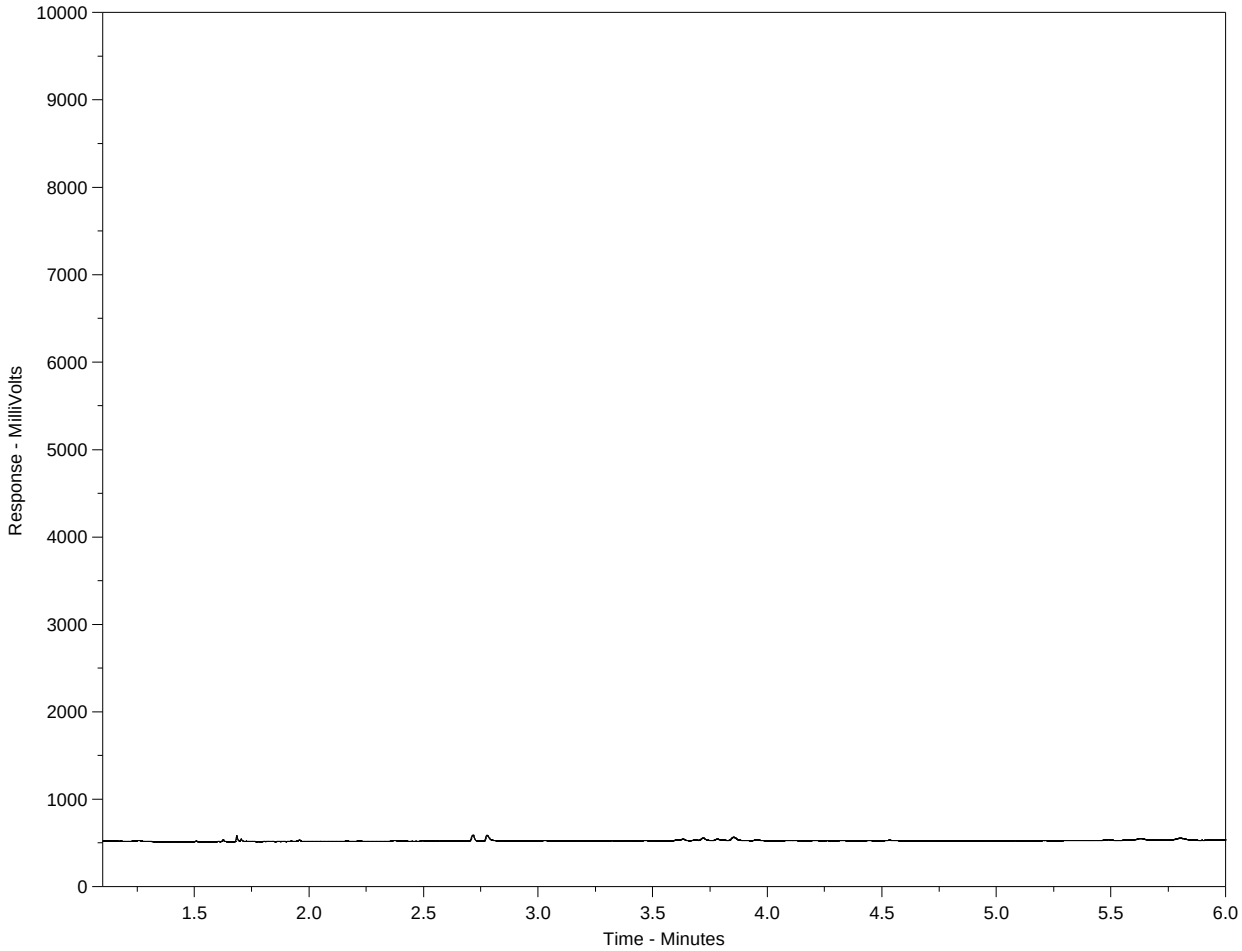
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2514848-20
Client ID: 21



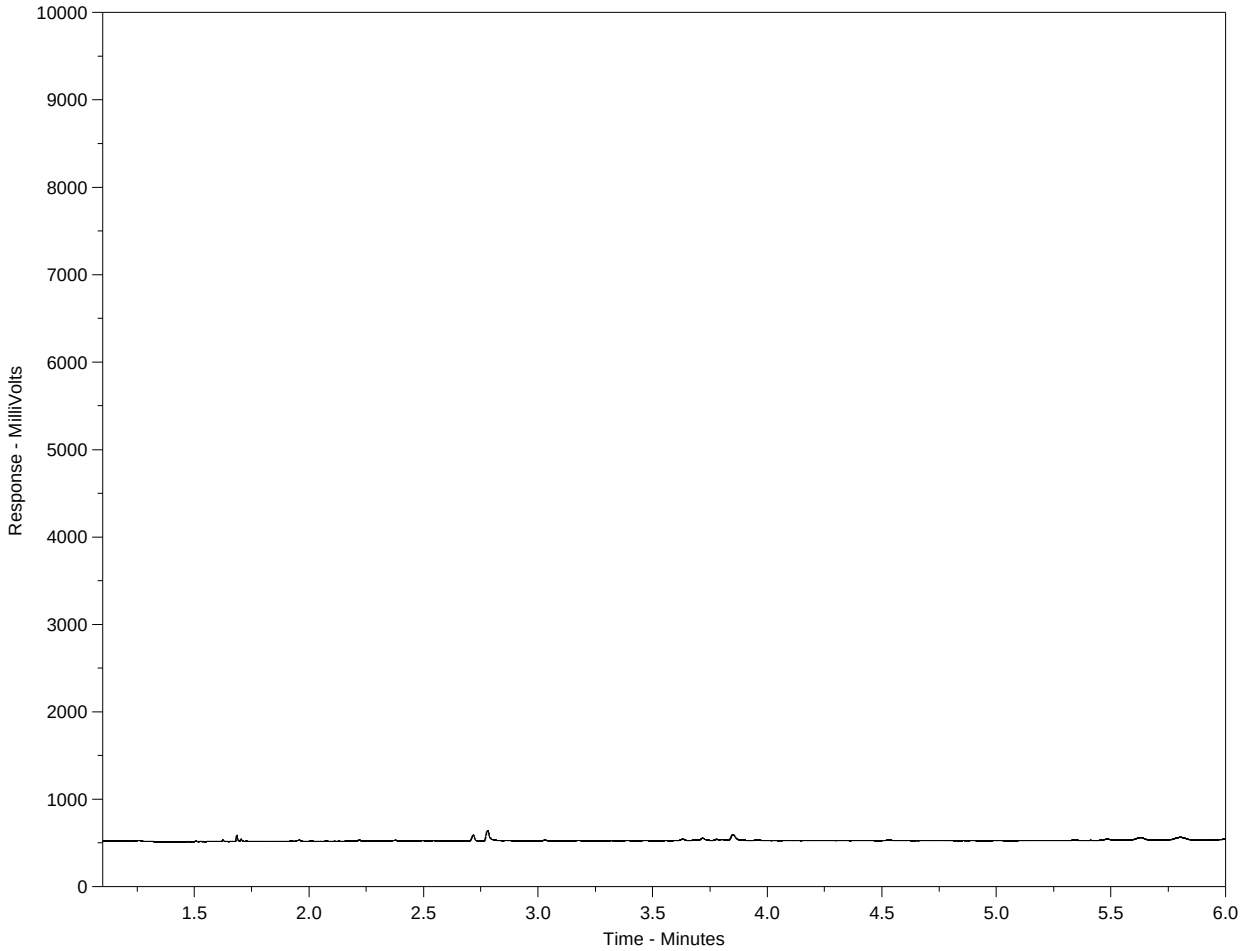
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-21
Client ID: 22



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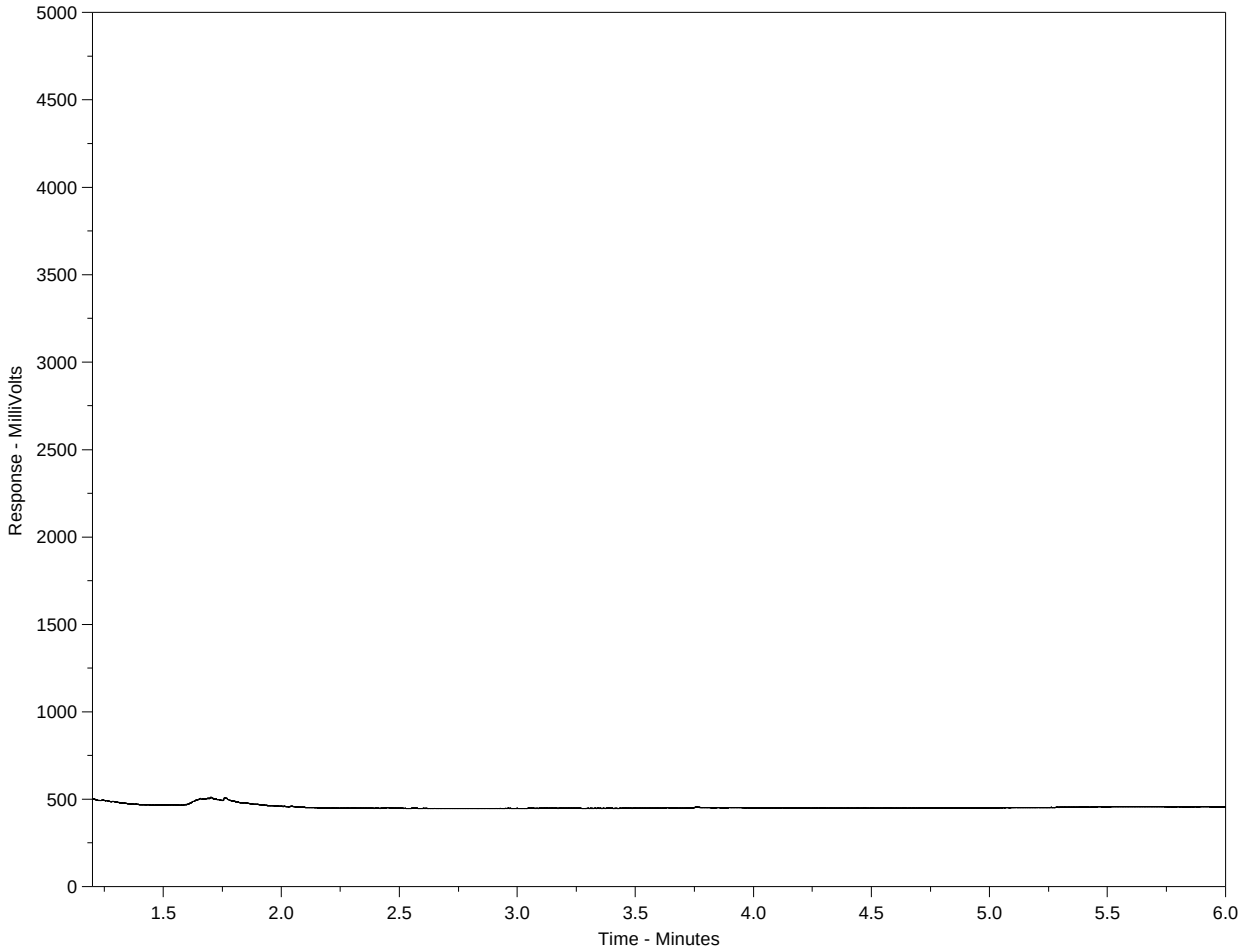
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2514848-22
Client ID: DUPLICATE 1



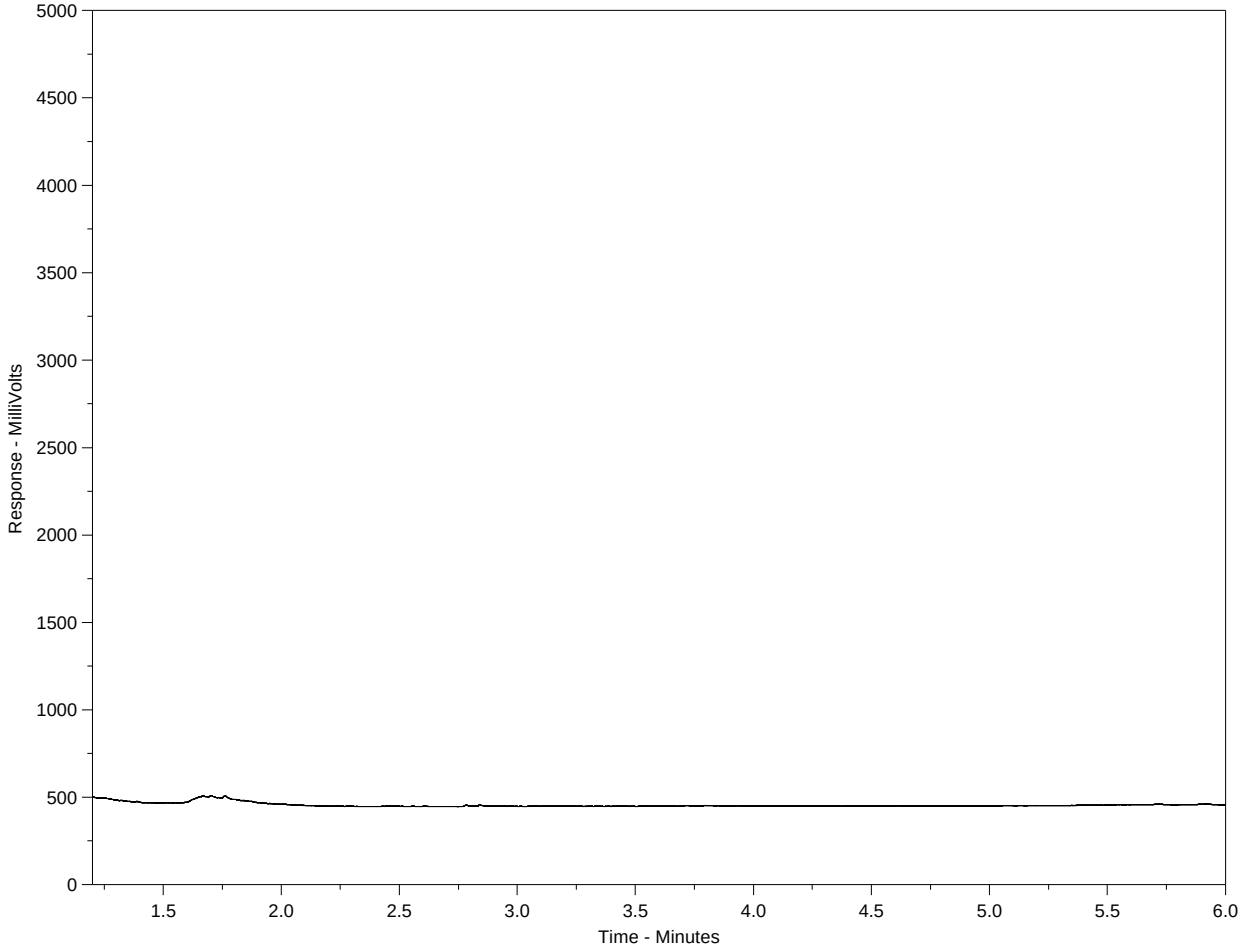
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified 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: L2514848-23
Client ID: DUPLICATE 2



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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.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2514848-COFC

COC Number: 17 -

Page 1 of 2

Report To		Report Format / Distribution	
Company:	Tetra Tech	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Contact:	Michelle Crawford	Quality Control (QC) Report with Report	☐ Yes ☐ No
Address:	14940 123 Ave NW, North Bldg. Edmonton, AB, T5V 1B4	☐ Criteria on Report - provide details below if box checked	
		Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Phone:	587-460-3489	Email 1 or Fax	michele.crawford@tetratech.com
		Email 2	labdata@tetratech.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	Same as Report To	☑ Yes ☐ No
	Copy of Invoice with Report	☑ Yes ☐ No
Company:		
Contact:		

Invoice Distribution	
Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	

Project Information	
ALS Quote #:	
Job #:	SWOP04269
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Lab Work Order # (lab use only): L2514848

ALS Contact:

Sampler: MC

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

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	BTXS,F1-F2-ED	C-DIS-ORG-CL	COD-T-COL-ED	MET_R-DIS-CCME-ED	NH3-COL-ED	P-T-COL-ED	PHENOLS-4AAP-ED	ROU-ED	TKN-F-ED						SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	1	8-10-20	1035	Water	9	R	R	R	R	R	R	R	R	R							
	2		1116	Water		R	R	R	R	R	R	R	R	R							
	3		1107	Water		R	R	R	R	R	R	R	R	R							
	4		1125	Water		R	R	R	R	R	R	R	R	R							
	5		1047	Water		R	R	R	R	R	R	R	R	R							
	6		1154	Water		R	R	R	R	R	R	R	R	R							
	7		1149	Water		R	R	R	R	R	R	R	R	R							
	8		1208	Water		R	R	R	R	R	R	R	R	R							
	9		1306	Water		R	R	R	R	R	R	R	R	R							
	10		1354	Water		R	R	R	R	R	R	R	R	R							
	11		1225	Water		R	R	R	R	R	R	R	R	R							
	12		1022	Water		R	R	R	R	R	R	R	R	R							

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

Are samples taken from a Regulated DW System? ☐ Yes ☐ No

Are samples for human drinking water use? ☐ Yes ☐ No

Special Instructions / Specify Criteria to add on report (client Use)

① All ~~bottles~~ diss. bottles were NOT filtered + they were presered, except diss. metals were NOT filtered + NOT presered.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐ No ☐
Ice packs	☐ Ice cubes ☐	Custody seal intact	Yes ☐ No ☐
Cooling Initiated	☐		

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
9.4	9.2	8.1	9.6				

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: 8-10-20	Time: 1610	Received by:	Date: 09 oct 20	Time: 12:22	Received by:	Date:	Time:

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.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2514848-COFC

COC Number: 17 -

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Tetra Tech	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Michelle Crawford	Quality Control (QC) Report with Report ☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	14940 123 Ave NW, North Bldg. Edmonton, AB, T5V 1B4	☐ Criteria on Report - provide details below if box checked	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
		Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	587-460-3489	Email 1 or Fax michele.crawford@tetratech.com	Specify Date Required for E2,E or P:
		Email 2 labdata@tetratech.com	

Invoice To	Same as Report To ☒ Yes ☐ No	Invoice Distribution	
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	
Company:	City of St. Albert	Email 1 or Fax	
Contact:		Email 2	
Project Information		**Oil and Gas Required Fields (client use)**	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	SWOP04269	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	L2514848	ALS Contact:	Sampler: MC

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

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	BTXS,F1-F2-ED	C-DIS-ORG-CL	COD-T-COL-ED	MET_R-DIS-CCME-ED	NH3-COL-ED	P-T-COL-ED	PHENOLS-4AAP-ED	ROU-ED	TKN-F-ED	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	13	8-10-20	1411	Water	4	R	R	R	R	R	R	R	R	R		
	14		1234	Water		R	R	R	R	R	R	R	R	R		
	15		1340	Water		R	R	R	R	R	R	R	R	R		
	16		939	Water		R	R	R	R	R	R	R	R	R		
	18		924	Water		R	R	R	R	R	R	R	R	R		
	19		1434	Water		R	R	R	R	R	R	R	R	R		
	20		1423	Water		R	R	R	R	R	R	R	R	R		
	21		1318	Water		R	R	R	R	R	R	R	R	R		
	22		1325	Water		R	R	R	R	R	R	R	R	R		
	Duplicate 1		—	Water		R	R	R	R	R	R	R	R	R		
	Duplicate 2		—	Water		R	R	R	R	R	R	R	R	R		

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

Are samples taken from a Regulated DW System? ☐ Yes ☐ No

Are samples for human drinking water use? ☐ Yes ☐ No

Special Instructions / Specify Criteria to add on report (client Use)

(2) Duplicate 1 + 18: all diss. bottles were NOT filtered + they were preserved. All other samples follow instruction (1)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | Ice packs ☐ | Ice cubes ☐ | Cooling Initiated ☐

SIF Observations Yes ☐ No ☐

Custody seal intact Yes ☐ No ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: 8-10-20	Time: 1610	Received by:	Date: 09 oct 20	Time: 12:22	Received by:	Date:	Time:

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**
Chem. O_2 Demand	mg/L	70	40	50	70	50	40	60	50	40	55	61	50	69	65.5	59.4	75	92	78	71	219	68	77	98	84
Ammonia-N	mg/L	<0.05	<0.05	<0.05	0.06	0.58	0.16	<0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	0.79	0.108	1.21	<0.050	0.565	<0.050
Total Kjeldahl Nitrogen	mg/L	<0.2	0.6	1.6	1.8	1.5	2.4	1.8	1.7	1.8	1.8	1.8	1.7	2.5	1.84	2.1	2.89	2.55	2.76	2.76	7.02	3.09	2.58	4.70	2.51
Total Organic Carbon	mg/L	16	15	19	17	17	16	22	17	21	21	21	19	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												18	22.5	22.2	29.4	26.8	29.0	22.7	59.9	21.4	77	29.9	22.9
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0019	0.0075
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	0.01	<0.010	<0.010	<0.010	0.013	<0.01	0.0035	0.0016	0.0031	0.0056	0.0021
Antimony	mg/L	0.0007	0.0005	0.0009	0.0005	0.0007	0.0006	0.0009	0.0012	0.0024	0.0007	0.0009	0.0019	0.0005	<0.00040	<0.00040	<0.00040	<0.00080	0.00043	<0.0004	0.00077	0.0002	0.00024	0.00029	0.00020
Arsenic	mg/L	Not required under previous permit														-	-	-	-	-	-	-	-	0.00703	0.00484
Barium	mg/L	0.033	0.025	0.03	0.032	0.051	0.049	0.025	0.039	0.018	0.033	0.079	0.075	0.073	0.0655	0.0731	0.0674	0.0518	0.0600	0.0673	0.0421	0.0883	0.0594	0.0714	0.0614
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	0.054	<0.050	<0.050	<0.050	<0.05	<0.020	0.064	0.045	0.049	0.047
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00092	0.00023	0.00034	0.00045	0.00035
Copper	mg/L	0.022	0.007	0.011	0.012	0.014	0.025	0.016	0.016	0.005	<0.001	0.001	<0.001	<0.001	<0.0010	0.0046	<0.0010	<0.0010	<0.0010	<0.001	<0.00040	0.00045	0.00054	0.00049	0.00053
Iron	mg/L	0.120	0.328	0.445	0.572	0.403	0.126	0.181	0.577	0.081	0.077	0.212	0.175	0.022	0.02	0.018	0.029	<0.010	0.025	0.07	0.021	0.021	0.033	0.028	0.121
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	0.00011	<0.00010	<0.000050	0.000077	<0.000050	0.000072
Lithium	mg/L	Not required under previous permit														-	-	-	-	-	-	-	-	0.0446	0.0327
Manganese	mg/L													0.003	0.005	<0.0020	<0.0020	<0.0020	0.0025	0.0024	0.154	0.00071	0.00744	0.00864	0.00250
Mercury	mg/L	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000095	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00244	0.00125	0.00111	0.000989	0.000853
Nickel	mg/L	<0.002	<0.002	0.003	0.005	0.005	0.003	0.004	0.006	<0.002	<0.002	0.004	0.003	0.003	0.0035	0.0038	0.0047	0.0036	0.0035	0.0041	0.0060	0.0043	0.0034	0.00279	0.00353
Selenium	mg/L													<0.0004	<0.00080	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00045	0.000114	0.000115	0.000143	0.000115
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													0.0002	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000010	<0.000010	0.000016	<0.000010
Tin	mg/L	Not required under previous permit												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	<0.001	<0.00060	<0.00030	0.00032	0.00049	0.00059
Uranium	mg/L															-	-	-	-	-	-	-	-	0.000784	0.000578
Vanadium	mg/L													0.001	<0.0010	<0.0010	<0.0010	0.0017	0.0026	0.0015	0.0053	0.00087	0.00112	0.00135	0.00076
Zinc	mg/L	0.293	0.256	0.106	0.055	0.117	0.099	0.011	0.026	0.054	0.002	0.005	0.011	0.008	<0.0020	<0.0020	<0.0020	0.0035	<0.0020	0.0119	0.0021	<0.0010	0.0021	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	100	108	101	101	102	102	98.5	104	102	104	101	99.2	98.8	95	109	88	91.9	104	110	96.7	107	95.5	107	103
Bicarbonate	mg/L	299	283	324	302	330	345	210	164	215	299	311	342	340	291	334	425	383	333	342	552	357	396	345	328
Chloride	mg/L	15.8	16.1	18.1	20.0	31.0	54.0	62	43	55	52	72	65	73	76	83.2	85.6	96.9	97.1	78.4	80.3	61.7	59.7	54.6	46.3
Carbonate	mg/L	<5	<5	<5	<5	<5	<5	76	37	45	<5	<5	<5	12	29.3	15	11.7	28.7	36.1	11.2	24.6	<5.0	10.7	7.6	<5.0
Conductivity (EC)	uS/cm	1080	986	903	956	1070	1260	1500	998	1150	898	951	944	987	1010	1100	1130	1180	1100	989	1560	885	893	845	714
Calcium	mg/L	25.5	20.5	18.1	15.5	26.2	28.6	13.2	14.2	14.6	23	31.2	30.1	21.7	14.8	33.3	28	13.1	14.7	19.6	33.6	29	14.8	14.7	21.5
Potassium	mg/L	7.6	7.2	7.8	7.8	11	10.5	12.3	9.6	9.3	9.7	12.3	10.6	10.9	12.2	11.7	9.26	11.8	12.9	12.2	17.9	13.9	12.3	15.1	12.5
Magnesium	mg/L	14.0	10.8	11.3	10.4	14.3	17.1	18	11.7	12.7	11.4	12.9	12.3	14	12.2	16.9	13	13.4	15.0	13.6	20.8	13.9	12.5	11.7	10.8
Sodium	mg/L	211	198	194	175	204	250	333	194	219	178	163	153	171	182	202	178	210	217	186	254	154	167	156	128
Sulfate	mg/L	307	231	216	185	223	332	382	233	228	159	136	100	98.3	125	135	101	106	90.2	67.7	157	70.6	59.6	43.0	43.4
Phosphorus	mg/L	Not required under previous permit													0.057	0.087	0.324	0.16	0.166	0.245	1.09	0.155	0.128	0.276	0.211
pH in H_20	pH	8.4	8.4	8.0	8.3	8.0	8.1	9.5	9.4	9.3	8.3	8.1	8.4	8.6	8.84	8.6	8.48	8.93	8.96	8.6	8.63	8.37	8.53	8.49	8.36
TDS (Calculated)	mg/L	729	625	625	563	659	870	966	624	690	580	581	542	568	594	661	636	668	647	557	860	524	531	472	428
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.040	0.312	<0.020	<0.020	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.020	0.026	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	<0.022
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	84.9	98.2
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	295	276
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.146	0.284
Field Data																									
pH in H_20	pH	Not required under previous permit												8.41	8.19	9.03	8.56	9.36	9.5	8.35	9.21	8.7	9.1	11.1	8.4
Conductivity (EC)	uS/cm													1044	650	717	1241	1157	1127	804	1580	893	980	858	80

Table D.2: Chemical Analytical Results

Sample ID:		Ewert D.1																							
Site Number:		2																							
Date Sampled:	**Units**	**16-Oct-1996**	**7-Oct-1997**	**9-Oct-1998**	**20-Oct-1999**	**11-Oct-2000**	**4-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**13-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	40	50	100	90	50	90	90	80	40	85	55	68	70	103	67	81	81	80	79	131	83	122	53	79
Ammonia-N	mg/L	1.65	0.36	0.8	<0.05	<0.05	0.28	<0.05	<0.05	<0.05	<0.05	1.64	<0.05	<0.05	0.207	<0.050	<0.050	0.198	<0.050	0.082	0.304	0.052	1.11	3.79	<0.050
Total Kjeldahl Nitrogen	mg/L	3.3	2.7	3	2.5	1.7	0.9	3.9	4.8	2.7	2.2	3.9	2.3	2.4	5.8	3.52	2.66	3.15	3.13	2.95	6.65	3.06	7.29	5.64	2.70
Total Organic Carbon	mg/L	17	24	23	19	19	31	37	29	23	31	20	24	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												18	29.1	31.7	20	24.8	24.9	23.4	37.2	24.3	122	21.6	22.2
Phenols	mg/L													-		-	-	-	-	-	-	-	-	0.0018	0.0101
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	0.026	0.022	<0.010	<0.010	<0.010	<0.01	0.0167	0.0025	0.0151	0.0303	0.0349
Antimony	mg/L	<0.0004	<0.0002	0.0005	<0.0004	0.0005	0.0009	0.0015	0.0015	0.0016	0.0015	0.0012	0.002	0.0005	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00043	0.00013	0.0003	<0.00010	0.00025
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00165	0.0137
Barium	mg/L	0.051	0.075	0.064	0.111	0.078	0.075	0.131	0.155	0.155	0.041	0.088	0.071	0.057	0.048	0.0581	0.044	0.0789	0.0584	0.0826	0.0506	0.0699	0.0642	0.118	0.0449
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													0.05	0.052	0.057	0.058	0.057	0.052	0.061	0.059	0.073	0.053	0.046	0.040
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000099	0.0000059	0.0000083	<0.0000050	0.0000070
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00013	<0.00010	<0.00010	0.00011	<0.00010
Cobalt	mg/L	<0.002	0.005	0.018	<0.002	<0.002	0.002	0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00060	0.00025	0.00064	0.00065	0.00062
Copper	mg/L	0.132	0.008	0.014	0.016	0.011	0.028	0.021	0.027	0.007	0.004	0.003	0.005	0.001	0.0019	0.0037	<0.0010	<0.0010	<0.0010	<0.001	0.00180	0.00360	0.00193	0.00081	0.00271
Iron	mg/L	0.277	0.754	0.595	1.400	0.770	2.920	4.33	7.07	0.616	0.454	1.67	1.19	0.032	0.087	0.055	<0.030	0.027	0.098	0.031	0.062	0.012	0.052	0.166	0.077
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	0.00018	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	0.000176	<0.000050	0.000098	0.000113	0.000076
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0263	0.0222
Manganese	mg/L													0.002	0.0075	0.0096	<0.0050	<0.0020	0.0046	<0.002	0.00448	0.00161	0.0116	0.192	0.0138
Mercury	mg/L	<0.0002	<0.0004	0.0005	<0.0002	<0.0002	0.0009	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	0.0000052	0.0000081	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.007	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00252	0.00142	0.000884	0.00136	0.00198
Nickel	mg/L	<0.002	<0.002	0.018	0.01	0.004	0.004	0.01	0.013	<0.002	0.004	0.006	0.006	0.005	0.0047	0.0043	0.0026	0.0046	0.0027	0.0037	0.00581	0.00424	0.00243	0.00389	0.00321
Selenium	mg/L	Not required under previous permit												0.0005	0.00058	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000347	0.000248	0.00025	0.000169	0.000258
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000017	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	0.00011	<0.00010	<0.00010
Titanium	mg/L													<0.001	0.0026	0.0027	<0.0010	<0.0010	<0.0010	<0.001	0.00118	<0.00030	0.00044	0.0029	0.00517
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00123	0.00138
Vanadium	mg/L													<0.001	0.002	0.0012	<0.0010	<0.0010	<0.0010	<0.001	0.00286	<0.00050	0.00228	0.00067	0.00299
Zinc	mg/L	<0.051	0.038	0.078	0.018	0.009	0.085	0.02	0.043	0.037	0.003	0.006	0.007	0.009	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0074	0.0026	<0.0010	0.0057	<0.0010	0.0011
Routine Water																									
Ion Balance	%	93	108	99	99	101	92.3	101	103	99.5	103	103	98.9	103	106	108	95.5	92.4	107	109	102	111	88.7	102	100
Bicarbonate	mg/L	401	368	422	421	349	282	499	280	315	211	554	297	307	277	298	350	392	272	310	285	354	456	319	304
Chloride	mg/L	11.5	12.7	10.7	15.0	13.0	18.0	27	26	13	12	13	13	16	14.8	13	20.8	20.4	32.0	23.7	27.2	31.5	31.3	30.8	32.9
Carbonate	mg/L	<5	13	<5	<5	<5	41	41	111	<5	36	<5	12	20	32.6	18	21.2	10.3	18.6	14.3	15.8	6.6	12.7	8.2	38.3
Conductivity (EC)	uS/cm	718	889	828	1050	1140	1170	1680	1410	656	519	554	653	734	662	662	692	727	597	648	622	759	851	758	675
Calcium	mg/L	15.6	27.6	32.2	32.5	27.5	17.1	23.3	17.5	17.4	16	18.8	16.7	17.1	12.8	15.3	15.3	16.8	11.8	17.3	10.6	24.8	13.3	26.0	21.5
Potassium	mg/L	15	17.4	17.6	17	19.5	13.8	22.5	14.8	13.9	9.6	14.1	12.2	13.4	13.8	13.6	14.6	15.5	17.7	17.8	14.4	19.2	18.5	19.9	16.0
Magnesium	mg/L	8.5	14.4	12.9	14.8	14.5	9.7	18.1	11	8.7	7.0	9.4	8	9.9	7.34	8.72	10.6	9.01	10.8	10.3	5.81	12.9	12	12.8	10.2
Sodium	mg/L	122	175	145	172	203	214	388	310	110	99	88	114	135	138	129	118	124	109	111	115	134	144	109	124
Sulfate	mg/L	39.9	144	111	170	261	278	390	293	59.2	35.1	24.1	57.7	73.9	53.3	50.9	21.4	31.2	13.3	10.8	14.4	39.6	30.2	65.3	24.3
Phosphorus	mg/L	Not required under previous permit													0.451	0.332	0.244	0.219	0.207	0.158	0.559	0.28	0.403	0.065	0.628
pH in H20	pH	8.2	8.6	8.0	8.1	8.5	9.1	8.6	9.7	8.4	9.3	8.2	8.7	8.8	8.95	8.78	8.71	8.56	8.84	8.72	8.81	8.45	8.54	8.49	9.16
TDS (Calculated)	mg/L	410	586	537	629	727	729	1120	921	381	318	316	379	436	409	395	394	420	347	358	344	444	491	429	417
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.043	<0.020	0.024	0.072	0.047
Nitrite	mg/L													-	<0.0050	<0.050	<0.050	<0.050	<0.050	<0.02	0.016	<0.010	0.103	<0.010	0.013
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.072	0.06
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	118	95.7
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	275	313
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.154	0.372
Field Data																									
pH in H_20	pH	Not required under previous permit												8.91	8.19	9.61	9.61	8.69	9.7	8.5	9.45	8.8	9.0	8.7	2.54
Conductivity (EC)	uS/cm													857	500	846	846	748	620	464	642	778	900	776	829

Table D.3: Chemical Analytical Results

Sample ID:		Ewert D.2																							
Site Number:		**3**																							
Date Sampled:	**Units**	**16-Oct-1996**	**7-Oct-1997**	**9-Oct-1998**	**20-Oct-1999**	**11-Oct-2000**	**4-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**13-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	40	50	70	90	50	60	70	30	30	49	53	67	65	54.7	55.2	62	77	53	61	158	61	88	127	92
Ammonia-N	mg/L	0.69	<0.05	0.06	0.05	0.05	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.613	<0.050	<0.050	0.174	<0.050	<0.05	0.127	<0.05	<0.05	0.113	0.254
Total Kjeldahl Nitrogen	mg/L	3.1	2.1	2.7	2.8	1.8	3.6	3.5	1.3	1.9	1.6	1.8	1.7	2.3	2.95	2.12	1.9	2.44	1.60	1.8	2.62	1.94	3.09	5.07	3.01
Total Organic Carbon	mg/L	19	27	31	22	21	21	32	11	21	16	23	19	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												18	19.2	22.4	18	22.9	31.7	18.2	23.4	21	88	44.0	28.2
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0018	0.0068
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												0.01	0.02	<0.010	0.01	0.055	<0.010	<0.01	0.0055	0.0011	0.0045	0.0317	0.0334
Antimony	mg/L	0.0004	<0.0002	0.0008	<0.0004	0.0005	0.0007	0.002	0.0011	0.0013	0.001	0.0010	0.0025	0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00021	0.00015	0.00017	0.00038	0.00020
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00803	0.00619
Barium	mg/L	0.106	0.065	0.056	0.083	0.059	0.093	0.046	0.077	0.018	0.034	0.069	0.052	0.042	0.0452	0.0454	0.0361	0.0532	0.0540	0.0482	0.0511	0.041	0.0501	0.0439	0.0364
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.038	0.05	0.039	0.039	0.034
Cadmium	mg/L	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	0.0000154	<0.0000050
Chromium	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010	0.00011	0.00013
Cobalt	mg/L	0.003	0.005	0.022	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00036	0.00014	0.00053	0.00063	0.00061
Copper	mg/L	0.008	<0.001	0.01	0.004	0.006	0.011	0.012	0.009	0.004	0.001	0.003	0.001	0.001	0.0014	0.0036	<0.0010	0.0016	<0.0010	<0.001	0.00063	0.00797	0.00111	0.00234	0.00127
Iron	mg/L	7.200	1.060	1.510	1.980	1.280	4.770	1.28	3.04	0.216	0.452	1.13	0.734	0.046	0.043	0.085	0.073	0.098	0.046	0.032	0.083	0.045	0.056	0.054	0.256
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	0.000072	<0.000050	<0.000050	0.00010	0.000164
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0323	0.0261
Manganese	mg/L													0.003	<0.0020	<0.0020	<0.0050	0.0021	0.0067	<0.002	0.00205	0.00125	0.107	0.0131	0.00377
Mercury	mg/L	<0.0002	<0.0004	0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000066	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00108	0.000744	0.000491	0.0010	0.000761
Nickel	mg/L	0.009	0.004	0.019	0.009	0.008	0.004	0.008	0.009	<0.002	0.004	0.007	0.006	0.005	0.0047	0.0065	0.0048	0.0053	0.0048	0.0034	0.0042	0.00457	0.00417	0.00423	0.00630
Selenium	mg/L	Not required under previous permit												0.0005	0.00052	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000243	0.000245	0.000184	0.000319	0.000366
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.00001	<0.000010	0.000016	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													0.001	0.0013	<0.0010	<0.0010	0.003	<0.0010	<0.001	0.00034	<0.0003	0.00062	0.00375	0.00694
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00159	0.000775
Vanadium	mg/L													0.001	0.0019	<0.0010	<0.0010	0.0012	<0.0010	<0.001	0.00096	0.00072	0.00136	0.00513	0.00218
Zinc	mg/L	0.028	0.025	0.027	0.019	0.014	0.039	0.011	0.016	0.066	0.002	0.006	0.008	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.006	0.0010	0.0020	0.0085	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	103	109	103	100	103	92.9	101	102	99.9	103	105	99.4	103	104	109	88.3	97.3	105	109	97.5	100	96.1	107	105
Bicarbonate	mg/L	380	369	394	338	327	341	445	261	130	175	242	255	251	260	238	272	341	306	281	312	355	496	433	407
Chloride	mg/L	12.5	14.3	11.8	13.0	10.0	14.0	22	9	15	10	12	13	16	21.4	10.5	10.3	13.7	15.5	13.2	18.0	31.3	36.3	35.7	33.3
Carbonate	mg/L	<5	25	13	17	<5	14	51	17	111	15	<5	<5	19	9.4	7.9	8.7	7.5	8.8	11	8.2	5	15.8	11.9	<5.0
Conductivity (EC)	uS/cm	845	926	869	900	941	1080	1610	852	1170	430	529	639	702	602	546	571	661	580	568	614	723	964	885	844
Calcium	mg/L	15.9	19.2	29.8	16.6	29.8	27.9	16.2	17.4	13.9	17.7	22.5	21.5	17.1	13.8	20.9	15.3	12.9	21.5	19.1	16.0	28.2	28.6	17.1	25.8
Potassium	mg/L	15.1	15.5	15.8	13.4	17	16.5	23.4	13.5	12	9.8	14.1	13.9	13.2	13	12.8	10.4	12.9	15.3	14.5	15.7	15.5	21.4	20.5	19.0
Magnesium	mg/L	8.5	9.7	9.4	9.6	12.4	15.8	18.5	9.7	8.6	6.4	8.2	8.7	8.6	6.97	7.76	6.78	6.99	8.89	8.08	8.00	11.90	14.00	11.2	13.4
Sodium	mg/L	174	201	182	168	157	177	365	167	223	71	81	98	128	104	93.8	85.6	124	101	98.6	98.4	118	168	179	157
Sulfate	mg/L	122	130	125	135	187	261	370	191	248	46.9	52.9	91.2	98.3	36.8	55.1	47	44	26.8	19.9	19.0	48.4	55.8	46.2	77.3
Phosphorus	mg/L	Not required under previous permit													0.195	0.164	0.262	0.223	0.108	0.163	0.224	0.262	0.442	0.542	0.576
pH in H20	pH	8.3	8.9	8.5	8.8	8.2	8.5	9	8.8	10.0	9.0	8.2	8.3	8.8	8.53	8.58	8.61	8.53	8.52	8.65	8.50	8.41	8.56	8.57	8.29
TDS (Calculated)	mg/L	535	596	570	539	575	699	1050	553	696	263	310	372	424	333	326	318	390	348	322	337	434	584	535	531
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	0.12	<0.050	<0.05	<0.020	<0.02	<0.020	<0.020	0.388
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.01	<0.010	<0.010	0.029
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	0.416
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	88.8	120
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	375	339
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.194	0.292
Field Data																									
pH in H_20	pH	Not required under previous permit												9.06	8.79	9.03	9.79	8.8	9.9	8.29	8.94	8.9	8.8	11.3	6.49
Conductivity (EC)	uS/cm													812	450	862	382	660	596	565	624	740	1062	950	104.3

Table D.4: Chemical Analytical Results

Sample ID:		Ewert D.3																							
Site Number:		**4**																							
Date Sampled:	**Units**	**16-Oct-1996**	**7-Oct-1997**	**9-Oct-1998**	**20-Oct-1999**	**11-Oct-2000**	**4-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**13-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	50	60	50	70	60	80	70	50	40	43	48	82	83	77	62.5	81	72	53	30	117	74	51	78	106
Ammonia-N	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.845	<0.050	<0.050	2.15	<0.050	<0.05	0.785	0.641	<0.050	0.655	<0.050
Total Kjeldahl Nitrogen	mg/L	2.7	1.8	2.1	2	1.8	3.9	4.6	3.9	3.1	1.5	1.5	2.3	2.9	3.38	2.08	2.66	4.3	2.04	1.88	5.40	3.84	2.55	3.31	3.22
Total Organic Carbon	mg/L	19	21	21	18	23	26	29	17	24	15	19	25	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												20	26.6	22.9	21	27.8	23.5	19.3	28.4	27.2	51	38.0	28.3
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0018	0.0058
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	0.069	<0.010	<0.010	0.113	<0.010	<0.01	0.0024	0.0473	0.0052	0.0673	0.0107
Antimony	mg/L	<0.0004	<0.0002	0.0007	<0.0004	0.0005	0.0005	0.001	0.0009	0.0014	0.0006	0.0014	0.0018	<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00018	0.0001	0.0001	0.00016	0.00016
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0032	0.0031
Barium	mg/L	0.059	0.057	0.046	0.064	0.05	0.064	0.076	0.046	0.024	0.026	0.045	0.052	0.028	0.0629	0.0431	0.0261	0.0631	0.0330	0.0302	0.0300	0.0433	0.0288	0.0656	0.0418
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.029	0.044	0.018	0.035	0.039
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Chromium	mg/L	<0.005	<0.005	n/a	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.00014	<0.00010	0.00018	0.00017
Cobalt	mg/L	<0.002	0.004	0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00039	0.00024	0.00046	0.00095	0.00036
Copper	mg/L	0.002	<0.001	0.011	0.003	0.002	0.006	0.009	0.004	0.002	<0.001	<0.001	0.002	<0.001	<0.0010	0.0023	<0.0010	0.0012	<0.0010	<0.001	<0.00020	0.00661	0.0013	0.00163	0.00163
Iron	mg/L	0.951	0.987	0.462	1.770	0.671	1.870	3.11	0.793	0.666	0.328	0.561	1.82	0.181	0.455	0.05	0.194	0.236	0.037	0.247	0.089	1.79	0.659	0.848	1.01
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	0.00019	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	0.000132	0.000168	0.000389	0.000211
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0153	0.0125
Manganese	mg/L													0.008	0.0812	<0.0020	<0.0050	0.082	0.0027	<0.002	0.0025	0.00451	0.0477	0.194	0.00879
Mercury	mg/L	<0.0002	0.0012	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000069	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000746	0.000389	0.00046	0.000956	0.000489
Nickel	mg/L	<0.002	0.003	0.016	0.006	0.004	<0.002	0.006	0.005	<0.002	0.003	0.003	0.004	0.002	0.0039	0.0043	0.0025	0.0047	0.0024	<0.002	0.00122	0.00222	0.00281	0.00396	0.00281
Selenium	mg/L	Not required under previous permit												<0.0004	<0.00080	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000135	0.000153	0.000151	0.000192	0.000188
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000032	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													<0.001	0.0031	<0.0010	<0.0010	0.004	<0.0010	<0.001	<0.00030	0.00264	0.00083	0.00499	0.00168
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.000531	0.000262
Vanadium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	0.0013	<0.0010	<0.001	0.00099	0.00102	0.00102	0.00193	0.00144
Zinc	mg/L	0.011	0.02	0.019	0.007	0.002	0.043	0.017	0.007	0.036	0.002	0.004	0.007	0.015	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0089	<0.0010	0.0024	0.0151	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	106	108	107	98	102	96.1	101	103	99.6	103	104	99	96.9	114	104	93.9	94.1	104	106	98.3	106	95.1	105	103
Bicarbonate	mg/L	250	232	244	232	255	265	381	234	272	153	179	207	232	289	241	259	298	245	200	205	247	326	308	290
Chloride	mg/L	9.7	15.2	9.8	13.0	12.0	13.0	20	7	11	14	21	25	30	33.3	25.4	52.2	63.1	51.5	32.9	65.3	51	55.8	64.6	56.2
Carbonate	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	12	<5.0	7.2	<5.0	<5.0	<5.0	<5	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	462	480	476	488	523	543	860	403	545	277	363	460	488	577	506	608	682	547	448	568	549	679	708	622
Calcium	mg/L	17.3	19.4	19.9	15.8	20.7	17.3	18.5	21.4	16.6	16.9	17.8	19.4	19.6	20.9	20.2	23.2	19.4	22.2	18.8	15.0	25.7	21.5	23.4	22.5
Potassium	mg/L	16.2	13.4	15	12.9	16.3	15	18.6	13.1	12.9	9.8	13.0	12.9	13.1	14.9	14	12.7	15.7	16.4	15.8	17.1	15	14.9	22.0	14.2
Magnesium	mg/L	6.8	8.1	8.6	7.7	8.9	9.5	10.7	7.6	6.9	5.8	7.2	7.8	8.7	9.31	7.68	9.81	9.67	10.3	7.96	8.28	10.5	9.48	10.9	10.7
Sodium	mg/L	70	77	75	69	74	73	186	64	89	37	46	62	71	109	78.6	76.2	96.1	79.4	57.1	75.5	76.3	108	114	103
Sulfate	mg/L	12.2	33.9	34.2	33.2	37.9	45	118	30.1	41	9.4	7.4	28.1	11.2	20.2	13.4	11.8	10.4	6.55	1.09	4.24	3.93	11.9	19.1	14.3
Phosphorus	mg/L	Not required under previous permit												-	0.25	0.12	0.639	0.203	0.224	0.18	0.317	0.596	0.437	0.523	0.605
pH in H_20	pH	8.1	8.4	7.9	8.3	7.9	8.3	8.1	8.2	8.3	8.2	7.9	8.3	8.7	8.18	8.56	8.41	8.37	8.32	8.45	8.21	8.23	8.37	8.05	7.98
TDS (Calculated)	mg/L	255	282	283	266	295	309	536	258	312	168	201	257	280	353	285	316	365	309	236	286	304	391	406	364
Nitrate	mg/L	Not required under previous permit												<0.1	0.692	<0.050	0.06	0.309	<0.050	<0.05	<0.020	0.083	<0.020	0.198	0.027
Nitrite	mg/L													-	<0.050	<0.050	<0.050	0.083	<0.050	<0.02	<0.010	0.039	<0.010	<0.010	0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.198	0.037
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	103	100
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	252	238
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.102	0.169
Field Data																									
pH in H_20	pH	Not required under previous permit												8.28	8.63	9.25	8.34	8.41	8.8	8.1	9.27	8.4	8.6	9.9	14.47
Conductivity (EC)	uS/cm													588	588	726	422	681	564	521	588	522	754	971	803

Table D.5: Chemical Analytical Results

Sample ID:		Ewert D.4																							
Site Number:		**5**																							
Date Sampled:	**Units**	**16-Oct-1996**	**7-Oct-1997**	**9-Oct-1998**	**20-Oct-1999**	**11-Oct-2000**	**4-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**12-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	30	40	50	80	60	60	60	50	40	103	123	82	78	98.5	69.6	66	95	67	79	109	30	102	86	92
Ammonia-N	mg/L	<0.05	<0.05	0.042	<0.05	<0.05	0.06	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	0.124	<0.050	0.055	0.103	0.098	<0.05	0.059	<0.050	<0.050	0.120	<0.050
Total Kjeldahl Nitrogen	mg/L	1.5	1.2	2.7	2.3	1.7	3.1	3.4	2.1	3.1	4	5	6	2.9	4.74	3.2	2.8	3.17	2.82	2.25	3.33	2.88	3.48	2.91	3.61
Total Organic Carbon	mg/L	16	17	21	19	18	23	31	20	23	35	48	26	-	-	-	-	-	-		-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												22	31.2	28	27.2	30.6	26.6	23	31.9	29.4	102	38.0	22.7
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0015	0.0076
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	0.77
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												0.02	0.033	0.053	0.011	<0.010	<0.010	<0.01	0.0238	0.0013	0.0062	0.0194	0.0015
Antimony	mg/L	<0.0004	<0.0002	0.0009	0.0004	0.0005	0.0006	0.0011	0.0011	0.0019	0.0011	0.002	0.003	0.0005	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00031	0.00018	0.00022	0.00025	0.00015
Arsenic	mg/L	Not required under previous permit														-	-	-	-	-	-	-	-	0.0114	0.00313
Barium	mg/L	0.054	0.058	0.058	0.135	0.083	0.056	0.203	0.069	0.054	0.126	0.1	0.1	0.127	0.0772	0.0843	0.0335	0.0722	0.148	0.0639	0.0651	0.0524	0.0903	0.0588	0.0528
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.035	0.046	0.04	0.050	0.042
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	0.0000196	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt	mg/L	<0.002	0.003	0.021	0.002	<0.002	<0.002	0.003	<0.002	<0.002	0.003	0.003	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.0010	0.00035	0.00051	0.00094	0.00043
Copper	mg/L	0.003	<0.001	0.01	0.005	0.004	0.006	0.011	0.005	0.002	0.004	0.002	0.002	0.001	0.0017	0.0042	<0.0010	0.0017	0.0011	<0.001	0.00139	0.00084	0.00095	0.00102	0.00054
Iron	mg/L	1.310	1.180	1.100	4.150	2.190	0.964	9.66	1.32	0.463	2.31	3.8	1.92	0.058	0.083	0.171	0.044	0.152	0.044	0.043	0.111	0.04	0.12	0.087	0.026
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	0.00019	<0.00010	<0.0050	<0.00010	<0.0001	0.000119	<0.000050	0.000096	0.00010	<0.000050
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0247	0.016
Manganese	mg/L													0.004	0.0021	0.007	<0.0020	0.0024	<0.0020	<0.002	0.0038	0.00066	0.00532	0.00626	0.00080
Mercury	mg/L	<0.0002	0.0009	0.0009	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000108	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00329	0.00216	0.00196	0.0019	0.00118
Nickel	mg/L	0.003	<0.002	0.014	0.01	0.008	0.004	0.013	0.009	0.003	0.011	0.01	0.008	0.009	0.0066	0.0063	0.0056	0.0066	0.0079	0.0052	0.00487	0.00606	0.00687	0.00569	0.00406
Selenium	mg/L	Not required under previous permit												0.0006	0.00056	0.00046	<0.00040	<0.00080	<0.00040	<0.0004	0.000372	0.000302	0.000271	0.000299	0.000217
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000015	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													0.001	0.002	0.0037	<0.0010	0.0025	<0.0010	<0.001	0.00345	<0.00030	0.00069	0.00219	<0.00030
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.001	0.000602
Vanadium	mg/L													<0.001	0.001	0.0013	<0.0010	0.0014	<0.0010	<0.001	0.00294	<0.00050	<0.00050	0.00251	<0.00050
Zinc	mg/L	0.007	0.018	0.023	0.012	0.007	0.052	0.023	0.004	0.05	0.02	0.005	0.009	0.003	<0.0020	<0.0020	<0.0020	0.002	<0.0020	0.0087	<0.0010	0.001	0.0031	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	109	109	100	99	103	93.5	99.1	97	97	102	102	97.4	99.2	99.1	106	92	93.1	106	108	96.2	114	92.9	115	102
Bicarbonate	mg/L	286	294	338	360	352	342	485	289	274	317	407	348	357	337	313	336	369	357	303	280	324	442	398	356
Chloride	mg/L	4.2	4.3	3.4	6.0	6.0	9.0	14	12	16	18	28	20	23	21.7	19.7	15.2	19.4	21.4	15.2	18.5	17.5	19.4	21.7	18
Carbonate	mg/L	25	17	<5	24	7	42	46	56	65	30	<5	<5	10	21.8	14.9	7	13.9	10.0	12.2	38.0	<5.0	7.2	<5.0	6.6
Conductivity (EC)	uS/cm	645	601	565	682	658	735	974	735	711	598	700	602	637	627	606	613	666	668	587	627	599	742	713	624
Calcium	mg/L	14	12.8	14.3	18.1	16.4	10.7	13.7	14.5	10.5	18.7	21.4	18.7	19.5	11.8	15.4	15.9	12.8	27.7	19.4	10.7	21.9	22	19.1	23.9
Potassium	mg/L	6.7	5.6	7	7.2	7.6	7.2	8.1	6.4	9.7	11.2	17.6	12.8	11.4	10.4	9.43	10.2	10.1	14.3	12.8	13.4	13.3	15.5	14.8	14.5
Magnesium	mg/L	6.8	7.5	7.4	9.0	9.0	10.0	11.9	7.6	8.5	10.4	12.5	10.2	10.8	9.7	8.85	10	7.97	13.1	11.1	9.75	12	13.4	13.3	13.3
Sodium	mg/L	133	130	109	126	117	131	259	149	139	115	118	96	111	122	116	95	122	114	98.6	106	105	125	141	103
Sulfate	mg/L	47.4	47.8	27.7	27.7	35	42	67	62.5	26.8	9.6	5.4	8.5	10.2	8.19	11.7	17.8	15.1	28.1	9.27	6.33	15.1	26.8	15.1	20.2
Phosphorus	mg/L	Not required under previous permit												-	0.253	0.271	0.2	0.265	0.129	0.178	0.239	0.248	0.251	0.493	0.225
pH in H_20	pH	8.9	8.9	8.1	8.8	8.5	9.1	8.9	9.3	9.5	9.0	8.2	8.3	8.5	8.71	8.7	8.46	8.68	8.50	8.64	9.14	8.38	8.4	8.32	8.44
TDS (Calculated)	mg/L	377	369	335	395	377	427	614	450	407	370	403	339	371	372	350	336	383	404	327	341	349	448	424	375
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	0.056	<0.05	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	<0.022
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	102	114
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	331	303
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.396	0.499
Field Data																									
pH in H_20	pH	Not required under previous permit												8.34	8.79	9.06	8.99	9.18	8.9	8.57	9.66	8.5	8.9	10.4	14.36
Conductivity (EC)	uS/cm													770	460	744	1000	664	691	424	650	623	810	780	803

Table D.6: Chemical Analytical Results

Sample ID:		Lyons D.1																							
Site Number:		**6**																							
Date Sampled:	**Units**	**15-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**20-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**13-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	50	50	80	90	80	80	160	60	60	56	61	84	71	91.1	59.8	63	83	75	71	101	71	70	78	89
Ammonia-N	mg/L	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.0021	<0.05	<0.05	<0.050	0.155	0.202	0.252	<0.050	<0.05	0.053	1.35	<0.050	0.063	0.575
Total Kjeldahl Nitrogen	mg/L	1.2	2	3.7	2.9	2.9	3.5	5.8	1.7	3.2	2	1.7	3.8	2.4	4.73	2.91	2.19	2.81	2.59	1.95	3.63	3.62	2.55	2.89	3.01
Total Organic Carbon	mg/L	19	20	26	24	27	31	40	22	26	21	20	36	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												21	27.4	22.9	28.6	26.8	27.1	19.8	26.8	25	70	28.0	24.7
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0013	0.0087
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	0.012	<0.010	<0.010	<0.010	<0.010	<0.01	0.0040	0.0962	0.0097	0.015	0.0306
Antimony	mg/L	<0.0004	0.0006	0.0006	<0.0004	0.0006	0.0006	0.0008	0.001	0.0012	0.0012	0.0021	0.0012	<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00025	0.00013	0.00014	0.00022	0.00017
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00522	0.00531
Barium	mg/L	0.052	0.058	0.066	0.085	0.078	0.082	0.105	0.015	0.046	0.023	0.044	0.075	0.053	0.0369	0.0554	0.0296	0.033	0.0623	0.0417	0.0472	0.0448	0.032	0.0495	0.0421
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													0.05	0.056	<0.050	<0.050	0.078	0.065	0.055	0.052	0.042	0.04	0.050	0.029
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	0.0000172	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.0002	<0.00010	0.00011	0.0002
Cobalt	mg/L	<0.002	<0.002	0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00050	0.0003	0.0004	0.00063	0.00038
Copper	mg/L	0.002	<0.001	<0.001	0.003	0.002	0.004	0.009	0.023	0.002	0.002	0.001	0.003	<0.001	<0.0010	0.0073	0.0011	0.0013	<0.0010	<0.001	0.00065	0.00066	0.0006	0.00071	0.00063
Iron	mg/L	<0.005	0.377	0.854	1.910	1.640	1.020	2.28	0.642	0.418	0.145	0.141	2.57	0.026	0.071	0.015	0.089	0.03	0.094	0.024	0.040	0.629	0.121	0.136	0.958
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	0.000189	0.000056	0.000112	0.000229
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0136	0.0074
Manganese	mg/L													0.002	0.033	<0.0020	<0.0050	0.0023	0.0127	<0.002	0.0052	0.00338	0.00586	0.0135	0.00866
Mercury	mg/L	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000878	0.000596	0.000817	0.00112	0.00076
Nickel	mg/L	0.002	<0.002	0.01	0.009	0.012	0.007	0.007	0.005	<0.002	0.003	0.005	0.009	0.006	0.004	0.0035	0.0035	0.0035	0.0038	0.0029	0.00278	0.00337	0.00397	0.00414	0.00361
Selenium	mg/L													0.0004	0.00042	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000202	0.000194	0.000194	0.000273	0.000212
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000017	<0.000010
Tin	mg/L	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
Titanium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.001	0.00047	0.00568	0.00088	0.00113	0.00329
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.000909	0.000234
Vanadium	mg/L													0.001	0.0018	<0.0010	0.0016	0.0026	0.0023	0.0011	0.00334	0.00241	0.0021	0.00256	0.00205
Zinc	mg/L	0.007	0.038	0.028	0.01	0.017	0.038	0.008	0.006	0.053	0.001	0.005	0.012	0.002	<0.0020	<0.0020	0.0027	<0.0020	<0.0020	0.0052	<0.0010	0.0012	0.0021	<0.0010	0.0016
Routine Water																									
Ion Balance	%	98	106	108	100	109	106	99.9	106	103	105	103	104	104	91.6	103	96.2	94.4	97.3	106	96.3	104	94.3	110	101
Bicarbonate	mg/L	334	314	361	359	338	427	510	281	452	211	259	207	271	287	257	304	291	311	224	213	277	281	270	217
Chloride	mg/L	7.5	8.3	11.5	12.0	12.0	17.0	24	14	35	21	23	15	19	25.1	21.3	19.9	18.4	29.2	22.1	20.9	19.4	17.7	20.6	12.9
Carbonate	mg/L	<5	<5	<5	5	5	17	25	48	8	<5	<5	<5	<5	5.4	5.7	5.1	5.4	7.9	6.7	22.2	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	844	734	735	900	887	1110	1980	1450	1680	504	612	455	594	612	591	649	605	595	490	526	523	510	519	405
Calcium	mg/L	33.8	29.3	30.1	29	29.8	47.8	33.3	44.6	44.9	28.3	29	18.8	27.1	18.6	22.1	22.5	17.5	23.4	22.4	16.7	21.2	20.1	22.3	18.6
Potassium	mg/L	11.6	12.5	16.1	14.6	17.8	20.9	24.1	19.3	23.6	15.5	17.1	18	17.3	16.3	15.5	16.2	16	17.3	14.6	15.3	19.3	17.5	21.7	17.1
Magnesium	mg/L	13.5	11.3	12.5	13.4	14.0	20.3	30.2	26.3	24.5	9.4	10.9	7.4	10.4	9.16	9.15	8.76	8.54	10.7	7.78	7.64	8.52	7.74	8.55	8.46
Sodium	mg/L	140	123	153	147	151	230	455	292	281	71	83	65	86	89.3	91.7	96.2	92.9	96.2	69.2	75.3	75.3	75.3	84.3	51
Sulfate	mg/L	176	107	126	143	165	204	561	481	429	65.7	64	40.2	56.5	45.3	50.2	47.1	45	32.4	14.9	23.9	11.6	27.2	22.3	15
Phosphorus	mg/L	Not required under previous permit												-	0.43	0.245	0.846	0.394	0.346	0.417	0.344	0.931	0.555	0.520	1.38
pH in H_20	pH	8.2	8.4	7.9	8.5	8.5	8.5	8.4	9.1	8.4	8.2	8.1	7.8	8.4	8.41	8.49	8.44	8.48	8.50	8.53	9.00	8.26	8.31	8.17	7.91
TDS (Calculated)	mg/L	547	449	527	541	574	732	1340	1060	1090	315	355	266	353	350	342	366	347	370	268	287	295	307	313	232
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	0.235	<0.050	<0.050	<0.05	<0.020	0.588	<0.020	<0.020	0.429
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	0.077	<0.010	<0.010	0.045
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	0.474
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	90.9	81.3
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	222	178
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.104	0.155
Field Data																									
pH in H_20	pH	Not required under previous permit												8.15	8.17	8.90	8.11	9.10	9.1	8.42	9.51	8.2	8.7	10.4	2.59
Conductivity (EC)	uS/cm													704	330	886	300	604	609	491	547	517	568	566	496

