2015-16 Monitoring and Maintenance Program
Come By Chance Secure Landfill
Come By Chance, NL
(FINAL REPORT)

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May 2016
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Executive Summary

The Newfoundland and Labrador Department of Environment and Conservation (ENVC) contracted Fracflow Consultants Inc. to conduct the 2015-16 Monitoring and Maintenance Program at the Come By Chance Secure Landfill located in Come By Chance, Newfoundland and Labrador (NL). The Secure Landfill is located on Refinery Road, immediately north of the Come By Chance Refinery. Access to the site is provided via a gravel-covered road that intersects with Refinery Road. The landfill covers an area of approximately 1.98 hectares and is enclosed with a fence (chain link) along the perimeter, with an access gate on the west side. The Secure Landfill was constructed by ENVC between 1994 and 1996 to contain industrial waste and contaminated soil generated by the original operators of the Come By Chance Refinery.

The 2015-2016 Monitoring and Maintenance Program was conducted in accordance with the June 2012 Operations, Maintenance and Monitoring (OMM) Manual and included the inspection and survey of the existing landfill cap, inspection of the existing groundwater drainage system, sampling and analysis of groundwater, surface water and leachate, as well as the procurement and management of a contractor to complete vegetation control. The removal/discharge of leachate was not conducted during the 2015-16 Monitoring and Maintenance Program. The findings of the work conducted and overseen by Fracflow are summarized below.

Surface Water

Surface water samples were submitted for analysis of general chemistry, total metals, trivalent and hexavalent chromium (Cr^{3+} and Cr^{6+}), benzene, toluene, ethylbenzene, and xylenes (BTEX), total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs).

Results from the December 8, 2015 sampling event show that the up-gradient surface water sample (Surface-Up) exceeded the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the protection of Freshwater Aquatic Life (FAL) for iron, and the down-gradient surface water sample (Surface-Down) exceeded the CCME CWQGs FAL for aluminum. Results for BTEX, TPH, VOCs, PAHs, and PCBs were non-detectable for both surface water samples, and no other guidelines were exceeded.

Groundwater

Groundwater samples were submitted for analysis of general chemistry, dissolved metals, BTEX, TPH, VOCs, PAHs, and PCBs.

Results from the December 8, 2015 sampling event show that groundwater from the up-gradient (background) well, MW93-1A, had higher concentrations of almost all major and minor ions compared with the two down-gradient wells, MW93-2A and MW10-1A. All concentrations of

trace metals were below the stated guideline values. Fracflow observed that dissolved iron was the most abundant trace metal at MW93-2A (7,770 µg/L), with a significant concentration of iron being detected at MW10-1A (1,100 µg/L) and no detectable iron at MW93-1A (< 50 µg/L). The sample from MW93-2A also had high colour (36 TCUs) compared with lower colour at MW10-1A (7.4 TCUs) and no colour at MW93-1A (< 5 TCUs).

There were no petroleum hydrocarbons detected in any of the groundwater samples that were analyzed. One VOC compound (1,2-dichloropropane) was detected at MW10-1A and one PAH compound (perylene) was detected at that same location. No PCBs were detected in any groundwater sample that was analyzed.

Leachate

Leachate samples collected from the primary leachate collection system (PLCS) and the secondary leachate collection system (SLCS) on December 8, 2015 were submitted for analysis of general chemistry, dissolved metals, BTEX, TPH, VOCs, PAHs, and PCBs. Leachate samples collected on December 12, 2015 were submitted for toxicity analysis. Additional leachate samples were collected on January 28, 2016 and analyzed for total metals.