Table D.7: Chemical Analytical Results

Sample ID:		Lyons D.2																							
Site Number:		**7**																							
Date Sampled:	**Units**	**15-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**20-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**13-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	60	70	80	110	70	90	100	60	60	56	95	80	72	75	55.6	77	71	71	84	103	80	64	70	83
Ammonia-N	mg/L	<0.05	0.48	0.16	0.15	<0.05	<0.05	<0.05	0.51	0.24	<0.05	<0.05	<0.05	<0.05	0.267	<0.050	0.663	<0.050	<0.050	<0.05	0.051	0.685	<0.050	1.17	0.414
Total Kjeldahl Nitrogen	mg/L	2.5	2.8	2.8	3.8	2.7	4.9	5.2	3.5	4.2	2	2.9	3.4	2.7	3.27	2.53	3.15	2.56	3.83	2.62	3.75	3.69	2.45	4.37	2.58
Total Organic Carbon	mg/L	24	23	25	24	23	26	30	25	35	23	29	30	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												20	25.9	20.5	30.4	25	25.2	21.5	27.4	26.9	64	25.0	23.4
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0018	0.0075
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	<0.010	<0.010	0.027	<0.010	0.015	<0.01	0.0070	0.0058	0.0096	0.0643	0.0613
Antimony	mg/L	<0.0004	<0.0004	0.0037	<0.0004	0.0005	0.0005	0.0013	0.0013	0.0014	0.0017	0.0013	0.002	<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00023	0.00013	0.00015	0.00021	0.00012
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00407	0.00497
Barium	mg/L	0.057	0.073	0.049	0.095	0.071	0.08	0.068	0.069	0.047	0.031	0.039	0.045	0.044	0.0588	0.041	0.0504	0.0469	0.0291	0.0503	0.0403	0.0263	0.0364	0.0655	0.0649
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	0.056	<0.050	<0.050	<0.05	0.053	0.026	0.037	0.044	0.022
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	0.0000098	<0.0000050	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.00017	<0.00010	0.00028	0.00018
Cobalt	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00026	0.00029	0.00048	0.00079	0.00049
Copper	mg/L	0.004	0.004	0.003	0.009	0.004	0.008	0.013	0.035	0.004	0.003	0.002	0.001	0.001	0.0018	0.0034	<0.0010	0.0013	0.0012	<0.001	0.00071	0.00073	0.00091	0.00116	0.00083
Iron	mg/L	<0.005	0.837	0.680	2.430	0.680	1.480	1.64	0.601	0.113	0.122	0.215	0.547	0.056	0.044	0.023	0.839	0.016	0.028	0.036	0.013	0.268	0.083	0.275	1.51
Lead	mg/L	<0.005	<0.005	<0.005	0.95	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	0.00032	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050	0.00015	0.000218	0.000281
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0137	0.0071
Manganese	mg/L													0.02	0.0318	<0.0020	0.0075	0.0055	0.0028	0.0026	0.0031	0.00297	0.0198	0.122	0.0361
Mercury	mg/L	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.000007	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000755	0.000696	0.000893	0.00102	0.00063
Nickel	mg/L	0.003	<0.002	0.007	0.007	0.005	0.005	0.006	0.006	<0.002	0.004	0.005	0.004	0.004	0.0042	0.0038	0.0043	0.0034	0.0030	0.0027	0.00223	0.00433	0.00483	0.00453	0.00341
Selenium	mg/L	Not required under previous permit												0.0005	0.00041	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000175	0.000252	0.000205	0.00023	0.000212
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000018	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.0001	0.00018	<0.00010	<0.00010
Titanium	mg/L													0.001	<0.0010	<0.0010	0.0028	<0.0010	<0.0010	<0.001	<0.00030	0.0013	0.00052	0.00545	0.00488
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.000787	0.000266
Vanadium	mg/L													0.002	0.0027	0.0022	0.0022	0.002	0.0022	0.001	0.00394	0.00253	0.00196	0.0023	0.00206
Zinc	mg/L	0.012	0.033	0.03	0.007	0.009	0.068	0.009	0.017	0.046	0.002	0.007	0.006	0.014	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0054	<0.0010	0.0026	0.0122	<0.0010	0.0018
Routine Water																									
Ion Balance	%	107	104	107	99	104	96.7	99.9	106	101	103	103	95.9	102	104	106	96.6	98.5	108	106	96.6	101	94.1	109	97.4
Bicarbonate	mg/L	300	318	351	326	348	372	406	386	346	308	288	250	289	318	257	254	354	300	270	279	222	296	278	232
Chloride	mg/L	9.9	11.7	15.3	15.0	15.0	20.0	23	24	30	27	28	19	24	23.7	25	14.1	24.3	32.8	26.9	28.6	11.8	20	21.4	15.6
Carbonate	mg/L	<5	<5	<5	7	7	35	48	38	58	5	13	<5	13	21.5	33.7	<5.0	12.3	10.9	13.8	14.6	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	600	650	643	721	791	963	1120	1120	1300	772	738	478	657	759	799	505	737	653	590	604	408	525	536	435
Calcium	mg/L	25.6	25.7	25.6	23.8	30.5	43.6	25.4	30.4	28.6	29	25.9	19	28.4	32.7	26.1	20.6	25.6	19.1	22.2	15.5	19.3	22.5	24.9	17.4
Potassium	mg/L	20	18.5	23.1	20.5	23.1	26.3	29.9	28.2	26	22.1	22.3	19.7	20.7	23.4	22.7	14.1	21.5	18.6	17	19.0	15.2	18.9	21.8	18.5
Magnesium	mg/L	8.3	9.1	9.4	9.0	11.0	15.4	16.6	16.2	15.0	11.3	11.1	7.2	10.6	11.3	11.6	7.82	10.7	10.5	8.17	7.80	7.55	7.81	8.34	7.74
Sodium	mg/L	97	105	125	112	132	192	239	228	214	131	118	74	98	124	137	67.8	117	116	94.8	93.0	51.6	76.2	79.7	56.5
Sulfate	mg/L	49.8	60.6	65	68	102	121	185	217	236	114	82	41.2	53.6	79.1	108	29.8	48.8	28.4	15.6	13.3	12.5	23	15.7	14.5
Phosphorus	mg/L	Not required under previous permit													0.427	0.372	0.994	0.346	0.523	0.484	0.392	0.954	0.351	0.580	1.13
pH in H_20	pH	7.8	8.2	7.6	8.6	8.5	8.8	8.9	9	9.2	8.4	8.4	8	8.7	8.65	9.05	8.33	8.64	8.57	8.73	8.75	8.15	8.22	8.24	8.11
TDS (Calculated)	mg/L	358	387	436	419	494	599	742	774	795	491	442	303	391	472	491	282	435	384	332	329	227	315	310	246
Nitrate	mg/L	Not required under previous permit												<0.1	0.082	<0.050	0.373	<0.050	<0.050	<0.05	<0.020	0.02	<0.020	0.316	0.396
Nitrite	mg/L													-	-	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	0.017	<0.010	<0.010	0.042
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.316	0.437
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	96.5	75.3
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	228	190
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.118	0.176
Field Data																									
pH in H_20	pH	Not required under previous permit												8.51	8.21	9.98	8.06	9.17	9.0	8.78	9.53	8.2	8.6	9.3	10.73
Conductivity (EC)	uS/cm													731	560	884	375	721	670	579	617	397	581	589	529

Table D.8: Chemical Analytical Results

Sample ID:		Lyons D.3																							
Site Number:		8																							
Date Sampled:	**Units**	**15-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**20-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**13-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	40	100	70	100	90	110	230	80	60	66	92	78	105	110	64.1	86	108	67	127	150	149	232	171	105
Ammonia-N	mg/L	0.05	0.74	<0.05	<0.05	0.31	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	0.14	<0.05	<0.050	0.133	0.264	0.434	<0.050	0.08	0.256	0.099	0.082	0.186	<0.050
Total Kjeldahl Nitrogen	mg/L	2.7	4.7	2.7	3	3.2	6.5	22.2	2.8	2.7	2.4	2.9	3.5	3.9	5.64	2.98	3.48	4.78	2.39	5.93	5.61	6.45	9.34	8.83	3.66
Total Organic Carbon	mg/L	19	36	27	30	34	42	151	27	29	26	32	33	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												31	41.8	24.5	30.4	34.9	29.5	27.6	47.3	35.8	232	41.4	30.9
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0021	0.0137
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												0.82	0.104	<0.010	0.471	0.095	0.036	0.014	0.0507	0.0166	0.0196	0.0563	0.0192
Antimony	mg/L	0.0006	0.0006	0.0008	<0.0004	0.0006	0.0006	0.0021	0.0011	0.0014	0.001	0.0014	0.0033	0.0007	0.00046	<0.00040	<0.00040	<0.00080	<0.00040	0.00052	0.00076	0.00043	0.00054	0.00096	0.0003
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00277	0.00261
Barium	mg/L	0.117	0.136	<0.003	0.095	0.116	0.159	0.26	0.091	0.077	0.085	0.111	0.146	0.058	0.0635	0.0733	0.0607	0.105	0.0416	0.0408	0.119	0.0567	0.0797	0.108	0.0461
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	0.055	<0.050	<0.050	<0.050	0.061	0.052	0.068	0.079	0.035	0.027
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000062	0.0000078	0.0000064	0.000031	0.0000068
Chromium	mg/L	0.012	0.006	<0.005	<0.005	<0.005	<0.005	0.017	<0.005	<0.005	<0.005	<0.005	0.011	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.00015	<0.00010	0.00058	0.00010
Cobalt	mg/L	0.003	<0.002	<0.002	<0.002	0.003	0.003	0.01	<0.002	<0.002	<0.002	<0.002	0.004	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0023	0.00100	0.00123	0.00182	0.00183	0.00161
Copper	mg/L	0.008	0.004	0.001	0.004	0.004	0.009	0.032	0.016	0.004	0.004	0.004	0.01	0.003	0.0031	0.0062	0.0033	0.0033	0.0028	0.0031	0.00334	0.0046	0.00427	0.00582	0.00484
Iron	mg/L	8.390	8.430	0.006	1.530	3.600	4.340	15.9	1.56	1.46	2.32	1.6	9.23	0.653	0.194	0.057	0.537	0.114	0.032	0.039	0.030	0.025	0.021	0.046	0.064
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	0.0004	0.00015	<0.00010	0.00029	<0.0050	<0.00010	<0.0001	<0.000050	<0.000005	<0.000050	0.000076	0.000051
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.028	0.0166
Manganese	mg/L													0.035	0.0062	0.0089	0.0088	0.0195	0.0021	0.0174	0.00259	0.00127	0.00254	0.00185	0.00279
Mercury	mg/L	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000051	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	0.023	<0.005	<0.005	<0.005	<0.005	0.006	0.006	<0.0050	<0.0050	<0.0050	0.0087	0.0062	0.007	0.0116	0.00669	0.00966	0.0144	0.00452
Nickel	mg/L	0.01	0.012	<0.002	0.01	0.015	0.017	0.04	0.013	0.004	0.008	0.011	0.021	0.012	0.0093	0.0106	0.0093	0.0128	0.0089	0.0128	0.0135	0.0135	0.0133	0.0151	0.0112
Selenium	mg/L	Not required under previous permit												0.0012	0.00117	0.00072	0.00067	0.00085	0.00067	0.00084	0.00141	0.000916	0.00106	0.00113	0.000684
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000001	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000001	<0.000010	0.000021	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													0.032	0.0065	<0.0010	0.0168	0.0057	0.0022	0.0019	0.00143	0.00098	0.00045	0.0040	0.00244
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.01	0.00318
Vanadium	mg/L													0.003	0.0035	<0.0010	0.0034	<0.0010	0.0018	0.0028	0.00110	0.0016	0.00149	0.00126	0.00110
Zinc	mg/L	0.037	0.036	0.005	0.006	0.034	0.098	0.049	0.013	0.061	0.007	0.007	0.032	0.017	<0.0020	<0.0020	0.0024	<0.0020	<0.0020	0.0069	<0.0010	<0.0010	<0.0010	<0.0010	0.0017
Routine Water																									
Ion Balance	%	99	106	110	101	104	109	101	103	98.4	106	103	102	94.6	98.4	108	95	96.9	102	110	95.3	112	95.2	113	103
Bicarbonate	mg/L	335	383	391	405	446	503	872	387	329	339	314	357	393	366	329	380	389	376	339	474	353	516	409	413
Chloride	mg/L	11.7	22.5	14.0	16.0	19.0	32.0	120	29	21	17	23	23	29	25.1	27.4	20.8	37.8	21.5	20.4	34.0	25.7	34.7	48.4	22.3
Carbonate	mg/L	<5	<5	<5	19	<5	27	196	13	17	<5	<5	<5	13	32.3	17.2	7.4	7.8	20.4	25.8	13.5	7.7	24.6	12.7	14.5
Conductivity (EC)	uS/cm	810	689	717	897	998	1440	2980	913	760	628	693	673	781	782	807	733	948	815	937	1210	855	1230	1420	978
Calcium	mg/L	17.7	22.5	20.8	19.6	30.1	30.6	12.8	32.3	18.3	20.8	25.4	26	24.4	17.6	42.4	24.2	17	28.6	33.2	24.4	42.4	33.3	37.6	41.3
Potassium	mg/L	7.3	20.6	11	10.8	16.1	18.9	21.1	19.1	18	15.3	17.9	18.8	16.8	17.5	22.7	15.8	17	21.2	22	20.9	27.6	30.2	29.2	22.2
Magnesium	mg/L	8.9	10.9	10.0	11.2	15.4	22.8	30.2	16.8	13.1	13.8	13.2	14	15.7	14.5	18.3	13.6	12.4	18.2	18.5	14.6	21.2	25.8	23.1	24.6
Sodium	mg/L	146	122	166	169	180	290	752	168	122	110	107	116	123	140	115	108	168	136	154	207	118	198	270	149
Sulfate	mg/L	116	22.6	83.3	85.1	145	264	421	137	69.4	43.6	68.3	62.1	51.4	46.3	87.4	36.6	108	85.6	122	160	89.4	167	280	138
Phosphorus	mg/L	Not required under previous permit												-	0.426	0.208	0.518	0.503	0.101	0.472	0.620	0.721	0.741	0.737	0.290
pH in H_20	pH	8.4	8.2	7.8	8.7	7.8	8.6	9.3	8.6	8.7	8.4	8.2	8.2	8.5	8.82	8.63	8.48	8.49	8.68	8.89	8.54	8.45	8.73	8.57	8.60
TDS (Calculated)	mg/L	476	411	497	529	631	942	1920	606	443	392	409	435	467	473	492	414	559	517	563	709	507	771	906	615
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	0.211	<0.050	<0.050	<0.05	<0.020	<0.020	<0.020	0.689	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.689	<0.022
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	189	204
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	357	362
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.478	0.472
Field Data																									
pH in H_20	pH	Not required under previous permit												8.36	8.22	9.22	8.26	8.45	9.1	9.32	8.68	9.0	9.2	10.1	-0.24
Conductivity (EC)	uS/cm													886	590	627	200	940	825	943	1233	876	1346	1488	1198

Table D.9: Chemical Analytical Results

Sample ID:		Lyons D.4																							
Site Number:		9																							
Date Sampled:	**Units**	**15-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**20-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**15-Oct-2004**	**20-Oct-2005**	**13-Oct-2007**	**3-Oct-2007**	**16-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**12-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	60	50	190	730	250	290	EMPTY	90	90	126	112	130	132	131	84.4	165	149	95	132	155	120	202	221	137
Ammonia-N	mg/L	<0.05	<0.05	0.06	1.59	0.89	5.69		0.16	0.73	0.42	0.68	<0.05	<0.05	0.065	<0.050	0.143	0.491	<0.050	0.055	0.137	0.111	3.04	1.82	0.397
Total Kjeldahl Nitrogen	mg/L	3.9	2.5	5	19.6	2.6	20.2		3.8	3.8	5.1	7.3	5.9	5.1	6.39	4.36	6.18	4.78	3.71	4.04	6.38	6.87	11.1	10.3	4.26
Total Organic Carbon	mg/L	33	20	47	184	156	26		33	33	47	48	51	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required by previous permit							Not required by previous permit					35	54	33.6	69.2	56.5	37.8	42	47.7	49.2	202	74.0	42.9
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0019	0.0088
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required by previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required by previous permit						EMPTY	Not required by previous permit					0.23	0.129	0.069	0.03	0.045	0.066	0.032	0.0313	0.0755	0.0785	0.0911	0.0764
Antimony	mg/L	0.0009	0.0009	0.003	<0.0004	0.0021	0.0011		0.0014	0.0021	0.0012	0.0016	0.0012	0.0006	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00069	0.00024	0.00047	0.00058	0.00024
Arsenic	mg/L	Not required by previous permit							Not required by previous permit					-	-	-	-	-	-	-	-	-	-	0.00685	0.00314
Barium	mg/L	0.097	0.106	0.143	0.677	0.388	0.399		0.181	0.245	0.136	0.297	0.133	0.057	0.0671	0.0785	0.0171	0.0556	0.0851	0.0658	0.124	0.0338	0.0643	0.0935	0.0406
Beryllium	mg/L	Not required by previous permit							Not required by previous permit					<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.052	<0.010	0.026	0.040	0.024
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000103	0.0000097	0.0000079	0.0000297	0.0000099
Chromium	mg/L	0.008	<0.005	0.007	0.032	0.028	0.017		0.01	0.016	0.008	0.025	0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00011	0.00042	0.00025	0.00033	0.00031
Cobalt	mg/L	<0.002	<0.002	<0.002	0.011	0.011	0.011		0.005	0.006	0.004	0.010	0.003	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00133	0.00063	0.00197	0.0022	0.00060
Copper	mg/L	0.004	0.004	0.007	0.024	0.027	0.02		0.055	0.015	0.008	0.02	0.006	0.004	0.002	0.004	<0.0010	0.0013	0.0012	0.0015	0.00181	0.00152	0.00243	0.00383	0.00123
Iron	mg/L	1.830	4.620	7.320	27.800	15.300	27.400		8.99	13.9	7.47	20.6	4.71	0.142	0.3	2.12	0.998	0.268	0.067	1.18	0.216	0.995	0.108	0.168	0.922
Lead	mg/L	<0.005	<0.005	<0.005	0.016	0.016	0.01		0.006	0.008	<0.005	0.012	<0.005	0.0001	0.0003	0.00065	<0.00010	<0.0050	<0.00010	0.00054	0.000267	0.00028	0.000059	0.000125	0.000283
Lithium	mg/L	Not required by previous permit							Not required by previous permit					-	-	-	-	-	-	-	-	-	-	0.0339	0.016
Manganese	mg/L													0.001	0.004	0.03	0.0484	0.0031	0.0022	0.0062	0.00197	0.00355	0.147	0.0927	0.00266
Mercury	mg/L	0.0004	<0.0002	<0.0002	<0.0002	0.0005	<0.0005		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	0.007	<0.005	0.008	0.01		0.007	0.008	<0.005	0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00953	0.00113	0.00311	0.00662	0.00164
Nickel	mg/L	0.003	0.003	0.014	0.039	0.056	0.039		0.021	0.023	0.013	0.030	0.013	0.008	0.0079	0.0057	<0.0020	0.0092	0.0072	0.0062	0.0126	0.00526	0.00965	0.0132	0.00455
Selenium	mg/L	Not required by previous permit							Not required by previous permit					0.0007	0.00095	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000626	0.000393	0.000497	0.000795	0.000262
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000019	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													0.01	0.008	0.0092	0.0024	0.0083	0.0026	0.0109	0.00518	0.0061	0.00269	0.0104	0.00661
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00446	0.000924
Vanadium	mg/L													0.006	0.0025	0.003	0.0014	0.0051	0.0018	0.0022	0.00199	0.00334	0.00415	0.00393	0.00222
Zinc	mg/L	0.038	0.025	0.058	0.029	0.605	0.088		0.032	0.143	0.063	0.079	0.021	0.012	<0.0020	<0.0020	<0.0020	0.0035	<0.0020	0.0066	<0.0010	0.0027	0.0017	<0.0010	0.0024
Routine Water																									
Ion Balance	%	98	108	100	99	114	105	EMPTY	104	103	105	102	98.1	98.6	99.9	109	92.8	94.8	110	104	98.9	110	97.7	112	101
Bicarbonate	mg/L	385	331	459	705	650	636		402	411	429	459	428	343	405	318	470	599	425	297	413	356	619	564	442
Chloride	mg/L	18.2	10.2	21.9	181.0	120.0	173.0		40	41	37	45	38	38	31.2	13.6	33.7	48.4	19.1	16.1	32.3	29.8	47.5	48.6	22.9
Carbonate	mg/L	<5	<5	<5	<5	<5	<5		9	<5	<5	<5	<5	42	17.4	6.4	<5.0	17.3	7.5	9.8	10.6	<5	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	742	713	745	1740	1390	1840		887	891	730	879	760	774	758	553	921	1090	730	559	834	675	1050	1050	734
Calcium	mg/L	23.1	20.5	21.9	39.5	45.9	56.6		39.1	29.5	27	28.2	24.4	22.7	20.5	27.7	29.4	31.9	36.6	25.3	28.7	23.5	28.8	28.6	22.2
Potassium	mg/L	12.5	9.2	20.9	93.4	75.8	54.1		28.9	28.9	32.8	34.9	32.8	23.5	25.6	21.5	38.7	39.3	35.4	28.5	36.0	35.6	45.2	43.5	26.8
Magnesium	mg/L	10.1	9.5	11.4	21.1	22.3	29.8		16.9	14.7	13.9	14.9	13.1	12.9	12	12.2	12.3	15.3	16.2	10.9	12.9	12.4	16.1	16.5	12.7
Sodium	mg/L	125	139	149	254	208	373		151	140	123	141	116	130	132	81.4	121	174	106	71.7	117	101	175	197	121
Sulfate	mg/L	51.7	83.2	38.9	36.2	37.4	224		105	73.1	10.7	34.3	12.3	22.8	15.3	6.13	36.5	15.7	6.24	5.18	25.8	6.68	14.9	28.9	5.32
Phosphorus	mg/L	Not required by previous permit							Not required by previous permit					-	0.507	1.39	5.07	1.48	0.361	1.88	0.531	2.2	0.98	1.89	0.614
pH in H_20	pH	8.2	8.4	7.7	8.4	7.7	8.2		8.5	8.4	8.4	8.2	8.1	9	8.59	8.43	8.37	8.56	8.41	8.57	8.50	8.4	8.06	8.29	8.23
TDS (Calculated)	mg/L	430	437	493	975	874	1180		591	540	460	524	447	461	453	325	507	637	436	314	467	389	640	644	431
Nitrate	mg/L	Not required by previous permit							Not required by previous permit					<0.1	<0.050	<0.050	0.092	<0.050	<0.050	<0.05	<0.020	<0.020	0.243	0.157	0.336
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010	0.086	<0.010	0.030
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.157	0.365
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	139	108
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	466	363
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.39	0.369
Field Data																									
pH in H_20	pH	Not required by previous permit						EMP	Not required by previous permit					9.08	8.19	9.24	7.94	8.33	8.6	8.16	8.86	8.5	8.6	10.2	6.14
Conductivity (EC)	uS/cm													919	580	867	300	1093	750	408	846	703	1170	1133	897

TETRA TECH

Table D.10: Chemical Analytical Results

Sample ID:		Magneson D.1																							
Site Number:		**10**																							
Date Sampled:	**Units**	**17-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**19-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**21-Oct-2003**	**15-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	50	70	110	90	130	80	140	120	120	88	126	244	186	96.3	134	280	211	149	257	197	320	323	268	339
Ammonia-N	mg/L	<0.05	0.27	0.85	1.6	1.42	0.36	0.53	0.21	0.79	0.13	0.13	0.13	<0.05	<0.050	0.167	0.134	0.138	0.086	0.157	0.215	0.571	0.200	0.123	0.104
Total Kjeldahl Nitrogen	mg/L	2.5	2.8	4.7	5.2	5.5	8.6	6.2	4.2	4.8	3.7	4.5	7.6	6.7	5.59	10.2	9.14	7.93	3.88	8.78	8.94	12.3	11.7	10.4	11.0
Total Organic Carbon	mg/L	20	24	38	32	44	53	55	43	43	37	45	54	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												55	34.7	72.3	85.5	64	77.4	58.1	93.9	106	323	91.0	102
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0017	0.0084
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.2	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.20	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												2.43	0.075	0.866	0.59	1.63	1.84	<0.01	0.326	0.168	0.0146	0.302	0.039
Antimony	mg/L	0.0005	0.001	0.0012	<0.0004	0.0008	0.0008	0.0012	0.0013	0.0013	0.001	0.0010	0.002	0.0009	<0.00040	0.00067	<0.00040	<0.00080	0.00049	<0.0004	0.00044	0.00045	0.00057	0.00059	0.0005
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0181	0.0175
Barium	mg/L	0.03	0.036	0.042	0.052	0.06	0.055	0.041	0.038	0.045	0.058	0.06	0.104	0.062	0.0618	0.0474	0.031	0.0645	0.0712	0.0308	0.0376	0.0623	0.0562	0.0720	0.0701
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Boron	mg/L													0.11	<0.050	0.115	0.072	0.086	0.085	0.087	0.087	0.107	0.091	0.091	0.091
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0003	<0.000050	0.000055	0.000055	<0.0010	0.000074	<0.00005	0.000043	0.00005	0.000038	0.000056	0.00005
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00104	0.00114	0.00096	0.00115	0.00092
Cobalt	mg/L	<0.002	<0.002	0.021	0.002	0.003	0.002	<0.002	<0.002	<0.002	0.002	0.002	0.005	<0.002	<0.0020	0.0026	0.0033	0.0044	0.0042	<0.002	0.00336	0.00442	0.00637	0.00608	0.0051
Copper	mg/L	0.004	0.002	0.011	0.006	0.014	0.009	0.012	0.005	0.005	0.096	0.226	0.162	0.139	0.0014	0.0922	0.169	0.198	0.107	0.484	0.309	0.094	0.0532	0.0521	0.0255
Iron	mg/L	<0.005	0.549	1.100	1.680	1.560	1.500	0.37	0.455	0.53	3.65	3.4	6.6	1.93	0.309	0.861	0.864	1.37	2.09	0.42	0.784	1.41	0.822	1.41	1.08
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0014	0.00032	0.00083	0.0006	<0.0050	0.00284	0.00039	0.00053	0.00134	0.00076	0.00118	0.00105
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0639	0.0537
Manganese	mg/L													0.029	0.0223	0.079	0.0699	0.232	0.440	0.0279	0.280	0.179	0.451	0.333	0.587
Mercury	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	0.0000205	<0.0000050	<0.0000050	<0.0000050	0.0000086
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	0.0054	<0.0050	0.005	<0.0050	<0.005	0.00595	0.00523	0.00447	0.00457	0.00327
Nickel	mg/L	0.007	0.01	0.016	0.012	0.014	0.011	0.013	0.013	0.01	0.015	0.02	0.022	0.022	0.0058	0.0239	0.0214	0.0316	0.0283	0.0226	0.0261	0.0287	0.0288	0.0293	0.0243
Selenium	mg/L	Not required under previous permit												0.0021	<0.00040	<0.0020	0.00069	0.00084	0.00067	0.00051	0.00076	0.00077	0.00096	0.00099	0.00080
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	0.000034	<0.000020	<0.000020	<0.000020
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000020	<0.000020	0.000023	<0.000020
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Titanium	mg/L													0.119	0.006	0.0546	0.0342	0.0754	0.0836	0.0031	0.0226	0.0135	0.00819	0.0552	0.00886
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00196	0.00185
Vanadium	mg/L													0.016	0.0034	0.0121	0.0106	0.0246	0.0201	0.0108	0.0139	0.0152	0.0155	0.0154	0.0131
Zinc	mg/L	0.023	0.017	0.014	0.01	0.021	0.062	0.008	0.008	0.049	0.08	0.021	0.051	0.015	<0.0020	0.0065	0.0103	0.0143	0.0174	0.0304	0.0055	0.0123	0.0091	0.0071	0.0076
Routine Water																									
Ion Balance	%	102	102	94	103	108	105	103	106	102	105	96.5	100	101	105	94.5	91.6	97.4	106	109	102	108	91.7	103	102
Bicarbonate	mg/L	346	328	465	360	646	590	675	746	717	434	483	471	516	251	481	440	482	453	434	474	540	688	617	609
Chloride	mg/L	73.1	70.5	96.1	97.0	110.0	159.0	161	149	158	94	101	123	157	12.2	149	126	142	136	151	147	174	200	197	202
Carbonate	mg/L	19	16	<5	48	<5	64	86	60	90	16	30	10	19	53.6	28.4	7.9	15.5	14.0	19.7	12.5	15	<5.0	17.9	16.1
Conductivity (EC)	uS/cm	1490	1150	1200	1420	1900	2160	2370	2500	2430	1410	1580	1430	1850	569	1930	1590	1750	1680	1830	1870	2030	2190	2150	2150
Calcium	mg/L	28.4	27	28.6	28.3	40.7	40.3	40.6	44.4	48.9	32.3	35.0	38.2	45.5	19.8	44.3	32.8	40.3	45.7	42.9	43.1	48.8	46.1	51.1	51.7
Potassium	mg/L	22.9	33.4	46.2	45.7	49.1	55.8	68	61.8	62.7	48.5	62.6	76.7	79.4	15.7	80.2	82.7	99.4	96.0	113	111	131	132	127	135
Magnesium	mg/L	13.0	11.5	11.2	12.3	20.5	22.0	26.1	24.7	25.5	16.0	17.5	18.9	23.2	7.6	20.2	14.3	19.7	19.9	19.3	18.9	25.1	24	26.9	31
Sodium	mg/L	280	211	222	250	357	404	495	520	528	280	270	245	302	110	288	208	251	263	284	250	304	305	327	326
Sulfate	mg/L	314	199	176	186	322	349	361	402	447	249	256	209	263	9.83	312	202	245	241	260	228	250	250	252	284
Phosphorus	mg/L	Not required under previous permit												-	0.8	5.38	5.26	4.69	4.29	6.43	5.71	7.1	7.43	8.88	8.91
pH in H_20	pH	8.8	8.7	7.8	9.1	8.2	8.9	9	8.9	9.0	8.6	8.6	8.4	8.5	9.24	8.72	8.47	8.6	8.53	8.7	8.50	8.54	8.3	8.54	8.52
TDS (Calculated)	mg/L	920	730	809	843	1250	1430	1550	1630	1710	952	1010	961	1150	352	1160	892	1050	1040	1110	1050	1220	1330	1310	1350
Nitrate	mg/L	Not required under previous permit												2	<0.050	0.138	0.419	0.517	0.882	0.473	0.662	0.43	1.4	0.958	1.12
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.020	0.034	<0.050	<0.020	<0.020
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.958	1.12
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	238	257
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	536	526
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.129	0.297
Field Data																									
pH in H_20	pH	Not required under previous permit												8.62	8.73	9.92	8.65	8.73	8.8	8.21	8.34	8.8	8.1	10.2	9.73
Conductivity (EC)	uS/cm													1738	500	2080	450	1772	1720	1872	1951	2030	2360	2290	2.66

Table D.11: Chemical Analytical Results

Sample ID:		Magneson D.2																							
Site Number:		**11**																							
Date Sampled:	**Units**	**17-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**19-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**15-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**12-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	250	220	370	590	260	550	EMPTY	340	160	395	165	349	231	EMPTY	124	185	EMPTY	298	215	267	126	188	160	114
Ammonia-N	mg/L	4.6	2.09	4.98	4.83	5	2.31		6.22	10.5	6.03	2.71	0.19	6.04		0.605	0.82		0.187	0.094	0.241	0.076	0.749	0.137	0.063
Total Kjeldahl Nitrogen	mg/L	20.5	18.8	23.3	19.4	3.6	30.1		31.8	17.2	22	12.0	16.7	23.7		16.7	11.5		4.11	8.76	13.6	4.64	8.26	6.13	3.46
Total Organic Carbon	mg/L	96	88	183	154	100	144		170	66	114	61	125	-		-	-		-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit							Not required under previous permit					117		51.2	77		51.9	39.3	35.6	41.3	188	60.0	33.5
Phenols	mg/L													-		-	-		-	-	-	-	-	0.0028	0.0142
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit						EMPTY	Not required under previous permit					<0.0005	EMPTY	<0.00050	<0.00050	EMPTY	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005		<0.00050	<0.00050		<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005		<0.00050	<0.00050		<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-		-	-		-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-		-	-		-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005		<0.00071	<0.00071		<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-		-	-		-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1		<0.10	<0.10		<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1		<0.10	<0.10		<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.2		<0.25	<0.25		0.44	<0.25	<0.20	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit						EMPTY	Not required under previous permit					0.33	EMPTY	0.021	0.095	EMPTY	0.016	0.018	0.0069	0.132	0.0858	0.217	0.168
Antimony	mg/L	0.0005	0.0007	0.0014	0.0004	0.0008	0.0007		0.0026	0.0021	0.0013	0.0020	0.0015	0.0011		0.00044	0.00047		<0.00040	<0.0004	0.00040	0.00021	0.00034	0.00024	0.00018
Arsenic	mg/L	Not required under previous permit							Not required under previous permit							-	-		-	-	-	-	-	0.0137	0.00332
Barium	mg/L	0.726	1.28	0.967	1.3	1.03	1.04		1.9	0.343	0.967	0.394	1.08	0.147		0.0544	0.0685		0.124	0.0733	0.0963	0.0276	0.0547	0.0136	0.0524
Beryllium	mg/L	Not required under previous permit							Not required under previous permit					<0.001		<0.0010	<0.0010		<0.0010	<0.001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
Boron	mg/L													0.07		0.058	<0.050		0.058	<0.05	0.038	0.038	0.028	0.036	0.024
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001		<0.000050	<0.000050		<0.000050	<0.00005	0.0000095	0.0000108	0.0000207	0.0000249	0.0000153
Chromium	mg/L	0.019	0.052	0.047	0.085	0.07	0.096		0.147	0.022	0.059	0.033	0.075	<0.005		<0.0050	<0.0050		<0.0050	<0.005	0.00013	0.00034	0.00027	0.00053	0.00034
Cobalt	mg/L	0.008	<0.002	0.044	0.018	0.016	0.031		0.042	0.008	0.019	0.011	0.021	0.003		0.002	<0.0020		0.0024	0.0028	0.00197	0.00079	0.00164	0.00070	0.00057
Copper	mg/L	0.015	0.04	0.037	0.031	0.033	0.052		0.102	0.016	0.035	0.026	0.045	0.01		0.0091	0.0044		<0.0010	<0.001	0.00078	0.00204	0.00454	0.00276	0.00211
Iron	mg/L	22.7	67.4	56.8	76.8	56.6	120		130	18.2	65.4	30.3	71.7	0.24		0.11	0.159		0.725	0.987	0.592	0.7	0.134	0.197	1.43
Lead	mg/L	0.017	0.009	<0.005	0.031	0.032	0.054		0.07	0.011	0.043	0.019	0.045	0.0002		<0.00010	0.00014		0.00014	0.00034	0.000141	0.000212	0.000154	0.000151	0.000582
Lithium	mg/L	Not required under previous permit							Not required under previous permit					-		-	-		-	-	-	-	-	0.0124	0.0104
Manganese	mg/L													0.197		0.0342	0.0063		0.424	0.344	0.384	0.00264	0.0402	0.0111	0.00213
Mercury	mg/L	0.0002	0.0002	<0.0002	<0.0002	0.0002	<0.0002		<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0001		<0.00010	<0.00010		<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005
Molybdenum	mg/L	<0.005	<0.005	0.005	<0.005	<0.005	0.007		0.01	0.018	0.007	0.009	<0.005	0.021		<0.0050	<0.0050		0.0129	<0.005	0.0162	0.00198	0.00451	0.00352	0.00111
Nickel	mg/L	0.022	0.086	0.07	0.052	0.077	0.079		0.111	0.028	0.049	0.033	0.055	0.019		0.0149	0.014		0.0118	0.0104	0.0129	0.00687	0.0105	0.00544	0.00512
Selenium	mg/L	Not required under previous permit							Not required under previous permit					0.002		<0.0020	0.00074		0.00051	<0.0004	0.000899	0.000297	0.000603	0.000474	0.000263
Silver	mg/L													<0.0001		<0.00010	<0.00010		<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001		<0.00010	<0.00010		<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000018	<0.000010
Tin	mg/L													<0.05		<0.050	<0.050		<0.050	<0.05	<0.00010	<0.00010	0.00025	<0.00010	<0.00010
Titanium	mg/L													0.025		0.0027	0.0065		0.0019	0.0018	0.00171	0.0056	0.00306	0.0158	0.0141
Uranium	mg/L															-	-		-	-	-	-	-	0.00188	0.000954
Vanadium	mg/L													0.008		0.0074	0.0069		0.0075	0.0019	0.00533	0.00443	0.0038	0.0122	0.00364
Zinc	mg/L	0.068	0.232	0.188	0.109	0.381	0.274		0.384	0.126	0.198	0.125	0.192	0.01		<0.0020	0.0024		<0.0020	0.0065	0.0013	0.0019	0.0037	<0.0010	0.0015
Routine Water																									
Ion Balance	%	101	97	105	107	112	107	EMPTY	101	104	102	100	98.7	96	EMPTY	110	91.3	EMPTY	102	107	97	114	92.1	107	102
Bicarbonate	mg/L	597	520	514	562	541	521		847	495	598	318	592	745		335	501		457	297	409	241	527	332	296
Chloride	mg/L	94.2	64.0	71.3	97.0	71.0	145.0		187	109	102	80	72	168		56.9	42.7		41.8	25.6	63.5	22.4	54.4	48.5	19.2
Carbonate	mg/L	<5	<5	<5	<5	<5	<5		<5	<5	6	<5	7	<5		9.9	11.5		14.5	11.8	6.0	<5	<5.0	12.7	<5.0
Conductivity (EC)	uS/cm	1310	998	922	1190	1070	1350		1600	1350	1160	904	1120	1780		832	946		853	590	904	499	967	760	516
Calcium	mg/L	42.4	27.1	31.9	34.2	47.8	88.6		84.5	55.7	47.1	24.4	37.5	54.6		38.1	30.7		44.8	34.4	40.5	22.8	26.1	19.9	20.8
Potassium	mg/L	75	68.8	58.1	66.3	73.6	94.8		101	69.4	74.6	48.9	71.2	79.8		47.8	45.3		57.6	38.3	51.5	34	45.8	39.1	32.9
Magnesium	mg/L	19.0	12.7	13.5	15.5	23.4	38.7		33.1	19.8	19.9	10.3	17.8	24.6		15.8	12.2		16.9	12.6	13.7	9.57	12.2	8.43	9.31
Sodium	mg/L	187	148	172	199	166	231		251	185	173	128	169	262		110	121		98.3	61.5	99.8	58.6	143	128	69.1
Sulfate	mg/L	53	26	35.5	27.5	23	74		62.7	157	32.4	73.3	28.1	116		45.2	3.76		3.38	0.8	16.6	2.91	14.1	21.6	5.44
Phosphorus	mg/L	Not required under previous permit							Not required under previous permit					-		4.56	2.48		1.69	2.42	1.35	1.93	0.622	2.28	1.21
pH in H_20	pH	8.2	8.0	7.5	8.2	7.7	8.0		8.3	8.3	8.4	7.9	8.3	8.2		8.49	8.5		8.53	8.64	8.40	8.28	8.26	8.68	8.19
TDS (Calculated)	mg/L	765	602	636	716	650	603		1140	841	752	525	702	1070		491	514		502	331	494	270	559	442	303
Nitrate	mg/L	Not required under previous permit							Not required under previous permit					0.2		0.574	0.06		<0.050	<0.05	<0.020	0.248	0.176	<0.020	0.253
Nitrite	mg/L													-		<0.050	<0.050		<0.050	<0.02	<0.010	<0.010	0.017	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-		-	-		-	-	-	-	-	<0.022	0.253
Hardness as $CaCO_3$	mg/L													-		-	-		-	-	-	-	-	84.4	90.3
Alkalinity (total as $CaCO_3$)	mg/L													-		-	-		-	-	-	-	-	293	242
Hydroxide	mg/L													-		-	-		-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-		-	-		-	-	-	-	-	0.284	0.228
Field Data																									
pH in H_20	pH	Not required under previous permit												na	EMPTY	9.95	8.45	EMPTY	8.6	8.45	9.09	8.8	8.8	11.4	10.3
Conductivity (EC)	uS/cm													na		997	300		864	433	931	508	1052	786	650

Table D.12: Chemical Analytical Results

Sample ID:		Magneson D.3																							
Site Number:		**12**																							
Date Sampled:	**Units**	**17-Oct-1996**	**Oct. 3, 97**	**8-Oct-1998**	**19-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**15-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**19-Oct-2010**	**12-Oct-2011**	**15-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	10	30	30	50	40	40	30	30	30	40	39	49	53	57.2	45.1	42	49	37	59	49	37	57	Not analyzed	119
Ammonia-N	mg/L	0.06	<0.05	0.05	<0.05	<0.05	<0.05	0.12	<0.05	0.38	<0.05	<0.05	0.1	<0.05	<0.050	<0.050	<0.050	0.116	<0.050	<0.05	0.252	<0.050	<0.050		<0.050
Total Kjeldahl Nitrogen	mg/L	1.3	<0.2	1.1	1	0.9	2.9	1.1	1.3	1.5	1	0.9	1.2	1.5	1.86	1.65	1.22	1.77	1.44	1.48	1.97	1.29	1.79		3.49
Total Organic Carbon	mg/L	9	12	13	13	12	13	14	12	16	14	14	17	-	-	-	-	-	-	-	-	-	-		-
Dissolved Organic Carbon	mg/L	Not required under previous permit												18	20.1	15.1	17.8	19.1	19.5	15.5	17.6	17.3	57		17.9
Phenols	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		0.0136
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	Not analyzed	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050		<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050		<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-		<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-		<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071		<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-		<0.00050
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10		<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10		<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.20	<0.13	<0.10		<0.10
Dissolved Metals																									
Antimony	mg/L	0.0004	0.0008	0.0012	<0.0004	0.0006	0.0005	0.0011	0.0011	0.0012	0.0014	0.0011	0.0018	0.0005	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00054	0.00031	0.00027	Not analyzed	0.00029
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		0.00194
Barium	mg/L	0.039	0.041	0.039	0.069	0.053	0.058	0.082	0.058	0.079	0.047	0.047	0.071	0.066	0.0646	0.0455	0.0687	0.0798	0.0262	0.0425	0.0968	0.0264	0.0913		0.0773
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000084	0.0000249	0.0000585		0.0000188
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010		0.00016
Cobalt	mg/L	0.002	0.002	0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00024	0.00018	0.00039		0.00052
Copper	mg/L	0.006	0.002	0.009	0.002	0.004	0.004	0.007	0.005	0.007	0.003	0.003	0.002	0.002	0.0022	0.0087	0.0011	0.0015	0.0016	0.0014	0.00136	0.0013	0.00283		0.00242
Iron	mg/L	<0.005	0.982	0.603	0.977	0.266	0.810	2.36	1.48	3.32	0.437	1.07	0.872	0.032	0.071	0.014	0.102	0.047	0.036	<0.01	0.018	<0.010	0.019		0.015
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050	0.000087		<0.000050
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		0.0409
Molybdenum	mg/L	0.008	<0.005	0.007	0.006	<0.005	0.006	0.007	0.008	0.007	0.006	0.006	<0.005	0.007	0.0072	0.0217	0.0146	0.0169	0.0225	0.0212	0.0302	0.0302	0.0206		0.0254
Nickel	mg/L	0.013	0.009	0.015	0.008	0.01	0.008	0.011	0.009	0.012	0.007	0.007	0.007	0.007	0.0081	0.0105	0.0113	0.0116	0.0127	0.013	0.0191	0.0172	0.0121		0.0203
Zinc	mg/L	0.016	0.015	0.031	0.009	<0.001	0.032	0.01	0.009	0.066	0.004	0.009	0.009	0.009	<0.0020	<0.0020	0.0021	<0.0020	<0.0020	0.0079	0.0021	0.0015	0.0057		0.0028
Mercury	mg/L	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050		<0.0000050
Aluminium	mg/L	Not required under previous permit												0.02	0.082	0.011	0.012	0.031	0.039	<0.01	0.0233	0.0023	0.0149		0.0033
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010		<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	0.058	0.055	0.055	0.053	0.065	0.061	0.071		0.060
Manganese	mg/L													0.002	0.0026	<0.0020	<0.0020	<0.0020	0.0020	<0.002	0.0009	0.00027	0.0211		0.00123
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010		<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	0.00033		<0.00010
Selenium	mg/L													0.0007	0.00054	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000412	0.000322	0.000233		0.000304
Titanium	mg/L													0.001	0.0037	<0.0010	<0.0010	0.0023	0.0025	<0.001	0.00114	<0.00030	0.00144		<0.00030
Thallium	mg/L													0.0002	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010		<0.000010
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-		0.00247
Vanadium	mg/L													0.001	<0.0010	0.0015	0.0034	0.005	0.0127	0.0096	0.00866	0.0164	0.00285		0.00262
Routine Water																									
Ion Balance	%	103	106	109	103	105	108	97.6	104	102	109	104	103	99.5	92.3	95.7	93.6	94.2	104	104	94.5	99.8	94.8	Not analyzed	102
Bicarbonate	mg/L	237	198	227	222	222	246	247	200	261	225	224	256	268	228	189	267	290	253	230	251	256	334		268
Chloride	mg/L	4.4	3.9	4.4	5.0	4.0	6.0	7	6	8	6	7	6	12	10.6	24	19.2	24.5	24.4	21.3	20.9	18.2	18.3		14.7
Carbonate	mg/L	<5	<5	<5	5	<5	<5	13	9	<5	<5	<5	<5	14	7.1	<5.0	7.1	6	6.7	8.4	<5.0	<5.0	6.4		<5.0
Conductivity (EC)	uS/cm	876	603	632	745	789	918	1050	909	1110	779	790	683	831	918	989	928	1060	993	957	987	943	1020		960
Calcium	mg/L	21.8	24.9	21.1	23	24.3	28.7	22.8	21.6	35.6	37.5	26.3	27.5	25.7	19	25.5	34.4	27.4	26.4	24.4	31.3	27.9	29.1		49.1
Potassium	mg/L	6.9	6.6	7.3	7.3	7.8	8.4	9.5	7.1	7.7	7.1	8.4	8.5	8.6	8.39	8.8	8.06	10.9	11.6	10.7	11.5	10.4	11.1		13.6
Magnesium	mg/L	8.0	6.4	7.9	8.8	10.2	12.0	13	10	11.0	10.6	10.4	9.9	12.4	12.4	13.1	13.5	14.2	16.0	14.7	11.8	15.5	15.3		17.4
Sodium	mg/L	168	100	130	129	139	181	213	174	201	145	140	107	140	154	153	132	171	172	162	142	153	162		139
Sulfate	mg/L	238	124	149	168	198	246	331	267	333	220	205	119	166	257	282	203	252	239	229	231	234	209		252
Phosphorus	mg/L	Not required under previous permit													0.055	0.161	0.118	0.091	0.051	0.132	0.134	0.038	0.051		0.185
pH in H_20	pH	8.4	8.4	7.9	8.6	8.4	8.3	8.3	8.7	8.3	8.4	8.3	8.5	8.7	8.51	8.44	8.51	8.49	8.46	8.62	8.36	8.23	8.44		8.38
TDS (Calculated)	mg/L	565	365	431	456	493	595	722	593	725	540	508	409	511	581	603	549	649	620	583	576	585	616		623
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.020	<0.020	<0.020		0.029
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010	<0.010		<0.010
Nitrate and Nitrite (as N)	mg/L	Not analyzed																							0.029
Hardness as CaCO3	mg/L																								194
Alkalinity (total as CaCO3)	mg/L																								227
Hydroxide	mg/L																								<5.0
Fluoride	mg/L																								0.465
Field Data																									
pH in H_20	pH	Not required under previous permit												8.72	8.24	8.85	8.57	8.86	9.2	8.68	8.57	8.8	8.8	Not analyzed	11.68
Conductivity (EC)	uS/cm													867	750	1055	689	1053	1007	693	996	930	1116		1203

Table D.13: Chemical Analytical Results

Sample ID:		Magneson D.4																						
Site Number:		**13**																						
Date Sampled:	**Units**	**7-Oct-1997**	**8-Oct-1998**	**19-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**14-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	350	1430	680	1450	5260	EMPTY	1270	EMPTY	259	1120	1070	1440	EMPTY	4810	1220	1550	1560	1580	1190	1300	1930	960	1370
Ammonia-N	mg/L	9.72	2.35	2.41	14.6	1.73		0.77		0.26	1.48	1.37	0.67		5.11	4.39	2.04	2.24	0.828	1.37	3.13	1.37	0.409	2.85
Total Kjeldahl Nitrogen	mg/L	27.8	86.2	30.7	<3	91.2		58.2		11.9	45.1	44.4	71		128	44.6	63.8	49.7	54.7	52.8	56.1	62	39.4	43.7
Total Organic Carbon	mg/L	168	714	187	813	1690		356		105	271	251	-		-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit						ired under previo		Not required under previous permit			527		1430	554	392	756	609	531	507	1930	329	415
Phenols	mg/L												-		-	-	-	-	-	-	-	-	<0.01	0.0116
BTEX, F1 (C6-C10) and F2 (>C10-C16)																								
Benzene	mg/L	Not required under previous permit					EMPTY	ired under previo	EMPTY	Not required under previous permit			<0.0005	EMPTY	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L												<0.0005		0.00318	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L												<0.0005		0.00107	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L												-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L												-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L												<0.0005		0.00825	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L												-		-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L												<0.1		<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L												<0.1		<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L												<0.2		<0.625	<0.25	<0.25	<0.25	<0.25	<0.20	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																								
Aluminium	mg/L	Not required under previous permit					EMPTY	ired under previo	EMPTY	Not required under previous permit			<0.2	EMPTY	0.23	0.617	1.09	0.45	0.075	5.79	0.273	0.149	0.145	0.080
Antimony	mg/L	<0.0002	0.003	<0.0004	0.0034	0.0021		0.0007		0.0019	<0.0004	0.0012	<0.008		<0.0080	<0.00080	0.00121	<0.01	<0.001	0.0013	0.00082	0.00088	0.00082	0.00064
Arsenic	mg/L	Not required under previous permit						ired under previo		Not required under previous permit			-		-	-	-	-	-	-	-	-	0.0327	0.0275
Barium	mg/L	0.383	1.09	0.208	1.29	0.998		0.137		0.083	0.03	0.736	<0.06		0.317	0.0722	0.305	0.113	0.137	0.330	0.188	0.236	0.383	0.166
Beryllium	mg/L	Not required under previous permit						ired under previo		Not required under previous permit			<0.02		<0.010	<0.0020	<0.0010	<0.050	<0.001	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050
Boron	mg/L												<1		0.48	<0.10	0.318	<1.0	0.28	0.270	0.289	0.302	0.267	0.204
Cadmium	mg/L	<0.001	<0.001	<0.001	0.002	<0.001		<0.001		<0.001	<0.001	<0.001	<0.002		<0.0010	<0.00010	<0.0010	<0.0010	0.00017	0.000114	0.000094	0.000061	0.000064	0.000079
Chromium	mg/L	0.039	0.079	0.026	0.114	0.055		0.018		0.005	<0.005	0.07	<0..1		<0.0080	<0.010	0.0057	<0.010	<0.005	0.0119	0.00483	0.00492	0.00482	0.00285
Cobalt	mg/L	0.024	0.063	0.011	0.069	0.061		0.008		0.006	0.003	0.036	<0.04		0.0218	<0.0040	0.013	0.014	0.0144	0.0154	0.0128	0.0108	0.00594	0.00794
Copper	mg/L	0.017	0.084	0.017	0.136	0.188		0.018		0.0011	0.008	0.078	0.02		0.016	0.0031	0.0283	0.024	0.0335	0.0263	0.0138	0.0093	0.0069	0.0093
Iron	mg/L	29.100	80.000	14.900	93.800	98.300		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
Lead	mg/L	0.011	0.009	0.005	0.048	0.043		0.007		<0.005	<0.005	0.033	<0.002		0.003	0.00103	<0.0050	<0.0050	0.0044	0.00689	0.00385	0.00305	0.00422	0.00304
Lithium	mg/L	Not required under previous permit						ired under previo		Not required under previous permit			-		-	-	-	-	-	-	-	-	0.128	0.0902
Manganese	mg/L												0.3		1.83	1.18	1.18	0.649	0.615	1.15	0.945	1.06	1.39	0.748
Mercury	mg/L	0.0009	<0.0002	<0.0002	0.0008	<0.0002		<0.0002		<0.0002	<0.0002	<0.0002	<0.0001		<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	0.0000184	<0.000050	<0.0000050	<0.000050	<0.000050
Molybdenum	mg/L	0.006	0.019	0.006	0.036	0.017		0.005		0.021	<0.005	0.005	0.03		<0.0050	<0.010	0.0189	0.0409	0.0078	0.0179	0.00911	0.00492	0.00333	0.00193
Nickel	mg/L	0.059	0.18	0.047	0.212	0.201		0.029		0.024	0.011	0.099	0.07		0.0998	0.0122	0.0658	0.085	0.0507	0.0553	0.0497	0.045	0.0350	0.0350
Selenium	mg/L	Not required under previous permit						ired under previo		Not required under previous permit			0.014		<0.040	<0.00080	0.00225	<0.010	0.0016	0.00339	0.00192	0.00218	0.00159	0.00142
Silver	mg/L												<0.002		<0.0020	<0.00020	<0.0050	<0.0010	<0.0001	0.00014	0.000092	0.000075	0.00009	<0.000050
Thallium	mg/L												<0.002		<0.0010	<0.00020	<0.050	<0.0050	<0.0001	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050
Tin	mg/L												<1		<0.050	<0.10	<0.050	<0.050	<0.05	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050
Titanium	mg/L												<0.02		0.128	0.0338	0.0989	0.083	0.0437	0.334	0.0677	0.0592	0.0716	0.0444
Uranium	mg/L												-		-	-	-	-	-	-	-	-	0.00295	0.00214
Vanadium	mg/L												0.06		0.0793	0.0072	0.0345	0.055	0.033	0.0481	0.0336	0.0351	0.0277	0.0286
Zinc	mg/L	0.149	0.424	0.027	0.505	1.92		0.067		0.073	0.015	0.261	<0.04		0.094	0.0106	0.0284	<0.10	0.053	0.047	0.0421	0.0297	0.0247	0.032
Routine Water																								
Ion Balance	%	104	102	105	107	107	EMPTY	103	EMPTY	102	111	98.1	95	EMPTY	115	91.8	96.1	96.8	101	97.9	114	98.6	101	110
Bicarbonate	mg/L	1240	1650	1450	2200	2500		1890		883	1570	1470	2830		2220	1320	2350	3210	1490	1540	1080	1830	1580	1310
Chloride	mg/L	505	868	674	1420	2530		1640		424	921	605	2040		1190	480	1030	1930	807	744	615	932	894	603
Carbonate	mg/L	29	70	95	<5	189		81		53	57	75	359		73	49.9	140	341	138	88.6	65.1	94.1	87.5	47.6
Conductivity (EC)	uS/cm	3620	4920	4510	7690	11700		8430		3000	6190	3980	11500		7840	4020	7490	11,800	5830	5640	4620	6910	6470	4570
Calcium	mg/L	86.3	113	74.1	205	212		244		113	144	108	61.9		177	86.6	165	119	93.5	113	89.2	105	118	84.2
Potassium	mg/L	322	492	359	1090	1310		1120		329	678	545	1260		1290	481	976	1550	788	728	610	870	717	634
Magnesium	mg/L	61.4	95.8	84.0	142.0	198.0		246		67.0	112	56	177		112	44.9	90.6	148	60.8	59.2	60.3	90	84.4	71.6
Sodium	mg/L	517	870	709	1220	2450		1540		432	838	515	1760		915	365	898	1700	680	591	560	881	844	596
Sulfate	mg/L	140	418	126	555	713		2150		448	751	174	826		341	141	521	856	343	331	308	659	637	361
Phosphorus	mg/L	Not required under previous permit						ired under previo		Not required under previous permit			-		44	30	44.5	48.1	41.6	34.4	34.8	44.7	31.3	26.9
pH in H_20	pH	8.5	8.4	8.7	8.2	8.7		8.5		8.6	8.5	8.7	8.8		8.54	8.56	8.72	8.88	8.96	8.73	8.74	8.74	8.73	8.64
TDS (Calculated)	mg/L	2270	3740	2830	5410	8260		7950		2300	4060	2800	7880		5290	2290	4980	8220	3640	3420	2840	4580	4160	3040
Nitrate	mg/L	Not required under previous permit						ired under previo		Not required under previous permit			0.2		<5.0	<1.0	<0.50	<1.0	0.36	0.86	<0.10	1.35	0.33	0.570
Nitrite	mg/L												-		<0.50	<1.0	<0.50	<1.0	0.11	<0.050	<0.050	<0.050	<0.050	0.083
Nitrate and Nitrite (as N)	mg/L												-		-	-	-	-	-	-	-	-	0.33	0.65
Hardness as $CaCO_3$	mg/L												-		-	-	-	-	-	-	-	-	642	505
Alkalinity (total as $CaCO_3$)	mg/L												-		-	-	-	-	-	-	-	-	1440	1150
Hydroxide	mg/L												-		-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L												-		-	-	-	-	-	-	-	-	<0.1	<0.10
Field Data																								
pH in H_20	pH	Not required under previous permit											na	EMPTY	9.00	8.34	8.84	9.1	8.79	8.76	9.2	8.7	10.4	9.81
Conductivity (EC)	uS/cm												na		7290	300	7640	1201	5190	5720	4480	7210	2230	6.83

Table D.14: Chemical Analytical Results

Sample ID:		Magneson D.5																						
Site Number:		**14**																						
Date Sampled:	**Units**	**7-Oct-1997**	**8-Oct-1998**	**19-Oct-1999**	**10-Oct-2000**	**5-Oct-2001**	**8-Oct-2002**	**15-Oct-2003**	**15-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	90	120	130	120	280	440	240	130	156	117	153	191	181	98.2	156	178	146	100	146	184	268	243	370
Ammonia-N	mg/L	0.05	0.32	0.1	0.08	<0.05	0.13	0.05	1.15	<0.05	1.04	0.52	0.95	0.432	0.087	0.135	0.084	<0.050	0.704	1.38	0.138	2.42	0.455	0.600
Total Kjeldahl Nitrogen	mg/L	3.7	5.1	5.2	4.6	14.2	21.5	8.2	7	5.9	7.5	6.6	8.6	9.67	8.29	5.73	7.03	4.24	4.16	6.24	6.84	11.6	10.0	13.9
Total Organic Carbon	mg/L	34	45	49	47	76	201	49	52	63	46	56	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit											60	68.7	61.6	57.5	60.5	49.1	36.8	55.1	62.4	268	88.0	100
Phenols	mg/L												-	-	-	-	-	-	-	-	-	-	0.0025	0.0071
BTEX, F1 (C6-C10) and F2 (>C10-C16)																								
Benzene	mg/L	Not required under previous permit											<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L												-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L												-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L												<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L												-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L												<0.2	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																								
Aluminium	mg/L	Not required under previous permit											1.16	0.057	0.031	0.035	0.106	0.203	<0.01	0.0288	0.0636	0.297	0.0245	0.0182
Antimony	mg/L	<0.0002	0.001	0.0009	0.0009	0.001	0.0022	0.0023	0.0021	0.0012	0.0022	0.0015	0.003	0.00138	0.00082	0.00072	0.00099	0.00104	0.00047	0.00055	0.00049	0.00045	0.00101	0.00073
Arsenic	mg/L	Not required under previous permit											-	-	-	-	-	-	-	-	-	-	0.019	0.0155
Barium	mg/L	0.068	0.081	0.092	0.063	0.121	0.188	0.191	0.197	0.057	0.327	0.083	0.09	0.0835	0.0459	0.0428	0.0737	0.0697	0.0402	0.0616	0.0324	0.0255	0.0764	0.0337
Beryllium	mg/L	Not required under previous permit											<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Boron	mg/L												<0.05	<0.050	0.056	<0.050	<0.050	<0.050	<0.05	0.032	0.038	<0.020	<0.020	0.048
Cadmium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	0.00005	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000010	<0.000010	<0.000010	0.000019	0.000012
Chromium	mg/L	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	0.024	0.019	<0.005	0.047	0.008	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00020	0.00043	0.00068	0.00025	0.00055
Cobalt	mg/L	0.005	0.022	0.004	0.003	0.003	0.008	0.014	0.01	0.004	0.015	0.005	0.004	0.0034	0.0035	0.0034	<0.0020	<0.0020	0.003	0.00218	0.00169	0.00234	0.00364	0.00428
Copper	mg/L	<0.001	0.014	0.009	0.007	0.008	0.032	0.028	0.016	0.005	0.031	0.008	0.008	0.0055	0.0118	0.0063	0.0035	0.0031	0.0023	0.00201	0.00214	0.00112	0.0052	0.00527
Iron	mg/L	2.770	3.470	3.220	1.510	4.460	6.480	15.2	13.1	0.725	32.2	3.34	0.726	0.059	0.064	0.05	0.098	0.143	<0.01	<0.020	0.322	0.223	0.070	0.277
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.01	0.009	<0.005	0.025	<0.005	0.0086	<0.00010	<0.00010	<0.00010	<0.0050	0.00020	<0.0001	<0.00010	0.00024	0.00021	0.00011	0.00037
Lithium	mg/L	Not required under previous permit											-	-	-	-	-	-	-	-	-	-	0.0576	0.0533
Manganese	mg/L												0.066	<0.0020	0.0384	0.0024	0.0033	0.0047	0.0375	0.00208	0.0381	0.633	0.00515	0.220
Mercury	mg/L	<0.0004	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000118	<0.0000050	<0.0000050	0.0000063
Molybdenum	mg/L	<0.005	0.005	0.007	0.007	0.012	0.065	0.014	0.019	0.016	0.015	0.008	0.04	0.0326	0.0122	0.0191	0.0458	0.0444	0.0131	0.0218	0.00595	0.00653	0.0110	0.00592
Nickel	mg/L	0.011	0.024	0.02	0.019	0.019	0.071	0.056	0.042	0.025	0.055	0.025	0.033	0.0319	0.0283	0.0314	0.0408	0.0253	0.0204	0.0236	0.0165	0.0168	0.0232	0.0225
Selenium	mg/L	Not required under previous permit											0.0018	0.002	<0.0020	0.00121	0.00091	0.00072	0.00063	0.00087	0.00067	0.00062	0.00078	0.00088
Silver	mg/L												<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Thallium	mg/L												<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000020	<0.000020	<0.00002	<0.000020
Tin	mg/L												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Titanium	mg/L												0.05	0.0037	0.0041	0.0015	0.0037	0.0164	<0.001	0.00148	0.00805	0.0116	0.00511	0.00459
Uranium	mg/L												-	-	-	-	-	-	-	-	-	-	0.00351	0.0023
Vanadium	mg/L												0.009	0.0044	0.0074	0.0294	0.0365	0.0286	0.0162	0.0138	0.0178	0.018	0.0188	0.0269
Zinc	mg/L	0.032	0.052	0.013	0.064	0.246	0.031	0.098	0.168	0.01	0.210	0.036	0.006	0.0108	0.003	0.0021	<0.0020	<0.0020	0.0071	<0.0020	0.0028	0.0033	<0.0020	0.004
Routine Water																								
Ion Balance	%	109	100	108	105	107	102	98.2	107	104	102	98.7	100	104	105	91.5	95.3	103	111	94.5	107	94.4	99.5	104
Bicarbonate	mg/L	360	529	455	408	571	1370	482	622	565	658	533	687	664	491	537	709	549	521	713	589	1100	932	850
Chloride	mg/L	40.9	51.6	57.0	60.0	109.0	323.0	104	103	106	99	95	140	126	76.7	82.1	114	89.3	54.9	81.4	71.4	143	145	175
Carbonate	mg/L	26	<5	60	45	69	89	20	19	19	<5	22	29	67.1	19.8	73	46.7	68.9	42.9	40.3	22.4	18.7	37.6	21.7
Conductivity (EC)	uS/cm	1020	976	1200	1030	1460	3320	1410	1700	1530	1500	1420	1830	1810	1280	1610	1950	1480	1370	1640	1520	2080	2030	2120
Calcium	mg/L	30.4	31.1	32	23.7	33.1	36.3	43	48.5	46.2	23.7	30.9	33.8	30	31.8	39.7	32.9	29.2	33.7	34.3	38.5	43.4	35.6	50.3
Potassium	mg/L	40.4	43.2	42.2	32.6	35.1	43.1	57.1	52.5	48.1	35.7	52.6	42.9	40.6	57	52.1	45	40.3	42	44.9	54.5	83.8	67.2	119
Magnesium	mg/L	11.8	12.2	13.5	10.5	12.3	23.2	15.1	18.7	17.2	9.7	15.3	14.2	15.3	13.2	16.9	14.6	11.3	15.6	13.5	20.4	26.1	18.2	35.9
Sodium	mg/L	194	184	238	205	367	802	253	307	323	299	235	359	388	227	252	363	296	261	274	263	375	391	353
Sulfate	mg/L	146	75.2	101	70.2	55	152	221	250	179	97.6	117	162	157	114	172	210	99.7	117	74.4	144	45.4	71.6	162
Phosphorus	mg/L	Not required under previous permit											-	0.77	3.05	2.74	1.27	0.994	1.52	1.40	5.4	5.82	2.99	10.1
pH in H_20	pH	8.9	8.3	9.1	9.0	9.0	8.7	8.6	8.5	9.0	8.3	8.6	8.6	8.89	8.57	8.99	8.85	9.06	8.86	8.71	8.64	8.45	8.66	8.53
TDS (Calculated)	mg/L	666	661	767	647	904	2110	953	1140	1070	889	831	1120	1150	788	952	1170	905	823	915	904	1300	1230	1340
Nitrate	mg/L	Not required under previous permit											<0.1	<0.050	1.68	<0.050	<0.050	<0.050	0.075	<0.040	<0.040	0.19	<0.040	0.557
Nitrite	mg/L												-	<0.050	<0.050	<0.050	<0.050	<0.050	0.029	<0.020	<0.020	0.053	<0.020	<0.020
Nitrate and Nitrite (as N)	mg/L												-	-	-	-	-	-	-	-	-	-	<0.045	0.557
Hardness as $CaCO_3$	mg/L												-	-	-	-	-	-	-	-	-	-	164	273
Alkalinity (total as $CaCO_3$)	mg/L												-	-	-	-	-	-	-	-	-	-	827	733
Hydroxide	mg/L												-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L												-	-	-	-	-	-	-	-	-	-	0.512	0.180
Field Data																								
pH in H_20	pH	Not required under previous permit											8.54	8.26	9.2	9.63	9.10	9.2	8.62	8.87	8.9	8.8	10.6	11.75
Conductivity (EC)	uS/cm												1775	1180	13.84	200	1953	1502	1389	1675	1509	2310	2140	2.78

Table D.15: Chemical Analytical Results

Sample ID:		**Magneson D.6**				
Site Number:		**15**				
Date Sampled:	**Units**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	121	106	127	125	125
Ammonia-N	mg/L	0.088	0.056	0.27	<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	4.06	4.16	4.05	4.58	4.16
Total Organic Carbon	mg/L	-	-	-	-	-
Dissolved Organic Carbon	mg/L	43.1	33	127	43.0	33.1
Phenols	mg/L	-	-	-	0.0021	0.013
BTEX, F1 (C6-C10) and F2 (>C10-C16)						
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L	-	-	-	<0.0005	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals						
Aluminium	mg/L	0.0224	0.0167	<0.0050	0.0151	0.0051
Antimony	mg/L	0.00080	0.0007	0.00103	0.00113	0.00086
Arsenic	mg/L	-	-	-	0.019	0.0134
Barium	mg/L	0.0342	0.0266	0.0375	0.0302	0.0512
Beryllium	mg/L	<0.0005	<0.00050	<0.00050	<0.00020	<0.00020
Boron	mg/L	0.306	0.279	0.337	0.301	0.237
Cadmium	mg/L	<0.000025	<0.000025	<0.000025	0.000018	0.000012
Chromium	mg/L	<0.00050	<0.0005	<0.00050	<0.00020	<0.00020
Cobalt	mg/L	0.00061	0.00086	0.00133	0.00089	0.00075
Copper	mg/L	<0.0010	0.0016	<0.0010	0.00103	0.00174
Iron	mg/L	<0.050	<0.050	0.063	0.037	0.023
Lead	mg/L	<0.00025	<0.00025	<0.00025	<0.00010	<0.00010
Lithium	mg/L	-	-	-	0.13	0.0978
Manganese	mg/L	0.00404	0.00561	0.532	0.00962	0.00599
Mercury	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.00327	0.00254	0.0016	0.00211	0.00179
Nickel	mg/L	0.0072	0.0069	0.0086	0.0067	0.0082
Selenium	mg/L	0.00033	0.00037	<0.00025	0.00032	0.00029
Silver	mg/L	<0.000050	<0.000050	<0.000050	<0.000020	<0.000020
Thallium	mg/L	<0.000050	<0.000050	<0.000050	<0.00002	<0.000020
Tin	mg/L	<0.00050	<0.00050	<0.00050	<0.00020	<0.00020
Titanium	mg/L	0.0016	<0.0015	<0.0015	0.00146	0.00134
Uranium	mg/L	-	-	-	0.00442	0.00507
Vanadium	mg/L	0.00450	0.0052	0.0044	0.0042	0.0063
Zinc	mg/L	<0.0050	<0.0050	<0.0050	0.0020	<0.0020
Routine Water						
Ion Balance	%	104	106	94.3	98.7	101
Bicarbonate	mg/L	593	343	694	538	520
Chloride	mg/L	334	235	340	359	286
Carbonate	mg/L	30.9	13.1	20	14.5	16.6
Conductivity (EC)	uS/cm	4080	2790	4020	4070	3120
Calcium	mg/L	54.3	40.2	70.2	41.7	97.9
Potassium	mg/L	31.3	27.1	29.6	29.8	34.1
Magnesium	mg/L	55.5	42.5	56.4	58.5	56.6
Sodium	mg/L	785	528	729	794	558
Sulfate	mg/L	990	711	1030	1120	818
Phosphorus	mg/L	0.707	0.385	0.963	0.486	0.745
pH in H_20	pH	8.61	8.56	8.52	8.47	8.52
TDS (Calculated)	mg/L	2570	1770	2620	2680	2120
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
Nitrate and Nitrite (as N)	mg/L	-	-	-	<0.11	<0.101
Hardness as $CaCO_3$	mg/L	-	-	-	345	478
Alkalinity (total as $CaCO_3$)	mg/L	-	-	-	465	454
Hydroxide	mg/L	-	-	-	<5	<5.0
Fluoride	mg/L	-	-	-	0.22	0.35
Field Data						
pH in H_20	pH	8.68	9.5	8.5	10.9	9.48
Conductivity (EC)	uS/cm	4120	2730	4300	4140	3.82

Table D.16: Chemical Analytical Results

Sample ID:		Beaver D.1																							
Site Number:		**16**																							
Date Sampled:	**Units**	**18-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**20-Oct-1999**	**11-Oct-2000**	**4-Oct-2001**	**9-Oct-2002**	**16-Oct-2003**	**14-Oct-2004**	**21-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**19-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	60	70	90	90	80	100	80	50	70	59	65	78	85	140	66.4	89	302	73	105	60	74	56	66	93
Ammonia-N	mg/L	0.1	<0.05	0.07	<0.05	<0.05	1.24	<0.05	<0.05	0.05	0.22	<0.05	2.11	0.46	5.66	<0.050	<0.050	<0.050	2.57	<0.05	0.168	<0.05	1.00	1.10	0.071
Total Kjeldahl Nitrogen	mg/L	4.9	2.2	2.9	2.5	2	5.9	2.3	<0.2	2	1.8	2.1	8.5	2.8	9	2.21	2.62	3.98	4.30	3.69	1.61	2.67	2.78	4.27	2.46
Total Organic Carbon	mg/L	25	28	30	25	26	30	32	26	24	22	22	27	-	-	-	-	-	-	-	-	-		-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												27	63.2	24.9	29	29.9	29.5	25.6	22.7	22.5	56.0	25.6	28.1
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0023	0.0099
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	0.074	0.022	<0.010	<0.010	0.059	<0.01	0.0119	0.0011	0.008	0.0064	0.0036
Antimony	mg/L	<0.0004	0.0006	0.0011	<0.0004	0.0005	0.0007	<0.0004	0.0009	0.0018	0.001	0.0014	0.0009	0.0008	<0.0016	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00025	0.00024	0.00023	0.00024	0.00022
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00455	0.00586
Barium	mg/L	0.15	0.049	0.029	0.084	0.074	0.123	0.15	0.051	0..040	0.047	0.061	0.092	0.039	0.115	0.037	0.0521	0.0799	0.0952	0.0558	0.0756	0.0581	0.0707	0.0833	0.0489
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													0.07	<0.050	0.071	<0.050	<0.050	<0.050	<0.05	0.037	0.058	0.037	0.051	0.039
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.00020	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	0.000005	<0.0000050	0.0000056
Chromium	mg/L	0.015	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.010	0.01	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010	<0.00010	0.00013
Cobalt	mg/L	0.005	<0.002	0.019	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00035	0.0003	0.00078	0.00094	0.00038
Copper	mg/L	0.01	<0.001	0.006	<0.001	0.001	0.007	0.022	0.005	0.001	<0.001	0.002	0.001	0.001	<0.0024	0.0019	<0.0010	<0.0010	<0.0010	<0.001	0.00043	0.00034	0.00101	0.00057	0.00071
Iron	mg/L	6.880	0.376	0.201	0.581	0.127	1.220	0.339	1.17	0.09	0.316	0.311	0.74	0.008	0.089	0.013	0.016	0.04	0.212	0.078	0.038	0.011	0.033	0.026	0.049
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0002	<0.00040	<0.00010	<0.00010	<0.0050	0.00013	<0.0001	<0.000050	<0.000050	0.000075	<0.000050	<0.000050
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0329	0.0308
Manganese	mg/L													0.025	0.137	<0.0020	0.0025	<0.0020	0.248	0.0073	0.00078	0.00062	0.182	0.387	0.00491
Mercury	mg/L	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00199	0.000986	0.00105	0.00153	0.00067
Nickel	mg/L	0.011	<0.002	0.015	0.005	0.003	<0.002	0.005	0.005	<0.005	<0.002	0.005	0.006	0.007	0.004	0.0049	0.0036	0.0049	0.0047	0.0043	0.00725	0.00521	0.00592	0.00697	0.00493
Selenium	mg/L	Not required under previous permit												0.0015	0.0038	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000217	0.000194	0.000206	0.000284	0.000205
Silver	mg/L													<0.0001	<0.00040	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00020	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000015	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	0.00016	<0.00010	<0.00010
Titanium	mg/L													0.002	<0.0012	<0.0010	<0.0010	<0.0010	0.0037	<0.001	0.00081	<0.00030	0.00044	0.00086	0.00069
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00225	0.00115
Vanadium	mg/L													0.01	0.0052	0.0024	0.0031	0.0072	0.0038	0.0036	0.00484	0.00328	0.00439	0.00363	0.00324
Zinc	mg/L	0.046	0.017	0.031	0.005	0.009	0.036	0.011	0.006	0.022	0.002	0.006	0.006	0.009	<0.0040	<0.0020	<0.0020	<0.0020	0.0051	0.0088	<0.0010	<0.0010	0.0098	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	97	103	103	94	103	91.7	102	102	96.7	103	103	97.4	95.5	92.5	93.9	93.5	95.8	101	109	98.6	100	104	103	109
Bicarbonate	mg/L	338	315	271	315	310	423	520	193	361	335	270	386	408	348	327	357	345	429	306	307	396	566	451	464
Chloride	mg/L	138.0	125.0	146.0	203.0	175.0	267.0	436	192	245	182	166	153	233	384	160	117	205	218	145	149	137	203	237	182
Carbonate	mg/L	<5	7	27	15	16	<5	<5	15	<5	<5	<5	<5	9	6.1	11.1	12.8	9.3	11.6	25.2	<5.0	8.4	<5.0	7.9	6.7
Conductivity (EC)	uS/cm	1200	1210	1020	1530	1380	1640	2860	1210	1520	1130	1120	1410	1620	1980	1280	1150	1420	1500	1130	1330	1230	1660	1780	1490
Calcium	mg/L	43.9	43.1	36.1	48.7	47.2	55.8	70.9	63.6	53.2	48.9	46.8	55.9	62.9	72.9	42.1	46.3	43.7	55.7	50.2	53.0	49.4	58.5	67.2	53.7
Potassium	mg/L	12.5	14.5	15.5	14.7	14.6	16.3	31.5	14.4	14.3	10	11.7	13.9	16.4	19.2	13.8	13.4	20.2	21.8	14.9	16.3	16.8	20.6	19.6	19.1
Magnesium	mg/L	19.3	18.4	18.3	21.9	19.0	22.3	55.5	21.7	19.7	17.7	16.0	19.9	24	23.2	18.3	17.2	22.2	24.7	17.9	18.5	20.4	26.6	28.5	28.2
Sodium	mg/L	186	200	204	223	219	228	498	185	234	194	171	206	238	283	185	156	207	234	179	166	185	279	275	266
Sulfate	mg/L	149	165	134	182	135	113	436	195	131	75.3	92.7	174	149	170	122	97.7	114	98.6	55.4	127	93.7	98	163	131
Phosphorus	mg/L	Not required under previous permit												-	0.258	0.568	0.876	0.615	1.45	1.42	0.160	0.612	0.82	0.464	1.41
pH in H_20	pH	8.4	8.6	8.7	8.7	8.7	8.1	7.1	8.8	8.3	8.4	8.3	8.2	8.4	8.38	8.51	8.54	8.52	8.46	8.85	8.23	8.44	8.08	8.39	8.37
TDS (Calculated)	mg/L	717	728	714	864	777	918	1780	782	878	698	637	812	933	1130	713	636	791	875	638	687	705	967	1020	915
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	1.38	<0.020	<0.10	0.299	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	0.039	<0.010	<0.050	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	0.299	<0.022
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	285	250
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	383	392
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.129	0.208
Field Data																									
pH in H_20	pH	Not required under previous permit												8.68	7.93	9.33	8.50	8.78	8.9	8.84	8.68	8.5	8.1	9.6	10.32
Conductivity (EC)	uS/cm													1634	1310	1258	1468	1423	1564	1146	1323	1225	1863	1875	1940

Table D.18: Chemical Analytical Results

Sample ID:		Norgaard D.1																							
Site Number:		18																							
Date Sampled:	**Units**	**17-Oct-1996**	**3-Oct-1997**	**8-Oct-1998**	**20-Oct-1999**	**11-Oct-2000**	**5-Oct-2001**	**9-Oct-2002**	**16-Oct-2003**	**14-Oct-2004**	**21-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**19-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	60	90	100	120	90	110	180	200	110	120	99	<5	109	131	82.8	119	109	106	155	81	80	78	35	158
Ammonia-N	mg/L	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	0.06	<0.05	3.85	<0.050	<0.050	<0.050	<0.050	0.062	1.31	0.553	<0.050	<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	4	1.8	3.8	3.6	2.4	4.7	4.9	3.2	3	3.4	2.7	3.1	3.5	7.86	2.52	4.03	3.42	2.57	2.98	3.14	2.67	2.74	1.71	4.19
Total Organic Carbon	mg/L	24	32	35	45	32	37	62	45	66	47	35	54	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												38	54.4	31.3	34.5	37	34.5	29.5	29.9	27.7	78	21.6	39.2
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0019	0.0081
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.04	0.14	<0.010	<0.010	<0.010	0.022	<0.01	0.0056	0.0086	0.0025	0.0034	0.0035
Antimony	mg/L	<0.0004	0.0006	0.0006	<0.0004	0.0005	0.0004	0.0007	0.0011	0.0015	0.001	0.0010	0.0021	<0.002	<0.0080	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	<0.00020	0.00012	0.00011	0.00027	0.00021
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00107	0.00247
Barium	mg/L	0.111	0.087	0.084	0.101	0.1	0.133	0.217	0.038	0.048	0.056	0.105	0.145	0.1	0.168	0.0779	0.086	0.0961	<0.0030	0.0947	0.096	0.0642	0.0801	0.0924	0.0716
Beryllium	mg/L	Not required under previous permit												<0.004	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00010	<0.00010	<0.00020	<0.00020
Boron	mg/L													<0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.027	0.077	0.032	0.024	0.053
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0004	<0.0010	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000010	<0.0000050	<0.0000050	0.000018	<0.000010
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.011	<0.005	<0.005	<0.005	0.013	0.012	<0.02	<0.0080	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00020	0.00015	0.00013	<0.0002	<0.00020
Cobalt	mg/L	<0.002	<0.002	0.019	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.008	0.0049	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00045	0.00033	0.00048	0.0101	0.00040
Copper	mg/L	0.003	0.04	0.005	<0.001	0.001	0.004	0.017	0.005	0.002	<0.001	0.001	0.002	<0.004	<0.012	0.0037	<0.0010	<0.0010	<0.0010	<0.001	<0.00040	0.00022	0.00031	0.00127	0.00049
Iron	mg/L	<0.005	0.265	0.243	0.469	0.063	0.377	4.04	0.372	0.098	0.067	0.136	0.646	0.011	<0.010	0.025	0.034	0.024	0.022	0.073	0.033	0.129	0.081	0.064	0.111
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0005	<0.0020	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.00010	<0.000050	<0.000050	<0.00010	<0.00010
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0698	0.0423
Manganese	mg/L													0.165	0.378	0.0021	0.01	<0.0020	0.411	0.0039	0.0758	0.00168	0.229	5.26	0.00533
Mercury	mg/L	0.0002	<0.0002	<0.0002	0.0002	0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.02	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00088	0.000341	0.000524	0.00304	0.00095
Nickel	mg/L	0.003	<0.002	<0.002	0.004	0.003	<0.002	0.011	0.003	<0.002	<0.002	0.005	0.006	<0.008	0.06	0.0034	0.0025	0.0039	0.0043	0.0035	0.0057	0.00333	0.00448	0.0113	0.0042
Selenium	mg/L	Not required under previous permit												0.003	0.0093	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	<0.00010	0.000118	0.000092	0.00013	0.00018
silver	mg/L													<0.0004	<0.0020	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	<0.000010	<0.000010	<0.000020	<0.000020
Thallium	mg/L													<0.0004	<0.0010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000010	<0.000010	0.000022	<0.000020
Tin	mg/L													<0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00010	<0.00010	<0.00020	<0.00020
Titanium	mg/L													<0.004	<0.0060	<0.0010	<0.0010	<0.0010	0.0019	<0.001	<0.00060	0.00072	0.00033	<0.00060	<0.0006
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.0197	0.000974
Vanadium	mg/L													0.009	<0.0020	0.0014	0.0012	0.0038	0.0032	0.0011	0.0032	0.0016	0.00151	<0.0010	0.0013
Zinc	mg/L	0.021	0.051	0.025	0.002	0.001	0.041	0.026	0.006	0.037	0.002	0.01	0.034	<0.008	<0.020	<0.0020	<0.0020	<0.0020	<0.0020	0.0085	<0.0020	0.0013	0.0012	0.0064	<0.0020
Routine Water																									
Ion Balance	%	101	103	99	95	102	103	100	104	98.7	98.2	99.9	95.3	99.5	95.2	94.5	95.6	98	99.0	108	99.2	104	97.9	109	107
Bicarbonate	mg/L	537	639	420	598	551	607	567	228	480	747	602	778	820	718	603	537	532	522	414	455	417	573	558	784
Chloride	mg/L	268.0	375.0	339.0	465.0	343.0	544.0	881	579	586	520	443	514	595	756	296	181	283	242	155	228	156	265	688	285
Carbonate	mg/L	<5	<5	<5	18	<5	<5	44	21	<5	10	<5	6	32	<5.0	<5.0	26.3	12.5	32.7	21.1	6.4	11.2	10.3	<5.0	<5.0
Conductivity (EC)	uS/cm	2250	2510	2140	2770	2410	2890	4120	2890	3080	2790	2350	3030	3230	3820	1800	1560	1790	1600	1250	1740	1180	1800	3810	2120
Calcium	mg/L	93.2	91.1	60.6	64.6	96.8	109	57.7	113	83.7	91.6	90.8	98.7	87.3	102	77.3	64.9	63.9	63.1	69.4	74.9	59.9	79.6	298	109
Potassium	mg/L	21.3	26.1	23.9	23.9	24.9	31.5	36.9	38.1	30.3	31.5	25.7	32	32.6	40	21.5	22.1	28.8	22.5	19.4	22.9	19.2	20	26.1	26.1
Magnesium	mg/L	49.7	57.5	39.5	48.2	49.0	62.4	66.5	91.7	57.9	58.9	48.4	59.5	63.4	67.3	35.5	25.9	29.1	29.4	20.9	26.7	21.8	31	87.2	43.8
Sodium	mg/L	348	380	348	443	344	556	816	556	498	452	360	449	540	613	258	213	266	255	181	216	171	267	498	330
Sulfate	mg/L	378	220	282	245	273	315	342	771	407	153	120	202	133	357	67.6	53.6	54.8	45.1	32.1	96.2	28.8	76.1	592	78.4
Phosphorus	mg/L	Not required under previous permit												-	<0.020	1.03	1.43	0.704	1.04	1.76	0.674	1.02	0.527	0.243	1.02
pH in H_20	pH	8.0	8.3	8.1	8.5	8.2	8.2	8.4	8.8	8.3	8.3	8.3	8.3	8.5	8.31	8.18	8.57	8.49	8.69	8.65	8.37	8.47	8.41	8.18	8.10
TDS (Calculated)	mg/L	1420	1470	1300	1600	1410	1850	2480	2280	1910	1680	1390	1740	1890	2290	1050	851	1000	947	703	896	673	1040	2460	1260
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.219	<0.020	<0.10	<0.10	<0.040
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	0.029	<0.010	<0.050	<0.050	0.022
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.11	<0.045
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	1100	453
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	457	643
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.15	0.273
Field Data																									
pH in H_20	pH	Not required under previous permit												8.42	7.85	8.67	8.46	8.45	9.0	7.72	8.15	8.8	8.3	8.3	9.89
Conductivity (EC)	uS/cm													2240	1890	1292	1167	1801	1621	1256	1774	1220	2040	3960	2.62

Table D.19: Chemical Analytical Results

Sample ID:		Winsnes D.1																							
Site Number:		19																							
Date Sampled:	**Units**	**16-Oct-1996**	**7-Oct-1997**	**9-Oct-1998**	**19-Oct-1999**	**10-Oct-2000**	**4-Oct-2001**	**9-Oct-2002**	**16-Oct-2003**	**14-Oct-2004**	**21-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**19-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	60	70	70	90	100	110	100	80	80	54	65	68	65	101	85.8	68	420	79	94	92	69	83	92	75
Ammonia-N	mg/L	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.105	0.09	<0.050	<0.050	0.084	0.059	0.069	<0.05	1.08	0.058	<0.050
Total Kjeldahl Nitrogen	mg/L	3.1	2.5	2.6	2.5	3.4	6.2	4.1	3.6	2.1	1.7	2.4	2.7	3.8	4.48	4.36	2.79	3.66	3.62	3.48	3.76	3.52	4.11	4.01	2.52
Total Organic Carbon	mg/L	25	28	28	27	31	36	40	37	30	23	24	24	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												23	31.9	29.7	25	33.6	28.2	26.4	28.2	27	83	27.3	24.2
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0026	0.0077
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.12	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	<0.010	0.025	<0.010	<0.010	<0.010	<0.01	0.0013	<0.0010	0.0038	0.0085	0.0017
Antimony	mg/L	<0.0004	0.0002	0.0009	<0.0004	0.0006	0.0008	0.0006	0.0014	0.0014	0.0015	0.0021	0.0011	0.0007	0.00045	0.0004	<0.00040	<0.00080	<0.00040	<0.0004	0.00029	0.00021	0.00023	0.00030	0.0002
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00574	0.00471
Barium	mg/L	0.036	0.055	0.049	0.051	0.053	0.042	0.105	0.04	0.011	0.022	0.043	0.081	0.04	0.0418	0.0425	0.0238	0.0149	0.0257	0.0589	0.0508	0.0633	0.0359	0.0623	0.0412
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	0.051	0.051	<0.050	<0.050	<0.050	<0.05	0.037	0.046	0.034	0.037	0.039
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	0.0000168	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.008	0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010	0.00011	<0.00010
Cobalt	mg/L	<0.002	0.002	0.021	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00033	0.00022	0.00065	0.00055	0.00035
Copper	mg/L	0.002	<0.001	0.009	0.002	0.003	0.006	0.009	0.006	0.003	0.001	0.002	0.002	<0.001	<0.0010	0.0059	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	0.00021	0.00033	0.00043	0.00027
Iron	mg/L	<0.005	0.291	0.200	0.460	0.342	0.081	0.991	0.369	0.203	0.101	0.211	0.76	0.005	0.022	<0.010	0.032	0.011	0.014	0.024	0.014	0.019	0.054	0.038	0.011
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050	0.000055	0.000061	<0.000050
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0279	0.0235
Manganese	mg/L													0.006	0.0341	0.0022	0.0025	0.0037	0.0029	0.0053	0.00179	0.00088	0.276	0.0371	0.00135
Mercury	mg/L	0.0003	0.0008	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.000006	0.0000058	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000688	0.00036	0.000554	0.000512	0.000602
Nickel	mg/L	<0.002	<0.002	0.012	0.003	0.004	<0.002	0.006	0.004	<0.002	0.002	0.005	0.006	<0.002	0.0026	<0.0020	0.002	<0.0020	<0.0020	0.0025	0.00178	0.00214	0.0035	0.00316	0.00287
Selenium	mg/L	Not required under previous permit												0.0007	0.00049	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000194	0.000232	0.00021	0.000206	0.000204
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000015	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00030	<0.00030	0.00078	0.00093	<0.0003
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00159	0.00116
Vanadium	mg/L													0.004	0.0041	0.0018	<0.0010	0.001	<0.0010	0.0015	0.00172	0.00107	0.00167	0.00163	0.00094
Zinc	mg/L	0.006	0.025	0.057	0.003	0.017	0.048	0.008	0.008	0.074	0.002	0.008	0.008	0.03	<0.0020	<0.0020	<0.0020	0.0024	<0.0020	0.0058	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	98	110	108	103	109	90.3	101	106	105	107	106	97.7	98	100	106	97.1	92.7	103	104	93.2	100	96.3	107	104
Bicarbonate	mg/L	483	445	475	485	464	457	635	361	276	285	315	366	319	366	362	370	348	450	420	408	446	563	469	416
Chloride	mg/L	20.7	20.0	17.0	21.0	21.0	25.0	32	29	29	17	18	15	19	17.9	19.4	15	17.7	19.8	23.5	27.2	38.3	59.3	58.7	71.6
Carbonate	mg/L	<5	<5	<5	17	25	60	44	49	75	13	7	12	46	52.4	32	11	46	11.3	30.9	18.2	9.3	<5.0	<5.0	10.8
Conductivity (EC)	uS/cm	1270	1230	1100	1270	1320	1520	1850	1950	2400	1530	1280	1030	1080	1150	1180	914	1000	1020	1040	971	997	1190	1070	1060
Calcium	mg/L	31.5	32.4	32.3	27.8	26.3	20.8	23.4	32.9	31.9	40.2	39.3	42.2	19.1	19.5	20.4	24.5	15.7	24.4	27.5	19.6	32.4	43.8	26.8	39.2
Potassium	mg/L	8.8	10.6	10.3	11.1	10.8	11	13.4	13.5	11.9	10.9	12.5	11.6	11	13.2	13.9	12.8	12.7	14.2	13.6	12.7	13.7	16.4	15.8	15.7
Magnesium	mg/L	16.6	17.5	17.8	17.7	18.9	19.5	21.6	34.9	31.7	26.3	22	18.7	17.8	19.6	20.8	14.7	15.6	18.2	17.2	14.2	18.7	22.9	21.3	23.7
Sodium	mg/L	219	248	250	259	277	279	415	444	482	289	221	159	191	225	256	149	175	191	191	158	168	190	197	174
Sulfate	mg/L	250	239	235	233	265	278	331	693	809	498	340	206	189	214	282	128	147	133	116	93.9	99.6	111	92.4	106
Phosphorus	mg/L	Not required under previous permit												-	0.523	0.459	0.4	0.391	0.467	0.43	0.336	0.515	0.419	0.339	0.263
pH in H_20	pH	8.2	8.4	8.0	8.6	8.6	9.0	8.7	9.1	9.4	8.6	8.5	8.6	9	9.01	8.69	8.54	9.16	8.49	8.85	8.67	8.48	8.22	8.36	8.51
TDS (Calculated)	mg/L	762	790	796	825	886	902	1160	1470	1610	1040	815	645	649	742	823	537	601	633	626	545	600	725	648	646
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.020	<0.020	<0.020	<0.020	0.025
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010	<0.010	<0.010	0.014
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	0.039
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	155	195
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	393	359
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.16	0.292
Field Data																									
pH in H_20	pH	Not required under previous permit												9.11	8.5	9.04	8.44	9.49	8.5	8.0	8.84	8.6	8.6	10.7	10.44
Conductivity (EC)	uS/cm													1062	800	1013	1000	1007	1039	1042	1005	1004	1295	1123	1306

Table D.20: Chemical Analytical Results

Sample ID:		Winsnes D.2																							
Site Number:		**20**																							
Date Sampled:	**Units**	**16-Oct-1996**	**7-Oct-1997**	**9-Oct-1998**	**26-Nov-1999**	**10-Oct-2000**	**4-Oct-2001**	**9-Oct-2002**	**16-Oct-2003**	**14-Oct-2004**	**21-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**19-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	40	50	50	60	70	70	70	50	60	45	56	65	62	80.7	49.6	56	61	65	49	54	81	77	61	79
Ammonia-N	mg/L	<0.05	0.06	<0.05	0.14	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.050	0.06	<0.050	<0.050	0.056	<0.05	0.139	0.618	0.67	<0.050	0.824
Total Kjeldahl Nitrogen	mg/L	0.9	0.9	1.5	1.6	1.9	2.8	1.5	1.6	1.3	1.6	1.7	1.8	2	2.99	1.5	1.32	1.74	2.29	1.54	1.51	3.93	2.06	1.73	3.35
Total Organic Carbon	mg/L	17	18	21	17	22	24	26	28	18	19	22	25	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												20	27.8	18.7	22	21.5	20.2	17.9	20.0	20.9	77	21.5	25.3
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0018	0.0052
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.0010	0.0018	0.004	0.0046	0.0052
Antimony	mg/L	<0.0004	<0.0002	0.0005	<0.0004	<0.0004	0.0005	<0.0004	0.0009	0.0011	0.0006	0.0012	0.0015	<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00013	<0.00010	0.00013	0.00016	0.00013
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00218	0.00283
Barium	mg/L	0.086	0.179	0.112	0.17	0.118	0.087	0.06	0.128	0.096	0.095	0.132	0.136	0.116	0.189	0.134	0.134	0.107	0.115	0.103	0.119	0.104	0.0911	0.104	0.0997
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.039	0.04	0.023	0.033	0.028
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	0.000661	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	0.0000237	0.0000063
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010	0.00013	0.00012
Cobalt	mg/L	<0.002	0.002	0.023	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00025	0.00012	0.0004	0.00053	0.00031
Copper	mg/L	0.002	<0.001	0.007	0.001	0.003	0.002	0.003	0.002	<0.001	0.001	<0.001	<0.001	<0.001	<0.0010	0.0033	<0.0010	<0.0010	<0.0010	<0.001	0.00022	0.00027	0.00037	0.00027	0.00026
Iron	mg/L	<0.005	0.771	1.490	0.065	0.765	0.748	0.308	0.818	0.983	1.29	0.927	1.96	0.057	0.095	0.416	0.152	0.013	0.444	0.047	<0.010	0.878	0.526	0.185	0.815
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050	0.000111	0.000067	0.000071
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0237	0.0178
Manganese	mg/L													<0.001	0.0306	0.003	<0.0020	<0.0020	<0.0020	<0.002	0.00053	0.00173	0.104	0.0629	0.00851
Mercury	mg/L	0.0002	0.0006	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.0015	0.000584	0.00068	0.00061	0.00039
Nickel	mg/L	<0.002	0.002	0.013	0.007	0.007	<0.002	0.004	0.005	<0.002	0.002	0.005	0.005	0.005	0.0093	0.0045	0.0032	0.0031	0.0030	0.0031	0.00341	0.00267	0.00373	0.00305	0.00293
Selenium	mg/L	Not required under previous permit												<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000186	0.000212	0.00019	0.00018	0.000188
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000024	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00030	<0.00030	0.00074	0.00053	0.00095
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.000372	0.000199
Vanadium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00050	<0.00050	0.00059	0.00071	0.00095
Zinc	mg/L	0.005	0.022	0.135	0.021	0.028	0.038	0.007	0.003	0.044	0.007	0.004	0.01	0.003	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0073	<0.0010	<0.0010	0.0027	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	99	106	104	101	99.5	101	103	103	98.5	105	109	98.7	97.5	96.3	97.6	105	93.9	107	103	102	109	91.1	108	106
Bicarbonate	mg/L	262	273	273	307	272	286	173	293	310	277	299	315	323	340	303	319	295	266	245	255	227	294	269	277
Chloride	mg/L	15.4	15.1	9.3	17.0	15.0	19.0	21	14	13	10	12	13	17	15.8	12.4	12.7	23.4	14.4	13.7	15.6	19.8	38.5	37.6	43.9
Carbonate	mg/L	<5	<5	<5	<5	<5	<5	56	<5	<5	<5	<5	<5	<5	<5.0	<5.0	5.4	6.5	6.3	7.6	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	514	557	511	591	479	523	514	482	518	501	529	542	552	567	538	567	515	484	465	490	431	634	569	574
Calcium	mg/L	27.3	34.5	36.2	34.1	34.2	26.7	11.7	34.6	32.2	37.6	38.3	41.2	38.3	34.9	34	40.3	23.7	29.8	32	31.6	32.7	39.1	35.2	43.6
Potassium	mg/L	11.5	11.5	11.2	13.3	12.2	13	15.2	14.5	14.4	12.9	14.2	13.8	14.4	16.6	15.6	17.1	15.7	15.4	14.3	16.7	13.6	15.8	17.8	14.8
Magnesium	mg/L	11.2	14.4	13.7	14.7	12.1	13.6	14.7	14.1	12.8	13.4	15.2	14.1	14.3	15.5	13.7	15.8	15.2	14.5	11.9	12.3	12.5	15.8	16.3	15.8
Sodium	mg/L	60	70	65	72	56	56	85	56	51	50	57	52	56	62.2	51.3	61.3	61.9	56.8	46.5	44.4	43.4	61.8	66.1	57.3
Sulfate	mg/L	26	46.9	51.7	39.9	19.3	21	16	16.5	8.9	15.4	14	18.1	13	17.7	13.3	17	8.42	9.93	7.76	10.3	12.4	40	23.8	12.1
Phosphorus	mg/L	Not required under previous permit												-	<0.050	0.072	0.112	0.070 *	0.064	0.088	0.050	0.396	0.27	0.106	0.463
pH in H_20	pH	8.1	8.0	7.7	8.0	7.5	8.1	9.5	8.2	8.2	8.2	8.3	8.2	8.3	8.2	8.38	8.38	8.49	8.44	8.55	8.37	8.04	8.15	8.19	8.13
TDS (Calculated)	mg/L	280	327	322	342	278	300	301	294	290	281	300	308	316	330	294	327	300	278	254	260	246	366	329	324
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.020	<0.020	<0.020	<0.020	0.037
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	0.037
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	155	174
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	220	227
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.101	0.199
Field Data																									
pH in H_20	pH	Not required under previous permit												8.39	8.4	8.33	7.63	8.36	8.6	7.99	8.10	8.1	8.3	10.3	9.26
Conductivity (EC)	uS/cm													642	450	960	1172	512	503	474	510	4.53	689	600	714

Table D.21: Chemical Analytical Results

Sample ID:		Winsnes D.3																							
Site Number:		21																							
Date Sampled:	Units	16-Oct-1996	7-Oct-1997	9-Oct-1998	19-Oct-1999	10-Oct-2000	4-Oct-2001	9-Oct-2002	16-Oct-2003	15-Oct-2004	20-Oct-2005	13-Oct-2006	3-Oct-2007	17-Oct-2008	28-Oct-2009	18-Oct-2010	12-Oct-2011	16-Oct-2012	8-Oct-2013	15-Oct-2014	14-Oct-2015	5-Oct-2016	20-Oct-2017	16-Oct-2018	29-Oct-2019
Chem. O_2 Demand	mg/L	60	80	160	110	110	260	Empty	90	110	54	85	64	106	251	97	96	128	116	108	108	81	97	112	93
Ammonia-N	mg/L	0.06	<0.05	1.45	0.3	<0.05	2.78		<0.05	<0.05	<0.05	0.15	1.47	0.34	1.02	0.083	<0.050	0.225	<0.050	<0.05	0.639	<0.05	0.059	0.090	<0.050
Total Kjeldahl Nitrogen	mg/L	5.5	3.2	10.5	5.2	4	15.8		2.9	3.4	1.7	3.1	3.8	4.1	13.8	4.71	3.08	4.2	4.03	3.81	5.34	2.92	3.91	4.39	2.75
Total Organic Carbon	mg/L	26	32	44	28	39	71		49	38	20	29	29	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit							Not required under previous permit					33	82.1	36.9	31	39	33.1	32.1	37.9	26.8	97	32.4	29.5
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0018	0.0093
BTEX, F1 (C6-C10) and F2(>C10-C16)																									
Benzene	mg/L	Not required under previous permit						Empty	Not required under previous permit					<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit						Empty	Not required under previous permit					<0.01	0.034	<0.010	<0.010	<0.010	<0.010	<0.01	0.0405	0.002	0.003	0.0177	0.0071
Antimony	mg/L	0.0008	<0.0002	0.0014	<0.0004	0.001	0.001		0.0017	0.0013	0.0014	0.0013	0.001	0.0008	<0.0016	<0.00040	<0.00040	<0.00080	0.00044	0.00054	0.00093	0.00031	0.00044	0.00061	0.00024
Arsenic	mg/L	Not required under previous permit							Not required under previous permit					-	-	-	-	-	-	-	-	-	-	0.00898	0.00575
Barium	mg/L	0.109	0.011	0.155	0.159	0.105	0.175		0.006	0.008	0.013	0.12	0.094	0.091	0.109	0.103	0.0553	0.111	0.101	0.0732	0.134	0.101	0.107	0.114	0.0766
Beryllium	mg/L	Not required under previous permit							Not required under previous permit					<0.001	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	0.067	0.077	0.073	0.079	0.077	0.094	<0.020	0.021	0.05
Cadmium	mg/L	<0.001	0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.00020	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000074	<0.0000050	<0.000010	0.0000199	<0.0000050
Chromium	mg/L	0.008	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00020	0.00014	<0.00010
Cobalt	mg/L	0.003	0.003	0.022	<0.002	0.002	0.003		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00156	0.00053	0.00124	0.00158	0.00056
Copper	mg/L	0.006	<0.001	0.008	0.001	0.006	0.01		0.005	0.002	<0.001	<0.001	<0.001	0.001	<0.0024	0.0031	<0.0010	0.0016	<0.0010	0.0012	0.00236	0.00132	0.00141	0.00202	0.00071
Iron	mg/L	1.320	1.090	2.500	1.110	0.628	3.690		0.146	0.163	0.051	0.083	0.508	0.015	0.062	0.011	0.02	0.025	0.022	0.047	0.022	0.011	0.03	0.037	0.038
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00040	<0.00010	<0.00010	<0.0050	<0.00010	0.0001	<0.000050	<0.000050	<0.00010	0.00006	<0.000050
Lithium	mg/L	Not required under previous permit							Not required under previous permit					-	-	-	-	-	-	-	-	-	-	0.0595	0.0419
Manganese	mg/L													0.003	0.0538	<0.0020	<0.0020	<0.0020	0.0593	0.0142	0.00143	0.00076	0.0129	0.00528	0.00437
Mercury	mg/L	0.0003	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.0074	0.00303	0.00251	0.00298	0.000719
Nickel	mg/L	0.007	<0.002	0.027	0.008	0.014	0.008		0.007	<0.002	<0.002	0.004	0.004	0.006	0.0063	0.0058	0.0043	0.0074	0.0041	0.0053	0.0117	0.00722	0.0057	0.0072	0.00398
Selenium	mg/L	Not required under previous permit							Not required under previous permit					0.0014	0.003	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000359	0.000239	0.00027	0.000366	0.000201
Silver	mg/L													<0.0001	<0.00040	0.00032	<0.00010	<0.0050	<0.00010	<0.0001	0.00001	<0.000010	<0.000020	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00020	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000020	0.000017	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010
Titanium	mg/L													0.003	<0.0012	<0.0010	<0.0010	0.0012	<0.0010	0.002	0.00198	<0.00030	0.00132	0.00333	0.00134
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00437	0.0021
Vanadium	mg/L													0.006	0.007	0.002	0.0025	0.0098	0.0019	0.0052	0.00154	0.0016	0.0048	0.00433	0.0018
Zinc	mg/L	0.016	0.022	0.049	0.004	0.063	0.047		0.009	0.06	0.006	0.003	0.017	0.016	0.006	<0.0020	<0.0020	<0.0020	<0.0020	0.0053	<0.0010	0.0014	<0.0020	<0.0010	<0.0010
Routine Water																									
Ion Balance	%	109	109	109	97	107	92.2	Empty	107	103	104	103	101	96.5	106	107	101	97.4	107	106	97.5	105	98.9	105	106
Bicarbonate	mg/L	219	285	336	357	428	623		72	693	381	450	455	352	386	353	446	419	375	292	375	396	504	429	435
Chloride	mg/L	81.9	112.0	156.0	158.0	152.0	248.0		318	294	76	101	133	213	266	270	156	222	209	224	216	238	357	304	244
Carbonate	mg/L	55	15	<5	7	34	<5		114	14	15	28	<5	69	70.5	30	21.1	48.3	38.8	59.6	9.3	<5.0	10.9	<5.0	<5.0
Conductivity (EC)	uS/cm	793	886	992	1210	1310	1640		2950	2620	832	1140	1180	1380	1620	1880	1350	1530	1410	1400	1500	1420	2020	1710	1580
Calcium	mg/L	19.8	32.4	27.9	34	29.1	26.6		57.6	105	46.6	45.4	50.4	39.9	36.7	54.4	54.1	39.3	38.2	29.7	29.8	52.4	52.3	46.7	69.8
Potassium	mg/L	20.6	22.4	22.5	24.5	25.8	26.4		67.3	73	26.1	32.2	25.6	23.3	33.1	38.6	28.8	30.4	28.1	26.1	28.5	27.8	30.3	28.5	22.6
Magnesium	mg/L	18.9	19.3	22.8	28.2	24.6	27.1		158	133.0	34.6	43.9	35.4	32.9	38.7	52.6	37	38	41.6	35.6	30.7	41.4	54.1	45.7	47.4
Sodium	mg/L	136	133	196	175	232	267		506	376	106	142	137	207	288	288	170	224	219	221	193	195	281	254	210
Sulfate	mg/L	26.9	21.6	67	102	51.3	17		1100	638	57.7	67.0	39.5	36.8	61.2	232	60.5	62.9	59.3	37.2	45.9	62.2	73.9	67.1	104
Phosphorus	mg/L	Not required under previous permit							Not required under previous permit					-	1.47	0.613	1.24	1.12	0.685	0.707	0.479	0.287	0.641	0.654	0.755
pH in H_20	pH	9.4	8.8	8.3	8.5	8.8	7.9		10	8.4	8.6	8.5	8.4	9.1	9.06	8.78	8.53	8.97	8.88	9.25	8.47	8.29	8.43	8.30	8.22
TDS (Calculated)	mg/L	466	496	658	705	764	922		2360	1970	550	681	650	795	984	1140	747	871	818	777	738	812	1110	960	912
Nitrate	mg/L	Not required under previous permit							Not required under previous permit					<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.040	<0.020	<0.10	<0.020	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.020	<0.010	<0.050	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	<0.022
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	305	369
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	356	357
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.188	0.184
Field Data																									
pH in H_20	pH	Not required under previous permit												9.08	8.55	9.1	9.23	9.28	9.4	9.65	8.60	8.60	9.10	10.7	9.22
Conductivity (EC)	uS/cm													1356	1050	2160	1780	1541	1439	1393	1530	1476	2100	1198	1960

Table D.22: Chemical Analytical Results

Sample ID:		Winsnes D.4																							
Site Number:		22																							
Date Sampled:	**Units**	**16-Oct-1996**	**7-Oct-1997**	**9-Oct-1998**	**19-Oct-1999**	**10-Oct-2000**	**4-Oct-2001**	**9-Oct-2002**	**16-Oct-2003**	**15-Oct-2004**	**20-Oct-2005**	**13-Oct-2006**	**3-Oct-2007**	**17-Oct-2008**	**28-Oct-2009**	**18-Oct-2010**	**12-Oct-2011**	**16-Oct-2012**	**8-Oct-2013**	**15-Oct-2014**	**14-Oct-2015**	**5-Oct-2016**	**20-Oct-2017**	**16-Oct-2018**	**29-Oct-2019**
Chem. O_2 Demand	mg/L	70	70	100	90	130	150	180	140	150	83	97	86	95	138	88.6	115	116	78	102	96	70	112	101	535
Ammonia-N	mg/L	0.06	<0.05	1.58	<0.05	<0.05	0.52	<0.05	<0.05	0.75	<0.05	<0.05	0.06	3.11	0.917	0.399	<0.050	0.052	<0.050	<0.05	0.070	<0.050	0.120	0.055	0.075
Total Kjeldahl Nitrogen	mg/L	4.5	3	5.5	3.4	3.7	8.2	5.4	5.9	9.3	2.9	2.9	2.6	6.1	8.08	3.47	3.95	4.36	2.65	3.27	2.48	2.33	3.4	3.57	17.0
Total Organic Carbon	mg/L	29	25	34	28	46	61	68	59	55	32	33	33	-	-	-	-		-		-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												32	47	34.8	32	38.9	32.3	30.4	33.2	25.3	112	34.2	31.2
Phenols	mg/L													-	-	-	-	-	-	-	-	-	-	0.0012	0.0067
BTEX, F1 (C6-C10) and F2 (>C10-C16)																									
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (m & p)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylene (o)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
Styrene	mg/L													-	-	-	-	-	-	-	-	-	-	<0.0005	<0.00050
F1 (C_6-C_{10})	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F1 (C_6-C_{10}) - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 - (C_{10}-C_{16})	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13	<0.10	<0.10	<0.10
Dissolved Metals																									
Aluminium	mg/L	Not required under previous permit												0.02	0.062	<0.010	<0.010	<0.010	<0.010	<0.01	<0.0010	0.0017	0.0114	0.0455	0.0165
Antimony	mg/L	<0.0004	<0.0004	0.0009	<0.0004	0.0006	0.0009	<0.0004	0.0015	0.0015	0.0016	0.0016	0.0022	<0.0004	<0.0016	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00033	0.00017	0.00026	0.00029	0.00019
Arsenic	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.00555	0.0057
Barium	mg/L	0.058	0.044	0.063	0.083	0.058	0.052	<0.003	0.089	0.061	0.01	0.022	0.014	0.084	0.0693	0.0728	0.0302	0.0782	0.129	0.0722	0.115	0.0559	0.0462	0.0659	0.0437
Beryllium	mg/L	Not required under previous permit												<0.001	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.041	0.041	0.036	0.031	0.033
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.00020	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050	<0.0000050	0.0000172	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010	<0.00010	0.00012	0.00014
Cobalt	mg/L	<0.002	0.005	0.019	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00056	0.00027	0.00085	0.00099	0.00101
Copper	mg/L	0.002	<0.001	0.007	0.002	0.007	0.009	<0.001	0.006	0.003	<0.001	<0.001	<0.001	<0.001	<0.0024	0.0038	<0.0010	<0.0010	<0.0010	<0.001	0.00043	0.00052	0.0008	0.00118	0.00101
Iron	mg/L	0.612	0.807	1.140	1.810	0.373	0.639	0.065	3.48	0.815	0.3	0.602	0.581	0.041	0.053	0.033	0.018	0.06	<0.010	0.027	0.011	0.021	0.088	0.130	0.898
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0001	<0.00040	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050	0.000068	0.00012	0.000139
Lithium	mg/L	Not required under previous permit												-	-	-	-	-	-	-	-	-	-	0.0158	0.013
Manganese	mg/L													0.404	0.0068	0.0143	0.0326	0.0046	<0.0020	0.003	0.00099	0.00054	0.0158	0.0104	0.410
Mercury	mg/L	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00373	0.00197	0.00135	0.00183	0.000865
Nickel	mg/L	0.002	0.003	0.018	0.006	0.015	<0.002	<0.002	0.011	0.006	0.002	0.005	0.003	0.006	0.0051	0.0051	0.0029	0.004	0.0058	0.0049	0.00578	0.00391	0.00359	0.00364	0.00233
Selenium	mg/L	Not required under previous permit												0.0011	0.0021	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000293	0.000227	0.000222	0.000252	0.000201
Silver	mg/L													<0.0001	<0.00040	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	mg/L													<0.0001	<0.00020	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010	<0.000010	0.000017	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L													0.001	<0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00030	<0.00030	0.00067	0.00854	0.00139
Uranium	mg/L													-	-	-	-	-	-	-	-	-	-	0.00247	0.000959
Vanadium	mg/L													0.003	0.0049	0.0011	<0.0010	0.0026	<0.0010	<0.001	<0.00050	<0.00050	0.00144	0.00229	0.0018
Zinc	mg/L	0.11	0.016	0.05	0.015	0.246	0.045	0.007	0.014	0.243	0.003	0.005	0.012	0.004	<0.0040	<0.0020	<0.0020	<0.0020	<0.0020	0.0086	<0.0010	0.001	0.0015	<0.0010	0.0012
Routine Water																									
Ion Balance	%	109	107	103	105	109	92	102	104	102	101	103	99.6	95.6	105	104	96.5	98.1	110	107	100	107	101	110	107
Bicarbonate	mg/L	253	287	284	223	591	526	536	387	509	347	336	322	384	288	313	341	311	300	261	248	216	350	290	264
Chloride	mg/L	135.0	105.0	183.0	181.0	134.0	189.0	235	200	207	98	101	83	146	156	242	173	241	240	246	204	170	238	222	246
Carbonate	mg/L	17	41	<5	16	<5	64	124	90	47	<5	13	<5	<5	38.2	11.9	<5.0	14.4	8.8	8.3	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity (EC)	uS/cm	884	934	1000	1050	1490	1660	1990	1520	1550	773	905	787	1050	1070	1350	1130	1310	1280	1270	1190	889	1330	1190	1230
Calcium	mg/L	28.1	34	34	29.9	32.4	22.2	25.7	34.2	26.4	21.9	20.5	25.5	28.9	25.8	31.5	29.8	27.2	34.1	27.9	29.4	27.9	40.2	37.5	45.1
Potassium	mg/L	24.4	19.7	25.6	22.8	26	24.6	27.7	29.9	27.7	18.8	24.1	21.2	23.1	25.7	29.7	25.8	28.1	30.6	28.1	25.9	22.9	32.3	32.8	26
Magnesium	mg/L	16.8	26.9	21.3	18.8	23.3	20.0	<0.1	19.2	19.5	13.0	15.9	16.5	18.1	16.9	24.7	20.7	22	24.6	22.3	18.4	18.5	29	26.7	29.2
Sodium	mg/L	141	138	168	169	299	299	2	320	304	138	145	107	153	184	210	149	197	209	198	150	129	182	177	173
Sulfate	mg/L	13.7	36.3	60.5	54.7	105	96	84.6	111	41.9	6	9.4	11.9	22.2	21.3	31.1	11.3	15.7	16.5	11.5	15.3	9.21	24.2	20.6	37.4
Phosphorus	mg/L	Not required under previous permit												-	0.849	0.269	0.594	0.539	0.083	0.264	0.156	0.111	0.312	0.283	2.55
pH in H_20	pH	8.9	9.2	8.1	8.8	8.2	9.0	9.3	9.4	8.9	8.4	8.4	8.4	8.3	8.96	8.57	8.38	8.74	8.50	8.57	8.28	8.05	8.15	8.25	7.99
TDS (Calculated)	mg/L	501	541	633	602	907	977	1200	995	924	468	494	428	582	610	735	580	698	711	671	566	484	718	660	687
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	0.111	<0.050	<0.050	<0.050	<0.05	<0.040	<0.020	<0.020	<0.020	<0.020
Nitrite	mg/L													-	<0.050	0.052	<0.050	<0.050	<0.050	<0.02	<0.020	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite (as N)	mg/L													-	-	-	-	-	-	-	-	-	-	<0.022	<0.022
Hardness as $CaCO_3$	mg/L													-	-	-	-	-	-	-	-	-	-	204	233
Alkalinity (total as $CaCO_3$)	mg/L													-	-	-	-	-	-	-	-	-	-	238	217
Hydroxide	mg/L													-	-	-	-	-	-	-	-	-	-	<5	<5.0
Fluoride	mg/L													-	-	-	-	-	-	-	-	-	-	0.113	0.028
Field Data																									
pH in H_20	pH	Not required under previous permit												8.63	8.41	9.48	9.5	9.27	8.8	8.56	8.44	8.9	9.1	10.5	9.67
Conductivity (EC)	uS/cm													1086	750	2020	1220	1309	1313	1268	1208	862	1429	1274	1545

APPENDIX 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 >15ºC- 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 grids 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).

<u>Cell 1 Leachate Management</u>

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 Levelogger 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 Soil Management Program report will be provided to the Director for approval, by April 1, 2021.

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 scale at the Ryley facility is 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 (PM_{10})

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.