Results from the December 8, 2015 sampling event show no detectable concentrations of BTEX, TPH, VOCs or PCBs in either sample, and none of the general chemistry parameters exceeded the stated guidelines. Several PAH compounds were detected in both leachate samples. Anthracene, benzo(a)anthracene, flouranthene, and pyrene were detected in the PLCS and the SLCS. Phenanthrene was also detected in the PLCS. The concentrations of those PAH compounds exceeded the CCME CWQGs for FAL. However, both leachate samples from the December 12, 2015 sampling event were found to be non-toxic to rainbow trout. There are no PAH guidelines specified under the *Environmental Control Water and Sewage Regulations, 2003* NLR 65/03 (ECWSR).

Two sets of leachate samples were collected for metals analysis. The samples collected on December 8, 2015 were filtered and analyzed for dissolved metals to permit a direct comparison with dissolved metals in groundwater samples, as required by the OMM. A second set of leachate samples was collected on January 28, 2016 for analysis of total metals to permit a direct comparison with the discharge limits set out in the ECWSR. Dissolved iron was considerably higher than the background concentrations of iron in surface water at sample station Surface-Up and in groundwater at monitoring well MW93-1A.

The concentrations of total metals (January 28, 2016 sample) and dissolved metals (December 8, 2015 sample) in the SLCS samples were similar. The only total metal to exceed the ECWSR was iron. The concentration of total iron in leachate from the SLCS was 24,000 ug/L compared with a guideline value of 10,000 µg/L.

No metal in total form in the leachate samples from the PLCS (January 28, 2016 sample) exceeded the ECWSR. The concentrations of total and dissolved metals in the PLCS were distinctly different. Dissolved iron in the PLCS sample collected on December 8, 2015 was 11,000 µg/L compared with only 540 µg/L in total form on January 28, 2016. Since the concentration of dissolved iron cannot exceed the concentration of total iron, the concentration of total iron in the December 8 sample would have been at least 11,000 µg/L. The decrease in total iron by a factor of 20 or more from one event to the other is indicative of chemical dilution by freshwater leakage into the PLCS chamber. There were also significant differences in chemistry between the PLCS and the SLCS in 2015, and differences in chemistry compared with the 2014 results reported by Conestoga-Rovers & Associates (CRA). The higher TDS and dissolved iron in the SLCS in both years suggest that a source water other than the PLCS is affecting leachate quality in the SLCS.

Inspection of the Landfill Cap and Groundwater Drainage System

Large vegetation heights and densities, typically alders, were observed to have reached approximately 1.5 to 2.0 metres in height during the site inspection on December 3, 2015. Therefore, cutting of vegetation was required to be compliant with the OMM recommended height restriction of 0.3 metres.

Evidence of rodent activity on the landfill surface was noted in the form of clumps of dead grass, but no obvious burrows were observed. Large animal activity on the landfill was noted in the form of beaten grass trails. There was no obvious landfill subsidence observed by either inspection or the elevation control survey. The two landfill vents were in good condition.

The outflow drainage pipe and clean out pipes were in generally good condition. The rodent screen on the outflow drainage pipe was missing during the December 2015 inspection, but was replaced in March 2016. The inner plastic cap on clean out pipe CO2 was cracked. Overall, it appeared that the groundwater drainage system was functioning properly.

The manhole covers of the PLCS and SLCS were in good condition. The valves inside the leachate collection chambers could not be inspected at the time of sampling because the chambers were filled with leachate. However, it was observed by CRA during the December 2014 Site visit that the PLCS and SLCS valves were permanently in the open position with the discharge hose no longer connected to the PLCS valve.

Vegetation Control

Removal of vegetation on and around the landfill cap was completed by the contractor and overseen by Fracflow staff from March 23 to April 4, 2016. A final site visit was conducted on April 11, 2016 by Fracflow staff to observe and document the quality of the work completed by the contractor. Vegetation control measures included brush cutting and mulching of alders,

trimming of alder stumps, and mulching and raking of grass. Vegetation on and around the landfill cap has been cut in accordance with the contract documents and is compliant with the OMM manual.