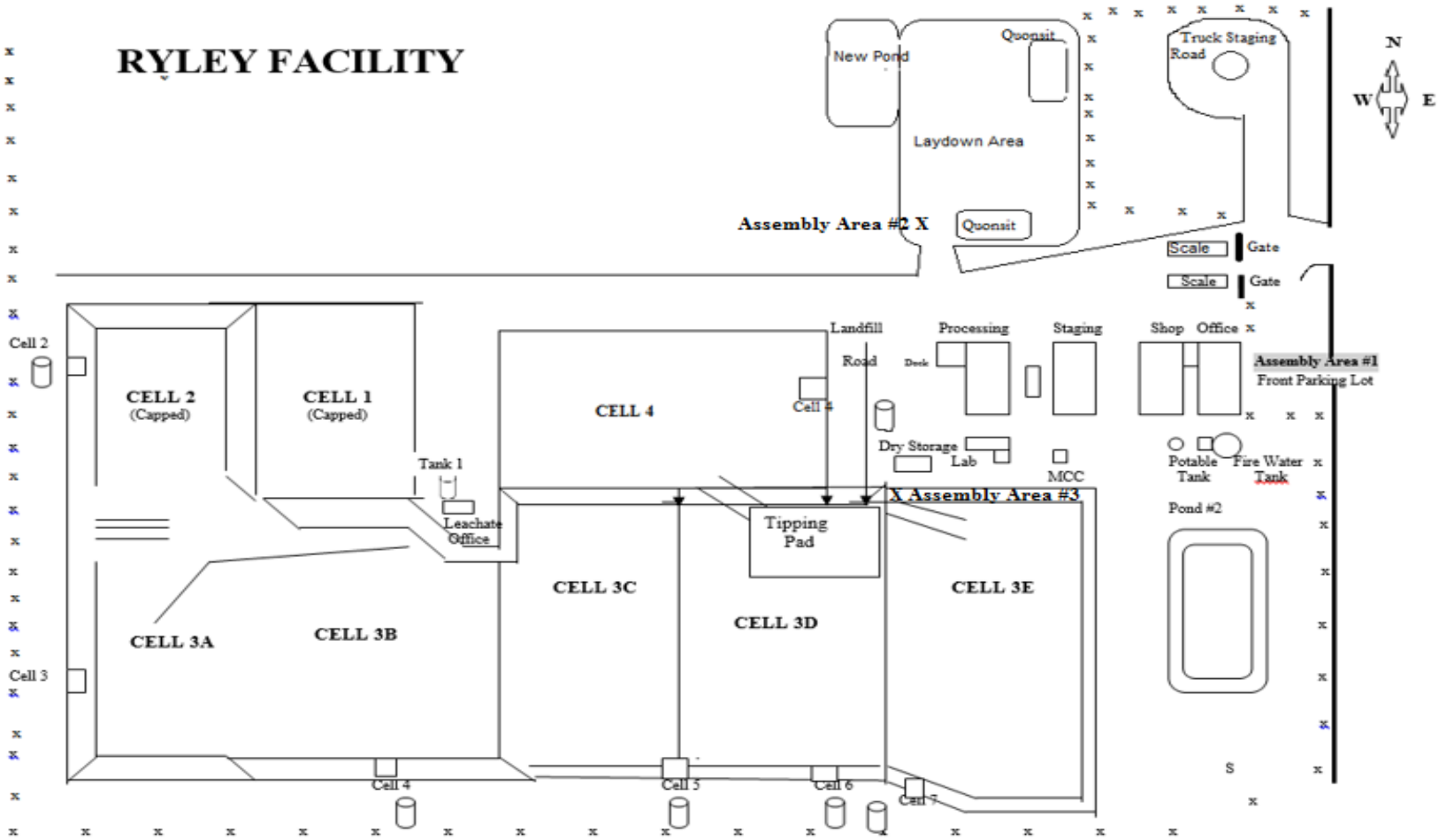
4. WINWEB Data base and Tracking System

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

I:Ryley Group Maps Facility Map January 2019

APPENDIX B

Contingency Plan

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: February 2021

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- **1.3** Revision Procedure

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- **4.2** Emergency Phone List
- **4.3** Facility Alarm System
  - **4.3.1** Testing Procedures

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16.0 Emergency Response Protocol
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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

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

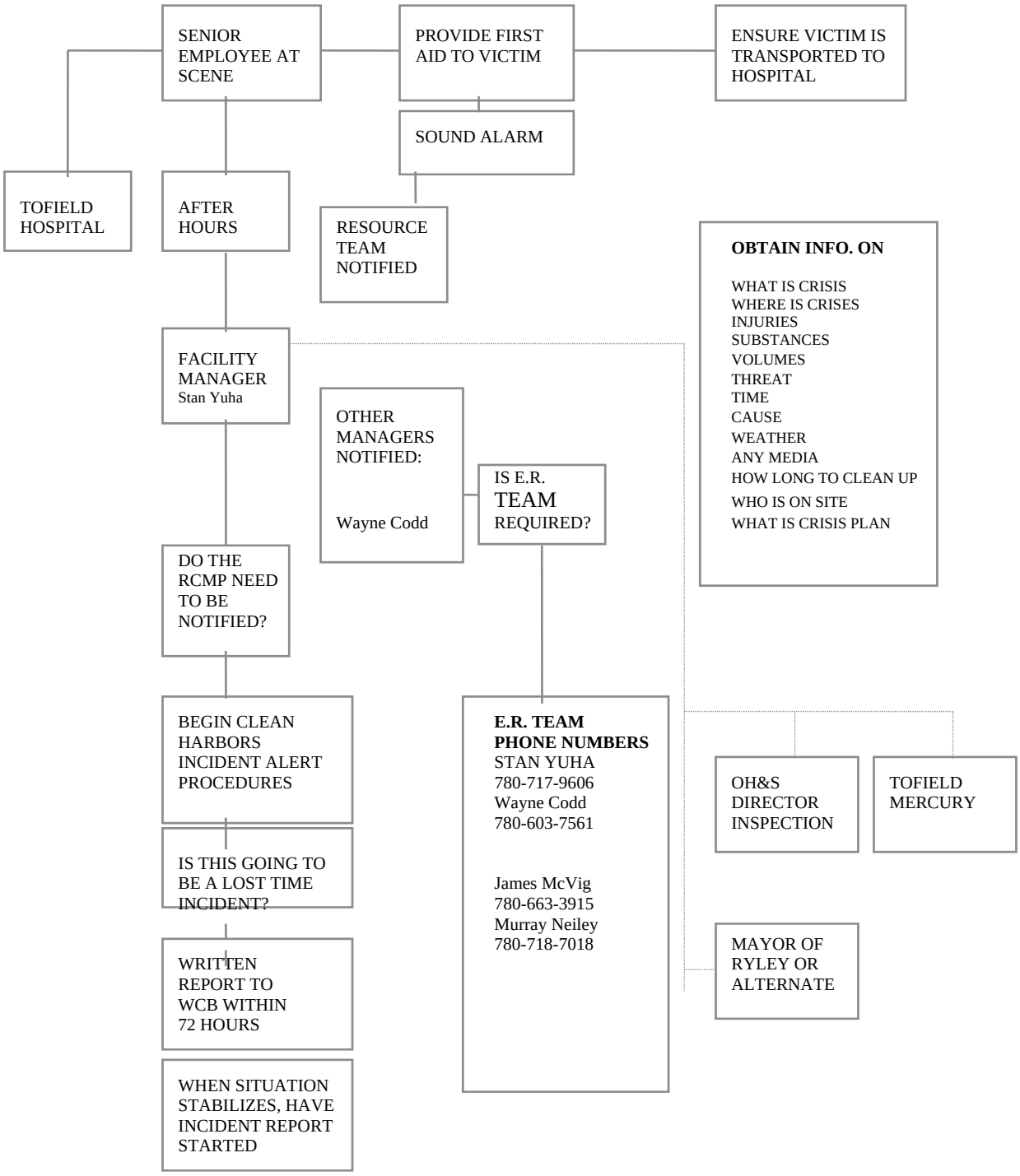


Figure 3

CONTINGENCY PLAN

FIRE AND/OR EXPLOSION

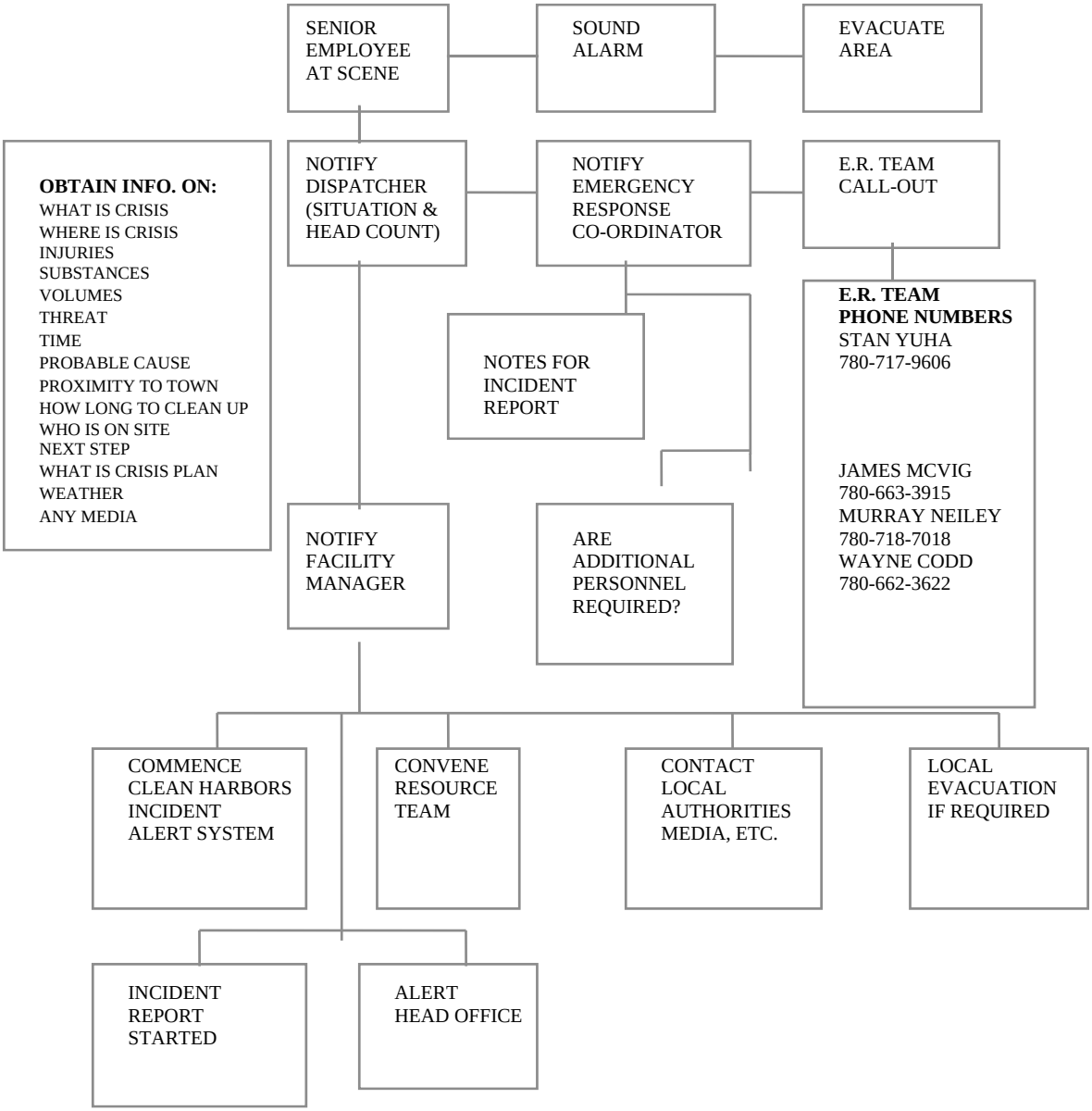


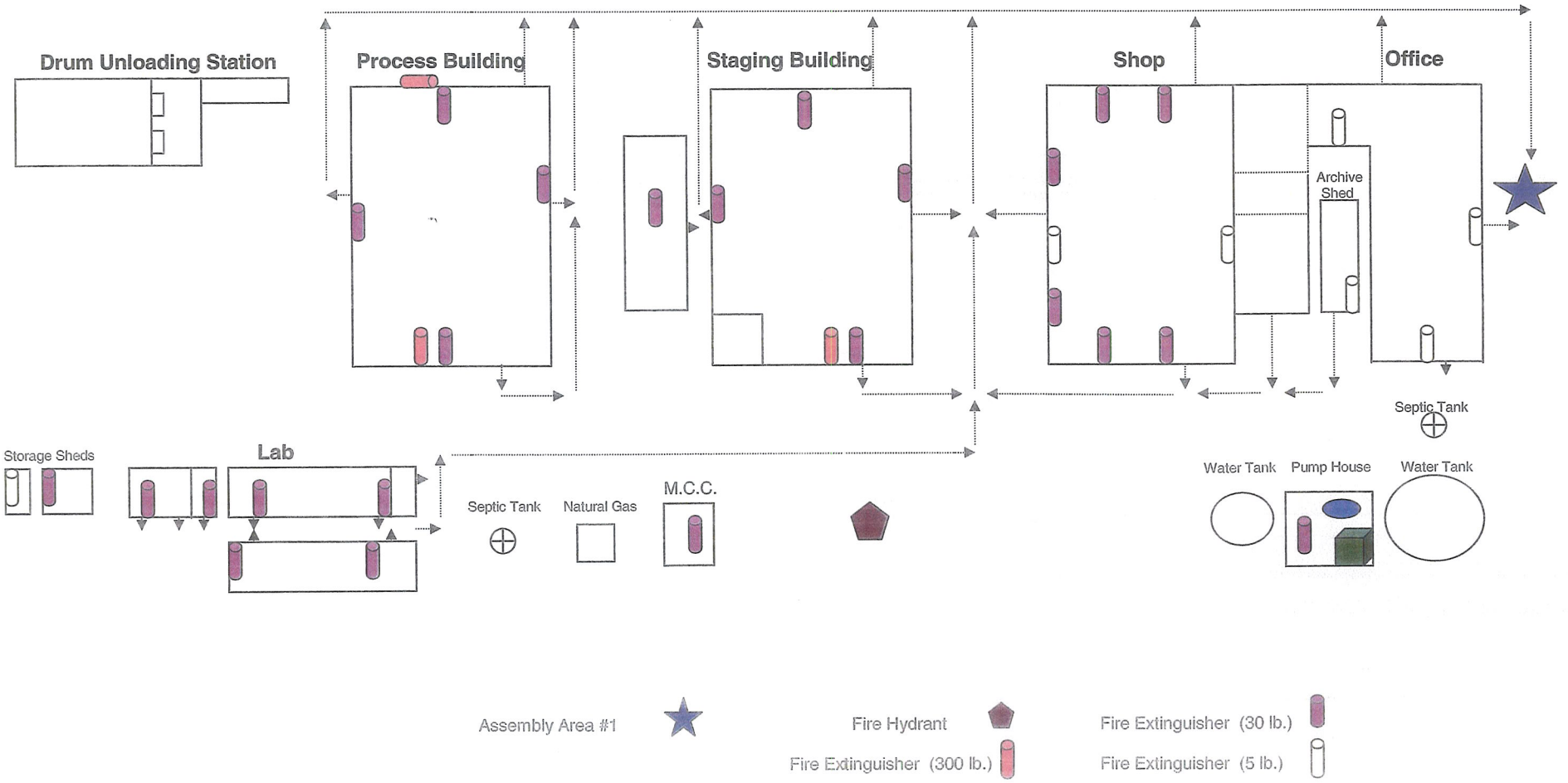
Figure 4

CONTINGENCY PLAN

FIRE HYDRANT AND EXTINGUISHER LOCATIONS

FIRE EXTINGUISHER AND HYDRANT LOCATIONS

Figure 4



Apr 6, 2011

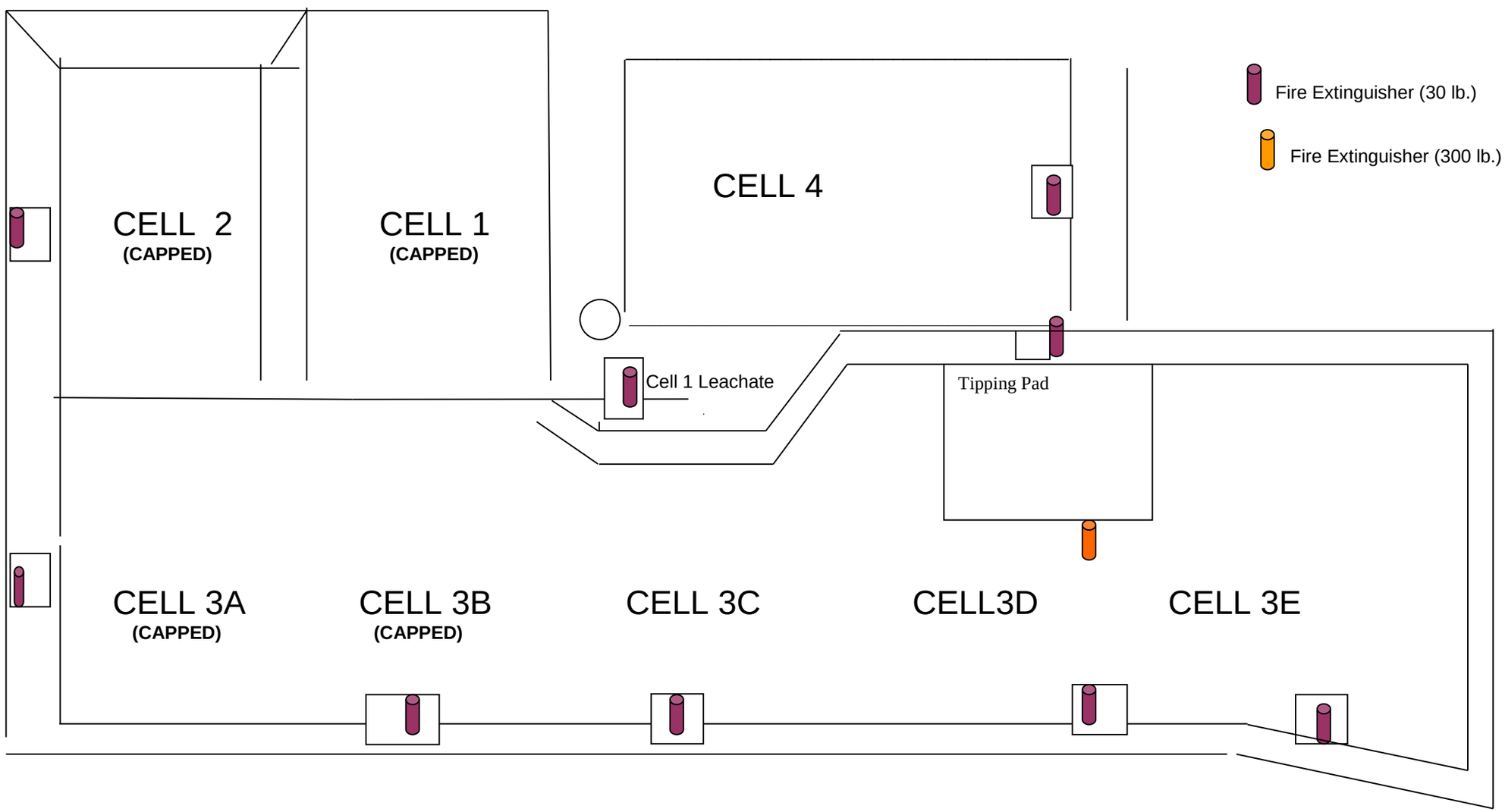
Figure 5

CONTINGENCY PLAN

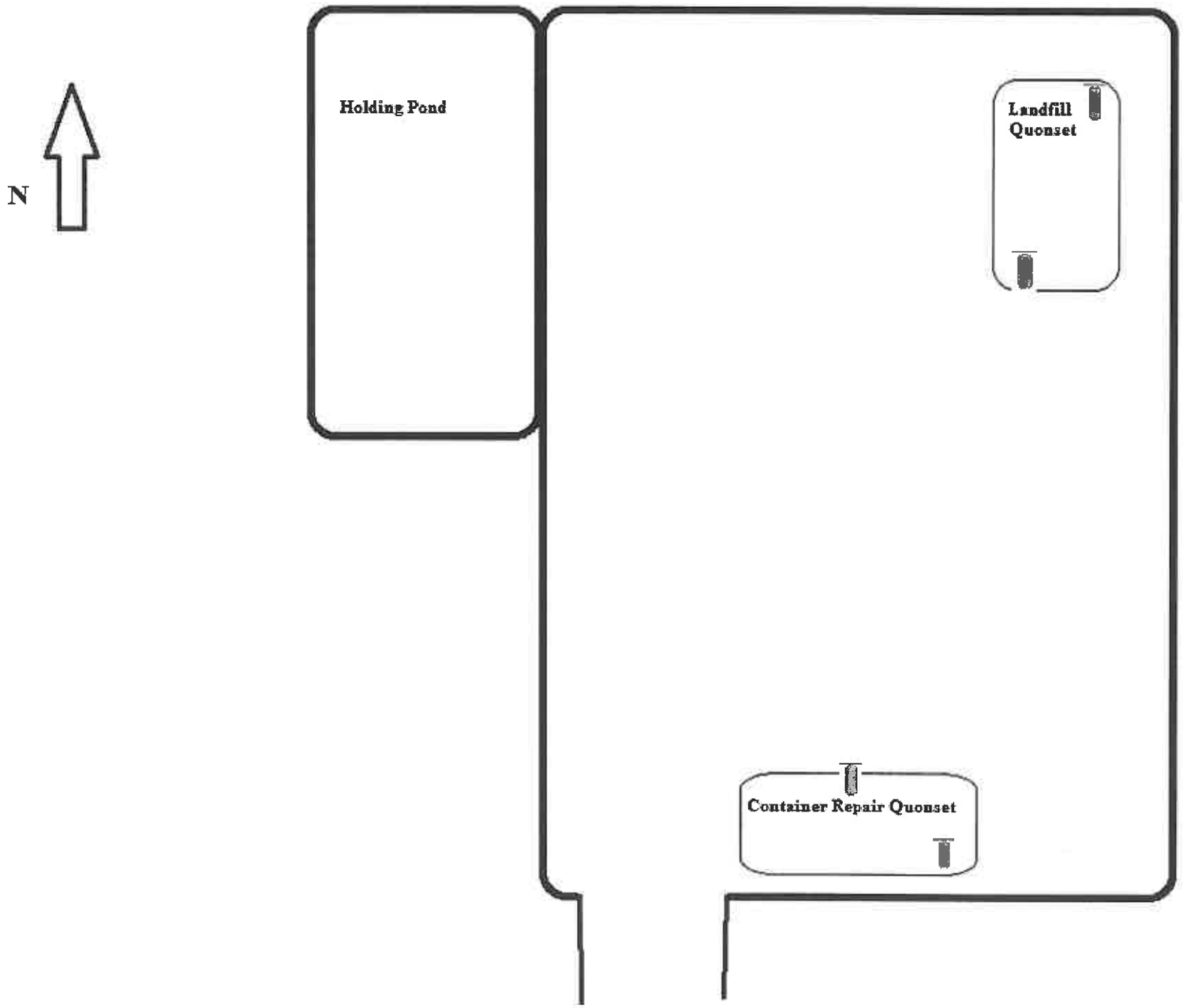
FIRE HYDRANT AND EXTINGUISHER LOCATIONS

FIRE EXTINGUISHER LOCATIONS - LANDFILL

Figure 5



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

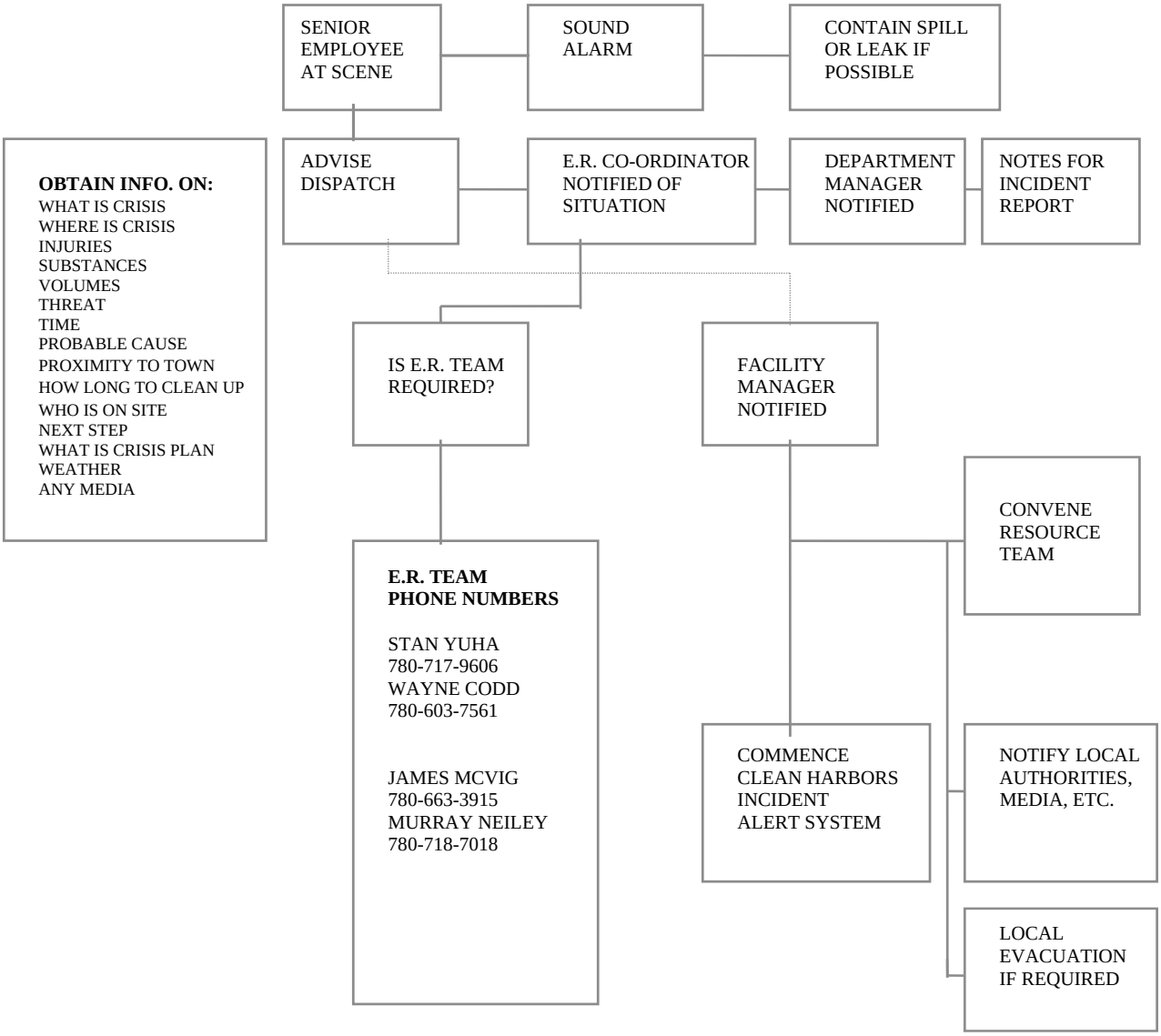
The Senior Employee should:

- **i)** Take measures to contain spill or stop leak, if possible;

Figure 6

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

EMPLOYEE TAKING CALL

NOTIFY DISPATCH TO SOUND ALARM

EVACUATION PLAN ACTIVATED

CONFIRMED HEAD COUNT TO RESOURCE TEAM

ACCESS RESTRICTED TO BOMB DISPOSAL UNIT

ALL CLEAR OBTAINED FROM FACILITY MANAGER

GET:

1. CALLERS NAME
2. LOCATION OF DEVICE
3. TIME OF DETONATION
4. APPEARANCE OF DEVICE
5. TYPE OF EXPLOSIVE
6. REASON FOR PLANTING BOMB
7. MALE OR FEMALE
8. AGE

YES/NO

9. IS CALLER SOBER?
10. IS CALLER SERIOUS?
11. MENTAL STABILITY?
12. IRRITATED?
13. IRRATIONAL?

NOTES:

_____
_____
_____
_____
_____
_____
_____
_____

_____
_____
_____
_____
_____

Once <u>all</u> 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

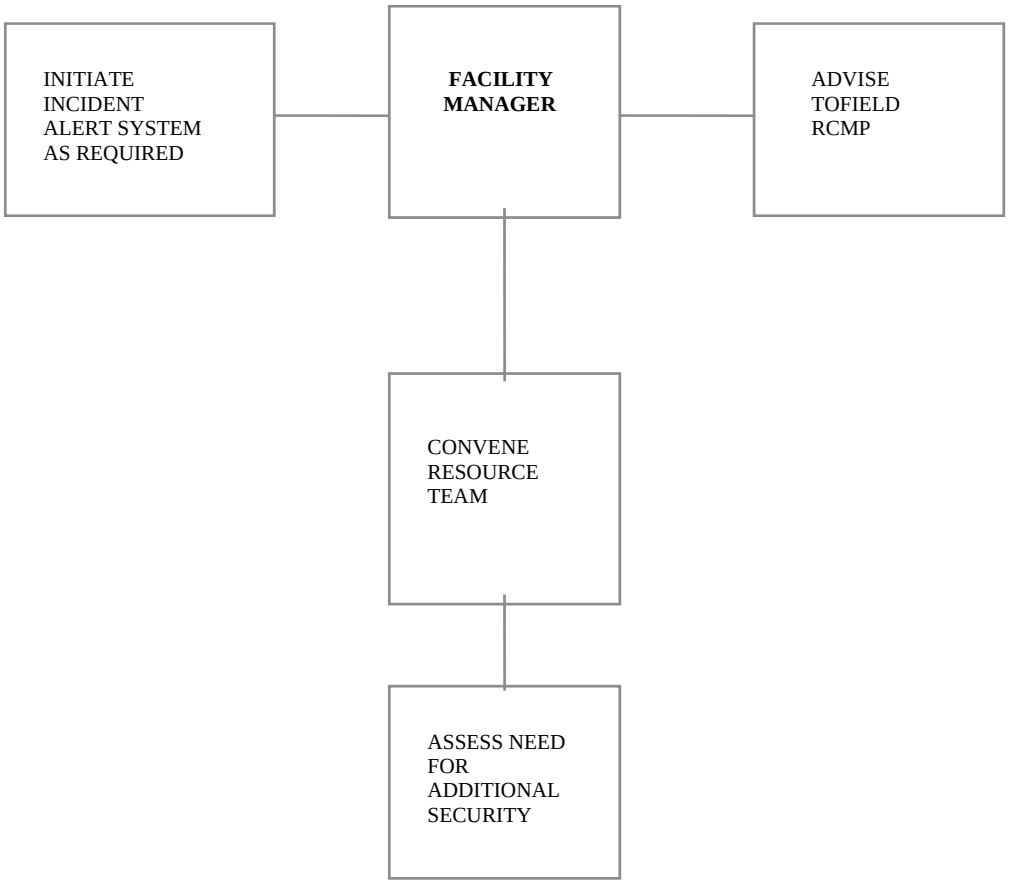
5.6.1 Direct Response

- **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, <u>all</u> 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.

Figure 9

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 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 Not Recommended (provides protection for less than 1 hour)
Butyl Rubber		
Neoprene	Chlorinated Polyethylene	Styrene Butadiene Rubber
Nitrile Rubber		Natural Rubber
Polyvinyl Alcohol		
Viton		
Saranex		
Teflon		

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 palleted piece of PCB equipment.

As a general rule, the handling of hot liquids should be avoided. If the temperature of the liquid is above 55^0C, 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 # 1-800-483-3718

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)……..... 1-780-955-2799
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

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Ecosorb 606
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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 PM_{10} 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. PM_{10} 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 PM_{10} 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 PM_{10} 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. PM_{10} is the respirable fraction of

particulate and can have an impact on human health. The emissions of PM_{10} 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 odourous 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,
- Odourous 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 ***<u>ODOUR CONTROL</u>***

5.1.1 Odour Action Plan

This plan re-emphasizes previous practices that have demonstrated success and incorporates improvements elaborated bellow:

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 sulpur 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 steam 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.

<u>When the Manager or designated representative meets or communicates with the neighbor:</u>
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.

<u>When the Manager returns to the site:</u>
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

CLEAN HARBORS CANADA INC.

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	Operations Manager		Health & Safety Manager
Supervisor	Chemist	Complaint File	Landfill Supervisor

APPENDIX B

APPENDIX B: CLEAN HARBORS CANADA, INC. RYLEY FACILITY-OFF-SITE COMPLAINT REPORT

Clean Harbors Canada, Inc.

Ryley Facility Off-Site Complaint Report

Date: **Time:**

Complainant Information

Name: _____

Address: _____

_____

Telephone Number:_____

Time of Complaint:_____

Where Problem was first detected: _____

_____

Where was the complainant: _____ _____

_____

How long did the problem last: _____

_____

The complainant would like a follow up call by management. **Yes** **No**

If "Yes" **Date:**_____ **Time:**_____

Comments:

Nature of Complaint: **Type, Description, etc.**

Odour	_____	**Noise**	_____
Plume	_____	**Dust**	_____
Water	_____	**Other**	_____

Present Atmospheric Conditions:

Wind Direction: **Wind Speed:** **Temperature:** **C**

Circle the appropriate conditions: **Overcast/Cloudy** **Partial Clouds** **Clear** **Rain** **Snow**

Atmospheric Conditions at the time of Complaint (from the Weather Station history):

Wind Direction:_____ **Wind Speed:**_____ **Temperature:**_____

Circle the appropriate conditions: **Overcast/Cloudy** **Partial Clouds** **Clear** **Rain** **Snow**

Investigation Results:

Action Taken: **Shift Supervisor Signature:**_____

MOE Communication: (Contact must be made within two hours of the complaint) Time:_____ **MOE Incident #:**

Person Contacted:_____ **Telephone Number:**_____

_____

Copies of this report must be emailed to: General Manager – Landfill; Compliance Manager; Lab Manager; Landfill Supervisor and a copy filed in the Complaint File.

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.

SECTION I

Manufacturer's Name

OMI Industries

Emergency Telephone Number

(800) 662-6367

Telephone Number for Information

(847) 304-9111

Address (Number, Street, City, State and Zip Code)

One Corporate Dr., Suite 100
Long Grove, IL 60047

Date Prepared

01-05-11

SECTION II - Hazardous Ingredients/Identity Information

Hazardous Components (Specify Chemical Identity: Common Name(s))	N/A OSHA PEL	ACGIH TLV	Other Limits 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?**	**Eyes**	**Ingestion?**
	Yes	Yes	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?**	**IARC Monographs?**	**OSHA Regulated?**
	No	No	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

CLEARFLOW
Enviro Systems Group Inc.

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 of 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
HMIS 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 cloves 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
$CaCl^2$
$CaCl^2$ 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

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 uploading 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 acrid 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 (B^2O^3 + $CaCO^3$).
- 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.

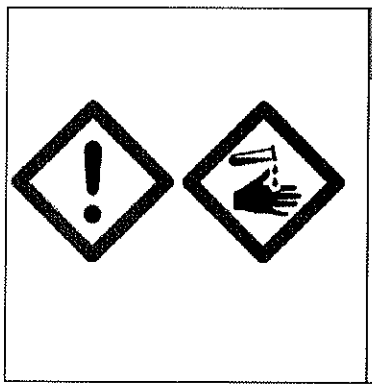
Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

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

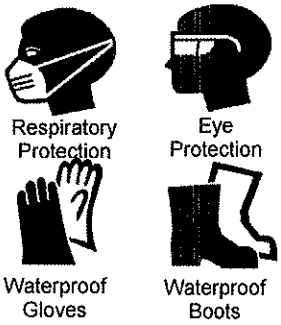


WARNING

Corrosive - Causes severe burns.
Toxic - Harmful by inhalation.
(Contains crystalline silica)

Use proper engineering controls, work practices, and personal protective equipment to prevent exposure to wet or dry product.

Read MSDS for details.



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

General Hazard: Avoid breathing dust. Wet cement is caustic.

Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Firefighting Equipment: Cement poses no fire-related hazard. A SCBA is recommended to limit exposures to combustion products when fighting any fire.

Combustion Products: None.

Section 6: ACCIDENTAL RELEASE MEASURES

General: Place spilled material into a container. Avoid actions that cause the cement to become airborne. Avoid inhalation of cement and contact with skin. Wear appropriate protective equipment as described in Section 8. Scrape wet cement and place in container. Allow material to dry or solidify before disposal. Do not wash cement down sewage and drainage systems or into bodies of water (e.g. streams).

Waste Disposal Method: Dispose of cement according to Federal, State, Provincial and Local regulations.

Section 7: HANDLING AND STORAGE

General: Keep bulk and bagged cement dry until used. Stack bagged material in a secure manner to prevent falling. Bagged cement is heavy and poses risks such as sprains and strains to the back, arms, shoulders and legs during lifting and mixing. Handle with care and use appropriate control measures.

Engulfment hazard. To prevent burial or suffocation, do not enter a confined space, such as a silo, bin, bulk truck, or other storage container or vessel that stores or contains cement. Cement can buildup or adhere to the walls of a confined space. The cement can release, collapse or fall unexpectedly.

Properly ground all pneumatic conveyance systems. The potential exists for static build-up and static discharge when moving cement powders through a plastic, non-conductive, or non-grounded pneumatic conveyance system. The static discharge may result in damage to equipment and injury to workers.

Usage: Cutting, crushing or grinding hardened cement, concrete or other crystalline silica-bearing materials will release respirable crystalline silica. Use all appropriate measures of dust control or suppression, and Personal Protective Equipment (PPE) described in Section 8 below.

Housekeeping: Avoid actions that cause the cement to become airborne during clean-up such as dry sweeping or using compressed air. Use HEPA vacuum or thoroughly wet with water to clean-up dust. Use PPE described in Section 8 below.

Storage Temperature: Unlimited. **Storage Pressure:** Unlimited.

Clothing: Promptly remove and launder clothing that is dusty or wet with cement. Thoroughly wash skin after exposure to dust or wet cement.

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls: Use local exhaust or general dilution ventilation or other suppression methods to maintain dust levels below exposure limits.

Personal Protective Equipment (PPE):

Respiratory Protection: Under ordinary conditions no respiratory protection is required. Wear a NIOSH approved respirator that is properly fitted and is in good condition when exposed to dust above exposure limits.

Eye Protection: Wear ANSI approved glasses or safety goggles when handling dust or wet cement to prevent contact with eyes. Wearing contact lenses when using cement, under dusty conditions, is not recommended.

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION (continued)

Skin Protection: Wear gloves, boot covers and protective clothing impervious to water to prevent skin contact. Do not rely on barrier creams, in place of impervious gloves. Remove clothing and protective equipment that becomes saturated with wet cement and immediately wash exposed areas.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid (powder).	**Evaporation Rate:**	NA.
Appearance:	Gray, off white or white powder.	**pH (in water):**	12 – 13
Odor:	None.	**Boiling Point:**	>1000° C
Vapor Pressure:	NA.	**Freezing Point:**	None, solid.
Vapor Density:	NA.	**Viscosity:**	None, solid.
Specific Gravity:	3.15	**Solubility in Water:**	Slightly (0.1 - 1.0%)

Section 10: STABILITY AND REACTIVITY

Stability: Stable. Keep dry until use. Avoid contact with incompatible materials.

Incompatibility: Wet cement is alkaline and is incompatible with acids, ammonium salts and aluminum metal. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas. Cement reacts with water to form silicates and calcium hydroxide. Silicates react with powerful oxidizers such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride.

Hazardous Polymerization: None. **Hazardous Decomposition:** None.

Section 11 and 12: TOXICOLOGICAL AND ECOLOGICAL INFORMATION

For questions regarding toxicological and ecological information refer to contact information in Section 1.

Section 13: DISPOSAL CONSIDERATIONS

Dispose of waste and containers in compliance with applicable Federal, State, Provincial and Local regulations.

Section 14: TRANSPORT INFORMATION

This product is not classified as a Hazardous Material under U.S. DOT or Canadian TDG regulations.

Section 15: REGULATORY INFORMATION

OSHA/MSHA Hazard Communication: This product is considered by OSHA/MSHA to be a hazardous chemical and should be included in the employer's hazard communication program.

CERCLA/SUPERFUND: This product is not listed as a CERCLA hazardous substance.

EPCRA SARA Title III: This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 and is considered a hazardous chemical and a delayed health hazard.

EPRCA SARA Section 313: This product contains none of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

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
IARC	International Agency for Research on Cancer	T	Total Particulate
		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.

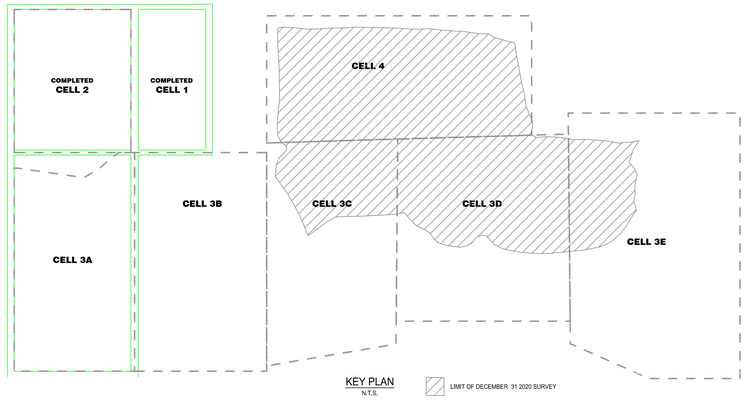
An electronic version of this MSDS is available at: www.lafarge-na.com under the Sustainability section.

Lafarge North America Inc. (LNA) believes the information contained herein is accurate; however, LNA makes no guarantees with respect to such accuracy and assumes no liability in connection with the use of the information contained herein which is not intended to be and should not be construed as legal advice or as insuring compliance with any federal, state or local laws or regulations. Any party using this product should review all such laws, rules, or regulations prior to use, including but not limited to US and Canada Federal, Provincial and State regulations.

NO WARRANTY IS MADE, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE.

APPENDIX D

Survey Records and Final Cover Elevations and Contours



WELL OBSERVATION COORDINATES				
WELL	NORTHING	EASTING	ELEVATION (TOP OF PIPE)	ELEVATION (GROUND)
19MW38B	995.98	1459.70	687.96	687.02
19MW38A	995.81	1456.10	687.97	687.09
19MW37B	1003.80	1261.99	686.99	685.98
19MW37A	1003.78	1260.72	686.94	686.00

CLEAN HARBORS INC.

SITE SURVEY ELEVATIONS

FOR

CELL 3D , 3E & 4

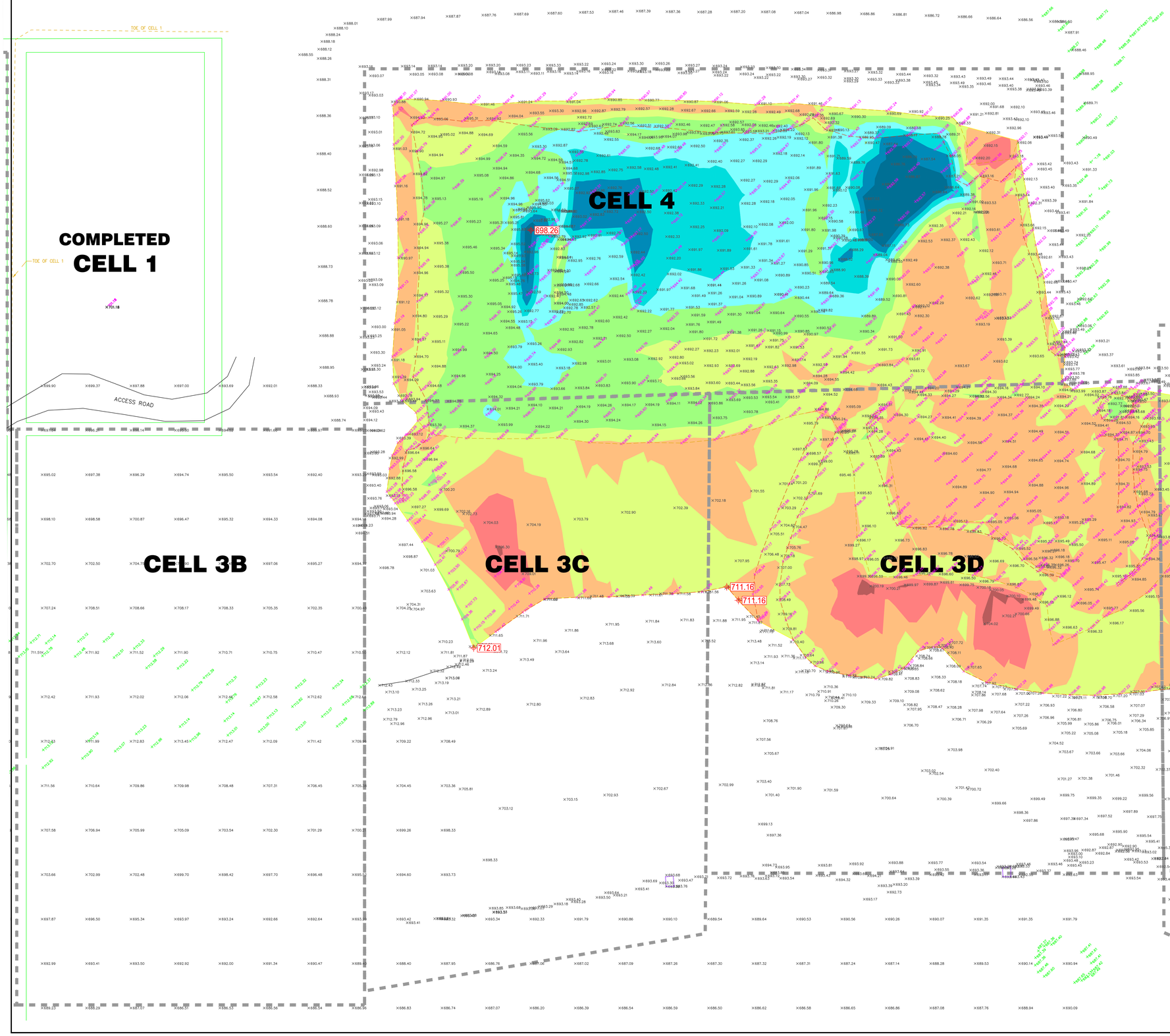
RYLEY, ALBERTA

DRAWN BY: AHB/VLE/JY/DM/RH CHECKED BY: AV	DATE : JANUARY 4, 2021	SCALE : (Metric) 1:500
CHALLENGER Suite 110, 2000 Broadmoor Blvd. Sherwood Park, Alberta T8H 1B5 Phone: (780) 406-9011 Fax: (780) 406-0007	JOB No. : 10265	REV. 0

DATE & TIME: Jan 04, 2021 - 10:46:41 pm
DRAWING NAME: 10265-SURVEY-Rev0.dwg

Parcel Volume Table: Unadjusted

Parcel	Cut cu.m.	Fill cu.m.	Net cu.m.
CELL 3C	1181	2252	1071(F)
CELL 3D	3069	1624	1445(C)
CELL 3E	457	719	262(F)
CELL 4	844	35375	34531(F)



Elevations Table				
Number	CUT/FILL FROM	CUT/FILL TO	Area	Color
1	−3.00	−2.00	72.67	
2	−2.00	−1.00	1449.62	
3	−1.00	0.00	14835.48	
4	0.00	1.00	16416.88	
5	1.00	2.00	6594.43	
6	2.00	3.00	4304.43	
7	3.00	4.00	2324.52	
8	4.00	5.00	893.21	
9	5.00	6.00	546.70	

LEGEND

JUNE 30, 2019 (AND PREVIOUS) 689.86

DECEMBER 31, 2020 ELEVATIONS 689.86

JANUARY 23, 2014 ELEVATIONS (LINE WORK PURPOSES) 692.50

OBSERVATION WELL

APPROXIMATE LIMITS OF CELLS (FOR VOLUME CALCULATION PURPOSES)

MAXIMUM ELEVATION CELL 3C = 712.01m
MAXIMUM ELEVATION CELL 3D = 711.16m
MAXIMUM ELEVATION CELL 3E = 712.37m
MAXIMUM ELEVATION CELL 4 = 698.26m

SURVEY AREA EXCLUDED FROM VOLUME CALCULATIONS

TETRA TECH

TECHNICAL MEMO

ISSUED FOR USE

To:	Stan Yuha, Facility Manager	**Date:**	January 14, 2021
c:	Michael E. Parker, Vice President, Canadian Environmental Compliance	**Memo No.:**	1
From:	Michelle Jelinski, P.Eng. Sean Buckles, M.Sc., P.Eng.	**File:**	704-SWM.SWOP04391-01
Subject:	Remaining Airspace 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, 2020.

2.0 AIRSPACE MODELLING

Using AutoCAD Civil 3D software, Tetra Tech completed airspace modelling based on the December survey data provided by Challenger, and design top of waste elevations previously completed by Tetra Tech. As of December 31, 2020, the remaining airspace in Cell 3E (Area 1) is estimated at 8,159 m^3; the remaining airspace in Cell 4 (Area 2) is estimated at 249,100 m^3; and the remaining airspace in the tipping pad area is estimated at 182,623 m^3.

The total estimated remaining airspace at the Clean Harbors Ryley Facility is 439,882 m^3.

This information is presented in Table 1 below and on the attached drawings C100 and C101.

Table 1: Airspace Modelling Summary

	Remaining Airspace Volume
Cell 3E (Area 1)	8,159 m^3
Cell 4 (Area 2)	249,100 m^3
Tipping Pad Area	182,623 m^3
Total	**439,882 m^3**

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.

Tetra Tech Canada Inc.
14940 - 123 Avenue
Edmonton, AB T5V 1B4 CANADA
Tel 780.451.2121 Fax 780.454.5688

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.

704-SWM.SWOP04391-01
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704-SWM.SWOP04391-01

Prepared by:
Michelle Jelinski, P.Eng.
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Sean.Buckles@tetratech.com

/lc

Attachments: Limitations on the Use of This Document

December 2020 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").

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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.

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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 third parties 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.

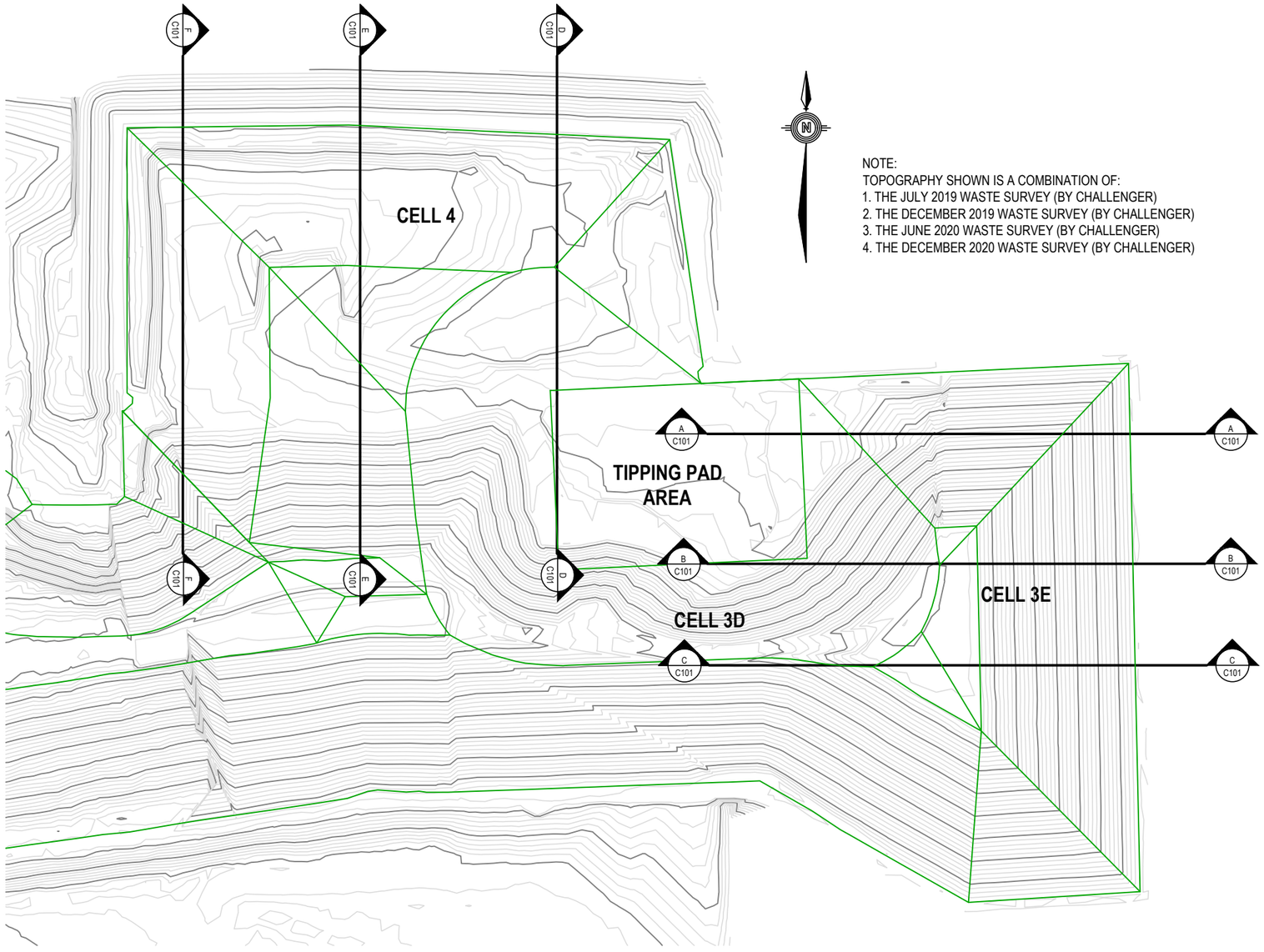
The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

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 exploration, 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.

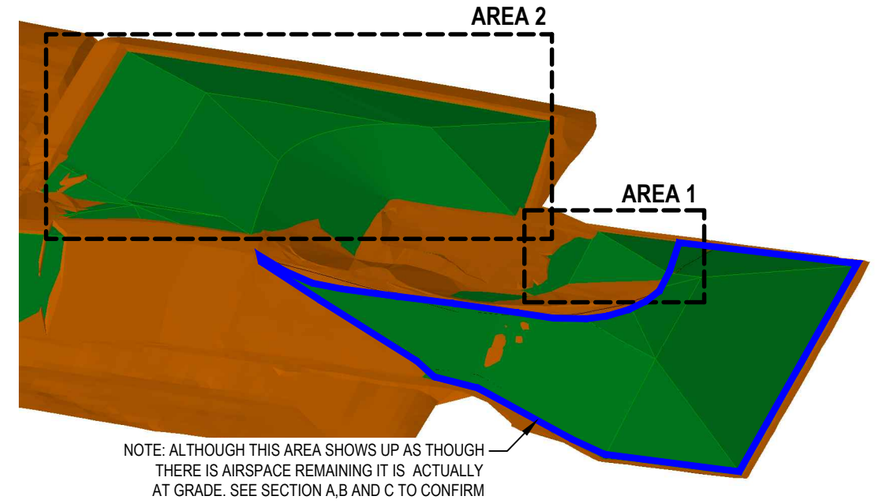
1.7 NOTIFICATION OF AUTHORITIES

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.



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)

EXISTING WASTE TOPOGRAPHY (DECEMBER 2020)



NOTE: ALTHOUGH THIS AREA SHOWS UP AS THOUGH THERE IS AIRSPACE REMAINING IT IS ACTUALLY AT GRADE. SEE SECTION A,B AND C TO CONFIRM

DESIGN TOP OF WASTE (green) VS. COMBINED WASTE SURVEY (orange)

AREA 1 REMAINING AIRSPACE.....8,159 m³

AREA 2 REMAINING AIRSPACE.....249,100 m³

REMAINING AIRSPACE IN TIPPING PAD BOWL.....182,623 m³

REMAINING AIRSPACE TOTAL.....439,882 m³

STATUS
ISSUED FOR USE

NUM	DATE	APR	DESCRIPTION
REVISIONS			
A	JAN 13/21	SB	ISSUED FOR REVIEW
NUM	DATE	APR	DESCRIPTION
DRAWING STATUS			

PERMIT

PROFESSIONAL SEAL

CLIENT

CleanHarbors

TETRA TECH

CLEAN HARBORS
DECEMBER 2020 WASTE SURVEY

PLAN
WASTE SURVEY DECEMBER 2020

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
SWM.SWOP04391-01	EDM	-	MJ	-	C100
DATE: January 8, 2021	SHEET No. 1 of 2	DWN DRG	APP SB	STATUS A	

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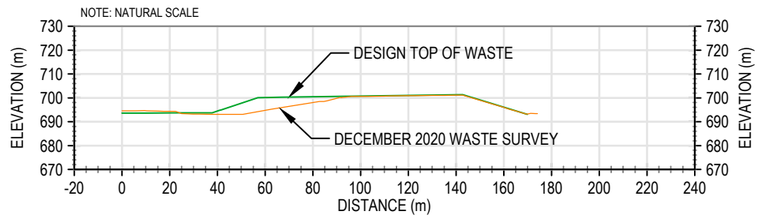
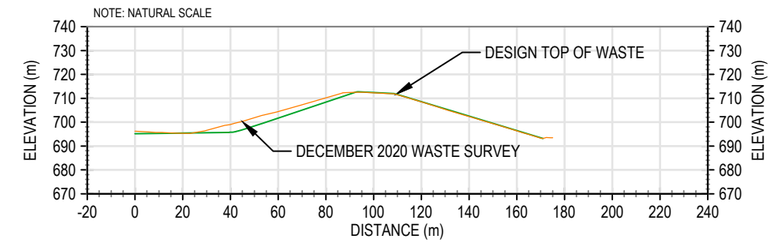


SECTION A



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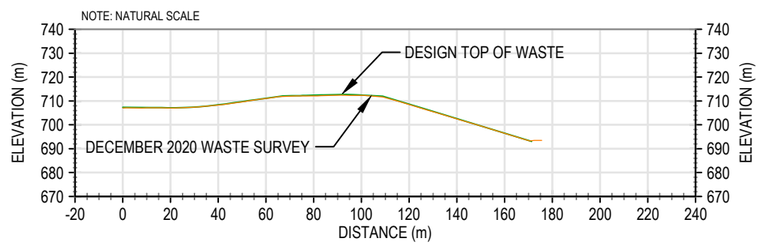

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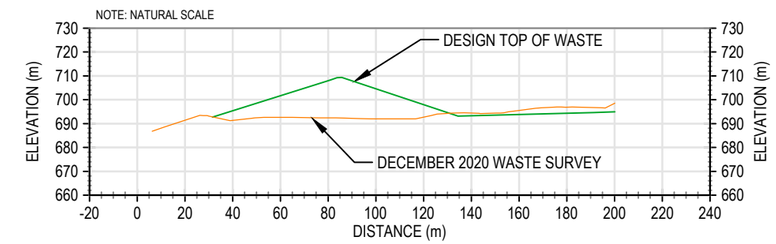
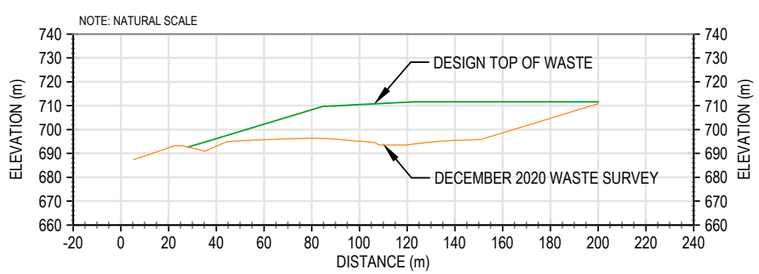
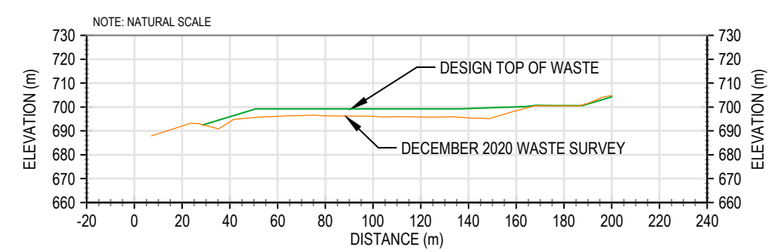


SECTION D



SECTION E



SECTION F

STATUS
ISSUED FOR USE

NUM	DATE	APR	DESCRIPTION
REVISIONS			
A	JAN 13/21	SB	ISSUED FOR REVIEW
NUM	DATE	APR	DESCRIPTION
DRAWING STATUS			

PERMIT

PROFESSIONAL SEAL

CLIENT

CleanHarbors

TETRA TECH

CLEAN HARBORS
DECEMBER 2020 WASTE SURVEY

CROSS-SECTIONS A - F
WASTE SURVEY DECEMBER 2020

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
SWM.SWOP04391-01	EDM	-	MJ	-	C101
DATE: January 8, 2021	SHEET No. 2 of 2	DWN DRG	APP SB	STATUS A	

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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 condtion 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 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	

CO Management Inspection

Response Id:

Landlord Header	
Inspector Name	
Area of Inspection	Ryley
Inspection Date and Time	
CO Management Inspection Instructions	
Instructions: Note condition of inspection items. If item does not apply to an area, mark N/A. All unsatisfactory findings must be explained below. Include any repairs, changes or other remedial actions required or performed.	
Container Storage Areas	
The housekeeping meets Clean Harbors standards. [Clean floors, clean walls, no trash, clean equipment, tools in proper storage locations, no odors or spills]	
There are no visible stains in the containment or other plant areas.	
The containers do not have waste/staining on the outside which would require cleaning or over-packing	
The Containers are in good condition, (not crushed, pinched or damaged), properly closed, with legible labels that are facing the aisle.	
Containers are stored in an organized fashion that allows for easy inspection; aisle space meets regulatory/permit requirements, and is clear and free of obstructions	
The containers have labels that are completed properly with no missing information (i.e. accumulation start date, hazard identification, etc.)	
There are no cracks or gaps in containment that need to be caulked/sealed. Any areas of older cracks that have been previously repaired are still in good condition.	
If concrete is sealed, sealant is in good	

condition with no cracks, gaps or areas needing repairs.	
Any sumps in containment are empty and clean.	
Satellite or accumulation containers are properly marked and closed.	
There are no observed safety issues (trips/slips/fall hazards, damaged equipment).	
Tanks	
Housekeeping meets Clean Harbors' standards.. There is no debris, plant matter, accumulated rain water or other material accumulated within containment.	
There are no visible stains in the containment area.	
Any small containers within the containment are properly marked and closed (unless adding or removing material).	
Sumps are clean and empty.	
If the tanks store hazardous waste they are marked with the words Hazardous Waste, have a NFPA diamond and appropriate "confined space" markings at entrances, and any other registration or permit required markings.	
If the tanks are out of service, they are marked with the words Out of Service and properly documented in the WIN tank management system.	
Satellite or accumulation containers are properly marked and closed.	
Level indicators are functional and do not indicate any potential overflow condition.	
All tanks are documented in the WIN tank management system.	
There are no observed safety issues.	
PCB Storage	

Any spills or visible stains have had a proper decon and wipe test	
All pumps and equipment associated with PCBs have PCB labeling.	
Out of Service dates and PCB marks are properly placed on containers	
Tanks have PCB mark	
Containment areas used to store PCB's are coated and the coatings are free of cracks, gaps, and damage.	
Entrances to the storage area are marked with the PCB Label as well as all access points into the facility. These marking requirements are also followed in the laboratory (if applicable).	
Housekeeping meets Clean Harbors' standards [Clean floors, clean walls, no trash, clean equipment, tools in proper storage locations, no odors or spills]	
There are no observed safety issues.	
Process Areas	
Process areas are free of heavy residues (accumulated solids, sludges or other process residues) that indicate a spill or equipment leak has occurred.	
Satellite or accumulation containers are labeled properly and remain closed.	
No visible staining on floors	
Housekeeping meets Clean Harbors' standards.	
There are no observed safety issues.	
Yard/General	
There are no incoming loads sitting in the yard that exceed the allowed time limit.	
There are no outgoing loads sitting in the yard for more than the allowed time limit (10 days in	

most cases).	
Trucks in staging or storage areas containing hazardous waste have the manifest attached to the truck or in close proximity.	
Truck landing gear is supported and is not sinking into the ground.	
There are no visible stains on the surfaces outside the facility.	
There are no vehicles parked in the yard that are leaking.	
Housekeeping meets Clean Harbors' standards.	
Facility signage is in good order and legible, including all required perimeter signs.	
Security fencing is not damaged or compromised; gates are closed and locked when facility is not manned, or if required to be closed and locked due to permit conditions during normal operations.	
Security cameras (if required) are operational.	
Yard lights are all operational.	
Spare or excess equipment storage area (Boneyard) is organized and neat.	
There are no observed safety issues.	
Permit or SOP Requirements	
All operations are compliant with permit requirements	
All operations are compliant with SOP or BMP requirements	
Inspections are properly done and findings are documented on work tickets	
All pending work tickets are promptly managed to completion.	
Landlord Footer	

Inspector Signature	
Inspection Overall Assessment	

APPENDIX N

Financial Security Calculations

Closure and Post-Closure Cost Calculations 2020

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*			$565,934.50								
TRANSPORTATION COST FOR INVENTORY DISPOSAL**			$66,852.50								
MOBILIZATION***			$5,000.00								
UTILITY LOCATES/CONFIRM UTILITY DISCONNECT***			10,000.00								
TANK CLEANING***			148,086.20								
REMOVE TANKS ***			$ 8,137.00		Leachate Tank T5100 removed and disposed						
REMOVE SECONDARY CONTAINMENT***			$ 23,083.00								
BUILDING DEMOLITION & REMOVAL***			$ 114,211.00								
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								
CONFIRMATORY SOIL SAMPLING***			$ 25,000.00								
ENVIRONMENTAL REPORTING***			$ 7,500.00								
REMEDIATION & RECLAMATION CERTIFICATE/CONFIRMATION OF NO IMPACT***			$ 10,000.00								

ON-SITE CONSULTING FEES (SITE SUPERVISION, LABORERS***			$ 36,000.00								
ON-SITE CONSULTING FEES (POST-CLOSURE ACTIVITIES***			$ 18,000.00								
PROJECT MANAGEMENT FEE (10% OF TOTAL CONSTRUCTION ABANDONMENT/DEMOLITION COSTS)***			$ 67,878.00								
CLOSURE COSTS, TRANSFER STATION			**$1,527,526.20**								
* cost based on rates from SENA Waste Services & Absolute Environmental											
** cost based on typical 2013 transport costs											
*** cost based on TetraTech EBA Estimated Decommissioning & Abandonment Costs & Pardy's Waste Management Cost Estimate (attached)											
TRANSFER STATION CLOSURE					**$1,527,526**						
CLOSURE COSTS, EQUIPMENT STORAGE AND LAYDOWN AREA (INCL. POND 3)											
SITE PREPARATION			$0.00								
SITE REMEDIATION			$59,249.00								
TRANSPORTATION AND DISPOSAL			$260,896.00								
BACKFILL			48,353.00								
RECLAMATION PREPARATION, SEEDING AND EROSION CONTROL			69,125.00								
PROJECT MANAGEMENT AND PROJECT ADMINISTRATION FEE			$ 75,616.00								
CLOSURE COSTS, EQUIPMENT STORAGE AND LAYDOWN AREA (INCL. POND 3)			**$513,239.00**								
* Closure costs for the Equipment Storage and Laydown Area (incl. Pond 3) are based on Tetra Tech (2018)											
EQUIPMENT STORAGE AND LAYDOWN AREA (INCL. POND 3) CLOSURE					**$513,239**						
POST CLOSURE COST ESTIMATE											
INSPECTIONS BY TECHNICIAN			**TIME (HOUR)**	**COST/HOUR**	**AVERAGE ANNUAL COST**						
1/WEEK, FIRST 3 MONTHS	12				**(# INSPECTIONS)(TIME)**						
1/MONTH, 4-12	9				**(COST)/25 YR}**						
1 PER 2 MONTHS, YEARS 2-5	24										
1 PER 6 MONTHS, YEARS 6-25	40										
TOTAL	**85**		8	$ 95.00	$ 2,584.00						
INSPECTIONS BY ENGINEER											
2/YEAR, FIRST YEAR	2										
1/YEAR, YEARS 2-25	24										
TOTAL	**26**		8	$ 125.00	$ 1,040.00						
Costs based on 2013 EBA Services Agreement											
TOTAL ANNUAL INSPECTION COSTS					**$ 3,624.00**						
MAINTENANCE											
				CELL 1	CELL 2	CELL 3A	CELL 3B	CELL 3C	CELL 3D	CELL 3E	CELL 4
GRASS MOWING, PER YEAR				$ 250.00	$ 500.00	$ 850.00	$ 850.00	$ 1,075.00	$ 1,075.00	$ 1,370.00	$ 1,630.00
Costs based on 2013 pricing from Rameus Investments											
TOTAL ANNUAL MAINTENANCE COSTS					**$ 7,600.00**						
ADMINISTRATION COSTS											
ESTIMATED ANNUAL ADMIN, (HOURS)	80										
COST/HOUR	$ 85.00										
ANNUAL ADMINISTRATION COST	**$ 6,800.00**										
TOTAL ANNUAL ADMINISTRATION COST					**$ 6,800.00**						
LANDFILL GAS MANAGEMENT & MONITORING	**Not applicable - no gas generated from Industrial landfill wastes**										
SURFACE WATER/STORMWATER MANAGEMENT & MONITORING	**Not applicable - site will be re-vegetated, surface water & stormwater will flow to natural drainage areas. Closure costs are shown above**										

Closure and Post-Closure Cost Calculations 2020

LEACHATE MONITORING	**Quantity**		**UNITS**	**COST/UNIT**							
Leachate head monitoring, monthly	12		8	$95.00	$9,120.00						
Leachate analysis - annual (primary & secondary) (Maxxam 2013)	8		2	$375.00	$6,000.00						
ANNUAL LEACHATE MONITORING COSTS					**$15,120.00**						
GROUNDWATER MONITORING											
# MONITORING WELLS	49										
# MONITORING EVENTS/YEAR	1										
COST OF MONITORING/WELL (includes est. reporting costs)	$ 905.00										
ANNUAL MONITORING COSTS	**$ 44,345.00**										
Monitoring costs based on 2013 EBA quotation											
TOTAL ANNUAL MANAGEMENT & MONITORING COSTS					**$59,465.00**						
ANNUAL POST CLOSURE COST					**$ 77,489.00**						
POST CLOSURE COST					**$ 1,937,225.00**						
CUMULATIVE LEACHATE MANAGEMENT COSTS (25 YEARS)					**$ 2,559,648.00**						
CLOSURE & POST CLOSURE					**$ 9,585,968.35**						

Financial Security Calculations for CHES Ryley Facility											
Waste Disposal Costs											
Cost to empty tanks						**Disposal Facility**					
Tank		**Volume (L)**		**Waste type**		**Swan Hills**		**Disposal Cost**		**Transport/kg**	**Transport cost**
T100		18500		Flammable liquid		$0.14	per kg	$2,590.00		$0.07	$1,295.00
T200		18500		Flammable liquid		$0.14	per kg	$2,590.00		$0.07	$1,295.00
T300		32,000		Aqueous incinerable		$0.35	per kg	$11,200.00		$0.07	$2,240.00
						Absolute Env					
T5100		60000		Leachate		$0.05	per kg	$0.00		$0.03	$0.00
T5200		60000		Leachate		$0.05	per kg	$3,000.00		$0.03	$1,800.00
T5400		60000		Leachate		$0.05	per kg	$3,000.00		$0.03	$1,800.00
T5500		60000		Leachate		$0.05	per kg	$3,000.00		$0.03	$1,800.00
T5600		120000		Leachate		$0.05	per kg	$6,000.00		$0.03	$3,600.00
Total (tanks)								**$31,380.00**			**$13,830.00**
Drummed waste		Avg mnthly qty,	Drum equiv			**Recycle Systems**					
Class 2		1025	5	aerosols		$125.00	per drum	$625.00		$15.00	$75.00
						Swan Hills					
Class 3		219350	1070	Flammable liquid		$0.38	per kg	$83,353.00		$0.10	$21,935.00
Class 4		15375	75	Flammable solid		$1.98	per kg	$30,442.50		$0.10	$1,537.50
Class 5.1		2050	10	Oxidizers		$9.42	per kg	$19,311.00		$0.10	$205.00
Class 6		70725	345	Toxics		$4.00	per kg	$282,900.00		$0.10	$7,072.50
Class 8		20500	100	Corrosives		$0.91	per kg	$18,655.00		$0.10	$2,050.00
NR (reg by AB Env)		61500	300			$0.38	per kg	$23,370.00		$0.10	$6,150.00
Not Regulated		111725	545			$0.38	per kg	$42,455.50		$0.10	$11,172.50
PCB		10250	50			$2.97	per kg	$30,442.50		$0.10	$1,025.00
Total (drums)		**512500**	**2500**					**$531,554.50**			**$51,222.50**
						Total Cost		**$562,934.50**			**$65,052.50**
						(tanks & drums)					

	Cell 1	Cell 2	Cell 3A	Cell 3B	Cell 3C	Cell 3D	Cell 3E	Cell 4	Total	Cost	Cost
	(m^3/yr)	(m^3/yr)	(m^3/yr)	(m^3/yr)	(m^3/yr)	(m^3/yr)	(m^3/yr)	(m^3/yr)	(m^3/yr)	$/m3	Total
2021	4.66	83.6	26.8	78.9	1,986	1,649	2,456	1,688	**7974**	$ 80.00	**$ 637,920.00**
2022	4.66	62.2	18.2	44.9	1,986	1,649	670	1,688	**6124**	$ 80.00	**$ 489,920.00**
2023	4.66	46.2	12.4	25.5	1,986	1,649	457	1,688	**5869**	$ 80.00	**$ 469,520.00**
2024	4.66	34.3	12.4	14.5	1,986	1,649	312	1,688	**5701**	$ 80.00	**$ 456,080.00**
2025	4.66	25.5	12.4	8.27	438	507	212	519	**1728**	$ 80.00	**$ 138,240.00**
2026	4.66	18.9	12.4	5.72	299	346	145	354	**1185**	$ 80.00	**$ 94,800.00**
2027	4.66	14.1	12.4	5.72	204	236	98.7	241	**816**	$ 80.00	**$ 65,280.00**
2028	4.66	10.5	12.4	5.72	139	161	67.3	165	**565**	$ 80.00	**$ 45,200.00**
2029	4.66	9.84	12.4	5.72	94.6	110	45.9	112	**395**	$ 80.00	**$ 31,600.00**
2030	4.66	9.84	12.4	5.72	64.5	74.8	31.3	76.5	**280**	$ 80.00	**$ 22,400.00**
2031	4.66	9.84	12.4	5.72	44	51	21.3	52.2	**201**	$ 80.00	**$ 16,080.00**
2032	4.66	9.84	12.4	5.72	30	34.8	17.4	35.6	**150**	$ 80.00	**$ 12,000.00**
2033	4.66	9.84	12.4	5.72	20.5	23.7	17.4	24.3	**118**	$ 80.00	**$ 9,440.00**
2034	4.66	9.84	12.4	5.72	13.9	16.2	17.4	16.5	**96.7**	$ 80.00	**$ 7,736.00**
2035	4.66	9.84	12.4	5.72	11.4	13.2	17.4	13.5	**88.1**	$ 80.00	**$ 7,048.00**
2036	4.66	9.84	12.4	5.72	11.4	13.2	17.4	13.5	**88.1**	$ 80.00	**$ 7,048.00**
2037	4.66	9.84	12.4	5.72	11.4	13.2	17.4	13.5	**88.1**	$ 80.00	**$ 7,048.00**
2038	4.66	9.84	12.4	5.72	11.4	13.2	17.4	13.5	**88.1**	$ 80.00	**$ 7,048.00**
2039	4.66	9.84	12.4	5.72	11.4	13.2	17.4	13.5	**88.1**	$ 80.00	**$ 7,048.00**
2040	4.66	9.84	12.4	5.72	11.4	13.2	17.4	13.5	**88.1**	$ 80.00	**$ 7,048.00**
2041	4.66	9.84	12.4	5.72	11.4	13.2	17.4	13.5	**88.1**	$ 80.00	**$ 7,048.00**
2042	4.66	9.84	12.4	5.72	11.4	13.2	17.4	13.5	**88.1**	$ 80.00	**$ 7,048.00**
2043	4.66	9.84	12.4	5.72	11.4	13.2	17.4	13.5	**88.1**	$ 80.00	**$ 7,048.00**
2044	4.66	9.84	12.4	5.72	11.4	13.2	17.4	13.5	**88.1**	$ 80.00	**$ 7,048.00**
2045	4.66	9.84	12.4	5.72	11.4	13.2	17.4	13.5	**88.1**	$ 80.00	**$ 7,048.00**
											$ 2,559,648.00

CHUBB

199 Bay Street, Suite 2500
PO Box 139, Commerce Court Postal Station
Toronto ON M5L 1E2 Canada

O (416) 863-0550
F (416) 863-5010

CONTINUATION CERTIFICATE

To be attached to and form part of
AB Environmental Protection Act Bond, Approval No. 10348-03-00

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 06, 2016
EFFECTIVE TERM:	SEPTEMBER 06, 2020 TO SEPTEMBER 06, 2021.

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.

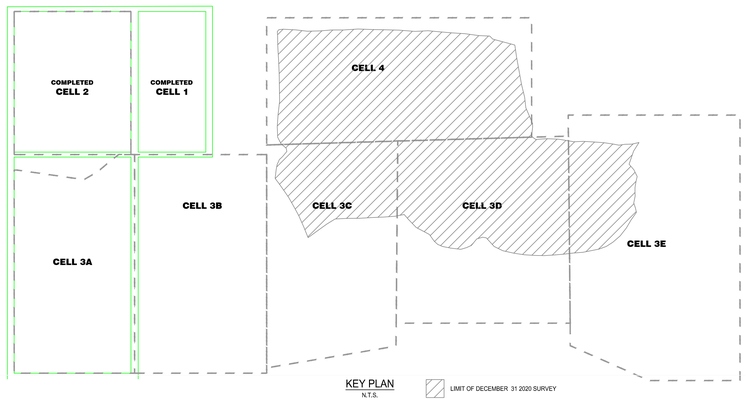
Dated this **7th** day of **July, 2020**

CHUBB INSURANCE COMPANY OF CANADA

Amanda Rais, Attorney-in-Fact

APPENDIX O

Site Development Plan



WELL OBSERVATION COORDINATES				
WELL	NORTHING	EASTING	ELEVATION (TOP OF PIPE)	ELEVATION (GROUND)
19MW38B	995.98	1459.70	687.96	687.02
19MW38A	995.81	1456.10	687.97	687.09
19MW37B	1003.80	1261.99	686.99	685.98
19MW37A	1003.78	1260.72	686.94	686.00

CLEAN HARBORS INC.

SITE SURVEY ELEVATIONS

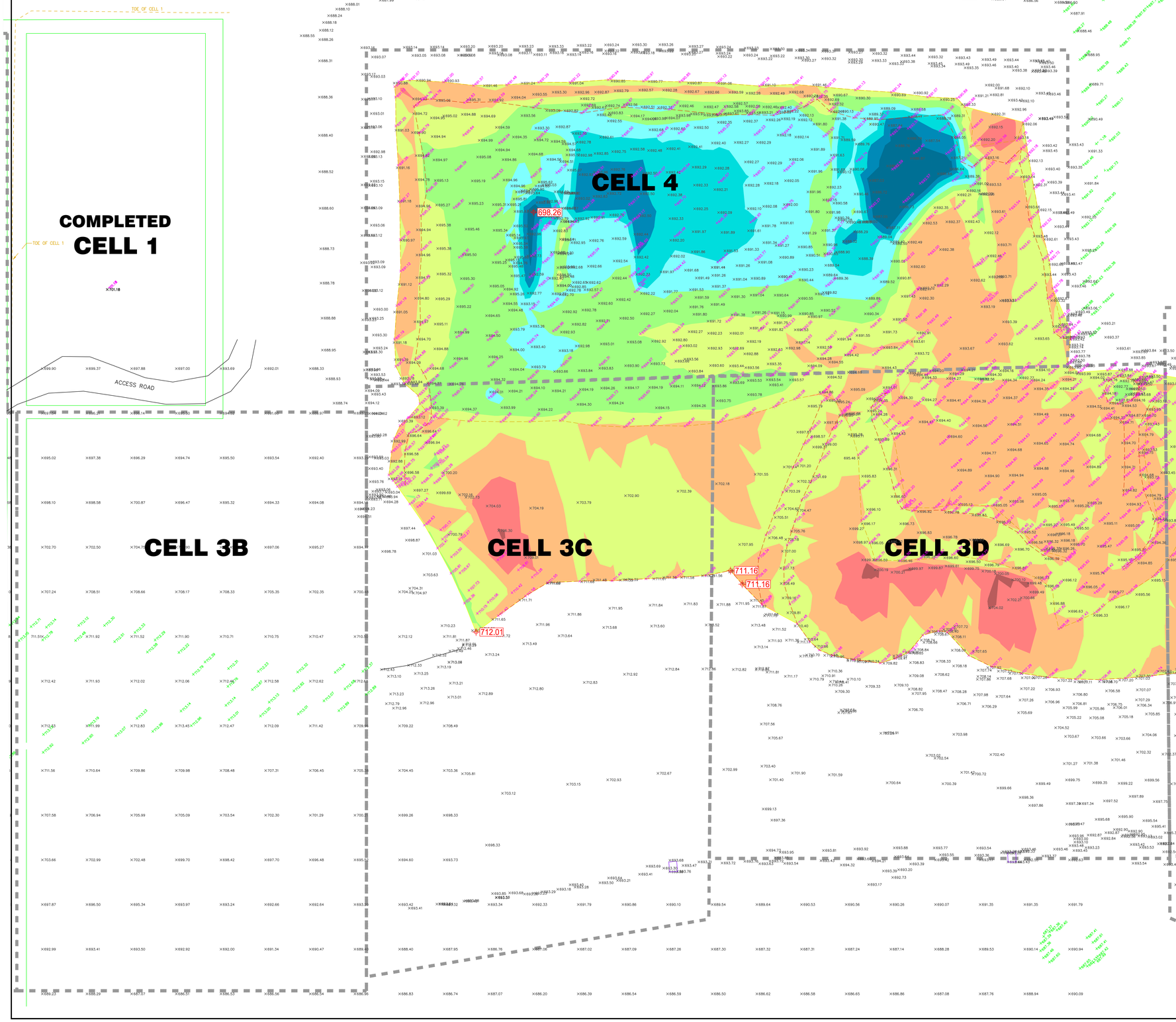
FOR

CELL 3D , 3E & 4

RYLEY, ALBERTA

DRAWN BY: AHB/VLE/JY/DM/RH CHECKED BY: AV	DATE : JANUARY 4, 2021	SCALE : (Metric) 1:500
CHALLENGER Suite 110, 2916 Broadmoor Blvd. Box: (780) 436-9011 Sherwood Park, Alberta T8H 1B5 Fax: (780) 464-0807	JOB No. : 10265	REV. 0

LAST EDITED: Jan 04, 2021 - 1:44:41 pm
DRAWING NAME: 10265-PL-2021-1.dwg



Elevations Table				
Number	CUT/FILL FROM	CUT/FILL TO	Area	Color
1	−3.00	−2.00	72.67	
2	−2.00	−1.00	1449.62	
3	−1.00	0.00	14835.48	
4	0.00	1.00	16416.88	
5	1.00	2.00	6594.43	
6	2.00	3.00	4304.43	
7	3.00	4.00	2324.52	
8	4.00	5.00	893.21	
9	5.00	6.00	546.70	

Parcel Volume Table: Unadjusted

Parcel	Cut cu.m.	Fill cu.m.	Net cu.m.
CELL 3C	1181	2252	1071(F)
CELL 3D	3069	1624	1445(C)
CELL 3E	457	719	262(F)
CELL 4	844	35375	34531(F)

LEGEND

JUNE 30, 2019 (AND PREVIOUS) 689.86

DECEMBER 31, 2020 ELEVATIONS 689.86

JANUARY 23, 2014 ELEVATIONS (LINE WORK PURPOSES) 692.56

OBSERVATION WELL

APPROXIMATE LIMITS OF CELLS (FOR VOLUME CALCULATION PURPOSES)

MAXIMUM ELEVATION CELL 3C = 712.01m
MAXIMUM ELEVATION CELL 3D = 711.16m
MAXIMUM ELEVATION CELL 3E = 712.37m
MAXIMUM ELEVATION CELL 4 = 698.26m

SURVEY AREA EXCLUDED FROM VOLUME CALCULATIONS

TETRA TECH

TECHNICAL MEMO

ISSUED FOR USE

To:	Stan Yuha, Facility Manager	**Date:**	January 14, 2021
c:	Michael E. Parker, Vice President, Canadian Environmental Compliance	**Memo No.:**	1
From:	Michelle Jelinski, P.Eng. Sean Buckles, M.Sc., P.Eng.	**File:**	704-SWM.SWOP04391-01
Subject:	Remaining Airspace 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, 2020.

2.0 AIRSPACE MODELLING

Using AutoCAD Civil 3D software, Tetra Tech completed airspace modelling based on the December survey data provided by Challenger, and design top of waste elevations previously completed by Tetra Tech. As of December 31, 2020, the remaining airspace in Cell 3E (Area 1) is estimated at 8,159 m^3; the remaining airspace in Cell 4 (Area 2) is estimated at 249,100 m^3; and the remaining airspace in the tipping pad area is estimated at 182,623 m^3.

The total estimated remaining airspace at the Clean Harbors Ryley Facility is 439,882 m^3.

This information is presented in Table 1 below and on the attached drawings C100 and C101.

Table 1: Airspace Modelling Summary

	Remaining Airspace Volume
Cell 3E (Area 1)	8,159 m^3
Cell 4 (Area 2)	249,100 m^3
Tipping Pad Area	182,623 m^3
Total	**439,882 m^3**

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.

Tetra Tech Canada Inc.
14940 - 123 Avenue
Edmonton, AB T5V 1B4 CANADA
Tel 780.451.2121 Fax 780.454.5688

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.

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Solid Waste Management Practice
Direct Line: 403.723.6876
Sean.Buckles@tetratech.com

/lc

Attachments: Limitations on the Use of This Document

December 2020 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").

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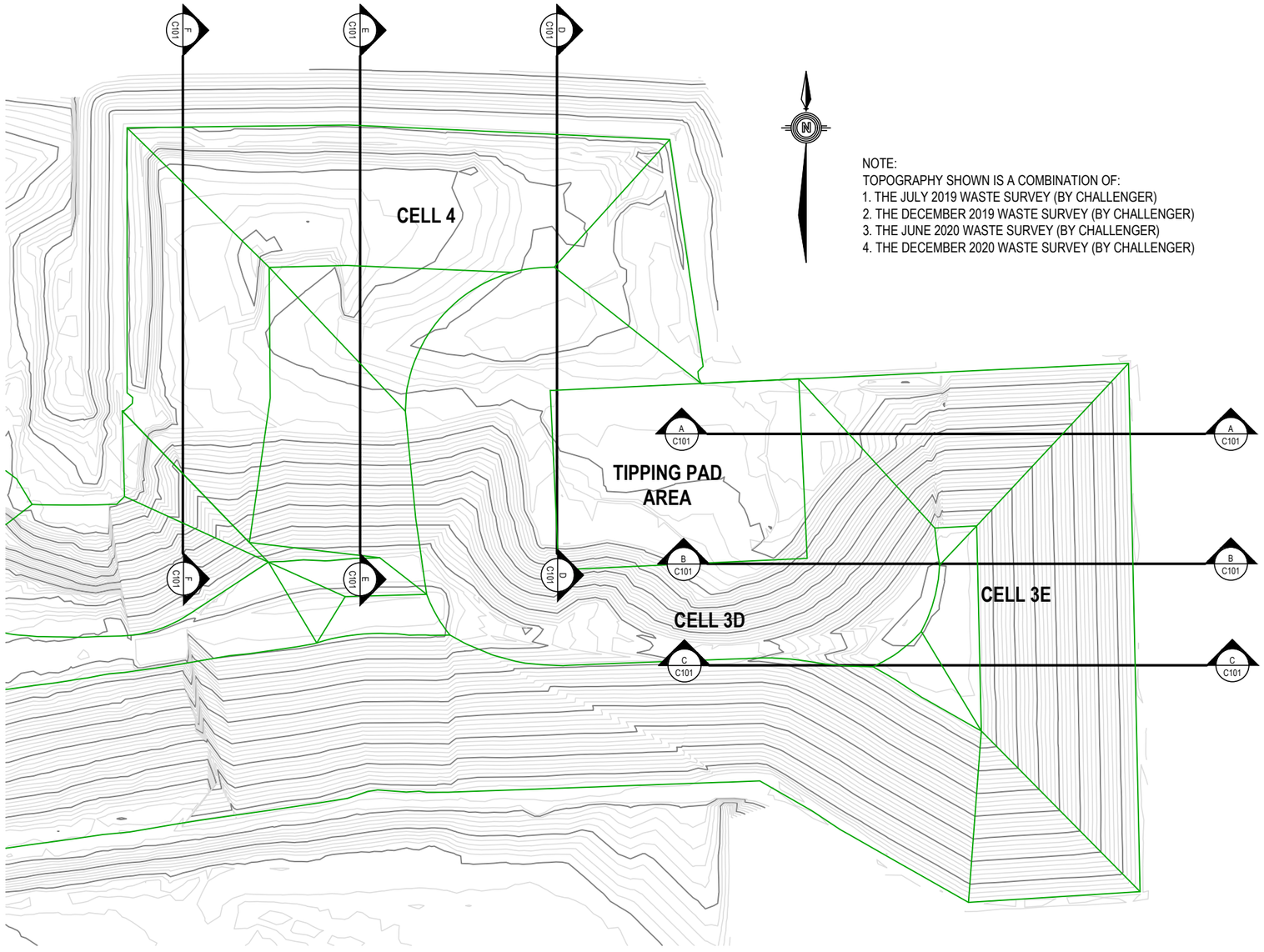
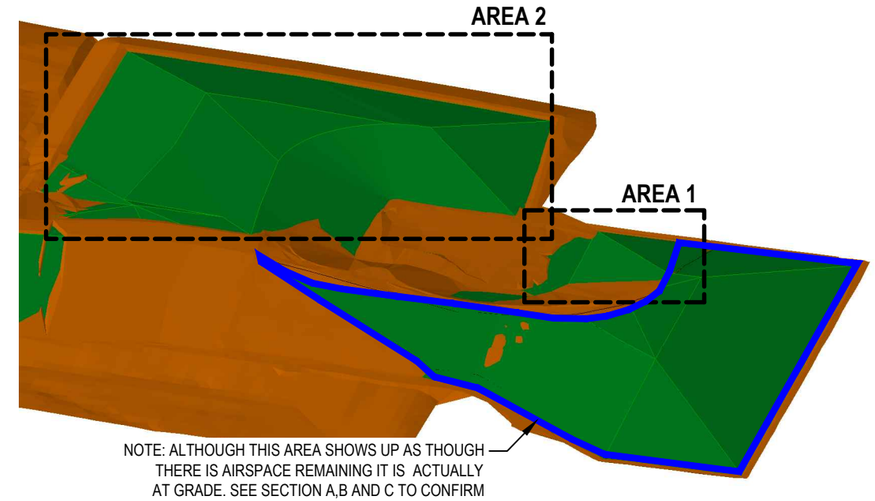


NOTE:
TOPOGRAPHY SHOWN IS A COMBINATION OF:
1. THE JULY 2019 WASTE SURVEY (BY CHALLENGER)
2. THE DECEMBER 2019 WASTE SURVEY (BY CHALLENGER)
3. THE JUNE 2020 WASTE SURVEY (BY CHALLENGER)
4. THE DECEMBER 2020 WASTE SURVEY (BY CHALLENGER)

EXISTING WASTE TOPOGRAPHY (DECEMBER 2020)



NOTE: ALTHOUGH THIS AREA SHOWS UP AS THOUGH THERE IS AIRSPACE REMAINING IT IS ACTUALLY AT GRADE. SEE SECTION A,B AND C TO CONFIRM

DESIGN TOP OF WASTE (green) VS. COMBINED WASTE SURVEY (orange)

AREA 1 REMAINING AIRSPACE.....8,159 m³

AREA 2 REMAINING AIRSPACE.....249,100 m³

REMAINING AIRSPACE IN TIPPING PAD BOWL.....182,623 m³

REMAINING AIRSPACE TOTAL.....439,882 m³

STATUS
ISSUED FOR USE

NUM	DATE	APR	DESCRIPTION

REVISIONS

NUM	DATE	APR	DESCRIPTION
A	JAN 13/21	SB	ISSUED FOR REVIEW

DRAWING STATUS

PERMIT TO PRACTICE
TETRA TECH CANADA INC.
RM SIGNATURE:
RM APEGA ID #: 62764
DATE: 2021-01-14
PERMIT NUMBER: P013774
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

PERMIT

PROFESSIONAL ENGINEER SEAN D. BUCKLES ALBERTA #62764
2021-01-14

PROFESSIONAL SEAL

CLIENT

CleanHarbors

TETRA TECH

CLEAN HARBORS
DECEMBER 2020 WASTE SURVEY

PLAN
WASTE SURVEY DECEMBER 2020

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
SWM.SWOP04391-01	EDM	-	MJ	-	C100
DATE: January 8, 2021	SHEET No. 1 of 2	DWN DRG	APP SB	STATUS A	

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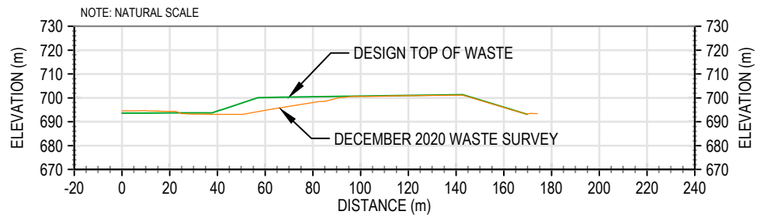
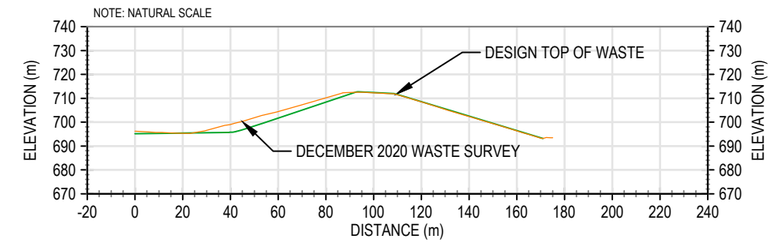


SECTION A



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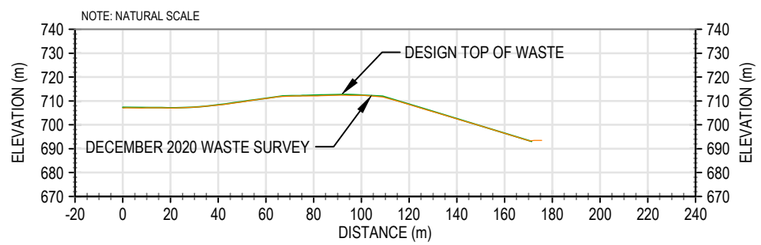

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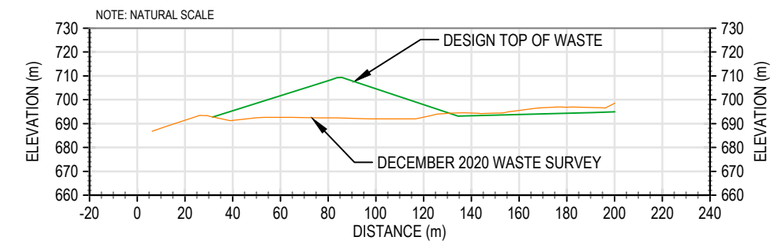

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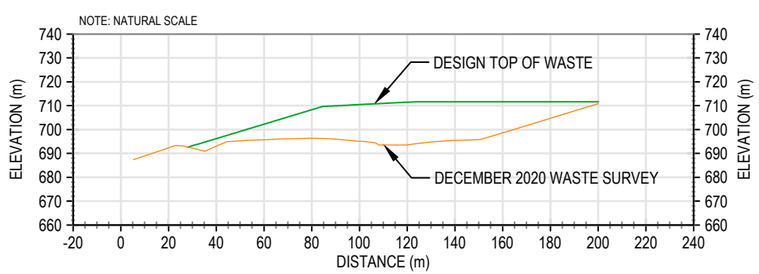
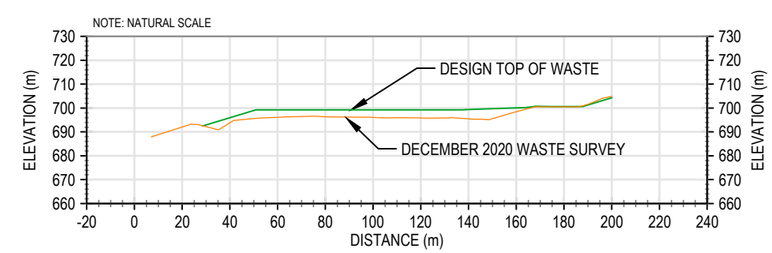


SECTION E



SECTION F

STATUS
ISSUED FOR USE

NUM	DATE	APR	DESCRIPTION
REVISIONS			
A	JAN 13/21	SB	ISSUED FOR REVIEW
NUM	DATE	APR	DESCRIPTION
DRAWING STATUS			

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TETRA TECH CANADA INC.
RM SIGNATURE:
RM APEGA ID #: 62764
DATE: 2021-01-14
PERMIT NUMBER: P013774
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

PERMIT

PROFESSIONAL ENGINEER SEAN D. BUCKLES ALBERTA #62764
2021-01-14

PROFESSIONAL SEAL

CLIENT

CleanHarbors

TETRA TECH

CLEAN HARBORS
DECEMBER 2020 WASTE SURVEY

CROSS-SECTIONS A - F
WASTE SURVEY DECEMBER 2020

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
SWM.SWOP04391-01	EDM	-	MJ	-	C101
DATE: January 8, 2021	SHEET No. 2 of 2	DWN DRG	APP SB	STATUS A	

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APPENDIX P

Annual Landfill Cell Closure Report

CLEAN HARBORS CANADA INC.

Annual Landfill Cell Closure Report

Clean Harbors' Ryley Facility

March 2021

March 2, 2021

1430 91st Street SW
Suite 101
Edmonton, Alberta
Canada
T6X 1M5
Telephone
780.664.0082
Fax
780.664.0086

Clean Harbors Canada Inc.
P.O. Box 390
Ryley, AB
T0B 4A0

Attention: Mr. Michael Parker
Vice President, Canadian Environmental Compliance

Annual Landfill Cell Closure Report – Cell 3B

Dear Mr. Parker,

Dillon Consulting Limited is pleased to present this Annual Landfill Cell Closure Report (Report) to Clean Harbors Canada Inc. (Clean Harbors) covering work performed on the Cell 3B final cover system at Clean Harbors' Ryley Facility (Facility or Site) during the 2020 reporting year. This Report has been prepared to satisfy clause 7.1.6 of the Facility's Environmental Protection and Enhancement Act (EPEA) Approval No. 10348-03-00 (Approval) and to aid Clean Harbors in their submission to Alberta Environment and Parks (AEP).

This Report discusses the Quality Assurance and Quality Control (QA/QC) measures that were implemented during the construction period and shows as-recorded conditions of the completed final cover system including depths of final cover, as required by the Facility's Approval.

We trust that this Report meets the needs of both Clean Harbors and AEP. Should you have any questions regarding the contents of this Report, please contact Dave Lake at 519-571-9833, ext. 3131, or at DLake@dillon.ca.

Sincerely,
DILLON CONSULTING LIMITED

Dave Lake
Project Manager

Phillip Auclair, P. Eng.
Waste Management Engineer

MJK/KJR:cmw
cc: Mr. Stan Yuha
Our file: 20-2976

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Acronyms, Abbreviations, Definitions

– G –

Geosynthetic Clay Liner **(GCL)**

– L –

Linear Low Density Polyethylene **(LLDPE)**

– H –

High Density Polyethylene **(HDPE)**

– Q –

Quality Assurance **(QA):** Activities carried out by Dillon Consulting Limited for the purpose of monitoring construction compliance with the Design Drawings and Technical Specifications.

Quality Control **(QC):** Activities carried out by the General Contractor and any sub-contractors thereof during construction to comply with the Design Drawings and Technical Specifications.

1.0 Introduction

Dillon Consulting Limited (Dillon) implemented and employed a Quality Assurance (QA) program during the installation of the Cell 3B final cover system at the Ryley Industrial Waste Management Facility (Facility or Site) located on Secondary Road 854 in Ryley, Alberta. The Cell 3B final cover installation included the removal of the existing 40 mil linear low density polyethylene (LLDPE) geomembrane as part of the temporary cover on the northern slope of Cell 3B previously constructed in 2013. The limits of the Cell 3B final cover system are identified within **Figure 1** titled Limit of Cell 3B Final Cover System. The QA program involved the observation of the construction of the final cover soil layer completed by the General Contractor BTO Contracting Ltd. (BTO) as well as the high density polyethylene (HDPE) geomembrane installation completed by the geosynthetic installer Western Tank & Lining Limited. The intent of the QA program was to review the construction activities performed to ensure the final cover installation was completed in accordance with the Issued for Construction drawings and technical specifications as well as review and analysis the Quality Control (QC) program implemented by the geosynthetic installer.

This report describes the QA/QC performed during the Cell 3B final cover installation including testing results and supporting documentation.

The project included the removal of the 40 mil LLDPE smooth geomembrane as part of the Cell 3B temporary cover system constructed in 2013. The other components of the temporary cover system remained in-place which consisted of the following (bottom to top):

- 100 mm protective soil base layer; and
- Protective 8 oz. non-woven geotextile.

The Cell 3B final cover system was subsequently installed following the removal of the 40 mil LLDPE smooth geomembrane in order to increase the level of containment. The Cell 3B final cover system constructed within 2020 consisted of the following components (bottom to top):

- 100 mm protective soil base layer;
- Protective 8 oz. non-woven geotextile;
- 600 mm compacted clay layer with maximum hydraulic conductivity of 1.0×10^{-7} meters per second;
- 80 mil HDPE textured geomembrane (double-sided);
- Protective 8 oz. non-woven geotextile;
- 450 mm thick subsoil layer; and
- 150 mm thick topsoil layer.

Subsequent to the final cover construction, hydro-seeding was performed to reduce and mitigate slope erosion as well as promote the growth of vegetation.

BTO completed the construction of the 600 mm compacted clay layer between the approximate dates of September 28, 2020 – October 10, 2020.

Western Tank & Lining Limited completed the installation of the 80 mil textured (double sided) HDPE geomembrane between the approximate dates of October 11, 2020 – October 18, 2020.

BTO completed the construction of the 450 mm subsoil layer between the approximate dates of October 18, 2020 – October 21, 2020.

BTO completed the construction of the 150 mm topsoil layer with hydro-seed between the approximate dates of October 21, 2020 – October 22, 2020.

2.0 Project Description

2.1 Facility Location / Description

The Facility is located 2 km north of Hwy. 14 on Secondary Road 854 in Ryley, Alberta. The Facility consists of a Class I and Class II Industrial Landfill and a Hazardous Waste / Recyclable Storage and Processing Facility.

Cell 3B is located on the northwest side of the Site and is adjacent to Cell 3A on the west and Cell 3C on the east. The final cover system was installed on the northern slope of Cell 3B.

2.2 Geology

The general subsoil conditions in the area immediately surrounding the Facility consists of an organic layer of topsoil and subsoil overlying glacial till, which is then underlain by Cretaceous era bedrock. The topsoil in the area is approximately 150 mm in thickness, and the subsoil thickness is approximately 200 mm. These soils are predominantly black solodized solonetzic soils of the Camrose series.

Glacial sediment overlying the bedrock vary from approximately 1.4 to 4.0 m in thickness. Glacial sediments in this area consist of either clay till or sandy clay till. Beneath these glacial sediments lies a 2.1 to 4.3 m thick layer of upper clayey sandstone. This sandstone is weakly cemented and contains a significant clay content. Clay shale immediately underlies the sandstone layer which appears weathered and is brown in colour in the upper portion. This layer varies between approximately 20 and 30 m in thickness.

2.3 Project Overview

The final cover system was installed over a portion of the north face of Cell 3B to replace the existing temporary cover system installed during 2013. Additionally, the slope of this face was reduced to a maximum of 30 percent to comply with requirements under the *"Standards for Landfills in Alberta"* (Standards). Decommissioning of on-site leachate management infrastructure was required as part of this project due to the additional footprint resulting from the north face slope reduction, however the installation of the final cover system will remain the focus of this Report.

The final cover system consists of the following components (bottom to top):

- 100 mm protective soil base layer;
- Protective 8 oz. non-woven geotextile;
- Min. 600 mm compacted clay layer (minimum hydraulic conductivity 1.0 x 10^{-7} m/s);
- 80 mil HDPE Geomembrane, textured (double-sided);
- Protective 8 oz. non-woven geotextile;

- 450 mm subsoil; and
- 150 mm topsoil.

Hydro-seeding was also performed in late Fall 2020 as a method to promote vegetative growth and increase soil stability. Due to the timing, vegetative growth will need to be monitored in Spring 2021, and re-seeded as necessary.

2.4 Project Organization

Clean Harbors acted as the Owner on this project, with representatives thereof approving all aspects of the design presented in the Issued for Construction Drawings and Technical Specifications. Mr. Michael Parker, Canadian Environmental Compliance Vice President, and Mr. Stan Yuha, Facility Manager were the primary points of contact at Clean Harbors.

Dillon acted as the designer and as the Field Observer. Dillon's Project Manager, Dave Lake, was responsible for the overall direction and management of the project. QA/QC monitoring was completed by Mathew Kress, E.I.T. (Field Observer), who reported directly to the Dillon Project Manager and was responsible for overseeing construction.

BTO was retained by Clean Harbors as the General Contractor, who was responsible for construction and installation of all components of the final cover system. The Site Superintendent, Yannick Picard was responsible for oversight of daily operations and for communicating with the BTO Project Manager; Ryan Balash.

Western Tank & Lining Ltd. was retained as a sub-contractor by BTO to perform geosynthetic / geomembrane work under the project. The field supervisor, Travis Williams, was the direct point of contact for both BTO and Dillon during geosynthetic / geomembrane installation.

3.0 Earthworks Construction Quality Assurance Program

3.1 Program Objectives

The QA Program for overseeing the earthworks component of the final cover system construction was developed based on the backfill and compaction requirements as well as the testing procedures and frequency set forth within the design documents.

The primary objective of this program was to verify that materials and methods utilized or employed at the Site by the General Contractor adhere to requirements within the following pieces of documentation:

- Design Drawings;
- Technical Specifications;
- HDPE Specifications Technical Memorandum;
- Guidance from geotechnical consultant; and
- Regulatory Standards.

3.2 Program Components

3.2.1 Material Inspections

Material inspections were performed on-site by Dillon's Field Observer. These inspections included visual inspection of on-site soil materials including clay, subsoil, and topsoil material as verification that the on-site materials were in accordance with the material specifications. The Field Observer was responsible to approve material suitable for construction of the final cover system and review material properties at the on-site material stockpiles.

3.2.2 Field Monitoring

Field monitoring was performed by Dillon's Field Observer. Field monitoring was necessary to ensure the appropriate methods and equipment employed were acceptable to achieve the required compaction density and moisture content. Dillon's Field Observer completed verification that materials were placed in uniform, continuous, and appropriate material lift thicknesses. Dillon's Field Observer ensured the works were completed in accordance with the design documents and regulatory requirements.

3.2.3 Geotechnical Soil Testing

Testing of materials and compaction of clay and backfill material was carried out by EnGlobe, the designated testing agency / testing laboratory. Geotechnical testing completed by EnGlobe included grain size analysis (including hydrometer), moisture content and in-place dry density field tests, maximum dry density (standard proctor), and hydraulic conductivity (permeability). Testing frequency

was based on industry standards and regulatory requirements. EnGlobe's Field Technician completed moisture content and in-place dry density field tests to confirm and verify compaction results were in accordance with the design documents. Test results were documented and conveyed to Dillon's Field Observer.

3.3 Compacted Clay Liner

Clay material utilized for the construction of the compacted clay liner as part of the final cover system was obtained from an on-site soil stockpile. The compacted clay was construction quality material with low permeability and a maximum hydraulic conductivity of 1 x 10^{-7} meters per second. Large stones and other hard matter were removed from the material to mitigate and reduce potential damage to the HDPE geomembrane. Clay material was placed in uniform and continuous lifts not exceeding a thickness of 200 mm to achieve top of compacted clay liner design grades. Subsequent to the construction of the compacted clay liner, a smooth drum roller was utilized to proof roll the top surface to provide a smooth surface in preparation for the installation of the HDPE geomembrane.

The **Photographs** section of the Report found following the text contains multiple photographs taken during the construction phase of the project. Select photos will be discussed within this Report. **Photo No. 2** shows the placement and spreading of clay material in uniform and continuous lifts of 200 mm. **Photo No. 3** shows the finished top of compacted clay layer prior to HDPE geomembrane installation.

BTO completed the surveying of each component of the final cover system as described within Section 3.7 Survey Review.

Figure 2 titled Compacted Clay Base Layer Thickness shows the surveyed top of compacted clay liner grades as well as the associated clay thickness. As per the Standards, Section 6.1 (c), the compacted clay liner was construction with a minimum thickness of 600 mm and maximum 30 percent slope.

The geotechnical consultant EnGlobe performed the necessary geotechnical testing to ensure the compacted clay liner was constructed in accordance with the design documents and regulatory requirements.

EnGlobe completed standard proctor tests in accordance with ASTM D698 on the on-site clay material to determine the optimum moisture content to achieve the maximum dry density. During the construction of the compacted clay liner, in-place dry density and moisture content field tests were performed and compared to the proctor test results. Compaction tests were required to meet a minimum 95% Standard Proctor Maximum Dry Density. Copies of the geotechnical test results for the proctor tests, in-place dry density, and moisture content field tests are included within **Appendix A**.

EnGlobe completed sampling of the clay material within the on-site stockpiles. Hydraulic conductivity laboratory testing was completed to ensure the clay material had a maximum hydraulic conductivity of 1 x 10^{-7} meters per second. The results of the hydraulic conductivity testing concluded the permeability of

the clay material ranged between 1.0 x 10^{-11} meters per second to 3.3 x 10^{-12} meters per second which exceeded the requirements for permeability. Hydraulic conductivity test results are included within **Appendix A**.

3.4 Subsoil Layer

Subsoil utilized within the construction of the subsoil layer as part of the final cover system was obtained from an on-site soil stockpile. Subsoil material deemed suitable for backfill was free of frozen material, trees, stumps, branches, roots, foreign material, and material containing hazardous or toxic constituents at hazardous or toxic concentrations. The subsoil was hauled, placed, and spread in a uniform thickness of 450 mm.

3.5 Topsoil Layer

Topsoil utilized within the construction of the topsoil layer as part of the final cover system was obtained from an on-site soil stockpile, as well as from strippings left over from accessing buried clay/subsoil material at an adjacent location. Topsoil deemed suitable for placement was fertile, free of subsoil, roots, vegetation, grass, weeds, stones, and foreign matter. The topsoil was hauled, placed, and spread in a uniform thickness of 150 mm. **Figure 3** titled Top of Final Cover Elevations shows the surveyed top of topsoil grades as well as elevation points representing the top of the final cover system.

Photo No. 9 shows the topsoil being placed in a uniform thickness of 150 mm. **Photo No. 10** shows the finished topsoil layer prior to placement of hydro-seeding.

3.6 Hydro-Seeding

Following placement of the topsoil layer, hydro-seeding was applied as a method to promote vegetative growth and increased soil stability. Hydro-seeding was completed by Instalawn Hydroseeding on November 12, 2020. Due to the timing, vegetative growth will need to be monitored in spring 2021, and re-seeding may be necessary.

The seed mix consisted of:

- 32% Pubescent wheat grass;
- 30% Dahurian wildrye;
- 30% Sheep fescue; and
- 8% Cereal Rye.

Seed mixture per “Alberta Infrastructure and Transportation Design Bulletin No.25”. Ryley, Alberta is located within Zone 5.

3.7 Survey Review

During construction of the final cover system, BTO completed the surveying of each of the material layers and subsequently provided the survey data to Dillon for review. The surveys completed as part of the project included:

- Top of waste area and exposed geosynthetic anchor trench prior to compacted clay liner placement;
- Top of compacted clay layer;
- Limit of installed HDPE geomembrane liner;
- Top of subsoil layer; and
- Top of topsoil layer.

Dillon received, processed, and reviewed the survey data to verify the design grades and minimum material thicknesses were achieved for the compacted clay, subsoil, and topsoil layers.

4.0 Geosynthetic Construction Quality Assurance Program

4.1 Program Objectives

The QA Program for overseeing geosynthetic portions of the work was developed in conjunction with the HDPE Specifications Technical Memorandum, prepared by Dillon and issued August 24, 2020.

The primary objective of this program was to verify that materials and methods utilized or employed at the Site by the geosynthetic installer adhere to requirements within the following pieces of documentation:

- Design Drawings;
- Technical Specifications;
- HDPE Specifications Technical Memorandum;
- Guidance from material suppliers; and
- Regulatory Standards.

4.2 Program Components

4.2.1 Material Inspections

Material inspections were performed on-Site by Dillon's Field Observer. These inspections included visual inspection of materials delivered to Site, and a verification that on-Site material was identical to the proposed material included in shop drawing submittals from the General Contractor. These inspections were used to verify that the installed material met all required standards and specifications.

4.2.2 Field Monitoring

Field Monitoring was performed by Dillon's Field Observer. Full-time field monitoring was conducted for crucial components of the final cover system; primarily during the installation of the 80 mil HDPE geomembrane. Part-time oversight was employed for other, less crucial construction activities.

Field monitoring was necessary to ensure that methods and equipment employed were acceptable, and were done so in a way to avoid damaging any component of the final cover system, and therefore ensuring conformance to standards and specifications.

4.2.3 Destructive Testing

Destructive seam testing was completed by Western Tank and Lining Ltd., with observation from Dillon's Field Observer. Destructive tests were completed to satisfy project requirements described within the HDPE Specifications Technical Memorandum, and to further confirm that seaming techniques were working as intended to meet the required minimum weld strength requirements. Copies of destructive

test results can be found following the text in **Appendix B**. **Photo No. 5** attached shows the destructive test method completed by Western Tank and Lining Ltd.

4.2.4 Non-Destructive Testing

Extrusion welds completed on the 80 mil HDPE geomembrane were non-destructively tested by Western Tank & Lining Ltd. with observation from Dillon's Field Observer. Tests for this type of seam were completed by using a vacuum box along the entire length of each seam (with sufficient overlap). Sections of seam which, when tested, resulted in the formation of air bubbles were marked and repaired. **Photo No. 6** shows the vacuum box test method completed by Western Tank and Lining Ltd.

Wedge welds were tested over their entire length by Western Tank & Lining Ltd. using the air pressure test method with observation from Dillon's Field Observer. In the case where a length of seam failed an air pressure test, the seam was marked, repaired, and re-tested until a passing grade was attained. Copies of air pressure test results can be found following the text in **Appendix B**.

4.3 8 oz. Non-woven Geotextile

The non-woven geotextile supplied and installed as part of the final cover system was Texel 080E non-woven geotextile. Roll dimensions of the non-woven geotextile supplied were 5.25 m wide x 91.44 m long rolls. The non-woven geotextile was installed over top of the 80 mil textured (double sided) HDPE geomembrane liner as a cushion layer to protect the liner from damage and puncture. During installation and deployment of the non-woven geotextile panels, a minimum 150 mm overlap between panels was maintained and achieved.

Photo No. 7 and **Photo No. 8** included within this report show the placement and deployment of the non-woven geotextile panels.

4.4 80 mil Textured HDPE Geomembrane

The geomembrane supplied and installed as part of the final cover system consisted primarily of SKAPS 80 mil HD-80T2 NOM textured (double sided) HDPE geomembrane. Roll dimensions of the geomembrane supplied were 7.00 m wide x 131 m long rolls. Due to supply shortages at the time of construction by the primary manufacturer, the General Contractor sourced an alternate supplier to provide a sufficient quantity of geomembrane material to complete the project within the allotted timeline. An alternate material specification sheet was provided to Dillon by the General Contractor for review and approval. SOLMAX Premium HD 2.00 mm White Reflective XRT textured (double sided) HDPE geomembrane was approved by Dillon for use as an alternate material. SOLMAX geomembrane was delivered in 6.80 m wide x 121.90 m long rolls. The 80 mil textured (double sided) HDPE geomembrane liner was installed on top of the compacted clay liner.

Each roll of 80 mil textured (double sided) HDPE geomembrane liner installed was required to undergo quality control testing performed by the manufacturer. Two weeks prior to delivery of materials to job site, BTO provided Dillon with copies of manufacturer's quality control certificates for review and verification. During the placement and installation, each panel was visually inspected by the geosynthetic installer and Dillon's Field Observer for any manufacturing defects or damages caused by handling and / or storage of the material. Similarly this process was repeated following installation to identify any damages caused by on-site operations. Any damages identified during these inspections were marked and subsequently repaired and recorded.

Western Tank & Lining Ltd. followed industry best practises and procedures throughout the installation. The compacted clay liner was proof rolled to provide a smooth surface prior to the installation of the 80 mil textured (double sided) HDPE geomembrane liner. **Photo No. 4** within the report shows the typical geomembrane deployment and wedge weld seaming procedures used by Western Tank & Lining Ltd.

Wedge welded seams and extrusion welded seams, as described below, were the seaming techniques used during the installation of the 80 mil textured (double sided) HDPE geomembrane liner as part of this project.

Wedge Welding:

Wedge welding machines use a heated element to fuse thermoplastic sheet materials. Wedge welders are automatic machines that run between two overlapped sheets of material. The welder heats the interface between the materials and then presses the materials together to form a lap (wedge) weld. The thermoplastic materials are fused at the molecular level without the addition of any glues or solvents. The seam that is created forms two bonded welds separated by an air channel. An air pressure test is subsequently completed on the air channel to verify the integrity of the two bonded welds.

Extrusion Welding:

Extrusion welding machines use a heated barrel with a plasticating screw to deliver molten plastic to a specially shaped shoe. The shoe is shaped to make a bead of plastic suitable for the material type and thickness being welded. A hot air blower is attached to the extrusion welder to preheat the weld area. The welder uses its own weight to create the pressure required for welding and the operator steers the welder manually. All extrusion welds are subjected to vacuum box testing to ensure the integrity of the weld.

4.5 Documentation

4.5.1 Material Inventory

During the placement and installation of the 80 mil textured (double sided) HDPE geomembrane liner Western Tank & Lining Ltd. completed the material inventory including roll number, dimensions, and start and end date. The material inventory is presented within **Appendix B**.

Western Tank & Lining Ltd. also completed additional documentation regarding the panel placement including panel number, date, roll number, work area description, and dimensions. The panel placement data sheet is presented within **Appendix B**.

Western Tank & Lining Ltd. figures labelled “Cell 3B Anchor Trench” and “Cell 3B Landfill Cap” the detailed panel layout of the 80 mil textured (double sided) HDPE geomembrane liner installation. These figures have been included as **Figure 4** and **Figure 5** within the **Figures** section at the end of this Report

4.5.2 Test Seams

Each seamer and his welding unit produced a test seam at the start of each shift, when the temperature fell to 2°C, fallen by 5°C since the last test seam, after equipment breakdown, and after 5 hours of continuous seaming. If a seamer was required to use a different welding unit, new test seams were required prior to seaming operations with each new unit.

Test seems made on piece of geomembrane identical to that being installed. Samples measured 1 m long by 0.3 m wide with the seam centred lengthwise and overlapped as specified. Test seam welding carried out under ambient conditions that replicated actual field conditions.

Six adjoining 25 mm wide specimens from the test seam sample were tested each in shear and in peel using a field tensiometer. If a seam failed, a second seam was produced and tested. A second failure resulted in rejection of either the seamer and/or equipment until the deficiency was corrected. This was verified by the production and successful testing of two consecutive test seams.

Test results for shear and peel were required to have Minimum Bonded Seam Shear and Peel Adhesion Strengths (force per unit width at yield) as per the below table (Geosynthetic Institute, 2002).

Table 1(b) – Seam Strength and Related Properties of Thermally Bonded **Smooth and Textured** High Density Polyethylene (HDPE) Geomembranes **(S.I. Units)**

Geomembrane Nominal Thickness	0.75 mm	1.0 mm	1.25 mm	1.5 mm	2.0 mm	2.5 mm	3.0 mm
Hot Wedge Seams(1)							
shear strength, N/25 mm.	250	350	438	525	701	876	1050
shear elongation at break(2), %	50	50	50	50	50	50	50
peel strength, N/25 mm	197	263	333	398	530	661	793
peel separation, %	25	25	25	25	25	25	25
Extrusion Fillet Seams							
shear strength, N/25 mm	250	350	438	525	701	876	1050
shear elongation at break(2), %	50	50	50	50	50	50	50
peel strength, N/25 mm	170	225	285	340	455	570	680
peel separation, %	25	25	25	25	25	25	25

All test / trail seam test results are presented within **Appendix B**.

4.5.3 Geomembrane Seaming

The geosynthetic installer Western Tank & Lining Ltd. completed the QA during the installation of the 80 mil textured (double sided) HDPE geomembrane. Pertinent information during geomembrane seaming was recorded including weld technician, welder number, seam length, start and end time of seam, air pressure testing start and finish, QA initials, and test date. Seaming was primarily performed using automatic fusion welding equipment and techniques. Extrusion welding was utilized when fusion welding was not possible. The records regarding the geomembrane seaming are contained within **Appendix B**.

4.5.4 Manufacturer's Quality Control Certification

Western Tank & Lining Ltd. provided a written certification to Dillon for review and acceptance, confirming required QC had been done and certifying the quality of the geomembrane, prior to delivering to the Site. QC certificates provided included:

- Product Identification;
- Roll Numbers;
- Sampling Procedures;
- Test Methods;
- Test Results (including Environmental Stress Cracking or single-point Notched and Constant Tensile Load Time to Failure test data); and
- Signature of Responsible Party.

A summary of the manufacturer's certifications are included within **Appendix B**.

Dillon reviewed the QC test data provided by Western Tank & Lining Ltd. for the 80 mil textured (double sided) HDPE geomembrane presented within the manufacturer's certificates to ensure the data was in accordance with the contract specifications. The manufacturer's certificates were in accordance with the project and regulatory requirements.

4.6 Geosynthetic Connections

4.6.1 Cell 3B Final Cover System Tie-in at North Toe of Slope

In preparation for the Cell 3B final cover system tie-in connection to the cell base liner along the north of slope, the existing temporary 40 mil LLDPE geomembrane along the Cell 3B northern side slope was removed and disposed of at the active tipping face following site specific disposal procedures. The existing plywood sheets and sandbag supports along the toe of slope were removed and salvaged. The existing flexible geomembrane edge wrap was removed and disposed of at the active tipping face following site specific disposal procedures. The existing geocomposite and protective geosynthetic clay liner (GCL) as part of the Cell 3B sidewall liner system was cut 500 mm below the edge of the anchor trench to allow for the HDPE extrusion weld connection. **Photo No. 1** shows the excavation and exposure of the existing anchor trench in preparation for the 80 mil textured (double sided) HDPE geomembrane liner connection.

The Cell 3B final cover 80 mil textured (double sided) HDPE geomembrane liner was extrusion welded to the existing 80 mil HDPE (protective) geomembrane as part of the Cell 3B sidewall liner system. The existing GCL was folded back over the newly installed extrusion weld.

4.6.2 Cell 3B Final Cover System East Edge Tie-in

In preparation for the Cell 3B final cover system east edge tie-in the existing temporary cover was required to be removed. The existing 40 mil LLDPE geomembrane was removed and disposed of at the active tipping face following site specific disposal procedures. The existing plywood sheets and sandbag supports along the toe of slope were removed and salvaged. The existing flexible geomembrane edge wrap was removed and disposed of at the active tipping face following site specific disposal procedures.

The 600 mm thick compacted clay liner was constructed to the east edge of the project area before tying into the interim cover of Cell 3C at a 3:1 (Horizontal: Vertical) slope. The 80 mil textured (double sided) HDPE geomembrane liner was installed to the east edge of the project area. Two inch x four inch wooden delineation markers were installed 10 m center to center along the east edge to delineate the extent of the 80 mil textured (double sided) HDPE geomembrane liner. One half (1/2) inch plywood sheets were installed spaced 1 m edge to edge with sandbag supports to protect the east edge of the 80 mil textured (double sided) HDPE geomembrane liner. The 8 oz. non-woven geotextile was installed on top of the 80 mil textured (double sided) HDPE geomembrane liner. The subsequent 450 mm subsoil and 150 mm topsoil layers were installed to the east edge of the protective area before tying into the interim cover of Cell 3C at a 3:1 (Horizontal: Vertical) slope.

4.6.3 Cell 3B Final Cover System Tie-in Connection to Existing Final Cover

In preparation for the Cell 3B final cover system tie-in connection to the existing Cell 3B final cover system on the south and west side of the project area the existing temporary cover was required to be

removed. The existing 600 mm compacted clay liner was excavated to expose the existing 40 mil LLDPE geomembrane. The existing 40 mil LLDPE geomembrane was cut at the extrusion weld to the Cell 3B 80 mil textured (double sided) HDPE geomembrane liner. The existing 40 mil LLDPE geomembrane was subsequently removed and disposed of at the active tipping face following site specific disposal procedures. The existing non-woven geotextile and 80 mil textured (double sided) HDPE geomembrane liner as part of the Cell 3B final cover system was folded back and secured in place in preparation for the proposed compacted clay liner key-in.

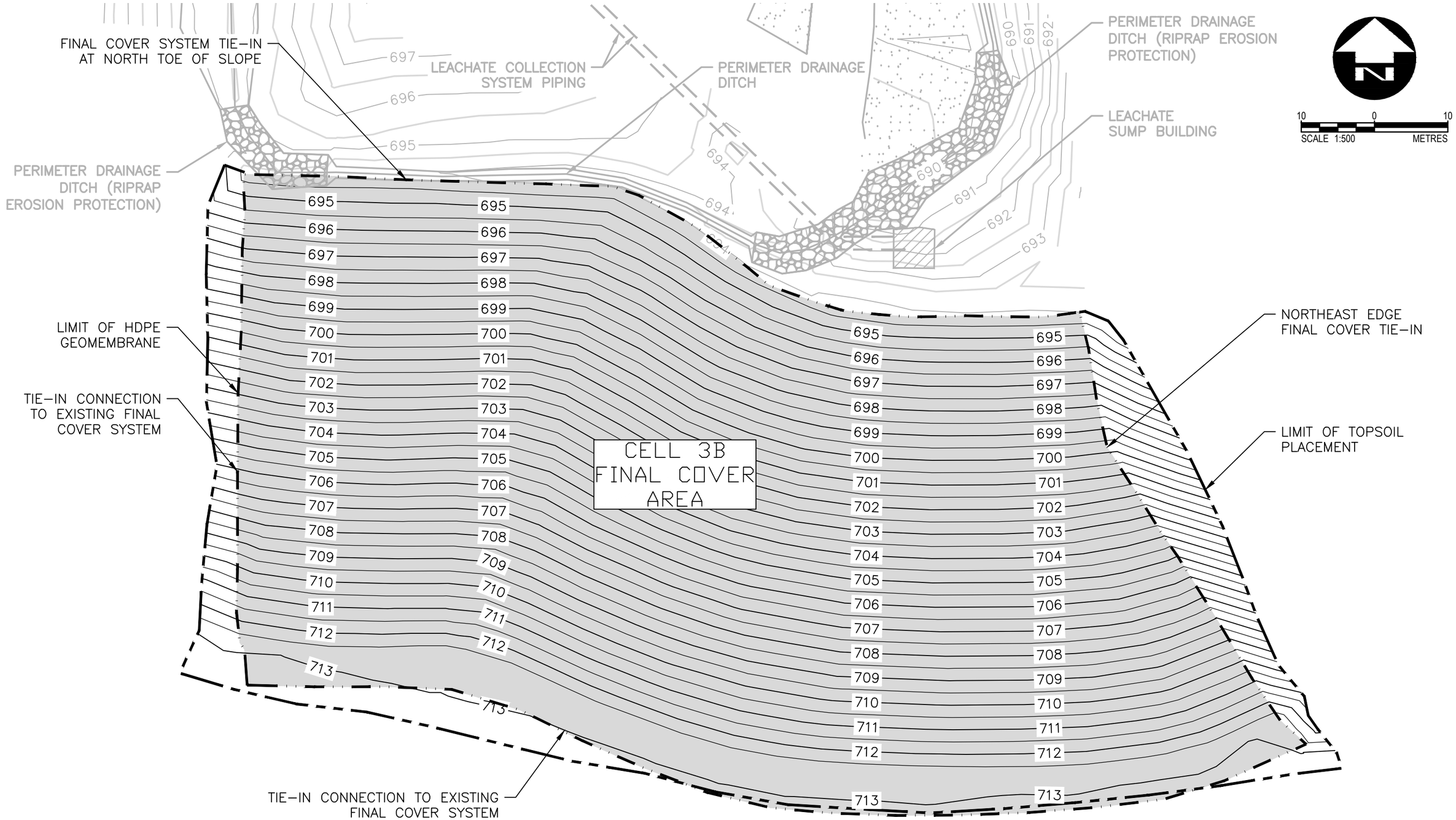
The new final cover compacted clay liner was joined and keyed into the existing final cover compacted clay liner. The existing compacted clay liner was scarified to ensure adequate bonding between the existing and new compacted clay liners. The new 80 mil textured (double sided) HDPE geomembrane liner was extrusion welded to the existing 80 mil textured (double sided) HDPE geomembrane liner with a 1.0 m overlap. The new 8 oz. non-woven geotextile was installed with a 1.0 m overlap over the existing 8 oz. non-woven geotextile. Subsequently, the new 450 mm subsoil and 150 mm topsoil layers were tied-in into the existing 450 mm subsoil and 150 mm topsoil layers.

5.0 Closing

Dillon trusts that this technical report meets the requirements set forth within the facility terms of Approval number 10348-03-00 issued by Alberta Environment and Parks.

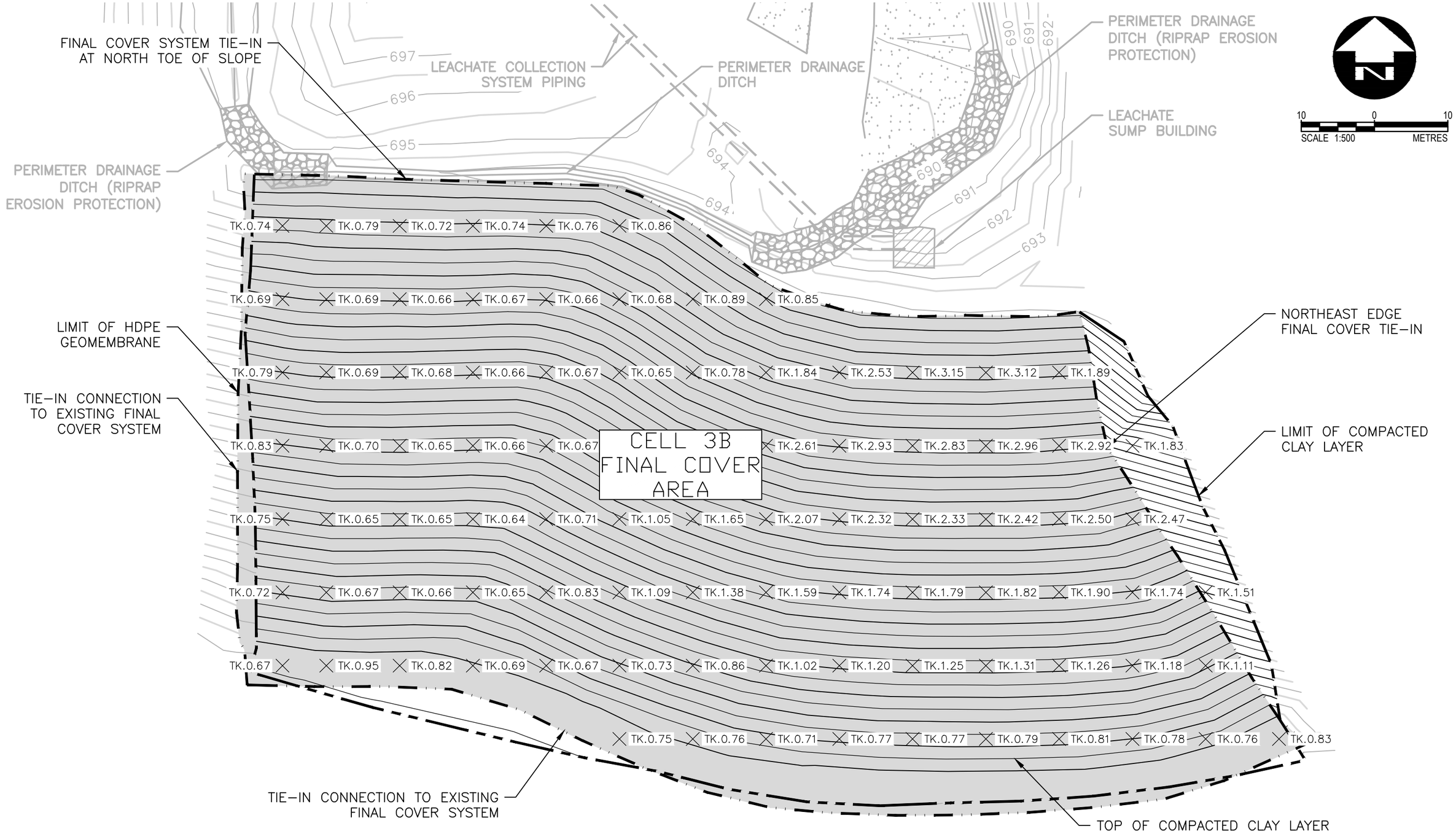
Should you have any questions or require clarification on any of the points discussed herein, please contact David Lake at 519-571-9833, ext. 3131, or at DLake@dillon.ca.

Figures



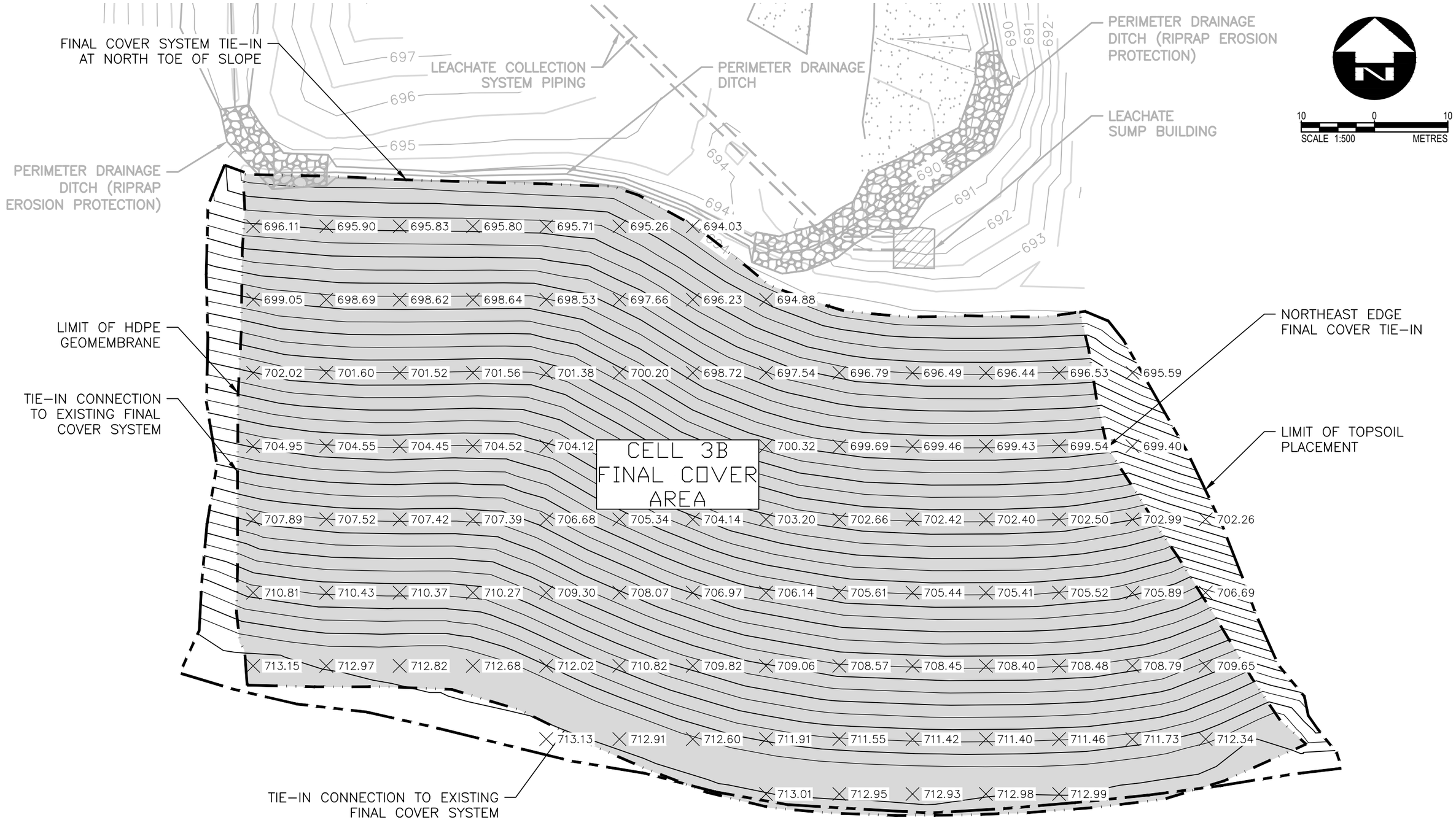
DILLON CONSULTING	PROJECT CLEAN HARBOR'S RYLEY FACILITY CELL 3B LANDFILL CAPPING	PROJECT NO. 20-2976
DATE January 2021	TITLE LIMIT OF CELL 3B FINAL COVER SYSTEM	FIGURE NO. Figure No.1

FileName:c:\pw working directory\projects 2020\31\kjr\dms75817\2029976-02-site-fig-001.dwg



DILLON CONSULTING	PROJECT CLEAN HARBOR'S RYLEY FACILITY CELL 3B LANDFILL CAPPING	PROJECT NO. 20-2976
DATE January 2021	TITLE COMPACTED CLAY BASE LAYER THICKNESS	FIGURE NO. Figure No.2

FileName:c:\pw working directory\projects 2020\31kjr\dms7581712029 76-02-site-fig-002.dwg



DILLON CONSULTING

DATE February 2021

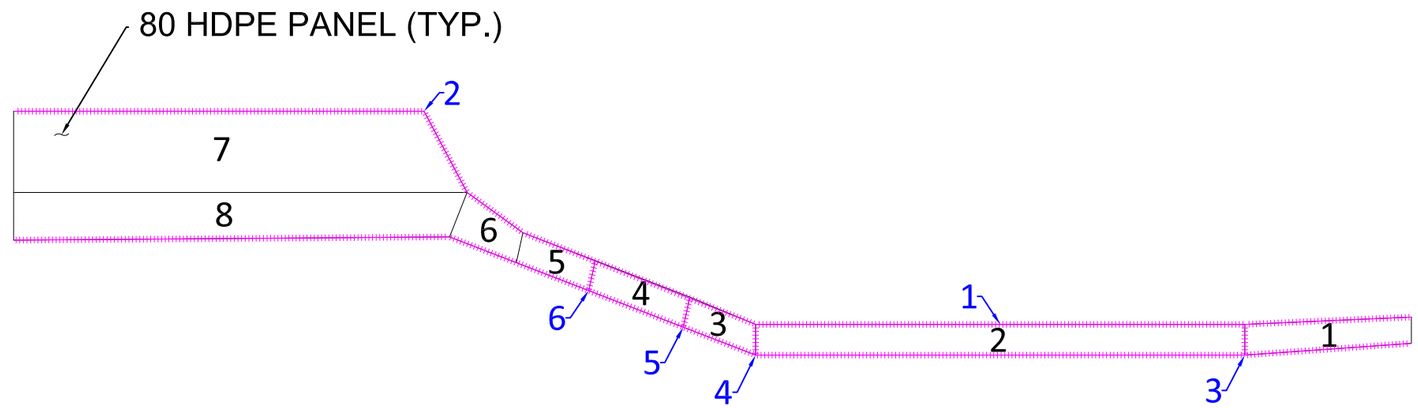
PROJECT CLEAN HARBOR'S RYLEY FACILITY CELL 3B LANDFILL CAPPING

PROJECT NO. 20-2976

TITLE TOP OF FINAL COVER ELEVATIONS

FIGURE NO. Figure No.3

FileName:c:\pw working directory\projects 2020\31kjr\dms7581\7\202976-02-site-fig-003.dwg



NOTES:

1. ALL UNITS IN METERS UNLESS OTHERWISE SPECIFIED.
2. AS BUILT PANEL LAYOUT IS AS PER ROUGH MEASUREMENTS TAKEN IN THE FIELD. ACTUAL LINER EXTENT SHOULD BE CONFIRMED WITH SITE SURVEY OF LINER.

NOTES:

EXTRUSION WELD
10 PANEL NUMBERS
10 EXTRUSION WELD NUMBERS

PLAN

CONSTRUCTION AS-BUILT

REV No.	REVISION DESCRIPTION	DATE	DRAWN	CHECKED
0	AS-BUILT PANEL LAYOUT	21/01/11	DC	CC

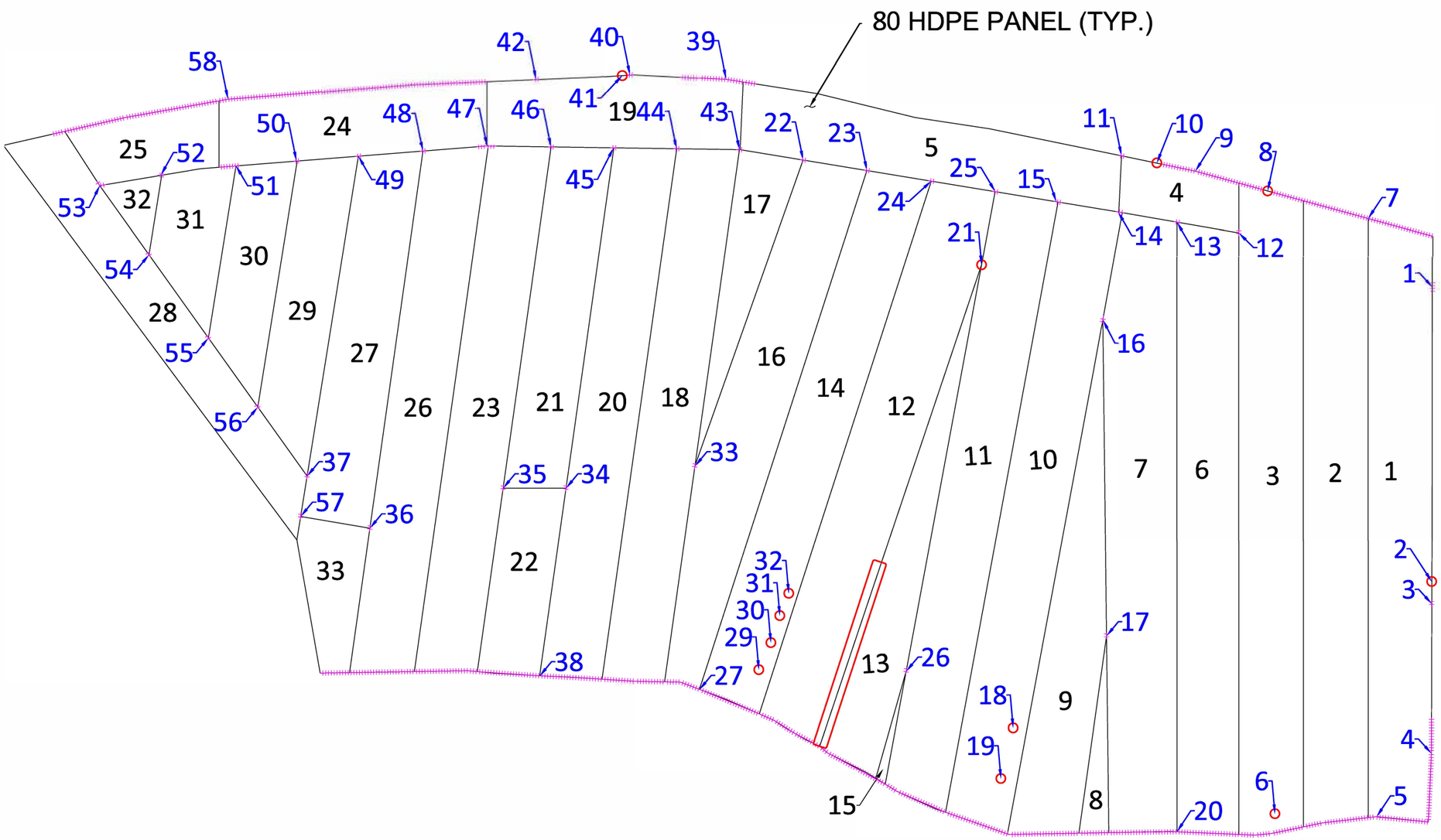
CLIENT
CLEAN HARBOURS

WESTERN TANK & LINING LTD.

PROJECT
CELL 3B ANCHOR TRENCH

TITLE
80 HDPE GEOMEMBRANE AS-BUILT PANEL LAYOUT

SCALE	JOB No.	FIG No.
1:500	2070	1



NOTES:

1. ALL UNITS IN METERS UNLESS OTHERWISE SPECIFIED.
2. AS BUILT PANEL LAYOUT IS AS PER ROUGH MEASUREMENTS TAKEN IN THE FIELD. ACTUAL LINER EXTENT SHOULD BE CONFIRMED WITH SITE SURVEY OF LINER.

NOTES:

EXTRUSION WELD
10 PANEL NUMBERS
10 EXTRUSION WELD NUMBERS
PATCH

PLAN

CONSTRUCTION AS-BUILT

REV No.	REVISION DESCRIPTION	DATE	DRAWN	CHECKED
0	AS-BUILT PANEL LAYOUT	21/01/11	DC	CC

CLIENT
CLEAN HARBOURS

WESTERN TANK & LINING LTD.

PROJECT
CELL 3B LANDFILL CAP

TITLE
80 HDPE GEOMEMBRANE AS-BUILT PANEL LAYOUT

SCALE	JOB No.	FIG No.
1:500	2070	1

Photographs

Photo 1: Excavating and Exposing Existing Anchor Trench

Photo 2: Spreading Clay Base Layer Material

Photo 3: Compacted Clay Prepared for Geomembrane Installation

Photo 4: HDPE Geomembrane Installation and Seaming

Photo 5: Destructive Testing Locations

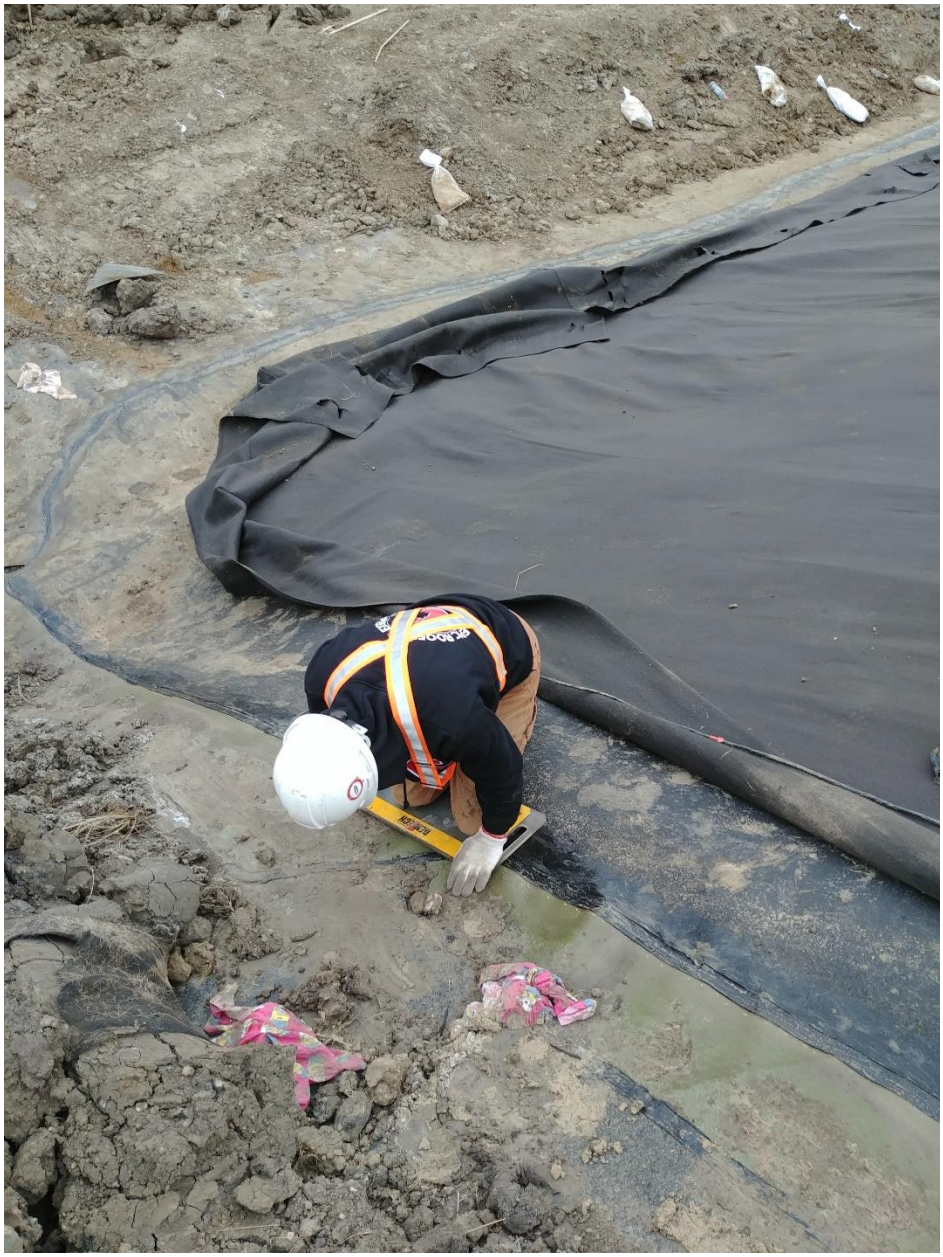


Photo 6: Vacuum Box Testing on West Tie-in

Photo 7: Non-Woven Geotextile Deployment

Photo 8: Geotextile and Subsoil Installation

Photo 9: Spreading Subsoil

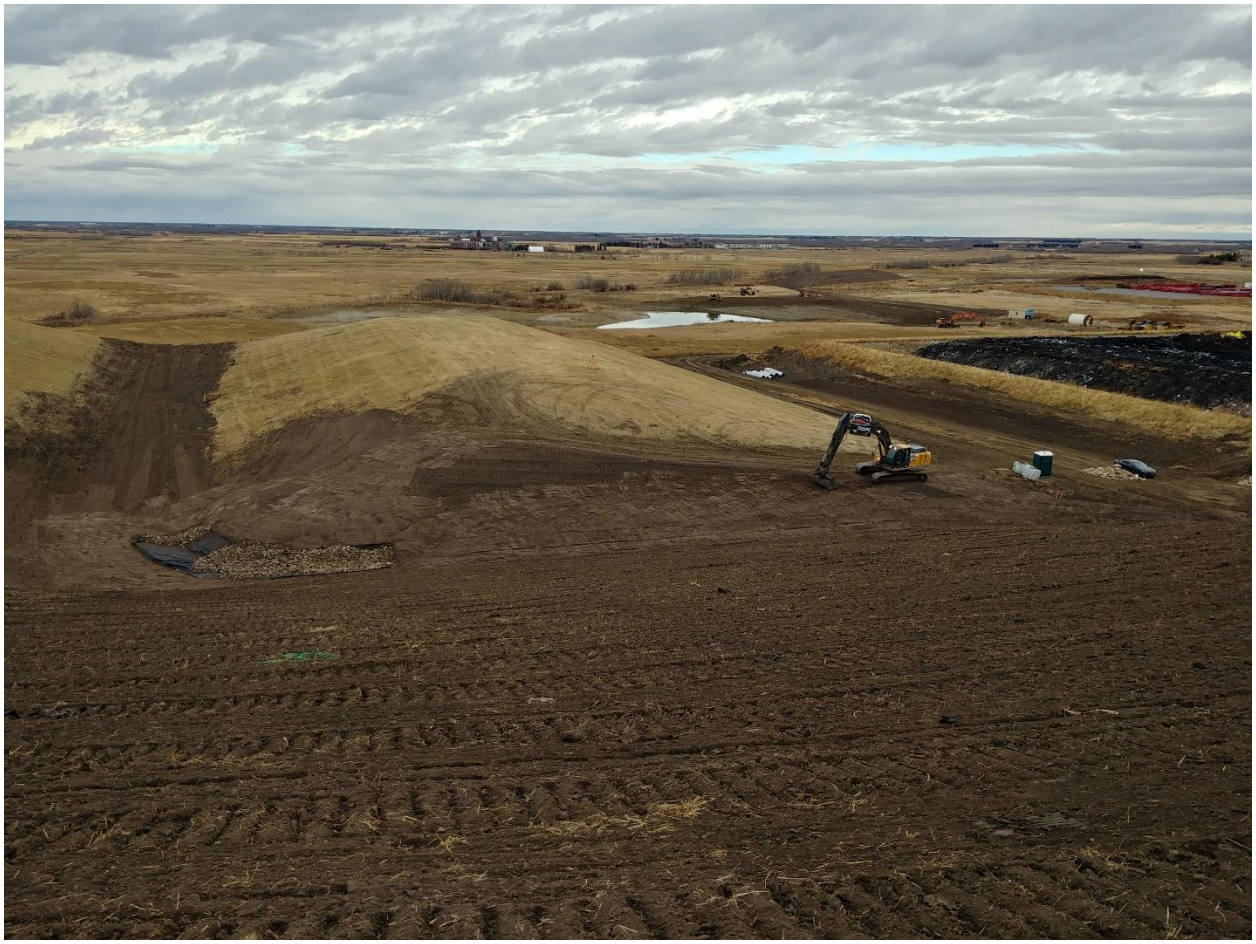


Photo 10: Installed Topsoil

Appendix A

Geotechnical Test Results

16114 114 Ave NW Edmonton, Alberta Canada, T5M 2Z5 Ph: 780-481-1416

PROCTOR ANALYSIS - STANDARD EFFORT

Accordance with ASTM D698 - 12E1

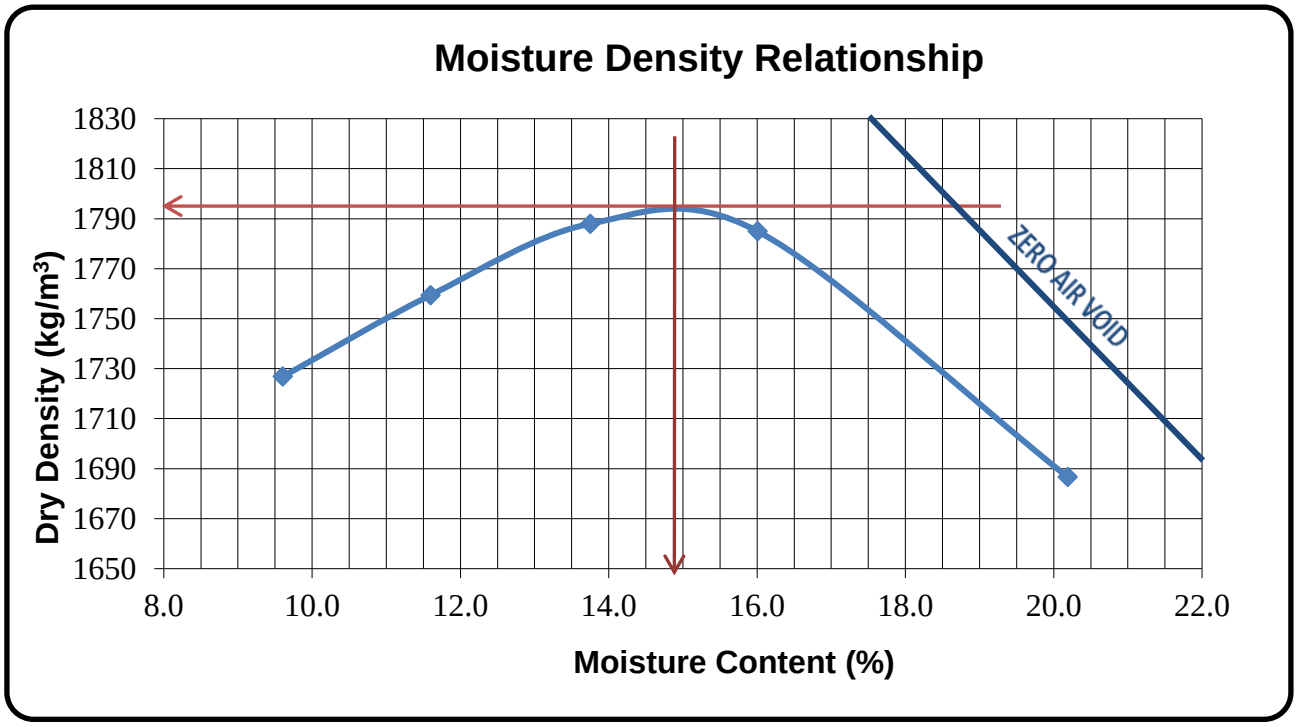
Method : A [x] B [ ] C [ ] Prep Method : Moist [ ] Dry [x]

Client:	BTO Contracting
Project:	Beaver Regional Landfill
Project Location:	Ryley, AB
Sample Source:	Import - Clean Harbours
Contact:	Ryan Balash (780) 777-1109

Date:	17-Sep-20
Project No.:	P-0012913

Proctor Moisture - Density Results:

Dry Density (kg/m3)	1727	1759	1788	1785	1687
MoistureContent (%)	9.6	11.6	13.7	16.0	20.2



Summary:

Maximum Dry Density:	**1795**	**kg/m³**
Optimum Moisture Content:	**14.9**	**%**
Description of material:	Dark Brown Silty Clay Till	
Delivered Moisture Content:	9.3	%
Sample ID:	1822	
Proctor number:	1822	
Tested by:	Connor	
Proctor Use:	General Backfill	

Oversize Rock Correction		
% Oversize	Density	Moisture
N/A	**N/A**	**N/A**

Reviewed By: Connor Carlson

Revision Date: 18/01/2016

16114 114 Ave NW Edmonton, Alberta Canada, T5M 2Z5 Ph: 780-481-1416

PROCTOR ANALYSIS - STANDARD EFFORT

Accordance with ASTM D698 - 12E1

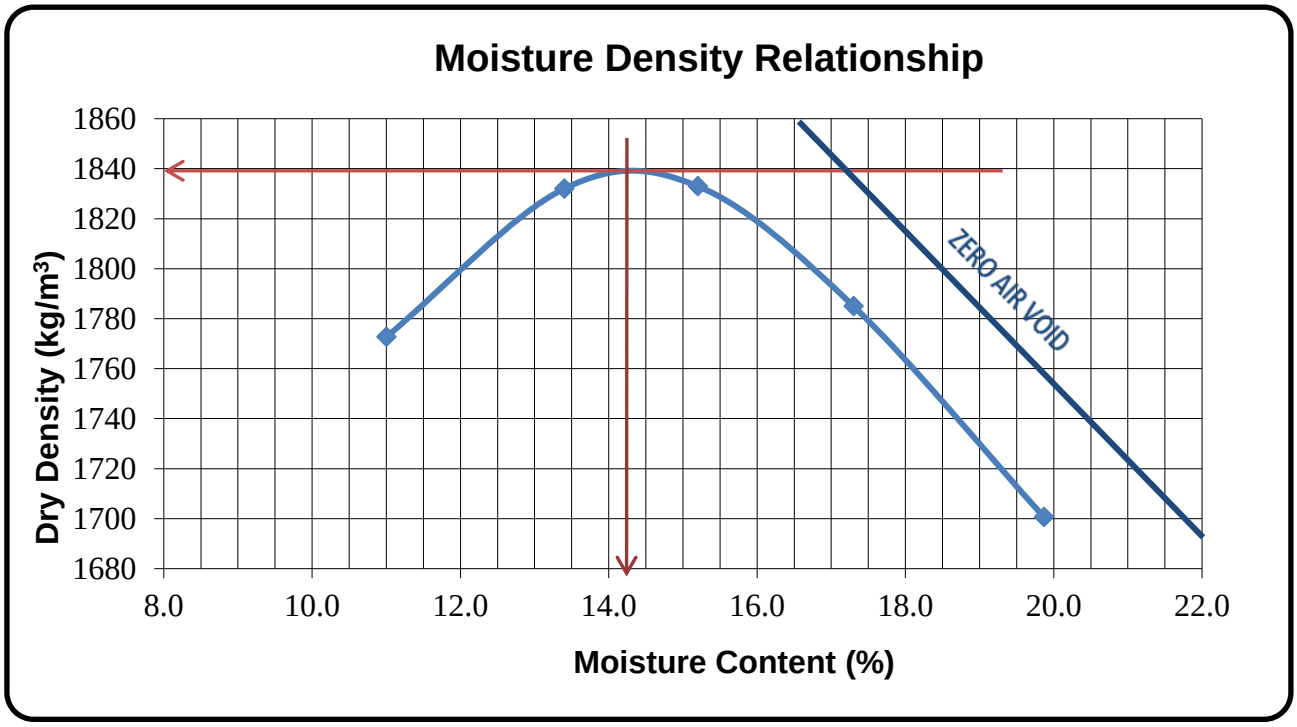
Method : A [x] B [ ] C [ ] Prep Method : Moist [ ] Dry [x]

Client:	BTO Contracting
Project:	Clean Harbors
Project Location:	Ryley, AB
Sample Source:	Site Native - On Site Stockpile
Contact:	Ryan Balash (780) 777-1109

Date:	17-Sep-20
Project No.:	P-0023455

Proctor Moisture - Density Results:

Dry Density (kg/m3)	1773	1832	1833	1785	1701
MoistureContent (%)	11.0	13.4	15.2	17.3	19.9



Summary:

Maximum Dry Density:	**1840**	**kg/m³**
Optimum Moisture Content:	**14.2**	**%**
Description of material:	Brown Silty Clay Till	
Delivered Moisture Content:	14.9	%
Sample ID:	1823	
Proctor number:	1823	
Tested by:	Jacob	
Proctor Use:	General Backfill	

Oversize Rock Correction		
% Oversize	Density	Moisture
N/A	**N/A**	**N/A**

Reviewed By: Connor Carlson

Revision Date: 18/01/2016

Englobe
1470 - 28 Street NE, Unit # 5
Calgary, Alberta
T2A 7W6
Phone: 403-255-3273

16114 - 114 Avenue NW
Edmonton, Alberta
T5M 2Z5
Phone: 780-481-1416

1607 Garfield Street, Unit #3
Saskatoon, Saskatchewan
S7M 5A6
Phone: 306-241-0185

Nuclear Density & Moisture Gauge Field Data Sheet

CLIENT BTO contracting
PROJECT NO. P-0012913
PROJECT Ryley Landfill
CONTACT Yanik (780-975-0546)

TYPE OF STRUCTURE TESTED Subbase

16704

DATE/TIME	GAUGE TYPE AND NO.	SOURCE	DENSITY STD.	MOISTURE STD.
Sep 25, 2020	64902	Troxler	2339	668
INSPECTOR	PROJECT SUPERINTENDENT	MATERIAL	CONTRACTOR	
		Dark Brown Clay		
LOCATION			SUBCONTRACTOR	
Riley Landfill (Base of slope)				
CURVE NO.	MAX. DRY DENSITY	LAB. OPTIMUM MOISTURE	COMPACTION EQUIPMENT	
1822	1795 kg/m³	14.9 %	Sheeps foot Packer	
SPECIFIED COMP. %	LAB. TEST METHOD	FIELD TEST METHOD		
95	ASTM D698 - 12e1	ASTM D6938 - 15		

			FAILED GAUGE READINGS			GAUGE READINGS					
TEST NO.	RE - TEST	TEST DEPTH (mm)	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	STATION	DEPTH BELOW GRADE	REMARKS
1		150				1750	15.3	97.5	10m from westend	~~600~~ 950	
2		150				1723	14.3	96.0	20m	~~600~~ 450	
3		150				1741	15.0	97.0	30m	~~600~~ 450	
4		150				1715	16.4	95.5	40m	~~600~~ 450	
5		150				1719	14.3	95.8	50m	~~600~~ 450	
6		150				1751	9.8	97.6	60m	~~600~~ 450	
7		150				1855	11.1	103.3	70m	~~600~~ 450	
8		150				1734	18.5	96.6	10m from westend	~~450~~ 300	
9		150				1745	19.4	97.2	30m	~~450~~ 300	
10		150				1720	18.0	95.8	50m from	~~450~~ 300	
					AVERAGES:	1745	15.2	97.2			

Foreman:
Remarks:

Scanned with CamScanner

Englobe
1470 - 28 Street NE, Unit # 5
Calgary, Alberta
T2A 7W6
Phone: 403-255-3273

16114 - 114 Avenue NW
Edmonton, Alberta
T5M 2Z5
Phone: 780-481-1416

1607 Garfield Street, Unit #3
Saskatoon, Saskatchewan
S7M 5A6
Phone: 306-241-0185

Nuclear Density & Moisture Gauge Field Data Sheet

CLIENT BTO Contracting
PROJECT NO. P-0012913
PROJECT Ryley Landfill
CONTACT Yanick

TYPE OF STRUCTURE TESTED Sub base

16705

DATE/TIME	GAUGE TYPE AND NO.	SOURCE	DENSITY STD.	MOISTURE STD.
Sep 25, 2020	64902	Troxler	2339	668

INSPECTOR	PROJECT SUPERINTENDENT	MATERIAL	CONTRACTOR
		Dark Brown Clay	

LOCATION	SUBCONTRACTOR
Riley Landfill (base of slope)	

CURVE NO.	MAX. DRY DENSITY	LAB. OPTIMUM MOISTURE	COMPACTION EQUIPMENT
1822	1795 kg/m³	14.9 %	Sheeps foot packer

SPECIFIED COMP. %	LAB. TEST METHOD	FIELD TEST METHOD
95	ASTM D698 - 12e1	ASTM D6938 - 15

			FAILED GAUGE READINGS			GAUGE READINGS					
TEST NO.	RE - TEST	TEST DEPTH (mm)	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	STATION	DEPTH BELOW GRADE	REMARK
11		150				1805	14.0	100.6	60m from west wall	~~150~~ 300	
12		150				1811	14.7	100.9	75m from west wall	~~150~~ 300	
13		150				1854	15.2	103.3	90m from west wall	~~150~~ 300	
14		150				1805	14.4	100.6	10m from west wall	150	
15		150				1816	13.5	101.2	25m from west wall	150	
16		150				1841	13.9	102.6	35m from west wall	150	
17		150				1798	14.9	100.2	50m from west wall	150	
18		150				1878	13.6	104.6	65m from west wall	150	
19		150				1832	14.9	102.1	85m from west wall	150	
					AVERAGES:	1828	14.3	101.8			

Foreman:
Remarks:

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Nuclear Density & Moisture Gauge Field Data Sheet

CLIENT BTO Contractors
PROJECT NO. P-0012913
PROJECT Riley Landfill
CONTACT Yarrah

TYPE OF STRUCTURE TESTED Subbase

16706

DATE/TIME	GAUGE TYPE AND NO.	SOURCE	DENSITY STD.	MOISTURE STD.
Sep 25, 2024	64902	Troxler	2239	668
INSPECTOR	PROJECT SUPERINTENDENT	MATERIAL	CONTRACTOR	
LOCATION Riley Landfill base of slope			SUBCONTRACTOR	
CURVE NO.	MAX. DRY DENSITY	LAB. OPTIMUM MOISTURE	COMPACTION EQUIPMENT	
1826	1795 kg/m³	14.9 %	Sheeps foot packer	
SPECIFIED COMP. %	LAB. TEST METHOD	FIELD TEST METHOD		
95	ASTM D698 - 12e1	ASTM D6938 - 15		

			FAILED GAUGE READINGS			GAUGE READINGS					
TEST NO.	RE - TEST	TEST DEPTH (mm)	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	STATION	DEPTH BELOW GRADE	REMARKS
20		150				1812	12.9	100.9		0.00	
21		150				1841	12.7	102.6		0.00 mm	
22		150				1811	11.8	100.9		0.00 mm	
23		150				1838	12.9	102.4		0.00	
24		150				1783	11.9	99.3		0.00	
25		150				1845	13.0	102.8		0.00	
					AVERAGES:	1822	12.5	101.5			

Foreman:
Remarks:

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Nuclear Density & Moisture Gauge Field Data Sheet

CLIENT BTD contracting
PROJECT NO. P-0012413
PROJECT Ryley Landfill
CONTACT Yanik (780-975-0546)

TYPE OF STRUCTURE TESTED Sub base

16704

DATE/TIME	GAUGE TYPE AND NO.	SOURCE	DENSITY STD.	MOISTURE STD.
Sep 20 2020	64902	Troxler	2339	668

INSPECTOR	PROJECT SUPERINTENDENT	MATERIAL	CONTRACTOR
		Dark Brown Clay	

LOCATION	SUBCONTRACTOR
Riley Landfill (Base of slope)	

CURVE NO.	MAX. DRY DENSITY	LAB. OPTIMUM MOISTURE	COMPACTION EQUIPMENT
1822	1795 kg/m³	14.9 %	Sheeps foot Packer

SPECIFIED COMP. %	LAB. TEST METHOD	FIELD TEST METHOD
95	ASTM D698 - 12e1	ASTM D6938 - 15

			FAILED GAUGE READINGS			GAUGE READINGS					
TEST NO.	RE - TEST	TEST DEPTH (mm)	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	STATION	DEPTH BELOW GRADE	REM.
1		150				1750	15.3	97.5	10m from westend	~~600~~ 450	
2		150				1723	14.3	96.0	20m	~~600~~ 450	
3		150				1741	15.0	97.0	30m	~~600~~ 450	
4		150				1715	16.4	95.5	40m	~~600~~ 450	
5		150				1719	14.3	95.8	50m	~~600~~ 450	
6		150				1751	9.8	97.6	60m	~~600~~ 450	
7		150				1855	11.1	103.3	70m	~~600~~ 450	
8		150				1734	18.5	96.6	10m from westend	~~450~~ 300	
9		150				1745	19.4	97.2	30m	~~450~~ 300	
10		150				1720	18.0	95.8	50 - 60m	~~450~~ 300	
					AVERAGES:	1745	15.2	97.2			

Foreman:
Remarks:

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Nuclear Density & Moisture Gauge Field Data Sheet

CLIENT BTO Contracting
PROJECT NO. P-0012963
PROJECT Ryley Landfill
CONTACT Yanick

TYPE OF STRUCTURE TESTED Sub base

16705

DATE/TIME	GAUGE TYPE AND NO.	SOURCE	DENSITY STD.	MOISTURE STD.
Sep 25, 2020	64902	Troxler	2339	668
INSPECTOR	PROJECT SUPERINTENDENT	MATERIAL	CONTRACTOR	
		Dark Brown Clay		
LOCATION			SUBCONTRACTOR	
Riley Landfill (base of slope)				
CURVE NO.	MAX. DRY DENSITY	LAB. OPTIMUM MOISTURE	COMPACTION EQUIPMENT	
1822	1795 kg/m³	14.9 %	Sheeps foot packer	
SPECIFIED COMP. %	LAB. TEST METHOD	FIELD TEST METHOD		
95	ASTM D698 - 12e1	ASTM D6938 - 15		

			FAILED GAUGE READINGS			GAUGE READINGS					
TEST NO.	RE - TEST	TEST DEPTH (mm)	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	STATION	DEPTH BELOW GRADE	REMARKS
11		150				1805	14.0	100.6	60m from west wall	~~450~~ 300	
12		150				1811	14.7	100.9	75m from west wall	~~450~~ 300	
13		150				1854	15.2	103.3	90m from west wall	~~450~~ 300	
14		150				1805	14.4	100.6	10m from west wall	150	
15		150				1816	13.5	101.2	25m from west wall	150	
16		150				1841	13.9	102.6	35m from west wall	150	
17		150				1798	14.9	100.2	50m from west wall	150	
18		150				1878	13.6	104.6	65m from west wall	150	
19		150				1832	14.9	102.1	85m from west wall	150	
					AVERAGES:	1827	14.3	101.8			

Foreman:
Remarks:

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Nuclear Density & Moisture Gauge Field Data Sheet

CLIENT BTO Contractors
PROJECT NO. P-0012963
PROJECT Riley Landfill
CONTACT Yanik

TYPE OF STRUCTURE TESTED Sub Base

DATE/TIME Sept 25, 2022	GAUGE TYPE AND NO. 64902	SOURCE Trexler	DENSITY STD. 2239	16706
INSPECTOR	PROJECT SUPERINTENDENT	MATERIAL	CONTRACTOR	MOISTURE STD. 668
LOCATION Riley Landfill base of slope			SUBCONTRACTOR	
CURVE NO. 1826	MAX. DRY DENSITY 1795 kg/m³	LAB. OPTIMUM MOISTURE 14.9 %	COMPACTION EQUIPMENT Sheeps foot packer	
SPECIFIED COMP. % 95	LAB. TEST METHOD ASTM D698 - 12e1	FIELD TEST METHOD ASTM D6938 - 15		

TEST NO.	RE - TEST	TEST DEPTH (mm)	FAILED GAUGE READINGS DRY DENSITY (kg/m³)	% MOIST.	% COMP.	GAUGE READINGS DRY DENSITY (kg/m³)	% MOIST.	% COMP.	STATION	DEPTH BELOW GRADE	RE
20		150				1812	12.9	100.9		0.00	
21		150				1841	12.7	102.6		0.00 mm	
22		150				1811	11.8	100.9		0.00 mm	
23		150				1838	12.9	102.4		0.00	
24		150				1783	11.9	99.3		0.00	
25		150				1845	13.0	102.8		0.00	
					AVERAGES:	1822	12.5	101.5			

Foreman:

Remarks:

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Nuclear Density & Moisture Gauge Field Data Sheet

CLIENT BTO contracting

TYPE OF STRUCTURE TESTED

PROJECT NO P-0012913

PROJECT Clean Harbors landfill, Ryley, AB

CONTACT Yanik. P

DATE/TIME	GAUGE TYPE AND NO	SOURCE	DENSITY STD	MOISTURE STD
Sep 27 2020	Troxler 3440 +	61978	2107	648
INSPECTOR	PROJECT SUPERINTENDENT	MATERIAL	CONTRACTOR	
Quinn. M	Yanik. P	Brown Silty Clay	BTO contracting	
LOCATION			SUBCONTRACTOR	
Clean Harbors Landfill, Ryley, AB			N/A	

CURVE NO	MAX DRY DENSITY	LAB OPTIMUM MOISTURE	COMPACTION EQUIPMENT
1823	1840 Kg/m3	14.2 %	sheeps foot roller.
SPECIFIED COMP. %	LAB TEST METHOD	FIELD TEST METHOD	
100	ASTM D698 - 12e1	ASTM D6938 - 15	

			FAILED GAUGE READINGS			GAUGE READINGS					
TEST NO.	RE - TEST	TEST DEPTH (mm)	DRY DENSITY (Kg/m3)	% MOIST	% COMP	DRY DENSITY (Kg/m3)	% MOIST	% COMP	STATION	DEPTH BELOW GRADE	REMARKS
1						1897	10.2	103.1			A
2						1849	13.0	100.5			B
3						1872	11.7	101.7			C
4						1877	12.8	102.0			D
5						1864	12.5	101.3			E
			AVERAGES:								

Foreman:

Remarks:

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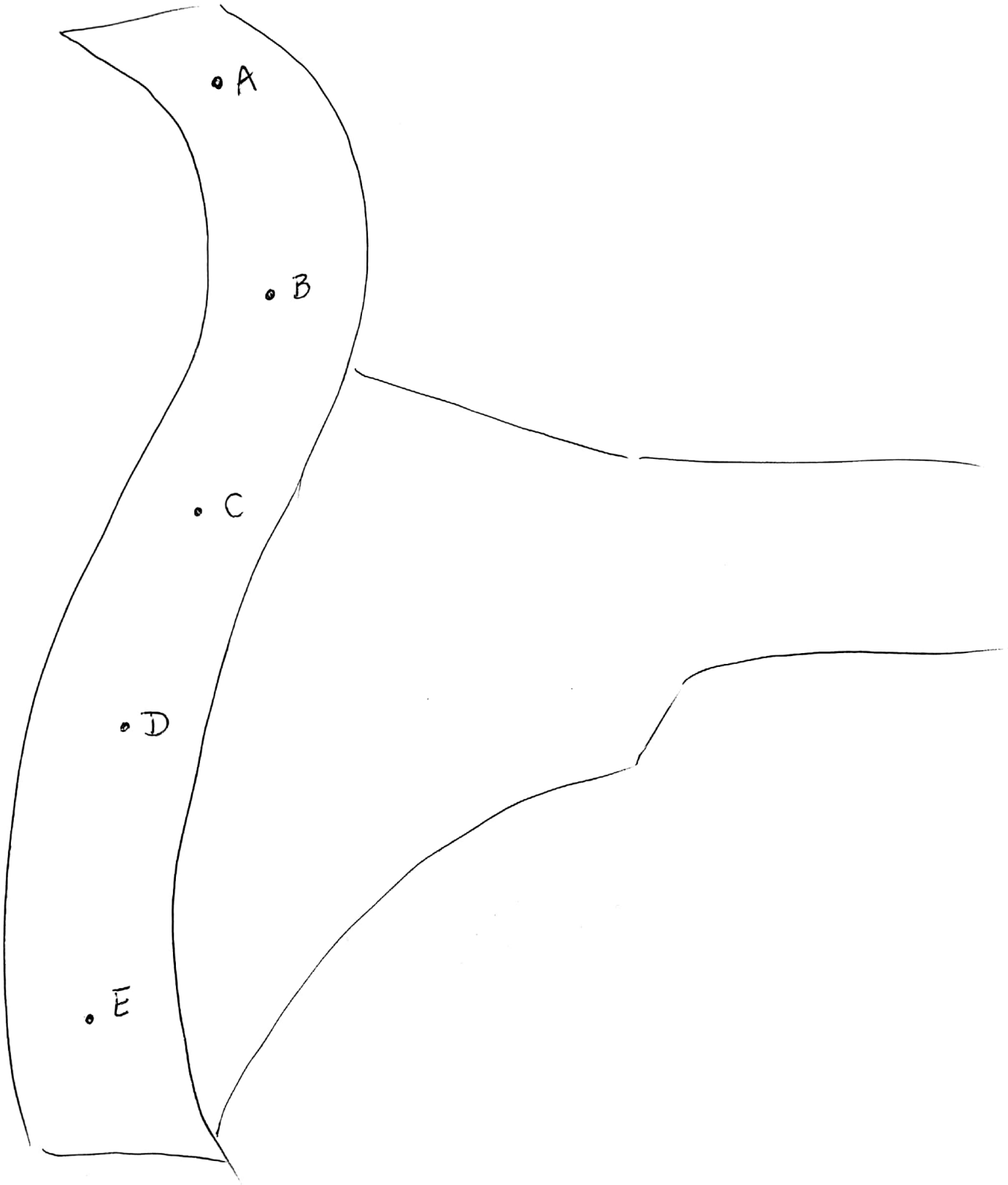
PROJECT



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Phone: 306-241-0185

Nuclear Density & Moisture Gauge Field Data Sheet

CLIENT BTO Contracting
PROJECT NO. P-04 2913
PROJECT Ryley Landfill
CONTACT Yanik (780-975-0546)

TYPE OF STRUCTURE TESTED Clay Slope

16708

DATE/TIME	GAUGE TYPE AND NO.	SOURCE	DENSITY STD.	MOISTURE STD.
Sept 28 2020	64962	Troxler	2200	638

INSPECTOR	PROJECT SUPERINTENDENT	MATERIAL	CONTRACTOR
		Brown Clay	

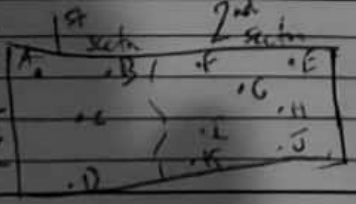
LOCATION	SUBCONTRACTOR
Ryley Landfill (slope)	

CURVE NO.	MAX. DRY DENSITY	LAB. OPTIMUM MOISTURE	COMPACTION EQUIPMENT
1823	1840 kg/m³	14.2 %	Sheeps foot Packer

SPECIFIED COMP. %	LAB. TEST METHOD	FIELD TEST METHOD
95	ASTM D698 - 12e1	ASTM D6938 - 15

			FAILED GAUGE READINGS			GAUGE READINGS					
TEST NO.	RE - TEST	TEST DEPTH (mm)	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	STATION	DEPTH BELOW GRADE	REMARKS
1		150				1748	14.3	95.0	~~10 m from west end of slope~~ A	1st layer 1st section	
2		150				1757	15.8	95.5	~~20 m from west end of slope~~ B	1st layer 1st section	
3		150				1753	16.0	95.3	~~Bottom middle slope~~ C	1st layer 1st section	
4		150				1888	13.8	102.6	~~15 m from west end bottom slope~~ D	1st layer 1st section	
5		150				1761	15.3	95.7	E	1st layer 2nd section	
6		150				1767	15.6	96.0	F	1st layer section 2	
7		150				1788	15.8	97.2	G	1st layer section 2	
8		150				1829	15.2	99.4	H	1st layer section 2	
9		150				1824	15.4	99.1	I	1st layer section 2	
10		150				1846	16.6	100.3	J	1st layer section 2	
					AVERAGES:						

Foreman:
Remarks:



Slope

* each layer is approximately ~~[illegible]~~ 300 mm

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Nuclear Density & Moisture Gauge Field Data Sheet

CLIENT BTO Contracting
PROJECT NO. P-0012993
PROJECT Ryley Landfill
CONTACT Yanik

TYPE OF STRUCTURE TESTED Slope

16710

DATE/TIME	GAUGE TYPE AND NO.	SOURCE	DENSITY STD.	MOISTURE STD.
Sep 28, 2020	64902	Troxler	2200	638
INSPECTOR	PROJECT SUPERINTENDENT	MATERIAL	CONTRACTOR	
		Brown Clay		
LOCATION			SUBCONTRACTOR	
Ryley Land fill (Slope)				

CURVE NO.	MAX. DRY DENSITY	LAB. OPTIMUM MOISTURE	COMPACTION EQUIPMENT
1823	1840 kg/m³	14.2 %	Sheeps foot packer
SPECIFIED COMP. %	LAB. TEST METHOD	FIELD TEST METHOD	
95	ASTM D698 - 12e1	ASTM D6938 - 15	

			FAILED GAUGE READINGS			GAUGE READINGS					
TEST NO.	RE - TEST	TEST DEPTH (mm)	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	STATION	DEPTH BELOW GRADE	REMARKS
11		150				1831	16.1	99.5	K	1st layer 2nd sect	
12		150				1809	17.5	98.3	L	layer 2 section 1	
13		150				1859	17.5	101.0	M	layer 2 section 1	
14		150				1749	18.5	95.1	N	layer 2 section 1	
15		150				1820	15.8	98.9	O	layer 2 section 1	
16		150				1853	16.5	100.7	P	layer 2 section 1	
					AVERAGES:						

Foreman: 1st sect. 2nd sect.
Remarks:

Slope E

.M	.L	
.N	.O	
.P		.K

W

* each layer approximately ~~200mm~~ 300mm

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Nuclear Density & Moisture Gauge Field Data Sheet

CLIENT BTO Contracting
PROJECT NO. P-0012913
PROJECT Ryley Landfill
CONTACT Yanik

TYPE OF STRUCTURE TESTED SubGrade

16709

DATE/TIME	GAUGE TYPE AND NO.	SOURCE	DENSITY STD.	MOISTURE STD.
Sep 28, 2020	64902	Troxler	2200	638

INSPECTOR	PROJECT SUPERINTENDENT	MATERIAL	CONTRACTOR
		Brown Clay Till	

LOCATION	SUBCONTRACTOR
Roadway Subgrade (Right lane when coming in)	

CURVE NO.	MAX. DRY DENSITY	LAB. OPTIMUM MOISTURE	COMPACTION EQUIPMENT
1622	1665 kg/m³	8.0 %	Packer

SPECIFIED COMP. %	LAB. TEST METHOD	FIELD TEST METHOD
95	ASTM D698 - 12e1	ASTM D6938 - 15

			FAILED GAUGE READINGS			GAUGE READINGS					
TEST NO.	RE - TEST	TEST DEPTH (mm)	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	STATION	DEPTH BELOW GRADE	REM
1		150				1694	13.4	101.8	about 1m from curb	0.00	
2		150				1645	14.7	98.8	about 150m from curb	0.00	
3		150				1650	15.0	99.1	about 50m from curb	0.00	
4		150				1659	14.4	99.6	about 125m from curb	0.00	
					AVERAGES:						

Foreman:
Remarks: Roadway very compacted very difficult to hammer in pin & to remove pin after.

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Nuclear Density & Moisture Gauge Field Data Sheet

CLIENT BTU Contracting
PROJECT NO. P-co 129
PROJECT Ryley Landfill
CONTACT Frank

TYPE OF STRUCTURE TESTED Slope

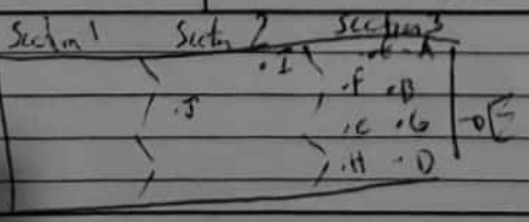
16711

DATE/TIME	GAUGE TYPE AND NO.	SOURCE	DENSITY STD.	MOISTURE STD.
Sep 29 2020	64902	Troxler	2232	701
INSPECTOR	PROJECT SUPERINTENDENT	MATERIAL	CONTRACTOR	
		Brown Clay		
LOCATION			SUBCONTRACTOR	
Ryley Landfill Slope				

CURVE NO.	MAX. DRY DENSITY	LAB. OPTIMUM MOISTURE	COMPACTION EQUIPMENT
1823	1840 kg/m³	14.2 %	Sheeps foot packer
SPECIFIED COMP. %	LAB. TEST METHOD	FIELD TEST METHOD	
95	ASTM D698 - 12e1	ASTM D6938 - 15	

			FAILED GAUGE READINGS			GAUGE READINGS					
TEST NO.	RE - TEST	TEST DEPTH (mm)	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	STATION	DEPTH BELOW GRADE	REMA
1		150				1761	19.9	95.7	A	section 3 first layer	
2		150				1807	17.9	98.2	B	Section 3 first layer	
3		150				1842	16.5	100.1	C	Section 3 first layer	
4		150				1858	15.5	100.0	D	Sect 3 first layer	
5		150				1805	15.8	98.1	E	Section 3 second layer	
6		150				1770	15.7	96.2	F	section 3 layer 2	
7		150				1827	15.1	99.3	G	Section 3 layer 2	
8		150				1834	15.3	99.7	H	Section 3 layer 2	
9		150				1750	17.6	95.1	I	section 2 layer 2	
10		150				1763	18.0	95.8	J	section 2 layer 2	
					AVERAGES:						

Foreman:
Remarks:



slope W-D

each layer approximately 300 mm

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Nuclear Density & Moisture Gauge Field Data Sheet

CLIENT BTO Contractors
PROJECT NO. P-0012413
PROJECT Ryley Landfill
CONTACT Yanik

TYPE OF STRUCTURE TESTED Slope (South)

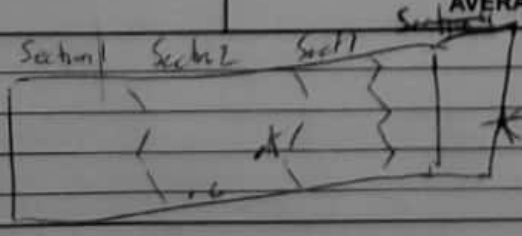
16712

DATE/TIME	GAUGE TYPE AND NO.	SOURCE	DENSITY STD.	MOISTURE STD.
Sept 29 2020	64902	Troxler	2232	701
INSPECTOR	PROJECT SUPERINTENDENT	MATERIAL	CONTRACTOR	
		Brown Clay		
LOCATION			SUBCONTRACTOR	
Ryley Landfill Slope on South end				

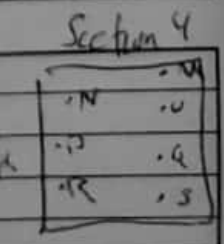
CURVE NO.	MAX. DRY DENSITY	LAB. OPTIMUM MOISTURE	COMPACTION EQUIPMENT
1823	1840 kg/m³	14.2 %	Sheeps foot packer
SPECIFIED COMP. %	LAB. TEST METHOD	FIELD TEST METHOD	
95	ASTM D698 - 12e1	ASTM D6938 - 15	

			FAILED GAUGE READINGS			GAUGE READINGS					
TEST NO.	RE - TEST	TEST DEPTH (mm)	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	DRY DENSITY (kg/m³)	% MOIST.	% COMP.	STATION	DEPTH BELOW GRADE	REMARKS
11		150				1811	16.0	98.4	K	Section 2 Layer 2	
12		150				1835	13.5	99.7	L	Section 2 Layer 2	
13		150				1825	12.7	99.2	M	Section 4 Layer 1	
14		150				1804	13.0	98.3	N	Section 4 Layer 1	
15		150				1793	12.1	97.3	O	Section 4 Layer 1	
16		150				1789	15.7	97.2	P	Section 4 Layer 1	
17		150				1834	15.7	99.7	Q	Section 4 Layer 1	
18		150				1896	13.2	103.1	R	Section 4 Layer 1	
19		150				1757	16.2	95.5	S	Section 4 Layer 1	
					AVERAGES:						

Foreman:
Remarks:



* each layer approximately 300 mm thick



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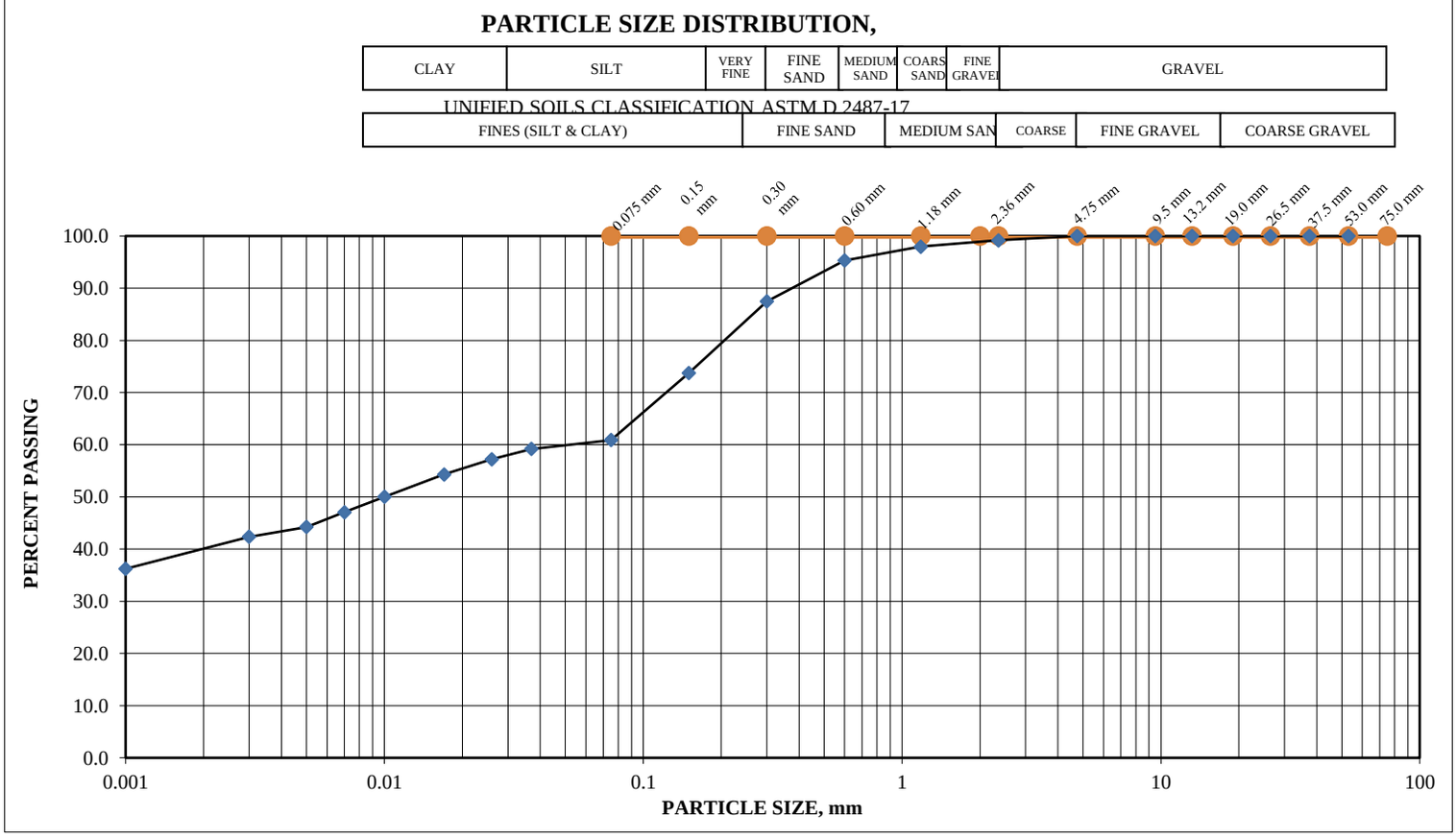
GRAIN SIZE ANALYSIS AND HYDROMETER TEST REPORT

ASTM D422 − 63

PROJECT NO:	P-0023455	**GRAIN SIZE ANALYSIS**		SAMPLE ID:	1822
CLIENT NAME:	BTO Contracting				
PROJECT NAME:	BMS	SIEVE SIZE mm	% PASSING	JOB NO.:	N/A
PROJECT LOCATION:	Ryley, AB			SAMPLER:	Client
SAMPLING LOCATION:	Site Native - On Site Stockpile	53	100.0	TESTER:	Jacob
SAMPLING METHOD:	Grab Sample	37.5	100.0	**HYDROMETER ANALYSIS**	
SAMPLE NUMBER:	N/A	26.5	100.0		
SAMPLING DEPTH, m:	N/A	19	100.0	DIAMETER mm	% PASSING
SAMPLING DATE:	17-Sep-20	13.2	100.0		
GRAIN SIZE PROPORTIONS, %		9.5	100.0	0.037	59.2
		4.75	100.0	0.026	57.2
% GRAVEL (> 4.75 mm):	0.0	2.4	99.2	0.017	54.3
% SAND (75 µm to 4.75 mm):	39.1	1.18	97.9	0.01	50.0
% Silt (5 µm to 75 µm):	16.7	0.60	95.3	0.007	47.1
% Clay (<5 µm):	44.2	0.30	87.4	0.005	44.2
DELIVERED MOISTURE CONTENT:	9.3%	0.15	73.7	0.003	42.3
		0.075	60.9	0.001	36.2



Reviewed by: Connor Carlson

Rev:May 5,2018

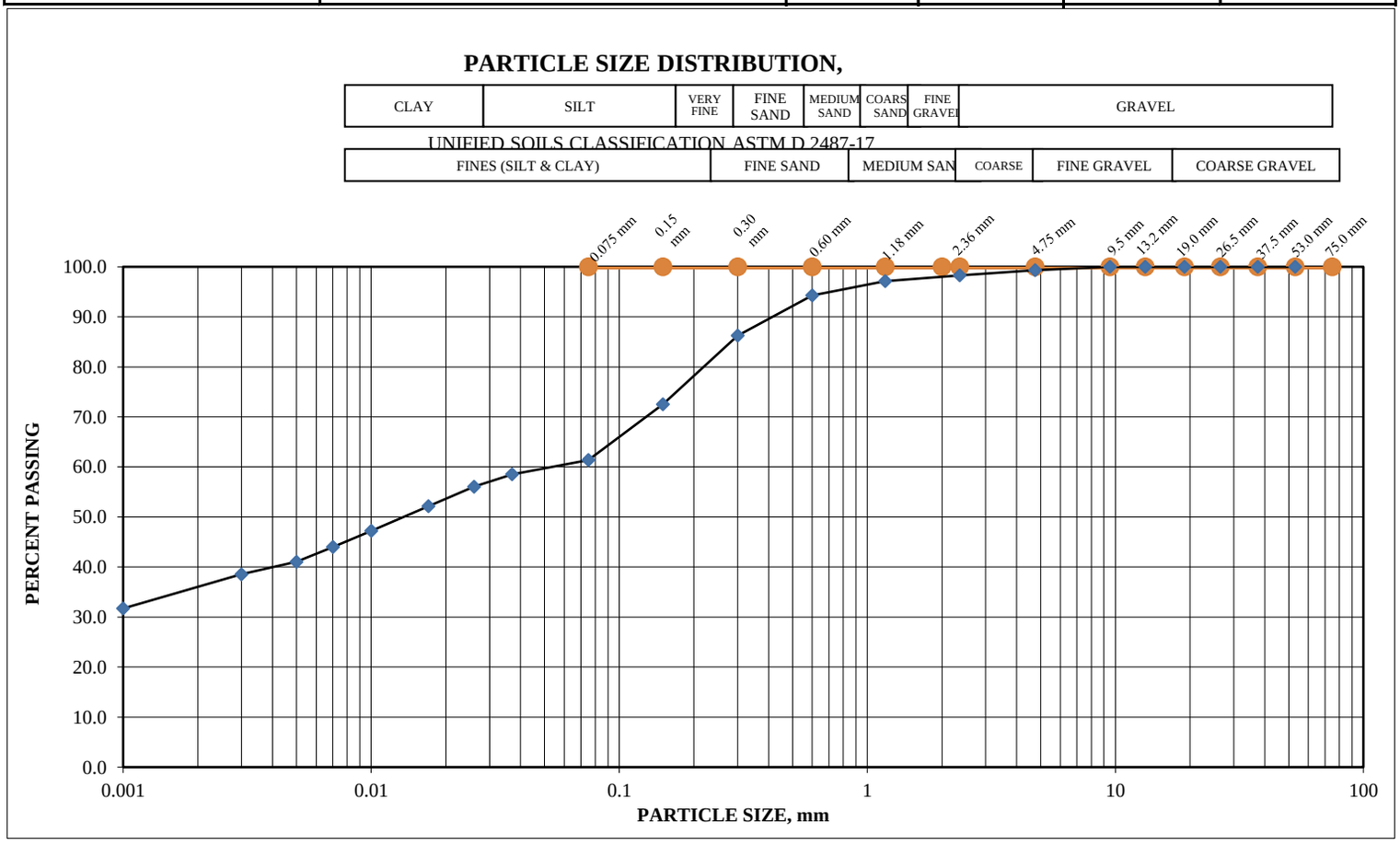
16114 114 Ave NW
Edmonton, Alberta
Canada, T5M 2Z5
Ph: 780-481-1416

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

GRAIN SIZE ANALYSIS AND HYDROMETER TEST REPORT

ASTM D422 − 63

PROJECT NO:	P-0023455	**GRAIN SIZE ANALYSIS**		SAMPLE ID:	1823
CLIENT NAME:	BTO Contracting				
PROJECT NAME:	Clean Harbors	SIEVE SIZE mm	% PASSING	JOB NO.:	N/A
PROJECT LOCATION:	Ryley, AB			SAMPLER:	Client
SAMPLING LOCATION:	Site Native - On Site Stockpile	53	100.0	TESTER:	Jacob
SAMPLING METHOD:	Grab Sample	37.5	100.0	**HYDROMETER ANALYSIS**	
SAMPLE NUMBER:	N/A	26.5	100.0		
SAMPLING DEPTH, m:	N/A	19	100.0	DIAMETER mm	% PASSING
SAMPLING DATE:	17-Sep-20	13.2	100.0		
GRAIN SIZE PROPORTIONS, %		9.5	100.0	0.037	58.5
		4.75	99.3	0.026	56.1
% GRAVEL (> 4.75 mm):	0.7	2.4	98.3	0.017	52.1
% SAND (75 µm to 4.75 mm):	37.9	1.18	97.1	0.01	47.2
% Silt (5 µm to 75 µm):	20.3	0.60	94.3	0.007	44.0
% Clay (<5 µm):	41.0	0.30	86.2	0.005	41.0
DELIVERED MOISTURE CONTENT:	14.9%	0.15	72.5	0.003	38.6
		0.075	61.4	0.001	31.7



Reviewed by: Connor Carlson

Rev:May 5,2018

THURBER ENGINEERING LTD.

Hydraulic Conductivity

ASTM D5084, Method A (Constant Head)

Client: BTO Contracting

Project: Clean Harbors

Date: 19-Oct-20

File No.: 30229

Sample Information

Location: Stockpile on Site

Elevation: -

Type: Bulk - Remolded

Soil Type: Clay till (CI), sandy, some silt, trace coal, trace coal, oxides, gravel, brown.

Lab Series: 4726

Test Results

Coefficient of Permeability: 4.26E-11 m/s

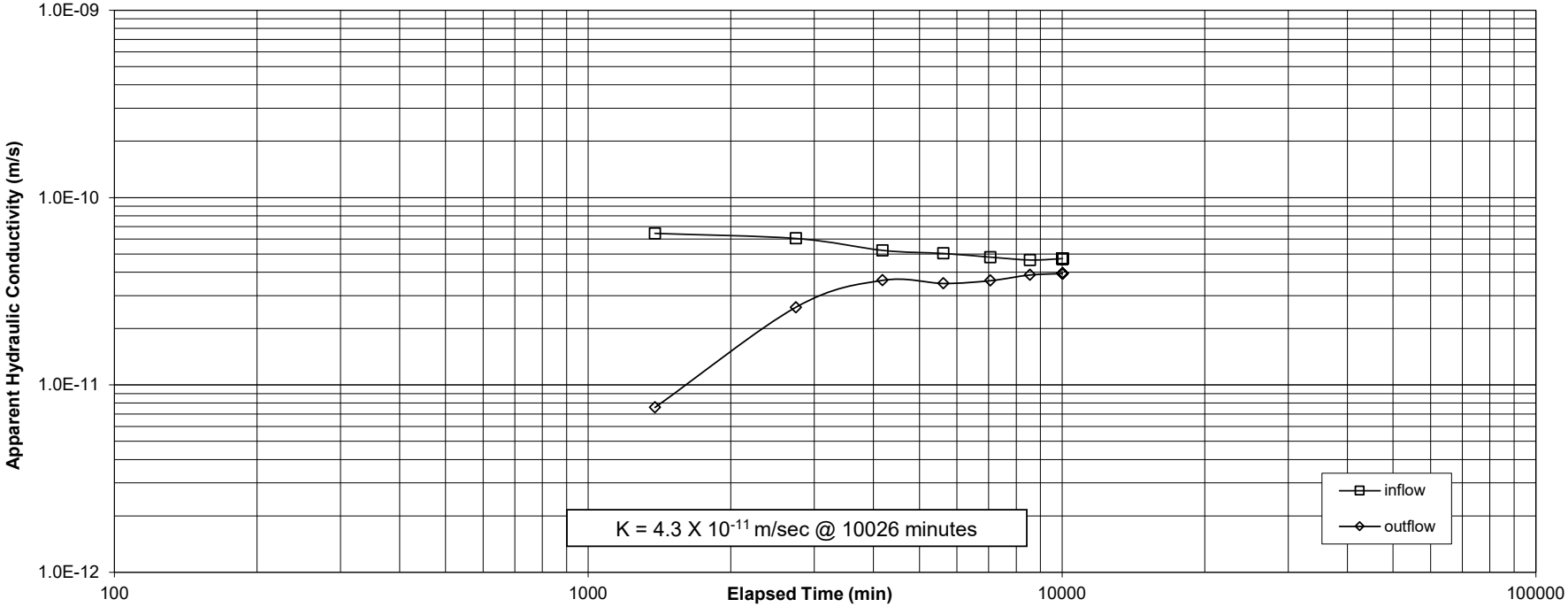
Ave Effective Confining Stress: 100 kPa

Ave. Hydraulic Gradient: 19

Permeate Liquid: Distilled Water

Comments:

	As Set Up	Final
Height:	5.97 cm	6.00 cm
Diameter:	10.16 cm	10.05 cm
Dry Density:	1747 kg/m^3	1777 kg/m^3
Water Conten	14.2 %	18.0 %
Saturation:	73 %	98 %



THURBER ENGINEERING LTD.

Hydraulic Conductivity

ASTM D5084, Method A (Constant Head)

Client: **BTO Contracting** **Date:** **25-Oct-20**

Project: **Clean Harbors** **File No.:** **30229**

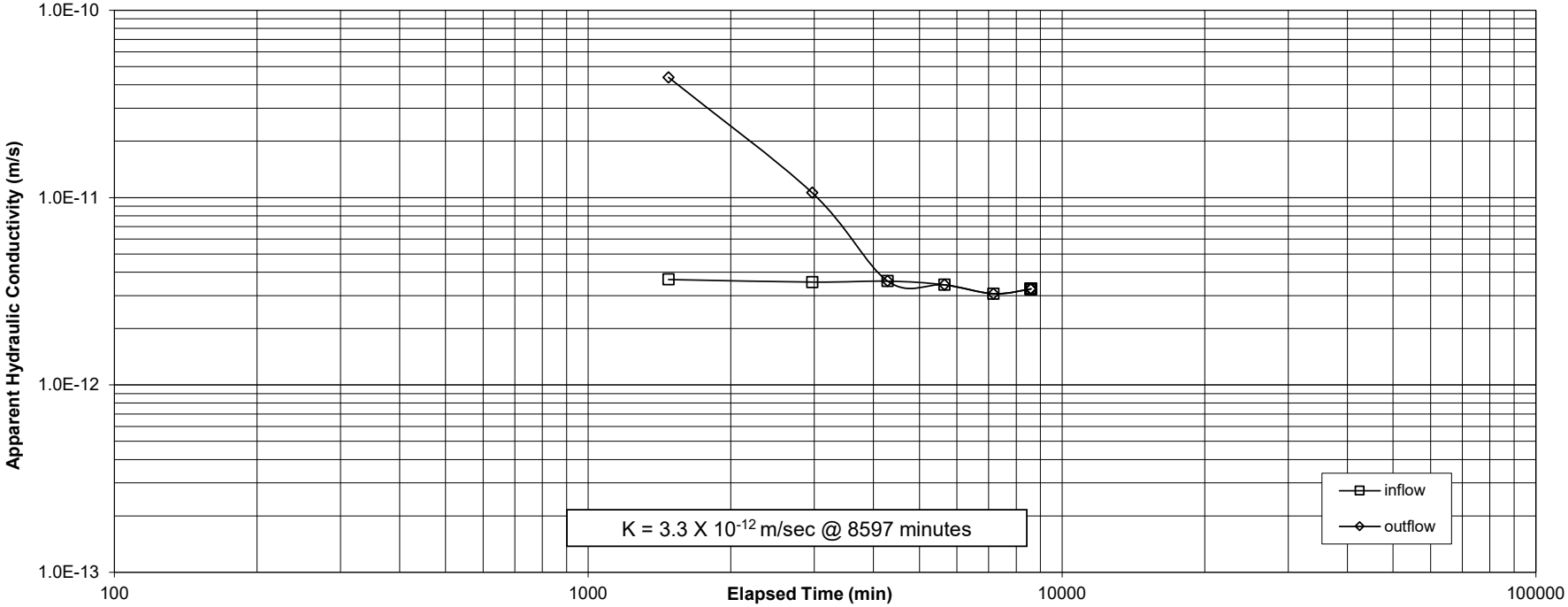
Sample Information

Location:	Sample #1, Constructed Clay Barrier Layer on North Slope of Cell 3
Elevation:	0.1 m below top of sample.
Type:	Undisturbed, Shelby tube.
Soil Type:	Clay till (CI), sandy, silty, trace coal, oxides, gravel, claystone nodules, brown.
Lab Series:	4727

Test Results

Coefficient of Permeability:	3.33E-12	m/s
Ave Effective Confining Stress:	99	kPa
Ave. Hydraulic Gradient:	41	
Permeate Liquid:	Distilled Water	
Comments:		

	As Set Up		Final	
Height:	4.96	cm	5.02	cm
Diameter:	7.27	cm	7.35	cm
Dry Density:	1983	kg/m^3	1915	kg/m^3
Water Conten	12.1	%	15.2	%
Saturation:	91	%	100	%



THURBER ENGINEERING LTD.

Hydraulic Conductivity

ASTM D5084, Method A (Constant Head)

Client: BTO Contracting

Project: Clean Harbors

Date: 17-Oct-20

File No.: 30229

Sample Information

Location: Sample #2, Constructed Clay Barrier Layer on North Slope of Cell 3

Elevation: 0.12 m below top of sample.

Type: Undisturbed, Shelby tube.

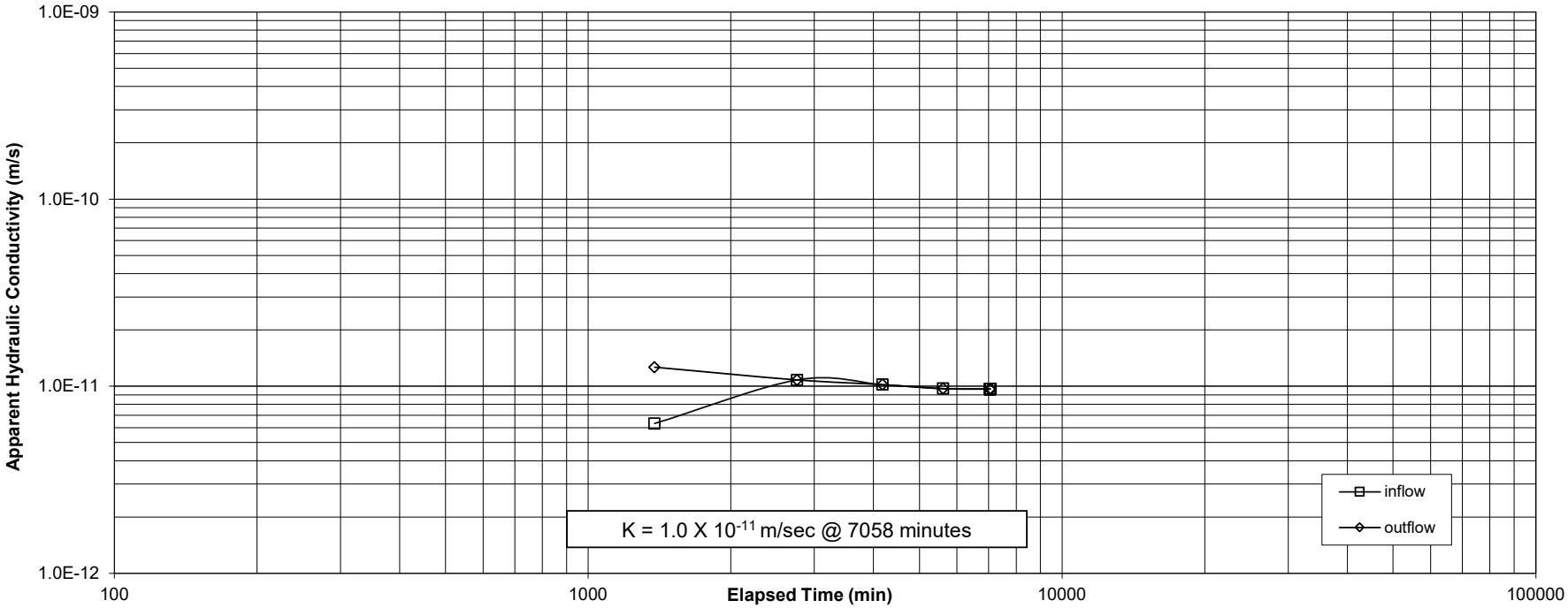
Soil Type: Clay till (CI), silty, some sand, trace coal, oxides, gravel, brown and grey.

Lab Series: 4728

Test Results

Coefficient of Permeability:	1.01E-11	m/s
Ave Effective Confining Stress:	99	kPa
Ave. Hydraulic Gradient:	27	
Permeate Liquid:	Distilled Water	
Comments:		

	As Set Up		Final	
Height:	4.97	cm	4.95	cm
Diameter:	7.27	cm	7.27	cm
Dry Density:	1858	kg/m^3	1864	kg/m^3
Water Conten	16.8	%	16.5	%
Saturation:	100	%	99	%



Appendix B

HDPE Geomembrane QA/QC Data

January 11, 2021

BTO Contracting Ltd.
9725 - 266 Street
Acheson, AB
T7X 6H6

Attention: Ryan Balash, P. Eng.

Re: QA/QC Submittal for Clean Harbours Landfill Cell 3B Cap - Geosynthetics Supply and Install

Dear Ryan,

Please find enclosed the liner installation QA/QC package, as-built panel layout, manufacturer's mill certificates, manufacturer's material warranty and WTL's workmanship warranty for the aforementioned project.

If we can be of further assistance please do not hesitate to call us at 604-241-9487.

Regards,

Western Tank & Lining Ltd.

Darmas Conrad

Darmas Conrad
Estimator
darmas@wtl.ca

LIST OF ATTACHMENTS

1. Installation QA/QC Package;
2. As-Built Panel Layout;
3. Mill Certifications; and
4. Warranties.

WESTERN TANK & LINING LTD.

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Installation QA/QC Package

VANCOUVER: 7192 Vantage Way, Delta, BC V4G 1K7 T: 604-241-9487 F: 604-241-9485

CALGARY: 105 Stockton Pt., Okotoks, AB T1S 1A5 T: 403-938-4361 F: 403-938-4371

1-800-551-4355

WESTERN TANK & LINING LTD.
YOUR CONTAINMENT SPECIALISTS SINCE 1985

Project Details

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485
TFN: 1-800-551-4355
www.wtl.ca

Project Name:	Ryley Slope
Project Number:	2070
Location:	Ryley
Start Date:	October 9, 2020
End Date:	October 18, 2020
Owner:	Clean Harbours
General Contractor:	BTO
Engineer:	Dillon

LINER MATERIALS

Type	Description	Supplier	Roll Details			
			Quantity (S.M)	Typical Length	Typical Width	Comments
Geomembrane	80MIL HDPE	SKAPS	917.0	131.00	7.00	
Geomembrane	80MIL HDPE	SOLMAX	828.9	121.90	6.80	
Geotextile	GT110	SKAPS	795.5	174.00	4.57	
Geotextile	080E	TEXEL	417.9	91.44	4.57	

Figure 1 - Cell 3B Cap

Comments:

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Inventory

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485
TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Anchor Trench Detail**	**Start Date:**	**2020-09-26**
Product Type:	**80MIL HDPE**	**Finish Date:**	**2020-09-26**

Roll Number	Length *(M)*		Width *(M)*		Area *(Sq M)*		Comments
	Actual	Used	Actual	Used	Actual	Used	
3112003712	131.00	120.40	7.00	7.00	917.00	843	
				Total Area	917	843	

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Panel Placement

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485
TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Anchor Trench Detail**	**Start Date:**	**26-Sep**
Product Type:	**80MIL HDPE**	**Finish Date:**	**26-Sep**

Panel #	Date	Roll Number	Work Area	*(M)* Length	*(M)* Width	Area	Comments
1	26-Sep-20	3112003712	Cap	14.00	2.20	30.80	
2	26-Sep-20	3112003712	Cap	41.00	2.20	90.20	
3	26-Sep-20	3112003712	Cap	6.50	1.50	9.75	
4	26-Sep-20	3112003712	Cap	8.00	1.00	8.00	
5	26-Sep-20	3112003712	Cap	6.50	2.00	13.00	
6	26-Sep-20	3112003712	Cap	6.00	2.40	14.40	
7	26-Sep-20	3112003712	Cap	38.40	7.00	268.80	
8	26-Sep-20	3112003712	Cap	38.00	4.00	152.00	
					Total Area	586.95	

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Wedge/Extruder Trials

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485 TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Anchor Trench Detail**	**Start Date:**	24-Sep
Materials Used:	**80MIL HDPE**	**Finish Date:**	26-Sep

Weld Edge: S.S.-smooth/smooth **T.T.**-Textured/Textured **S.T.**-smooth/textured

HDPE Seam Strengths(PPI)*GM19*:			
MIL	**Shear**	**Fusion**	**Ext**
40	**80**	**60**	**50**
60	**120**	**91**	**78**
80	**160**	**121**	**104**
100	**200**	**151**	**130**

LLDPE Seam Strengths (PPI)*GM19*:			
MIL	**Shear**	**Fusion**	**Ext**
40	**60**	**50**	**44**
60	**90**	**75**	**66**
80	**120**	**100**	**88**
100	**150**	**125**	**114**

Test #	Date	Time	Machine info			Weld Edge	Temp(°C) / Speed (%)	Peel Strength (ppi)						Shear (ppi)						
			Amb (°C)	ID	Type			#	1	2	3	4	5	#	1	2	3	4	5	
1	24-Sep	10:00	6	MD	EXT 14	T/T	510/500	EXT	120	119	121	122	132	PPI	249	252	Comments:			
														%	50	50				
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass				
2	25-Sep	7:10	5	GM	EXT 11	T/T	510/500	EXT	133	132	136	129	132	PPI	246	245	Comments:			
														%	50	50				
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass				
3	26-Sep	10:20	10	KC	DT12	S/S	460/30	in	148	147	153	151	154	PPI	259	250	Comments:			
								out	147	138	153	158	155	%	50	50				
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass				
4	26-Sep	10:30	10	KC	DT12	T/T	460/20	in	131	156	138	171	158	PPI	256	257	Comments:			
								out	154	154	184	172	150	%	50	50				
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass				
5	26-Sep	12:38	10	GM	EXT 11	S/T	510/500	EXT	154	150	145	138	141	PPI	259	258	Comments:			
														%	50	50				
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass				

WESTERN TANK & LINING LTD.
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Extruder Detail Log

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485
TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Anchor Trench Detail**	**Start Date:**	**24-Sep**
Product Type:	**80MIL HDPE**	**Finish Date:**	**26-Sep**

Extrude Codes: BS - Penetration / **C** - Capstrip / **DSS** - Destructive Sample / **E** - Extrusion Bead / **EXT** - Extension / **R** - Crease / **P** - Patch / **T** - Three Panel Intersection (Continuous Air channel) / **TE**- Three Panel Intersection (Blocked Air channel) / **O** - Other (Use Comments)

Detail #	Weld Date	Tech	Code	*(m)* Dimensions	*(Panel)* Location	Test Result *(P/F)*	QA Initials	Test Date	Comments
1	24-Sep	MD	E	63	LINER TRENCH	P	KC	25-Sep	VTP/PT
2	25-Sep	GM	E	63	LINER TRENCH	P	KC	25-Sep	VTP/PT
3	26-Sep	GM	E	2.2	P1/P2	P	KC	26-Sep	VTP/PT
4	26-Sep	GM	E	1.5	P2/P3	P	KC	26-Sep	VTP/PT
5	26-Sep	GM	E	1	P3/P4	P	KC	26-Sep	VTP/PT
6	26-Sep	GM	E	1	P4/P5	P	KC	26-Sep	VTP/PT

WESTERN TANK & LINING LTD.
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Wedge Seam Log

Project Name:	Ryley Anchor Trench Detail	Start Date:	26-Sep-20	Destructive Test Specifications			Air Test Specifications
				Length of Seam/Test:	150	m/Test	Test Pressure: 40 psi
Product Type:	80MIL HDPE	Finish Date:	26-Sep-20	Total Length of Seams:	42.40	m/Test	Test Duration: 5 minutes
				Total Tests Required:	0	Tests	Finish: 36 psi

Seam Number	Time	Date	Weld Tech	Welder #	*Seam Length*	Start Time	Start *(psi)*	Finish time	Finish *(psi)*	QA intials	Test Date	Comments
P7/P8	16:30	26-Sep	MD	DT12	38.0	17:30	40	17:35	40	KC	26-Sep	
P6/P7	17:08	26-Sep	MD	DT12	2.4	17:31	40	17:36	40	KC	26-Sep	
P5/P6	17:15	26-Sep	MD	DT12	2.0	17:31	40	17:36	40	KC	26-Sep	
				Total	42.40							

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Inventory

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485
TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Slope**	**Start Date:**	**2020-11-11**
Product Type:	**80MIL HDPE**	**Finish Date:**	**2020-11-16**

Roll Number	Length *(M)*		Width *(M)*		Area *(Sq M)*		Comments
	Actual	Used	Actual	Used	Actual	Used	
3111005096	131.00	122.50	7.00	7.00	917.00	858	
3111005097	131.00	102.70	7.00	7.00	917.00	719	
3111005098	131.00	113.20	7.00	7.00	917.00	792	
3111005100	131.00	83.50	7.00	7.00	917.00	585	
3111005102	131.00	104.40	7.00	7.00	917.00	731	
3111005103	131.00	123.50	7.00	7.00	917.00	865	
3111005104	131.00	59.00	7.00	7.00	917.00	413	
3111005105	131.00	103.00	7.00	7.00	917.00	721	
3112003713	131.00	55.00	7.00	7.00	917.00	385	
3112003714	131.00	48.50	7.00	7.00	917.00	340	
1-143292	121.90	100.90	6.80	7.00	828.92	706	
1-143310	121.90	101.00	6.80	7.00	828.92	707	
1-143321	121.90	74.50	6.80	7.00	828.92	522	
				Total Area	11,657	8,342	

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Panel Placement

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485
TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Slope**	**Start Date:**	**11-Oct**
Product Type:	**80MIL HDPE**	**Finish Date:**	**16-Oct**

Panel #	Date	Roll Number	Work Area	*(M)* Length	*(M)* Width	Area	Comments
1	11-Oct-20	3111005098	SLOPE	75.00	7.00	525.00	
2	11-Oct-20	3111005104	SLOPE	75.00	7.00	525.00	
3	11-Oct-20	3111005102	SLOPE	75.90	7.00	531.30	
4	13-Oct-20	3111005098	TOP OF CAP	12.70	7.00	88.90	
5	13-Oct-20	3111005098	TOP OF CAP	41.50	7.00	290.50	
6	13-Oct-20	3111005108	SLOPE	73.50	7.00	514.50	
7	13-Oct-20	3111005103	SLOPE	72.00	7.00	504.00	
8	13-Oct-20	3111005103	SLOPE	11.50	5.00	57.50	CUT FROM P9
9	13-Oct-20	3111005103	SLOPE	56.00	7.00	392.00	
10	13-Oct-20	3111005097	SLOPE	72.00	7.00	504.00	
11	13-Oct-20	3111005101	SLOPE	73.20	7.00	512.40	
12	14-Oct-20	3111005096	SLOPE	69.50	7.00	486.50	
13	14-Oct-20	3111005096	SLOPE	53.00	7.00	371.00	
14	14-Oct-20	3112003714	SLOPE	64.50	7.00	451.50	
15	14-Oct-20	3111005096	SLOPE	16.00	2.60	41.60	CUT FROM P12
16	14-Oct-20	3112003713	SLOPE	71.00	7.00	497.00	
17	14-Oct-20	3111005093	SLOPE	39.00	7.00	273.00	
18	15-Oct-20	3111005100	SLOPE	72.10	7.00	504.70	
19	15-Oct-20	3111005100	TOP OF CAP	27.40	7.00	191.80	
20	16-Oct-20	1-143310	SLOPE	69.00	6.80	469.20	
21	16-Oct-20	1-143310	SLOPE	48.00	6.80	326.40	
22	16-Oct-20	1-143321	SLOPE	20.50	6.80	139.40	
23	16-Oct-20	1-143321	SLOPE	70.00	6.80	476.00	
24	16-Oct-20	3111005097	TOP OF CAP	31.70	7.00	221.90	
25	16-Oct-20	3111005097	TOP OF CAP	15.00	7.00	105.00	
26	16-Oct-20	1-143292	SLOPE	69.00	6.80	469.20	
27	16-Oct-20	1-143292	SLOPE	47.90	6.80	325.72	
28	16-Oct-20	3111005105	SLOPE	53.50	7.00	374.50	
29	16-Oct-20	3111005105	SLOPE	37.50	7.00	262.50	
30	16-Oct-20	3111005105	SLOPE	28.00	7.00	196.00	
31	16-Oct-20	3111005102	SLOPE	18.00	7.00	126.00	
32	16-Oct-20	3111005102	SLOPE	8.00	5.70	45.60	
33	16-Oct-20	3111005102	SLOPE	18.50	6.80	125.80	
					Total Area	10,925.42	

WESTERN TANK & LINING LTD.
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Wedge/Extruder Trials

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485 TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Slope**	**Start Date:**	10-Oct
Materials Used:	**80MIL HDPE**	**Finish Date:**	18-Oct

Weld Edge: S.S.-smooth/smooth **T.T.**-Textured/Textured **S.T.**-smooth/textured

HDPE Seam Strengths(PPI)*GM19*: MIL	Shear	Fusion	Ext
40	80	60	50
60	120	91	78
80	160	121	104
100	200	151	130

LLDPE Seam Strengths (PPI)*GM19*: MIL	Shear	Fusion	Ext
40	60	50	44
60	90	75	66
80	120	100	88
100	150	125	114

Test #	Date	Time	Machine info			Weld Edge	Temp(°C) / Speed (%)	Peel Strength (ppi)						Shear (ppi)					
			Amb (°C)	ID	Type			#	1	2	3	4	5	#	1	2	3	4	5
1	10-Oct	9:00	4	TJ	DT4	S.S.	460/40	in	132	142	145	137	140	PPI	162	166			
								out	140	141	137	136	139	%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
2	10-Oct	9:10	4	MD	DT12	S.S.	460/35	in	121	126	127	131	133	PPI	160	165			
								out	122	128	136	134	134	%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
3	12-Oct	10:20	-1	GM	PX5 14	T.T.	282/278	in	114	111	108	105	111	PPI	276	284			
								out						%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
4	13-Oct	9:00	-1	TJ	DT4	S.S.	460/40	in	200	190	216	188	187	PPI	296	291			
								out	199	162	191	166	198	%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
5	13-Oct	9:07	-1	MD	DT12	S.S.	460/35	in	141	158	206	175	203	PPI	229	220			
								out	206	210	194	180	177	%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
6	13-Oct	12:30	-1	GM	PX5 11	T.T.	276/276	in	104	105	114	116	119	PPI	263	245			
								out						%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
7	14-Oct	9:00	-1	TJ	DT4	S.S.	460/40	in	173	160	178	176	186	PPI	308	306			
								out	170	162	180	174	184	%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
8	14-Oct	9:08	-1	MD	DT12	S.S.	460/35	in	157	157	144	182	145	PPI	279	267			
								out	152	167	191	158	162	%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
9	14-Oct	9:15	-1	GM	PX5 11	T.T.	276/276	in	179	161	147	195	168	PPI	279	273			
								out						%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass

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Wedge/Extruder Trials

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485 TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Slope**	**Start Date:**	10-Oct
Materials Used:	**80MIL HDPE**	**Finish Date:**	18-Oct

Weld Edge: S.S.-smooth/smooth **T.T.**-Textured/Textured **S.T.**-smooth/textured

HDPE Seam Strengths(PPI)*GM19*: MIL	Shear	Fusion	Ext
40	80	60	50
60	120	91	78
80	160	121	104
100	200	151	130

LLDPE Seam Strengths (PPI)*GM19*: MIL	Shear	Fusion	Ext
40	60	50	44
60	90	75	66
80	120	100	88
100	150	125	114

Test #	Date	Time	Machine info: Amb (°C)	ID	Type	Weld Edge	Temp(°C) / Speed (%)	Peel Strength (ppi) #	1	2	3	4	5	Shear (ppi) #	1	2	3	4	5
10	15-Oct	8:30	0	MD	DT4	S.S.	460/35	in	171	182	185	165	180	PPI	275	280			
								out	148	149	153	163	161	%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
11	16-Oct	8:04	-2	KC	DT4	S.S.	460/40	in	142	144	131	136	153	PPI	269	267			
								out	145	152	148	147	150	%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
12	16-Oct	8:11	-2	MD	DT12	S.S.	460/40	in	156	132	150	157	156	PPI	256	259			
								out	155	150	182	159	151	%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
13	17-Oct	8:18	-9	TW	DT12	S.S.	460/35	in	158	135	144	122	135	PPI	240	228			
								out	152	147	138	140	151	%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
14	17-Oct	9:00	-9	GM	PX5 11	T.T.	300/285	in	165	172	157	168	147	PPI	280	276			
								out						%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
15	17-Oct	9:10	-9	MD	PX5 14	T.T.	295/285	in	139	145	151	155	152	PPI	268	269			
								out						%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass
16	18-Oct	8:30	-11	GM	PX5 11	T.T.	300/285	in	154	147	143	158	139	PPI	259	267			
								out						%	50	50	50	50	50
								P/F	Pass	Pass	Pass	Pass	Pass	P/F	Pass	Pass	Pass	Pass	Pass

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Extruder Detail Log

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485
TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Slope**	**Start Date:**	**12-Oct**
Product Type:	**80MIL HDPE**	**Finish Date:**	**18-Oct**

Extrude Codes: BS - Penetration / **C** - Capstrip / **DSS** - Destructive Sample / **E** - Extrusion Bead / **EXT** - Extension / **R** - Crease / **P** - Patch / **T** - Three Panel Intersection (Continuous Air channel) / **TE**- Three Panel Intersection (Blocked Air channel) / **O** - Other (Use Comments)

Detail #	Weld Date	Tech	Code	*(m)* Dimensions	*(Panel)* Location	Test Result *(P/F)*	QA Initials	Test Date	Comments
1	12-Oct	GM	TE	1.3	P1/EXISTING	P	JB	16-Oct	VTP/PT
2	12-Oct	GM	P	2.7	P1/EXISTING	P	JB	16-Oct	VTP/PT
3	12-Oct	GM	TE	0.3	P1/EXISTING	P	JB	16-Oct	VTP/PT
4	12-Oct	GM	TE	14.1	P1/EXISTING	P	JB	16-Oct	VTP/PT
5	12-Oct	GM	E	22.4	P1/P2/P3 TIE IN	P	JB	16-Oct	VTP/PT
6	12-Oct	GM	P	1X.5	P3	P	JB	16-Oct	VTP/PT
7	13-Oct	GM	E	17.4	P1/P2/P3/EXISTING	P	JB	16-Oct	VTP/PT
8	13-Oct	GM	P	1	P3/EXISTING	P	JB	16-Oct	VTP/PT
9	13-Oct	GM	E	9.3	P3/P4/EXISTING	P	JB	16-Oct	VTP/PT
10	13-Oct	GM	P	2	P4/EXISTING	P	JB	16-Oct	VTP/PT
11	13-Oct	GM	TE	0.5	P4/P5/EXISTI\NG	P	JB	16-Oct	VTP/PT
12	13-Oct	GM	TE	1	P3/P4/P6	P	JB	16-Oct	VTP/PT
13	13-Oct	GM	P	0.9	P4/P6/P7	P	JB	16-Oct	VTP/PT
14	13-Oct	GM	TE	5	P4/P5/P7/P10	P	JB	16-Oct	VTP/PT
15	13-Oct	GM	TE	0.5	P5/P10/P11	P	JB	16-Oct	VTP/PT
16	13-Oct	GM	TE	1	P7/P9/P10	P	JB	16-Oct	VTP/PT
17	13-Oct	GM	TE	1	P7/P8/P9	P	JB	16-Oct	VTP/PT
18	13-Oct	GM	P	0.6	P10	P	JB	16-Oct	VTP/PT

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Extruder Detail Log

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485
TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Slope**	**Start Date:**	**12-Oct**
Product Type:	**80MIL HDPE**	**Finish Date:**	**18-Oct**

Extrude Codes: BS - Penetration / **C** - Capstrip / **DSS** - Destructive Sample / **E** - Extrusion Bead / **EXT** - Extension / **R** - Crease / **P** - Patch / **T** - Three Panel Intersection (Continuous Air channel) / **TE**- Three Panel Intersection (Blocked Air channel) / **O** - Other (Use Comments)

Detail #	Weld Date	Tech	Code	*(m)* Dimensions	*(Panel)* Location	Test Result *(P/F)*	QA Initials	Test Date	Comments
19	13-Oct	GM	P	0.6	P10	P	JB	16-Oct	VTP/PT
20	13-Oct	GM	E	39	P6/P7/P8/P9/P10/P11 TIE IN	P	JB	16-Oct	VTP/PT
21	14-Oct	GM	P	2.2X.8	P11/P12/P13	P	JB	16-Oct	VTP/PT
22	14-Oct	GM	TE	0.5	P5/P16/P17	P	JB	16-Oct	VTP/PT
23	14-Oct	GM	TE	0.5	P5/P14/P16	P	JB	16-Oct	VTP/PT
24	14-Oct	GM	TE	0.5	P5/P12/P14	P	JB	16-Oct	VTP/PT
25	14-Oct	GM	TE	2	P5/P11/P12	P	JB	16-Oct	VTP/PT
26	14-Oct	GM	TE	1	P11/P13/P15	P	JB	16-Oct	VTP/PT
27	14-Oct	GM	TE	29.8	P12/P13/P14/P15/P16/P18 TIE IN	P	JB	16-Oct	VTP/PT
28	17-Oct	MD	C	21X1	P12/P13	P	KC	17-Oct	VTP/PT
29	17-Oct	MD	P	0.5	P14	P	KC	17-Oct	VTP/PT
30	17-Oct	MD	P	0.5	P14	P	KC	17-Oct	VTP/PT
31	17-Oct	MD	P	0.7	P14	P	KC	17-Oct	VTP/PT
32	17-Oct	MD	P	0.8	P14	P	KC	17-Oct	VTP/PT
33	17-Oct	MD	TE	0.5	P16/P17/P18	P	KC	17-Oct	VTP/PT
34	17-Oct	MD	TE	0.5	P20/P21/P22	P	KC	17-Oct	VTP/PT
35	17-Oct	MD	TE	0.5	P21/P22/P23	P	KC	17-Oct	VTP/PT
36	17-Oct	MD	TE	0.5	P26/P27/P33	P	KC	17-Oct	VTP/PT

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Extruder Detail Log

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485
TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Slope**	**Start Date:**	**12-Oct**
Product Type:	**80MIL HDPE**	**Finish Date:**	**18-Oct**

Extrude Codes: BS - Penetration / **C** - Capstrip / **DSS** - Destructive Sample / **E** - Extrusion Bead / **EXT** - Extension / **R** - Crease / **P** - Patch / **T** - Three Panel Intersection (Continuous Air channel) / **TE**- Three Panel Intersection (Blocked Air channel) / **O** - Other (Use Comments)

Detail #	Weld Date	Tech	Code	*(m)* Dimensions	*(Panel)* Location	Test Result *(P/F)*	QA Initials	Test Date	Comments
37	17-Oct	MD	TE	0.5	P27/P28/P33	P	KC	17-Oct	VTP/PT
38	17-Oct	MD	E	34	P16/P18/P20/P22/P23/P26/P33 TIE IN	P	KC	17-Oct	VTP/PT
39	17-Oct	GM	TE	7.7	P5/P19/EXISTING	P	KC	17-Oct	VTP/PT
40	17-Oct	GM	TE	1.3	P19/EXISTING	P	KC	17-Oct	VTP/PT
41	17-Oct	GM	P	3.1	P19/EXISTING	P	KC	17-Oct	VTP/PT
42	17-Oct	GM	TE	0.6	P19/EXISTING	P	KC	17-Oct	VTP/PT
43	17-Oct	GM	TE	0.5	P5/P17/P18/P19	P	KC	17-Oct	VTP/PT
44	17-Oct	GM	TE	0.5	P18/P19/P20	P	KC	17-Oct	VTP/PT
45	17-Oct	GM	TE	0.5	P19/P20/P21	P	KC	17-Oct	VTP/PT
46	17-Oct	GM	TE	0.5	P19/P21/P23	P	KC	17-Oct	VTP/PT
47	17-Oct	GM	TE	2	P19/P23/P24/P26	P	KC	17-Oct	VTP/PT
48	17-Oct	GM	TE	0.5	P24/P26/P27	P	KC	17-Oct	VTP/PT
49	17-Oct	GM	TE	0.5	P24/P27/P29	P	KC	17-Oct	VTP/PT
50	17-Oct	GM	TE	0.5	P24/P29/P30	P	KC	17-Oct	VTP/PT
51	17-Oct	GM	TE	2	P24/P25/P30/P31	P	KC	17-Oct	VTP/PT
52	17-Oct	GM	TE	0.5	P25/P31/P32	P	KC	17-Oct	VTP/PT
53	17-Oct	GM	TE	3	P25/P28/P32	P	KC	17-Oct	VTP/PT
54	17-Oct	GM	P	0.5	P28/P31/P32	P	KC	17-Oct	VTP/PT

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Extruder Detail Log

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485
TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Slope**	**Start Date:**	**12-Oct**
Product Type:	**80MIL HDPE**	**Finish Date:**	**18-Oct**

Extrude Codes: BS - Penetration / **C** - Capstrip / **DSS** - Destructive Sample / **E** - Extrusion Bead / **EXT** - Extension / **R** - Crease / **P** - Patch / **T** - Three Panel Intersection (Continuous Air channel) / **TE**- Three Panel Intersection (Blocked Air channel) / **O** - Other (Use Comments)

Detail #	Weld Date	Tech	Code	*(m)* Dimensions	*(Panel)* Location	Test Result *(P/F)*	QA Initials	Test Date	Comments
55	17-Oct	GM	TE	0.5	P28/P30/P31	P	KC	17-Oct	VTP/PT
56	17-Oct	GM	TE	0.5	P28/P29/P30	P	KC	17-Oct	VTP/PT
57	17-Oct	GM	TE	0.5	P27/P28/P29	P	KC	17-Oct	VTP/PT
58	18-Oct	GM	E	48.7	P19/P24/P25/P28/ EXISTING	P	KC	18-Oct	VTP/PT

WESTERN TANK & LINING LTD.
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Wedge Seam Log

Project Name:	Ryley Slope	Start Date:	10-Oct-20	Destructive Test Specifications			Air Test Specifications
				Length of Seam/Test:	150	m/Test	Test Pressure: 40 psi
Product Type:	80MIL HDPE	Finish Date:	15-Oct-20	Total Length of Seams:	1655.80	m/Test	Test Duration: 5 minutes
				Total Tests Required:	11	Tests	Finish: 36 psi

Seam Number	Time	Date	Weld Tech	Welder #	*Seam Length*	Start Time	Start *(psi)*	Finish time	Finish *(psi)*	QA intials	Test Date	Comments
P1/EXISITNG	16:16	10-Oct	TJ	DT4	5.0	13:30	40	13:35	40	JB	14-Oct	
					1.3	EXTRUDED PASSED				JB	14-Oct	
					35.0	13:31	40	13:36	37	JB	14-Oct	
					2.7	EXTRUDED PASSED				JB	14-Oct	
					2.0	13:32	40	13:37	39	JB	14-Oct	
					0.3	EXTRUDED PASSED				JB	14-Oct	
					14.7	13:33	40	13:38	38	JB	14-Oct	
					14.1	EXTRUDED PASSED				JB	14-Oct	
P1/P2	14:53	10-Oct	TJ	DT4	75.0	13:40	40	13:45	39	JB	14-Oct	
P2/P3	15:05	10-Oct	MD	DT12	75.0	13:41	40	13:46	40	JB	14-Oct	
P4/P5	9:24	13-Oct	TJ	DT4	6.8	13:42	40	13:47	40	JB	14-Oct	
P3/P4	9:40	13-Oct	MD	DT12	6.8	13:43	40	13:48	40	JB	14-Oct	
P3/P4/P6					1.0	EXTRUDED PASSED				JB	14-Oct	
P3/P6					68.1	13:49	40	13:54	40	JB	14-Oct	
P4/P6	9:45	13-Oct	TJ	DT4	6.5	13:50	40	13:55	40	JB	14-Oct	
P6/P7	10:10	13-Oct	TJ	DT4	72.0	13:51	40	13:56	40	JB	14-Oct	
P8/P9	11:18	13-Oct	MD	DT12	11.5	13:52	40	13:57	40	JB	14-Oct	
P7/P9	11:30	13-Oct	TJ	DT4	29.9	13:58	40	14:03	40	JB	14-Oct	
P7/P8/P9					1.0	EXTRUDED PASSED				JB	14-Oct	
P7/P8					21.6	13:58	40	14:03	40	JB	14-Oct	
P9/P10	13:26	13-Oct	TJ	DT4	56.0	13:59	40	14:04	40	JB	14-Oct	
P7/P9/P10					1.0	EXTRUDED PASSED				JB	14-Oct	
P7/P10					17.8	14:01	40	14:06	40	JB	14-Oct	
P10/P11	14:13	13-Oct	TJ	DT4	72.0	14:07	40	14:12	39	JB	14-Oct	
P5/EXISTING	15:10	13-Oct	TJ	DT4	41.5	14:08	40	14:13	40	JB	14-Oct	
P4/P5/EXISTING					1.0	EXTRUDED PASSED				JB	14-Oct	
P4/EXISTING					4.4	14:08	40	14:13	40	JB	14-Oct	

WESTERN TANK & LINING LTD.
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Wedge Seam Log

Project Name:	Ryley Slope	Start Date:	10-Oct-20	Destructive Test Specifications			Air Test Specifications
				Length of Seam/Test:	150	m/Test	Test Pressure: 40 psi
Product Type:	80MIL HDPE	Finish Date:	15-Oct-20	Total Length of Seams:	1655.80	m/Test	Test Duration: 5 minutes
				Total Tests Required:	11	Tests	Finish: 36 psi

Seam Number	Time	Date	Weld Tech	Welder #	*Seam Length*	Start Time	Start *(psi)*	Finish time	Finish *(psi)*	QA intials	Test Date	Comments
P5/P11	16:15	13-Oct	TJ	DT4	6.8	14:09	40	14:14	40	JB	14-Oct	
P5/P10/P11					0.5	EXTRUDED PASSED				JB	14-Oct	
P5/P10					4.3	14:09	40	14:14	40	JB	14-Oct	
P12/P14	10:00	14-Oct	TJ	DT4	64.5	14:15	40	14:20	40	JB	14-Oct	
P12/P13	10:40	14-Oct	MD	DT12	28.0	14:16	40	14:21	40	JB	14-Oct	
P13/P15	10:40	14-Oct	TJ	DT4	16.0	14:17	40	14:22	40	JB	14-Oct	
P14/P16	10:20	14-Oct	MD	DT12	64.5	14:18	40	14:23	40	JB	14-Oct	
P11/P12	11:05	14-Oct	TJ	DT4	15.5	14:25	40	14:30	40	JB	14-Oct	
P11/P12/P13					2.2	EXTRUDED PASSED				JB	14-Oct	
P11/P13					38.4	14:25	40	14:30	40	JB	14-Oct	
P11/P13/P15					1.0	EXTRUDED PASSED				JB	14-Oct	
P11/P15					16.0	14:26	40	14:31	40	JB	14-Oct	
P16/P17	11:17	14-Oct	MD	DT12	39.0	14:27	40	14:32	40	JB	14-Oct	
P5/P17	13:20	14-Oct	MD	DT12	5.0	14:35	40	14:40	40	JB	14-Oct	
P5/P16/P17					0.5	EXTRUDED PASSED				JB	14-Oct	E
P5/P16					6.8	14:36	40	14:41	40	JB	14-Oct	
P5/P14/P16					0.5	EXTRUDED PASSED				JB	14-Oct	E
P5/P14					6.8	14:36	40	14:41	40	JB	14-Oct	
P5/P12/P14					0.5	EXTRUDED PASSED				JB	14-Oct	E
P5/P12					2.5	14:44	40	14:49	40	JB	14-Oct	
P5/P11/P12					2.0	EXTRUDED PASSED				JB	14-Oct	E
P17/P18	10:01	15-Oct	MD	DT12	31.0	11:13	40	11:18	40	KC	17-Oct	
P16/P17/P18					0.5	EXTRUDED PASSED				KC	17-Oct	
P16/P18					40.0	11:14	40	11:19	40	KC	17-Oct	
P5/P19	10:05	15-Oct	MD	DT12	6.8	11:15	40	11:20	40	KC	17-Oct	
P18/P19	10:10	15-Oct	MD	DT12	6.8	11:16	40	11:21	40	KC	17-Oct	
P18/P20	9:00	16-Oct	KC	DT4	69.0	11:22	40	11:27	38	KC	17-Oct	

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Wedge Seam Log

Project Name:	Ryley Slope	Start Date:	10-Oct-20	Destructive Test Specifications				Air Test Specifications		
				Length of Seam/Test:	150	m/Test		Test Pressure:	40	psi
Product Type:	80MIL HDPE	Finish Date:	15-Oct-20	Total Length of Seams:	1655.80	m/Test		Test Duration:	5	minutes
				Total Tests Required:	11	Tests		Finish:	36	psi

Seam Number	Time	Date	Weld Tech	Welder #	*Seam Length*	Start Time	Start *(psi)*	Finish time	Finish *(psi)*	QA intials	Test Date	Comments
P21/P22	9:30	16-Oct	TW	DT12	6.6	11:23	40	11:28	40	KC	17-Oct	
P20/P22	9:35	16-Oct	KC	DT4	20.5	11:24	40	11:29	40	KC	17-Oct	
P20/P21/P22					0.5	EXTRUDED PASSED				KC	17-Oct	
P20/P21					48.0	11:25	40	11:30	40	KC	17-Oct	
P21/P23	10:39	16-Oct	KC	DT4	48.0	11:32	40	11:37	40	KC	17-Oct	
P21/P22/P23					0.5	EXTRUDED PASSED				KC	17-Oct	
P22/P23					20.5	11:33	40	11:38	40	KC	17-Oct	
P19/P24	10:52	16-Oct	MD	DT12	6.8	11:34	40	11:39	40	KC	17-Oct	
P24/P25	11:00	16-Oct	MD	DT12	6.8	11:35	40	11:40	40	KC	17-Oct	
P23/P26	12:53	16-Oct	KC	DT4	69.0	11:45	40	11:50	39	KC	17-Oct	
P26/P27	13:40	16-Oct	KC	DT4	47.9	11:46	40	11:51	40	KC	17-Oct	
P27/P29	14:13	16-Oct	KC	DT4	37.5	11:47	40	11:52	40	KC	17-Oct	
P29/P30	14:25	16-Oct	MD	DT12	28.0	11:48	40	11:53	40	KC	17-Oct	
P30/P31	14:40	16-Oct	KC	DT4	18.0	11:55	40	12:00	40	KC	17-Oct	
P31/P32	14:45	16-Oct	MD	DT12	8.0	11:56	40	12:01	40	KC	17-Oct	
P27/P33	15:06	16-Oct	KC	DT4	6.6	11:57	40	12:02	40	KC	17-Oct	
P26/P33	15:12	16-Oct	KC	DT4	18.5	11:58	40	12:03	40	KC	17-Oct	
P28/P29	15:28	16-Oct	KC	DT4	10.0	12:06	40	12:11	38	KC	17-Oct	
P28/P29/P30					0.5	EXTRUDED PASSED				KC	17-Oct	
P28/P30					10.0	12:07	40	12:12	40	KC	17-Oct	
P28/P30/P31					0.5	EXTRUDED PASSED				KC	17-Oct	
P28/P31					10.0	12:08	40	12:13	40	KC	17-Oct	
P28/P31/P32					0.5	EXTRUDED PASSED				KC	17-Oct	
P28/P32					8.5	12:09	40	12:14	40	KC	17-Oct	

WESTERN TANK & LINING LTD.
YOUR CONTAINMENT SPECIALISTS SINCE 1985

Wedge Seam Log

Project Name:	Ryley Slope	Start Date:	10-Oct-20	Destructive Test Specifications				Air Test Specifications		
				Length of Seam/Test:	150	m/Test		Test Pressure:	40	psi
Product Type:	80MIL HDPE	Finish Date:	15-Oct-20	Total Length of Seams:	1655.80	m/Test		Test Duration:	5	minutes
				Total Tests Required:	11	Tests		Finish:	36	psi

Seam Number	Time	Date	Weld Tech	Welder #	*Seam Length*	Start Time	Start *(psi)*	Finish time	Finish *(psi)*	QA intials	Test Date	Comments
P25/P32	15:10	16-Oct	MD	DT12	5.7	12:15	40	12:20	40	KC	17-Oct	
P25/P31/P32					0.5	EXTRUDED PASSED				KC	17-Oct	
P25/P31					4.4	12:16	40	12:21	40	KC	17-Oct	
P24/P25/P30/P31					2.0	EXTRUDED PASSED				KC	17-Oct	
P24/P30					6.8	12:17	40	12:22	40	KC	17-Oct	
P24/P29/P30					0.5	EXTRUDED PASSED				KC	17-Oct	
P24/P29					6.8	12:18	40	12:23	40	KC	17-Oct	
P24/P27/P29					0.5	EXTRUDED PASSED				KC	17-Oct	
P24/P27					6.2	12:24	40	12:29	40	KC	17-Oct	
P24/P26/P27					0.5	EXTRUDED PASSED				KC	17-Oct	
P24/P26					4.2	12:25	40	12:30	40	KC	17-Oct	
P19/P24/P23/P26					2.0	EXTRUDED PASSED				KC	17-Oct	
P19/P23					6.2	13:03	40	13:08	40	KC	17-Oct	
P19/P21/P23					0.5	EXTRUDED PASSED				KC	17-Oct	
P19/P21					6.2	13:04	40	13:09	40	KC	17-Oct	
P19/P20/P21					0.5	EXTRUDED PASSED				KC	17-Oct	
P19/P20					6.2	13:05	40	13:10	39	KC	17-Oct	
P27/P28	16:04	16-Oct	MD	DT12	7.8	13:06	40	13:11	40	KC	17-Oct	
P27/P28/P33					0.5	EXTRUDED PASSED				KC	17-Oct	
P28/P33					2.0	13:13	40	13:18	40	KC	17-Oct	
P25/P28	16:30	16-Oct	MD	DT12	6.6	13:14	40	13:19	40	KC	17-Oct	

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Wedge Seam Log

Project Name:	Ryley Slope	Start Date:	10-Oct-20	Destructive Test Specifications			Air Test Specifications
				Length of Seam/Test:	150	m/Test	Test Pressure: 40 psi
Product Type:	80MIL HDPE	Finish Date:	15-Oct-20	Total Length of Seams:	1655.80	m/Test	Test Duration: 5 minutes
				Total Tests Required:	11	Tests	Finish: 36 psi

Seam Number	Time	Date	Weld Tech	Welder #	*Seam Length*	Start Time	Start *(psi)*	Finish time	Finish *(psi)*	QA intials	Test Date	Comments
P5/P19/EXISTING	11:00	15-Oct	MD	DT12	7.7	EXTRUDED PASSED				KC	17-Oct	
P19/EXISTING					5.9	13:22	40	13:27	37	KC	17-Oct	
					4.4	EXTRUDED PASSED				KC	17-Oct	
					4.0	13:22	40	13:27	38	KC	17-Oct	
					0.6	EXTRUDED PASSED				KC	17-Oct	
					2.5	13:23	40	13:28	40	KC	17-Oct	
P19/P24/EXISTING					3.0	EXTRUDED PASSED				KC	17-Oct	
				Total	1655.80							

WESTERN TANK & LINING LTD.
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Destructive Test

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485 TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Slope**	**Start Date:**	**2020-10-14**	**Destruct Check**		**HDPE Seam Strengths(PPI)*GM19*:**				**LLDPE Seam Strengths (PPI)*GM19*:**			
				Tests Required:	**11**	**MIL**	**Shear**	**Fusion**	**Ext**	**MIL**	**Shear**	**Fusion**	**Ext**
Materials Used:	**80MIL HDPE**	**Finish Date:**	**2020-10-16**	**Tests Completed:**	**11.00**	**40**	**80**	**60**	**50**	**40**	**60**	**50**	**44**
				Check:	**OK**	**60**	**120**	**91**	**78**	**60**	**90**	**75**	**66**
						80	**160**	**121**	**104**	**80**	**120**	**100**	**88**
						100	**200**	**151**	**130**	**100**	**150**	**125**	**114**

Seam Number	DST #	Date	Time	QA Tech	QA Monitor	Peel Strength (ppi)						Shear (ppi)					
						#	1	2	3	4	5	#	1	2	3	4	5
P1/P2	1	2020-10-14	10:00	JB	Matt	in	163	165	172	190	186	PPI	259	269	258	269	257
						out	187	187	157	186	168	%	50	50	50	50	50
						FTB	Yes	Yes	Yes	Yes	Yes	P/F	Pass	Pass	Pass	Pass	Pass
						P/F	Pass	Pass	Pass	Pass	Pass	Comments:		CUT FROM BUTT SEAM			
P3/P6	2	2020-10-14	10:10	JB	Matt	in	153	140	140	142	164	PPI	284	285	275	296	291
						out	171	185	149	148	147	%	50	50	50	50	50
						FTB	Yes	Yes	Yes	Yes	Yes	P/F	Pass	Pass	Pass	Pass	Pass
						P/F	Pass	Pass	Pass	Pass	Pass	Comments:		CUT FROM BUTT SEAM			
P10/P11	3	2020-10-14	10:20	JB	Matt	in	169	137	167	139	143	PPI	283	276	273	276	272
						out	154	187	200	193	194	%	50	50	50	50	50
						FTB	Yes	Yes	Yes	Yes	Yes	P/F	Pass	Pass	Pass	Pass	Pass
						P/F	Pass	Pass	Pass	Pass	Pass	Comments:		CUT FROM BUTT SEAM			
P7/P9	4	2020-10-14	10:30	JB	Matt	in	197	171	156	186	200	PPI	235	282	283	283	254
						out	161	164	174	154	157	%	50	50	50	50	50
						FTB	Yes	Yes	Yes	Yes	Yes	P/F	Pass	Pass	Pass	Pass	Pass
						P/F	Pass	Pass	Pass	Pass	Pass	Comments:		CUT FROM BUTT SEAM			
P12/P13	5C	2020-10-16	15:37	JB	Matt	in	120	126	121	111	120	PPI	268	265	269	269	268
						out	133	134	141	180	120	%	50	50	50	50	50
						FTB	Yes	Yes	Yes	Yes	Yes	P/F	Pass	Pass	Pass	Pass	Pass
						P/F	Pass	Pass	Pass	Pass	Pass	Comments:		broke clean matt from dillon okayed low numbers			

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Destructive Test

7192 Vantage Way, Delta, BC V4G 1K7
Tel: 604-241-9487 Fax: 604-241-9485 TFN: 1-800-551-4355
www.wtl.ca

Project Name:	**Ryley Slope**	**Start Date:**	**2020-10-14**	**Destruct Check**		**HDPE Seam Strengths(PPI)*GM19*:**				**LLDPE Seam Strengths (PPI)*GM19*:**			
				Tests Required:	**11**	**MIL**	**Shear**	**Fusion**	**Ext**	**MIL**	**Shear**	**Fusion**	**Ext**
Materials Used:	**80MIL HDPE**	**Finish Date:**	**2020-10-16**	**Tests Completed:**	**11.00**	**40**	**80**	**60**	**50**	**40**	**60**	**50**	**44**
				Check:	**OK**	**60**	**120**	**91**	**78**	**60**	**90**	**75**	**66**
						80	**160**	**121**	**104**	**80**	**120**	**100**	**88**
						100	**200**	**151**	**130**	**100**	**150**	**125**	**114**

Seam Number	DST #	Date	Time	QA Tech	QA Monitor	Peel Strength (ppi)						Shear (ppi)					
						#	1	2	3	4	5	#	1	2	3	4	5
P14/P16	6	2020-10-16	15:45	JB	Matt	in	185	172	183	171	173	PPI	291	281	267	270	264
						out	181	132	134	139	142	%	50	50	50	50	50
						FTB	Yes	Yes	Yes	Yes	Yes	P/F	Pass	Pass	Pass	Pass	Pass
						P/F	Pass	Pass	Pass	Pass	Pass	Comments:		CUT FROM BUTT SEAM			
P18/P20	7	2020-10-16	15:56	JB	Matt	in	197	181	180	177	192	PPI	269	283	288	287	285
						out	155	154	168	160	132	%	50	50	50	50	50
						FTB	Yes	Yes	Yes	Yes	Yes	P/F	Pass	Pass	Pass	Pass	Pass
						P/F	Pass	Pass	Pass	Pass	Pass	Comments:		CUT FROM BUTT SEAM			
P21/P23	8	2020-10-16	16:04	JB	Matt	in	153	156	153	133	141	PPI	278	244	253	284	219
						out	175	138	153	165	149	%	50	50	50	50	50
						FTB	Yes	Yes	Yes	Yes	Yes	P/F	Pass	Pass	Pass	Pass	Pass
						P/F	Pass	Pass	Pass	Pass	Pass	Comments:		CUT FROM BUTT SEAM			
P26/P33	9	2020-10-16	16:15	JB	Matt	in	168	177	183	194	193	PPI	288	286	287	294	282
						out	145	151	138	171	131	%	50	50	50	50	50
						FTB	Yes	Yes	Yes	Yes	Yes	P/F	Pass	Pass	Pass	Pass	Pass
						P/F	Pass	Pass	Pass	Pass	Pass	Comments:		CUT FROM BUTT SEAM			
P29/P30	10	2020-10-16	16:26	JB	Matt	in	154	176	129	150	158	PPI	297	300	302	312	299
						out	163	129	162	171	185	%	50	50	50	50	50
						FTB	Yes	Yes	Yes	Yes	Yes	P/F	Pass	Pass	Pass	Pass	Pass
						P/F	Pass	Pass	Pass	Pass	Pass	Comments:		CUT FROM BUTT SEAM			
P28/P33	11	2020-10-16	16:37	JB	Matt	in	159	181	174	174	172	PPI	283	286	270	284	292
						out	120	174	145	136	142	%	50	50	50	50	50
						FTB	Yes	Yes	Yes	Yes	Yes	P/F	Pass	Pass	Pass	Pass	Pass
						P/F	Pass	Pass	Pass	Pass	Pass	Comments:		CUT FROM BUTT SEAM			

WESTERN TANK & LINING LTD.

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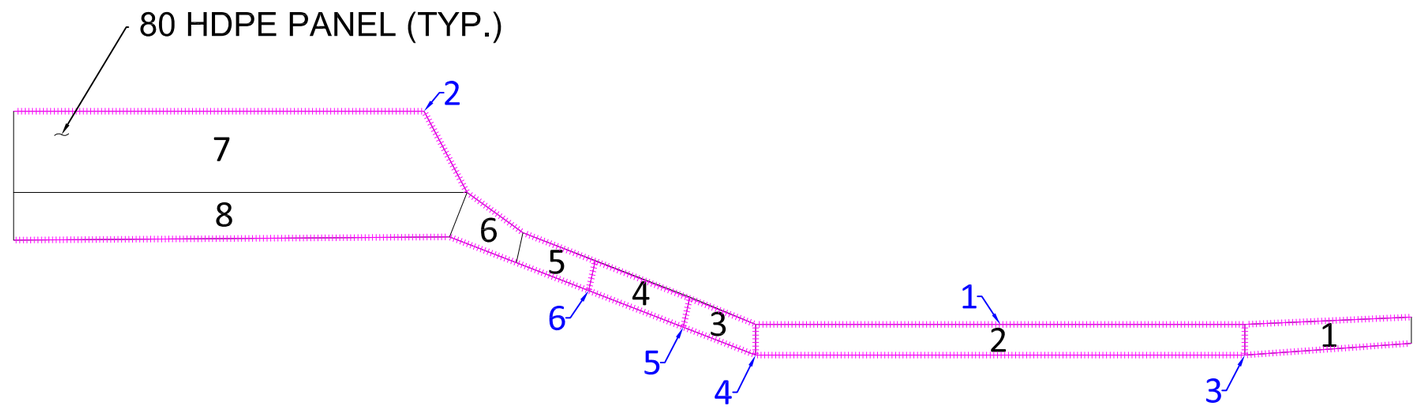
As-Built Panel Layout

VANCOUVER: 7192 Vantage Way, Delta, BC V4G 1K7 T: 604-241-9487 F: 604-241-9485
CALGARY: 105 Stockton Pt., Okotoks, AB T1S 1A5 T: 403-938-4361 F: 403-938-4371

1-800-551-4355



NOTES:

1. ALL UNITS IN METERS UNLESS OTHERWISE SPECIFIED.
2. AS BUILT PANEL LAYOUT IS AS PER ROUGH MEASUREMENTS TAKEN IN THE FIELD. ACTUAL LINER EXTENT SHOULD BE CONFIRMED WITH SITE SURVEY OF LINER.

NOTES:

EXTRUSION WELD
10 PANEL NUMBERS
10 EXTRUSION WELD NUMBERS

PLAN

CONSTRUCTION AS-BUILT

REV No.	REVISION DESCRIPTION	DATE	DRAWN	CHECKED
0	AS-BUILT PANEL LAYOUT	21/01/11	DC	CC

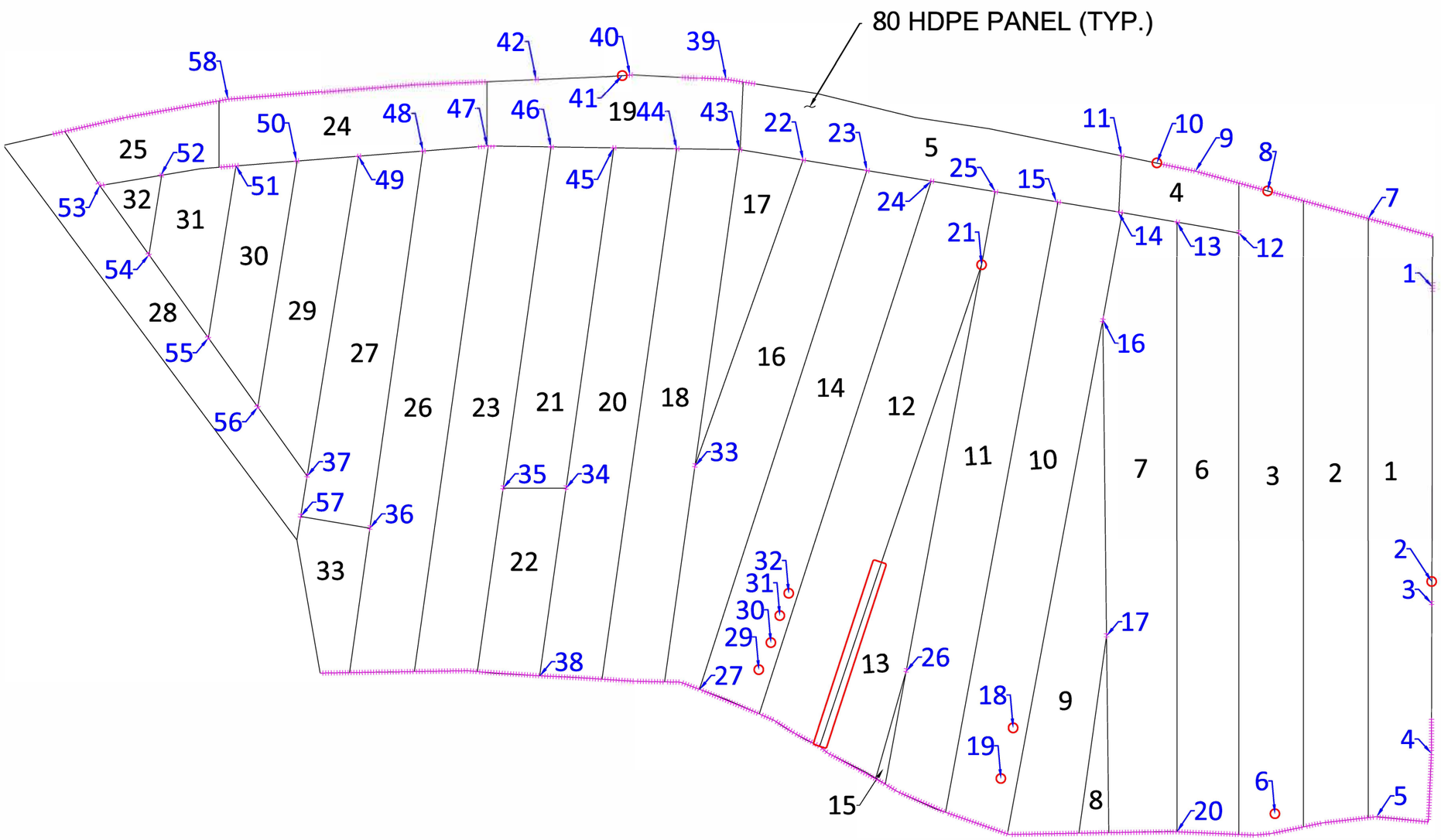
CLIENT
CLEAN HARBOURS

WESTERN TANK & LINING LTD.

PROJECT
CELL 3B ANCHOR TRENCH

TITLE
80 HDPE GEOMEMBRANE AS-BUILT PANEL LAYOUT

SCALE	JOB No.	FIG No.
1:500	2070	1



NOTES:

1. ALL UNITS IN METERS UNLESS OTHERWISE SPECIFIED.
2. AS BUILT PANEL LAYOUT IS AS PER ROUGH MEASUREMENTS TAKEN IN THE FIELD. ACTUAL LINER EXTENT SHOULD BE CONFIRMED WITH SITE SURVEY OF LINER.

NOTES:

EXTRUSION WELD
10 PANEL NUMBERS
10 EXTRUSION WELD NUMBERS
PATCH

PLAN

CONSTRUCTION AS-BUILT

REV No.	REVISION DESCRIPTION	DATE	DRAWN	CHECKED
0	AS-BUILT PANEL LAYOUT	21/01/11	DC	CC

CLIENT
CLEAN HARBOURS

WESTERN TANK & LINING LTD.

PROJECT
CELL 3B LANDFILL CAP

TITLE
80 HDPE GEOMEMBRANE AS-BUILT PANEL LAYOUT

SCALE	JOB No.	FIG No.
1:500	2070	1

WESTERN TANK & LINING LTD.

YOUR CONTAINMENT **SPECIALISTS** SINCE 1985

Mill Certifications

VANCOUVER: 7192 Vantage Way, Delta, BC V4G 1K7 T: 604-241-9487 F: 604-241-9485
CALGARY: 105 Stockton Pt., Okotoks, AB T1S 1A5 T: 403-938-4361 F: 403-938-4371

1-800-551-4355

Date:	**September 18, 2020**
Customer:	**Western Tank & Lining Ltd.**
Customer P. O.:	**504**
Sales Order:	**31C2000409**
Project:	**Clean Harbours Cap**
Product:	**80-HD-11-BLK-BLK-NOM-STD-23.5**
Bill of Lading:	**301312000739**

Roll Number:	**3111005096**	**3111005101**	**3111005105**
	3111005097	**3111005102**	**3112003712**
	3111005098	**3111005103**	**3112003713**
	3111005100	**3111005104**	**3112003714**

We hereby certify that the geomembrane being produced for above project/PO, meets or exceeds the properties listed below:

Property	Test Method	Unit	Value	Qualifier
Thickness	ASTM D 5994	mil	80.0	NOM
Density	ASTM D 1505	g/cc	0.940	MIN
Carbon Black Content	ASTM D 4218	%	2.0 - 3.0	Range
Tensile Strength at Break	ASTM D 6693, Type IV Specimen, 2 inch/min	lb/in-width	120	NOM
Elongation at Break (GL=2.0 in)		%	100	NOM

Sincerely,

Rajesh Patel

Rajesh Patel
QA Manager

SKAPS Industries
571 Industrial Parkway
Commerce, GA 30529

Phone: 706-336-7000
Fax: 706-336-7007
Email: contact@skaps.com

LIST OF GEOMEMBRANE ROLLS

SOLMAX

Solmax, 2801 Boul. Marie-Victorin, Varennes, Qc, Canada, J3X 1P7
Tél.: 1-450-929-1234 • Fax.: 1-450-929-2547 • www.solmax.com

SOLMAX APPROVED Quality Assurance

Project Name : Cache Creek LF, BC

Project Number : 1911

Reference Number : 112639

Packing Slip Number : 227300

Roll Number	Product Code	Resin Lot Number	Manufactured Date	Resin Melt Index 190/2.16 g/10 min D1238	Resin Density g/cc D1505	OIT Spec min D3895	OIT Result min D3895	HPOIT Spec min D5885	HPOIT Result min D5885	ESCR SP-NCTL Spec hours D5397	ESCR SP-NCTL Roll Tested hours D5397
Premium HD 2.00 mm White Reflective XRT											
1-143292	1003262-59862-3	19A1189	20-Apr-19	0.06	0.937	160	211	800	>1,000	>1000	1-143258 CERTIFIED
1-143296	1003262-59862-3	19A1189	20-Apr-19	0.06	0.937	160	211	800	>1,000	>1000	1-143258 CERTIFIED
1-143297	1003262-59862-3	19A1189	20-Apr-19	0.06	0.937	160	211	800	>1,000	>1000	1-143258 CERTIFIED
1-143299	1003262-59862-3	19A1193	20-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143303	1003262-59862-3	19A1193	20-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143304	1003262-59862-3	19A1193	20-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143305	1003262-59862-3	19A1193	21-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143306	1003262-59862-3	19A1193	21-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143308	1003262-59862-3	19A1193	21-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143309	1003262-59862-3	19A1193	21-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143310	1003262-59862-3	19A1193	21-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143312	1003262-59862-3	19A1193	21-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143313	1003262-59862-3	19A1193	21-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143315	1003262-59862-3	19A1193	21-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143319	1003262-59862-3	19A1193	21-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143320	1003262-59862-3	19A1193	21-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143321	1003262-59862-3	19A1193	21-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED
1-143322	1003262-59862-3	19A1193	21-Apr-19	0.05	0.938	160	209	800	>1,000	>1000	1-143300 CERTIFIED

Quantity (rolls) : 18

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

MANUFACTURING QUALITY CONTROL

Test Results - Rolls

SOLMAX

Solmax, 2801 Boul. Marie-Victorin, Varennes, Qc, Canada, J3X 1P7
Tél.: 1-450-929-1234 • Fax.: 1-450-929-2547 • www.solmax.com

Project Name : Cache Creek LF, BC

Reference Number : 112639

Project Number : 1911

Packing Slip Number : 227300

SOLMAX APPROVED Quality Assurance

Product : 1003262-59862-3

Premium HD 2.00 mm White Reflective XRT

CE Certificate = HD-80-TT-W20B

Properties		Thickness ave / min.	Geo-membrane Density	Carbon Black Content	Carbon Black Dispersion	Tensile Yield Strength	Tensile Yield Elong.	Tensile Break Strength	Tensile Break Elong.	Tear Resist.	Puncture Resist.	Dimension. Stability	Asperity Height in / out
Unit		mm	g/cc	%	Cat. 1 and 2	kN/m	%	kN/m	%	N	N	%	mm
Test Method		D5994	D1505/D792	D4218 / D1603	D5596	D6693				D1004	D4833	D1204	D7466
Frequency		Each roll		1/2 ro	1/10 ro	1/2 ro				1/5 ro	1/5 ro	Certied	Each Roll
Specification		1.90 / 1.70	≥ 0.94	2.0 - 3.0	Cat. 1 / Cat. 2	31	13	27	200	266	711	± 2	0.71
1-143292	MD	1.93 / 1.84	0.946	2.51	10 /10 Views	35.9	15.6	41.0	490	294			0.78 / 0.82
	XD					35.3	15.5	40.0	500	311			
1-143296	MD	1.93 / 1.83	0.949	2.50	10 /10 Views	35.8	16.0	42.3	504	303			0.75 / 0.80
	XD					35.0	16.9	34.2	354	315			
1-143297	MD	1.90 / 1.82	0.949	2.50	10 /10 Views	35.8	16.0	42.2	504	303			0.78 / 0.80
	XD					35.0	16.9	34.1	354	315			
1-143299	MD	1.95 / 1.85	0.948	2.45	10 /10 Views	36.3	16.4	44.0	534	295			0.77 / 0.79
	XD					35.6	16.3	39.9	486	307			
1-143303	MD	1.94 / 1.78	0.948	2.54	10 /10 Views	36.7	15.9	45.4	549	306			0.74 / 0.81
	XD					37.3	15.1	35.7	240	301			
1-143304	MD	1.92 / 1.77	0.948	2.88	10 /10 Views	37.2	15.2	40.3	459	306			0.76 / 0.88
	XD					36.5	15.1	37.2	344	301			
1-143305	MD	1.96 / 1.82	0.948	2.88	10 /10 Views	37.2	15.2	40.3	459	306			0.74 / 0.80
	XD					36.5	15.1	37.1	344	301			
1-143306	MD	1.94 / 1.71	0.948	2.46	10 /10 Views	36.5	15.4	41.7	489	306			0.79 / 0.87
	XD					36.0	15.3	37.1	402	301			
1-143308	MD	1.92 / 1.83	0.950	2.55	10 /10 Views	36.3	15.0	40.8	474	303			0.78 / 0.84
	XD					35.5	16.0	42.5	545	299			
1-143309	MD	1.94 / 1.84	0.950	2.55	10 /10 Views	36.3	15.0	40.8	474	303			0.76 / 0.77
	XD					35.5	16.0	42.6	545	299			
1-143310	MD	1.92 / 1.76	0.950	2.38	10 /10 Views	35.9	15.2	44.1	530	303			0.78 / 0.78
	XD					36.4	16.5	44.6	564	299			
1-143312	MD	1.90 / 1.79	0.950	2.61	10 /10 Views	36.1	16.6	38.6	448	303			0.78 / 0.82
	XD					35.3	16.8	38.0	491	299			
1-143313	MD	1.91 / 1.78	0.950	2.61	10 /10 Views	36.1	16.6	38.7	448	292			0.78 / 0.81
	XD					35.3	16.8	38.0	491	305			
1-143315	MD	1.94 / 1.81	0.950	2.36	10 /10 Views	35.7	16.4	42.6	515	292			0.80 / 0.80
	XD					34.9	16.6	35.6	409	305			
1-143319	MD	1.90 / 1.77	0.950	2.43	10 /10 Views	36.2	16.2	43.4	526	291			0.77 / 0.88
	XD					35.1	16.3	39.9	511	302			
1-143320	MD	1.90 / 1.83	0.950	2.61	10 /10 Views	35.2	16.3	42.1	500	291			0.79 / 0.83
	XD					36.6	15.7	36.9	462	302			
1-143321	MD	1.95 / 1.83	0.950	2.61	10 /10 Views	35.2	16.3	42.0	500	295			0.74 / 0.86
	XD					36.6	15.7	37.0	462	296			

MANUFACTURING QUALITY CONTROL

Test Results - Rolls

Solmax, 2801 Boul. Marie-Victorin, Varennes, Qc, Canada, J3X 1P7
Tél.: 1-450-929-1234 • Fax.: 1-450-929-2547 • www.solmax.com

Project Name : Cache Creek LF, BC

Reference Number : 112639

Project Number : 1911

Packing Slip Number : 227300

SOLMAX APPROVED Quality Assurance

Product : 1003262-59862-3

Premium HD 2.00 mm White Reflective XRT

CE Certificate = HD-80-TT-W20B

Properties	Thickness ave / min.	Geo-membrane Density	Carbon Black Content	Carbon Black Dispersion	Tensile Yield Strength	Tensile Yield Elong.	Tensile Break Strength	Tensile Break Elong.	Tear Resist.	Puncture Resist.	Dimension. Stability	Asperity Height in / out
Unit	mm	g/cc	%	Cat. 1 and 2	kN/m	%	kN/m	%	N	N	%	mm
Test Method	D5994	D1505/D792	D4218 / D1603	D5596	D6693				D1004	D4833	D1204	D7466
Frequency	Each roll		1/2 ro	1/10 ro	1/2 ro				1/5 ro	1/5 ro	Certied	Each Roll
Specification	1.90 / 1.70	≥ 0.94	2.0 - 3.0	Cat. 1 / Cat. 2	31	13	27	200	266	711	± 2	0.71
1-143322 MD	1.90 / 1.80	0.950	2.30	10 /10 Views	36.7	15.2	41.3	488	295			0.78 / 0.89
XD					36.5	15.9	37.0	444	296			

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Warranties

LIMITED WARRANTY

PROJECT:	Clean Harbours Cell 3B Landfill Cap		
WARRANTOR:	Solmax International Inc		
WARRANTOR ADDRESS:	2801 Boul Marie-Victorin, Varennes, QC, Canada, J3X 1P7		
WARRANTY TERM:	**5 years from the Effective Date**		
Project Address:	AB-854, Ryley,AB T0B 4A0		
Owner:	Clean Harbours	**Warranty Number:**	WTL-02-01-21
Sales Order N°:	112639,	**Effective Date:**	October 18, 2020
Product(s):	1003262 Premium HD 2.00 mm White Reflective XRT		
Roll Numbers:	1-143292, 1-143302, 1-143310, 1-143312, 1-143321,		

WHEREAS pursuant to the Sales Purchase Order referenced herein (the "Sales Order") between the Warrantor and the buyer identified in the said Sales Order (the "Buyer"), the Buyer purchased the Product for the Project and for which the owner of the Project is the end user/customer of the Product (the "Owner");

WHEREAS the Project was designed exclusively by the Owner and/or its general contractor, professionals (such as engineers, architects, surveyors), subcontractors, land experts, suppliers (collectively the "Owner's Professionals");

WHEREAS the Warrantor is not a design professional nor did the Warrantor participate in the design/conception of the Project;

NOW, THEREFORE, in consideration of the foregoing, and subject to the terms and conditions of this Limited Warranty, the Warrantor hereby represents and warrants to the Owner that as of the date of sale of the Product to the Purchaser for the said Project**,** the Product conforms to the Warrantor's specifications and that the Product will be free from manufacturing defects which appear during the Warranty Term for the Product's normal use in approved applications (the "Normal Use").

LIMITATIONS AND DISCLAIMERS

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY, HABITABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE EXPRESSLY EXCLUDED HEREIN. Warrantor's liability hereunder is the sole and exclusive obligation of Warrantor with regard to the Product. Warrantor shall have no liability for any claim except as specified hereunder. Warrantor shall not be liable for labor or any other costs incurred in connection with the use, repair, removal, installation or replacement of any Product covered by this Limited Warranty, or for any direct or indirect damages, labor, removal, installation, incidental or consequential damages, loss of profits or sales, injury to property or any other damages, losses or contingencies due to or arising out of the Product, whether under alleged breach of contract, tort, personal injury, property damage, environmental liability or otherwise, regardless of whether or not the Product is subject to a defect.

The Warrantor shall not be held liable or responsible to the Owner nor be deemed to have defaulted under or breached this Limited Warranty for failure or delay in fulfilling or performing any term of this Limited Warranty when such failure or delay is caused by or results from causes beyond the reasonable control of the Warrantor, including but not limited to fire, floods, embargoes, war, acts of war (whether war is declared or not), insurrections, riots, civil commotions, the existence or administration of any laws, rules or regulations, strikes, lockouts or other labor disturbances, acts of God or acts, omissions or delays in acting by any governmental authority; provided, however, that the Warrantor shall use reasonable commercial efforts to avoid or remove such causes of non-performance, and shall continue performance hereunder with reasonable dispatch whenever such causes are removed. This Limited Warranty does not cover damages or defects resulting from normal wear and tear, faulty installation, maintenance or repair, misuse or negligent use of the Product as well as damages caused by acts of God, natural disasters such as earthquakes, floods, piercing hail, or tornadoes. The term "Normal Use" as used herein does not include usage for which the Product was not designed or intended, faulty design and/or construction of the facility into which the Product is installed, failure to install the Product in compliance with Warrantor's Product technical materials and/or bulletins, or exposure of the Product to harmful chemicals. Chemical resistance performance is the responsibility of the Owner since it has control over and of the Project's production/ design/composition and

exposure conditions (including chemicals, concentration, time and temperature). As such, any proposed product, including the Product, should be thoroughly evaluated for its intended application by the Owner and the Owner's Professionals. Also, the term "Normal Use" as used herein does not include damage to the Product by machinery, equipment, people, animals; improper site preparation or covering materials; existing conditions, including, but not limited to, subsurface conditions beneath the geosynthetic product such as a settlement of the ground, cave-in, etc., excessive pressures or stresses from any source or improper application. There shall be no intended or incidental third-party beneficiary hereof. In no event shall Warrantor have any liability for any patent defects or discrepancies which were or could have been discovered prior to the installation of the Product**.**

Subject to the terms and conditions hereof, after receipt of a timely valid claim hereunder, Warrantor will have the right to inspect and determine the cause of any alleged defect in the Product and if coverage is confirmed, then Warrantor shall have the option, in its sole discretion, to repair the affected area of the Product or to ship replacement product reasonably equivalent to the affected area of the Product proven to be subject to the covered defect. Warrantor is not a design professional and has not performed any design services for the Project and disclaims any alleged design liability regarding use of the Product at or for the Project, it being understood that any design was performed exclusively by the Owner or the Owner's Professionals. Warrantor shall not be obligated to perform repairs or replacements under this Limited Warranty until the area to be repaired or replaced is clean, dry and unencumbered, including, without limitation, the area having been made available for repair and/or replacement free from all water, dirt, sludge, residuals and liquids of any kind. If Warrantor determines that a claim is invalid, Owner shall reimburse Warrantor for its inspection and analysis costs.

Notwithstanding any contrary provision hereof, in no event shall any liability of Warrantor hereunder exceed the actual per square foot cost of the Product required to repair or replace (in Warrantor's sole discretion) in the affected area of the Product (the "Liability Limit"); provided however, that Warrantor's Liability Limit hereunder shall, starting on the first (1st) anniversary of the Effective Date, be reduced each year during the Warranty Term by a calculated fraction, where the numerator corresponds to the expired number of years in the Warranty Term prior to Warrantor's receipt of a written notice of claim, and the denominator corresponds to the Warranty Term.

Any claim for any alleged defect under this Limited Warranty must be made in writing, by certified mail, to Warrantor at the Warrantor's address specified above within ten (10) business days of the Owner becoming aware of the alleged defect. Any failure to timely issue such notice shall void any warranty coverage.

Warrantor makes no representations, expressed or implied, not specified herein. No representative, agent or employee of Warrantor, or any other person, including the Buyer, is authorized to assume for Warrantor any additional liability or responsibility except as described above. In the event any term or provision of this Limited Warranty is inconsistent with or in conflict with any writing, purchase order, representations, statements, contract, or any other document, then, to the extent such inconsistency or conflict exists, the terms and conditions of this Limited Warranty shall control in all respects. The Limited Warranty is valid only for the original Owner and is not assignable or transferable under any circumstances. The terms hereof shall be governed by the laws provided in the contract or Sales Order entered into between the Warrantor and the Buyer and any dispute arising out and in connection with this Limited Warranty shall be settled in accordance with the provisions of the said contract or Sales Order. If it is determined and adjudicated that the exclusive remedy provided herein fails in its essential purpose, then in that event only, Owner shall be entitled to a return of that portion of the purchase price equal to the Liability Limit (as reduced as provided above) for so much of the Product as Warrantor determines to be defective. If any provision of this Limited Warranty is held to be invalid or unenforceable, such provision shall be deemed to be modified to the extent necessary for the balance hereof to be enforceable, and this Limited Warranty shall be enforced to the maximum extent permittable.

NOTWITHSTANDING ANY CONTRARY PROVISION HEREOF, AN EXPRESS CONDITION PRECEDENT TO ANY AND ALL OBLIGATION OF WARRANTOR HEREUNDER SHALL BE WARRANTOR'S TIMELY RECEIPT OF FULL PAYMENT FOR THE PRODUCT.

5 Year Material Warranty Letter
Project: Clean Harbours Cap (PO# 504)
Material: SKAPS Geomembrane HD-80T2 NOM
Application: Buried

Warranty Start Date: 10/18/2020

To Whom It May Concern

SKAPS Industries, Geomembrane Liner Division, hereby warrants that, at the time of manufacture, all SKAPS Industries manufactured Geomembrane materials will conform to the respective SKAPS Industries published material specifications for such materials and to be able to withstand normal weathering for a period of 5 years. Excluded from the warranty given herein shall be any damage to or failure of the material caused by, but not limited to: acts of God; casualty; catastrophe or severe weather conditions, such as earthquakes, tornadoes, hurricanes, floods, high winds, piercing hail, lightening and fire; the exposure of the material to sharp objects, harmful chemicals, acids, gases or vapors, either known or unknown, or combinations as being harmful thereto; physical abuse to the material caused by vandalism, sabotage, machinery, equipment, people and animals; damage to the material during the transportation, unloading, handling, storage or installation thereof by parties other than SKAPS Industries; excessive pressure or stress from any source, both above and below the material; after installation; subsidence or sub-grade settlement; improper site preparation and engineering, and any use of the material which the manufacturer never intended. As used throughout this warranty, the term "sale" shall mean the date on which the material is shipped from SKAPS Industries manufacturing facility.

Should any significant deterioration or premature loss in use of the material occur during the term hereof which is believed to be covered by this warranty, then SKAPS Industries shall be given prompt written notice of the alleged claim within 30 days after such facts are first observed. Said notice shall be sent by registered or certified mail, return receipt requested, and addressed to SKAPS Industries, Geomembrane Liner Division, 571 Industrial Parkway, Commerce, GA 30529. Should the investigation by SKAPS Industries conclude that any loss of use is the results of a manufacturing defect or other warrantable cause, SKAPS Industries will provide replacement material on a pro-rata basis at the then current market price for the materials.

The warranty described above is strictly limited to sales of the material for commercial or industrial uses only in accordance with SKAPS Industries published material specifications. Said warranty also is the sole and exclusive warranty given for such material and all other warranties; either expressed or implied, including but not limited to any warranty of merchantability or fitness for a particular purpose, are hereby disclaimed. In no event shall SKAPS Industries be liable for any direct, indirect, incidental, specific or consequential damages of any kind or any loss or profits resulting from failure of the material or the breach of this warranty; it being further understood that should said warranty fail in its essential propose, and in that event only, SKAPS Industries liability hereunder shall in no event exceed the sales price of the material actually received from SKAPS by the Original Purchaser thereof.

Said warranty is not effective until all payments due to SKAPS Industries, for materials shipped, are paid in full.

Perry Vyas
President
SKAPS Industries

WESTERN TANK & LINING LTD.

7192 Vantage Way
Delta, B.C., V4G-1K7
PHONE (604) 241-9487
FAX (604) 241-9485

WARRANTY NUMBER	2070
ACCEPTANCE DATE	October 18th / 2020
WARRANTY PERIOD	Two Years

WORKMANSHIP WARRANTY

PURCHASER/USER	**Clean Harbours Cell 3B Landfill Cap**
LOCATION OF INSTALLATION	**Ryley, Alberta**
DESCRIPTION OF INTENDED USE	**Install of Geosynthetics for Landfill Closure**

WESTERN TANK & LINING LTD. (the "**Installer**") warrants to the party named above as the Purchaser/User ("**Purchaser**") that the tank and/or lining membrane system ("the "Liner System") as installed by the Installer will be free from installation-related defects for normal use in approved applications, on the terms and conditions set forth in this Workmanship Warranty (the "**Warranty**"). This Warranty shall be in effect from the above noted **Acceptance Date** for the above noted **Warranty Period**.

The term "**normal use**" means uses reasonably consistent with the above noted Description of Intended Use, and does not include, among other things, the exposure of the Liner System to harmful chemicals; abuse of the Liner System by machinery, equipment or people; excessive pressures or stresses from any source; subsurface or overburdened soil conditions; and total or differential soil settlements and the effect those settlements may have on the Liner System. The Purchaser acknowledges that the sale of the Liner System is for commercial or industrial use only.

This Warranty does **not** include damages or defects in the Liner System resulting from: (i) acts of God, casualty or catastrophe, including earthquakes, floods, weather, tornadoes, explosion, war, acts of any public authority, or any other cause beyond the Installer's reasonable control; (ii) faulty materials, or any defects in the workmanship, design or manufacturing of the materials comprising the Liner System; (iii) defects arising on account of third party action; (iv) defects arising from improper maintenance, use, repair, replacement or alteration of the Liner System by the Purchaser; (v) subsidence of the land around the Liner System; or (vi) surface defects in workmanship and materials apparent and accepted by the Purchaser at the date of delivery.

Any claim for an alleged breach of this *Warranty* must be made in writing, by registered mail or fax, to the President of the Installer at the address above within thirty (30) days of the Purchaser becoming aware of the alleged defect. If the Purchaser fails to deliver notice as required under this Warranty, the defect and all warranties shall be deemed to have been waived and the Purchaser will have no right of recovery against the Installer. Should defects within the scope of the above Warranty occur, the Installer will, at its option, repair or replace the Liner System or defective portion thereof. The Installer will have the right to inspect and determine the cause of any alleged defect in the Liner System and to take appropriate steps to repair or replace the Liner System if a defect exists for which the Installer is liable under the terms of this Warranty. The Installer will not be required to make such repairs and/or replacements until the Purchaser has ensured that the area surrounding the Liner System is clean, dry, and in an unencumbered condition, including without limitation free from all water, dirt, sludge, residuals, and liquids of any kind.

The Installer's liability under this Warranty shall in no event exceed the lesser of: (i) the replacement cost of the Liner System or defective portion thereof; or (ii) the total amount paid by the Purchaser to the Installer in respect of the Liner System. Further, under no circumstances shall the Installer be liable to the Purchaser or any other party for any special, direct, indirect, or consequential damages arising from any defect in the installation of the Liner System. This Warranty is given in lieu of all other possible warranties by the Installer in respect of the Liner System and by accepting delivery of the Liner System, the Purchaser waives all other such possible warranties, except those specifically given.

THE INSTALLER MAKES NO WARRANTY OF ANY KIND OTHER THAN AS EXPRESSLY SET OUT HEREIN, AND HEREBY DISCLAIMS ALL OTHER WARRANTIES, BOTH EXPRESSED AND IMPLIED, OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THIS WARRANTY IS NOT EFFECTIVE AND THE INSTALLER IS NOT BOUND BY THE TERMS HEREOF UNTIL RECEIPT OF FULL AND FINAL PAYMENT FOR THE LINER SYSTEM FROM THE PURCHASER.

I hereby state I have read and understand the above and foregoing Warranty and agree to such by signing hereunder.

	PURCHASER/USER	WESTERN TANK & LINING LTD.
NAME		Chris Calvez
SIGNATURE		Chris Calvez
TITLE		Project Manager
DATE (dd/mm/yy)		11/01/21

References

1. Cell 3 Cap Construction (2013), Construction Quality Assurance Report, Tetra Tech (EBA), 2013
2. Cell 3 Cap Construction (2014), Construction Quality Assurance Report, Tetra Tech (EBA), 2014
3. GRI-GM19a Standard Specification for Seam Strength and Related Properties of Thermally Bonded Homogeneous Polyolefin Geomembranes/Barriers, Geosynthetic Institute, 2002

Appendix Q

Contravention Reports

(7-Day Letters)

January 8, 2020

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 362400
Clean Harbors Approval No. 10348-03-00

On January 2nd, 2020 Clean Harbors reported to AEP a non-compliance issue with our VOC air sampler. An error was noticed by our Technician when he retrieved the VOC canister for sample #725. The control valve on the sample canister did not appear to close after the 24-hour sampling period. When tested, the control valve seemed to be in good working order. We are unable to confirm but we suspect it may have been a programming error which caused the valve to not close. We are still going to send the canister for analysis with the sample time estimated at 56 hours however the data will be considered invalid.

This did not affect the PM10 sample portion of test #725.

Moving forward, we will ensure all programming is checked and confirmed prior to the sample date.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

Stan Yuha

Stan Yuha
General Manager

November 23, 2020

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 373833
Clean Harbors Approval No. 10348-03-00

On November 20th, 2020 Clean Harbors Canada Inc., Ryley Facility, reported a contravention of a late monthly report submission. We had discovered the September Monthly Inventory Report Table 4.6-B was not submitted to the AEP before the October 31st deadline. This is a contravention of section 4.6.29 of our Approval.

The Facility Administrator normally responsible for completing and submitting the report went on a one-month medical leave of absence which started September 30th. In early October the Facility Manager met with his staff to discuss and decide who was going to cover and complete the Facility Administrator's reports and other duties. Due to some unfortunate miscommunication between Facility Manager and Facility Coordinator, the report was not completed or submitted before October 31st. The Facility Administrator returned from her leave of absence on November 16th. On November 20th she discovered the report had not been submitted. The report is now being completed and will be submitted as soon as possible.

Clean Harbors has an internal Compliance Calendar which lists and tracks all compliance activities and tasks that have a deadline. It was discovered this report had not been added to the calendar previously, but it has now been added to the calendar. Compliance Calendar items appear on management dashboards and a reminder alert gets sent to the Facility Manager.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

Stan Yuha

Stan Yuha
General Manager

May 13, 2020

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 366282
Clean Harbors Approval No. 10348-03-00

On May 8th, 2020 Clean Harbors received an odor complaint from a Ryley resident.

The resident called at about 4:10 pm letting us know that at around 11:00 am that morning he started noticing an odor he suspected that was coming from our landfill. Of the three loads we received by 11:00 am that morning, none were declared odorous. We immediately asked our landfill operators to do a perimeter walk to see if they could detect any strange odors. They reported that no strange odors were noticeable. Our mechanic was also working on a piece of equipment at the time inside the landfill and he also reported he did not notice any strange odors. The wind was blowing quite strong out of the north that day towards Ryley. We are unsure of the origin of the odor.

We have not received an odor complaint in quite some time. 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,

Stan Yuha

Stan Yuha
General Manager

November 4th, 2020

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 373338
Clean Harbors Approval No. 10348-03-00

On November 3rd, 2020 Clean Harbors received an odor complaint from a Ryley resident. The resident called at 11:41 am complaining of an odor that was coming from our landfill. At the time of the complaint, the wind was blowing out of the NNE at approximately 3 meters per second or 11 km/hr. Immediately after the conversation, the Manager drove into Ryley and drove down the street where the complainant lives. The Manager noticed two individuals working in their yard approximately a half block north of the complainant's house. The Manager asked them if they had smelled any bad odors recently and they replied they had not. The Manager continued past the house and noticed another person working in their garden and he asked her the same question. She replied she had not smelled any bad odors recently. The Manager drove around Ryley a bit more and did not notice any odors anywhere in town.

When the Manager got back to the facility he continued his investigation. We had received 11 bulk loads that morning between 7:30 am and 11:40 am. One load that was received at 9:05 am was reported to have a slight odor but not excessive. The load was managed as per our Dust and Odor Best Management Practice protocols and covered immediately after it was dumped. We do not suspect the odor had come from that load.

In conclusion, the source and the origin of the odor remains undetermined. We do not suspect it came from Clean Harbors. It was mentioned by one of our employees the lagoon next door to the east was melting due to the warmer weather and may have been the source. However, this was not detected by the Manager in the village either.

We have not received an odor complaint since May of this year. We have been utilizing good cover on a regular basis and in my opinion the landfill is in good condition. We continue to track any received loads of concern and if any odors are detected, the material is buried and covered immediately.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

Stan Yuha

Stan Yuha
General Manager

June 15, 2020

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 367436
Clean Harbors Approval No. 10348-03-00

On June 9th, 2020 Clean Harbors Canada Inc., Ryley Facility, reported exceedances of the action leakage rate for Cell 3A. This relates to section 4.4.10 of the Approval.

The calculated limit for Cell 3A using the formula 790 L per hectare per day is 1678 liters. On June 9th, 2457 liters of leak detection liquid was removed from the leak detection system. On June 10th, 2054 liters were removed, on the 11th 2337 liters were removed and on the 12th 1857 liters were removed. On Monday June 15th only 126 liters were removed. These exceedances occurred shortly after a significant rain event.

The facility incurred exceedances in Cells 3B and 3C in August 2019, Reference #256485. We submitted a Response Action Plan for Reference #356485, where we proposed inspecting the liner welds on the boots where the liner attaches to the leachate pipes when the come out of the ground. However due to the extremely wet conditions in the summer and fall of 2019, we were unable to complete this task as it would have been extremely unsafe working on the wet landfill slope. Winter came, and we were unable to complete any inspections in 2019. We have already contacted our contractor and we will complete this project as soon as the weather allows.

We will be submitted a Response Action Plan summarizing our proposal and any more information we gain as required within thirty (30) days. There were no environmental impacts as a result of this exceedance.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

Stan Yuha

Stan Yuha
General Manager

June 15, 2020

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 367478
Clean Harbors Approval No. 10348-03-00

On June 10th, 2020 Clean Harbors Canada Inc., Ryley Facility, reported exceedances of the action leakage rate for Cell 3B. This relates to section 4.4.10 of the Approval.

The calculated limit for Cell 3B using the formula 790 L per hectare per day is 1678 liters. On June 10th, 2356 liters of leak detection liquid was removed from the leak detection system. On June 11th, 1870 liters were removed and on the 12th it decreased to 1535 liters. We reported an exceedance for Cell 3A on June 9th, the day before. These exceedances occurred shortly after a significant rain event.

The facility incurred exceedances in Cells 3B and 3C in August 2019, Reference #256485. We submitted a Response Action Plan for Reference #356485, where we proposed inspecting the liner welds on the boots where the liner attaches to the leachate pipes when the come out of the ground. However due to the extremely wet conditions in the summer and fall of 2019, we were unable to complete this task as it would have been extremely unsafe working on the wet landfill slope. Winter came, and we were unable to complete any inspections in 2019. We have already contacted our contractor and we will complete this project as soon as the weather allows.

We will be submitted a Response Action Plan summarizing our proposal and any more information we gain as required within thirty (30) days. There were no environmental impacts as a result of this exceedance.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

Stan Yuha

Stan Yuha
General Manager

July 3, 2020

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 368458
Clean Harbors Approval No. 10348-03-00

On July 2nd, 2020 Clean Harbors Canada Inc., Ryley Facility, reported an exceedance of the action leakage rate for Cell 2. This is a contravention of section 4.4.5 section 4.4.1 of our Approval.

The calculated limit for Cell 2 using the formula 790 L per hectare per day is 1068 liters. On July 2nd, 2168 liters of leak detection liquid was removed from the leak detection system. This exceedance occurred shortly after a significant rain event. Cell 2 also incurred exceedances in August 2019 after significant rain events, reported to AEP Reference #355912.

In our Response Action Plan for Reference #355912, we planned to remove the old concrete foundation of the old leachate building and expose the liner weld to the leachate pipes for inspection, however due to the extreme wet conditions last year, we never had a safe opportunity to complete that task. We will continue our plan to complete that inspection as weather permits.

Cell 2 leachate building burnt down on January 12th, 2020 due to an electrical issue with the heater; reported to AEP, Reference #362650. Due to weather and then COVID issues, the building was not able to be replaced until June 2020 which included all the plumbing and electrical. We started pumping leachates again on June 30th.

We will be submitting a Response Action Plan summarizing our proposal and any more information we gain as required within thirty (30) days. There were no environmental impacts as a result of this exceedance.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

Stan Yuha

Stan Yuha
General Manager

July 15, 2020

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 368820
Clean Harbors Approval No. 10348-03-00

On July 9th, 2020 Clean Harbors Canada Inc., Ryley Facility, reported an exceedance of the action leakage rate for Cell 3C. This is a contravention of section 4.4.5 of our Approval.

The calculated limit for Cell 3C using the formula 790 L per hectare per day is 2011 liters. On July 9th, 2937 liters of leak detection liquid was removed from the leak detection system. This exceedance occurred shortly after a significant rain event. Cell 3C also incurred an exceedance in July 2019 after significant rain events, reported to AEP Reference #356485.

In our Response Action Plan for Reference #356485, we planned to remove the old concrete foundation of the old leachate building and expose the liner weld to the leachate pipes for inspection, however due to the extreme wet conditions last year, we never had a safe opportunity to complete that task. We will continue our plan to complete that inspection as weather permits.

We will be submitting a Response Action Plan summarizing our proposal and any more information we gain as required within thirty (30) days. There were no environmental impacts as a result of this exceedance.

If you have any further questions, do not hesitate to contact Stan Yuha (Facility Manager) at (780) 663-2509.

Sincerely,

Stan Yuha

Stan Yuha
General Manager

February 19, 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 376183
Clean Harbors Approval No. 10348-03-00
Non-compliance against section 4.4.5

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.

In preparation of our Annual Report, an internal audit was completed on the leak detection volumes pumped and removed in 2020. It was discovered that in a number of circumstances some of the landfills exceeded the leakage action rate of 790 liters per hectare per day limit. Each initial event for each landfill was reported to AEP as a contravention however subsequent events were not reported. At the time when subsequent events happened, the Facility Manager called the AEP Approvals Engineer to discuss whether or not is was necessary to report each event the following days after the initial exceedance was reported. At the time it seemed logical and determined that each day after the initial exceedance event was not necessary to report. This led to a misunderstanding on the General Manager's part that exceedances for each individual landfill only had to be reported once. On February 18th, 2021 the GM called the Approvals Engineer to discuss the audit findings and it was clarified that if there were days between exceedances when the landfills were back in compliance, the new exceedance would be a new non-compliant event and would need to be reported. This is now clearly understood by the GM.

Below is a summary of the exceedances. Each exceedance can be linked to a significant rainfall. Clean Harbors has taken steps to solve the infiltration of fresh water getting into the leak detection systems by removing the old leachate buildings and re-sloping those areas, re-sloping the valley between landfill 1 and landfill 2, as well as completing the final cap on cell 3B. There were no negative environmental impacts during any exceedance.

Cell 2 Maximum Daily Limit = 1068 Liters

Reported Reference #368458: July 2 = 2168 L
July 3 = 2052 L
Not Reported: July 21 = 3871 L
July 22 = 2967 L
July 23 = 2133 L
July 29 = 2923 L
Aug. 5 = 1233 L
Aug. 13 = 2010 L

Cell 3A Maximum Daily Limit = 1678 Liters

Reported Reference #376436: June 9 = 2457 L
June 10 = 2054 L
June 11 = 2337 L
June 12 = 1857 L
Not Reported: June 24 = 3228 L
June 25 = 3227 L
July 10 = 2154 L
July 14 = 4268 L
July 15 = 3000 L
July 16 = 10,000 L
July 28 = 4002 L
July 29 = 2260 L

Cell 3B Maximum Daily Limit = 1678 Liters

Reported Reference #376476: June 10 = 2356
June 11 = 1870 L
Not Reported: July 9 = 3479 L
July 10 = 3693 L
July 11 = 3240 L
July 12 = 3240 L
July 13 = 3240 L
July 14 = 3413 L
July 16 = 1914 L

If you have any further questions, do not hesitate to contact Stan Yuha at (780) 663-2509.

Sincerely,

Stan Yuha
Facility General Manager
Clean Harbors Canada Inc.
P.O. Box 390
Ryley, AB
T0B 4A0