Recommendations

A number of recommendations have been developed by Fracflow based on the findings of the 2015-16 Monitoring and Maintenance Program at the Come By Chance Secure Landfill. Those recommendations are presented at the end of this report for consideration by ENVC.

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Glossary of Terms

APHA	American Public Health Association
BTEX	Benzene, toluene, ethylbenzene and xylenes
CCME	Canadian Council of Ministers of the Environment
CRA	Conestoga-Rovers & Associates
CWQGs	Canadian Water Quality Guidelines
ECWSR	Newfoundland and Labrador Environmental Control Water and Sewage Regulations
ENVC	Newfoundland and Labrador Department of Environment and Conservation
FAL	CCME CWQGs for the protection of freshwater aquatic life
OMM	Come By Chance Secure Landfill Operations, Maintenance and Monitoring Manual
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PLCS	Primary leachate collection system
SLCS	Secondary leachate collection system
TCUs	True colour units
TDS	Total dissolved solids
TPH	Total petroleum hydrocarbons
VOCs	Volatile organic compounds

1.0 INTRODUCTION

The Newfoundland and Labrador Department of Environment and Conservation (ENVC) contracted Fracflow Consultants Inc. to conduct the 2015-16 Monitoring and Maintenance Program at the Come By Chance Secure Landfill located in Come By Chance, Newfoundland and Labrador (NL). This report reviews the scope of work, outlines the field methods and data collected, and summarizes the conclusions and recommendations arising from this work.

Figures and photos referenced in this report can be found in **Appendix A**. Data tables are provided in **Appendix B**. Laboratory Certificates of Analysis are presented in **Appendix C** and analytical data from previous sampling events are presented in **Appendix D**.

1.1 Site Location and Description

The Come By Chance Secure Landfill is located on Refinery Road, immediately north of the Come By Chance Refinery (**Figure 1**). Access to the site is provided via a gravel-covered road that intersects with Refinery Road. The site is fenced (chain link) along the perimeter and has an access gate.

The Come By Chance Secure Landfill was constructed by ENVC between 1994 and 1996 to contain wastes left by the original operators of the Come By Chance Refinery. During that time, the landfill was filled with industrial waste and contaminated soil. The landfill was capped by the end of 1996.

The landfill is equipped with a primary and secondary (leak detection) leachate collection system (PLCS and SLCS), as well as nested groundwater monitoring wells. It has a double liner consisting of a primary liner containment system and a secondary liner containment system, both of which are equipped with drainage pipes leading to a manhole or valve chamber. Leachate collected in the primary and secondary liner containment systems is sampled and removed via a drainage pipe and valve inside the valve chambers. Additionally, a groundwater drainage system was installed in March 2009, adjacent to the north and east sides of the landfill. A Site Plan of the Come By Chance Secure Landfill is provided in **Figure 2**.

1.2 Historical Data

Annual monitoring of leachate, groundwater and surface water quality has been ongoing since 2008. Historical data provided in **Appendix D** characterize post-closure water quality in all media. There were no baseline data available for review. Historically, periods between successive monitoring events have varied between five and fifteen months and individual monitoring events have been conducted at different times of the year.

1.3 Scope of 2015-16 Monitoring Program

The scope of work for the 2015-16 Monitoring Program was conducted in accordance with the June 2012 Operations, Maintenance and Monitoring (OMM) Manual for the Come By Chance Secure Landfill and consisted of the following list of activities.

- A complete inspection of the groundwater drainage system and landfill cover, including elevation control survey, including height and density of vegetation on the slopes and top of the landfill, signs of subsidence of the landfill or erosion of the slopes, evidence of animal burrows or activity, and condition of the landfill vents and drains.

- Management of the vegetation control project including contract administration duties and supervising the onsite activities of the contractor.

- Sampling of ambient surface water and groundwater. Background surface water quality was established by sampling at station Surface-Up, which is located approximately 25 m east of the southeast corner of the landfill fence. Background groundwater quality was established by sampling at monitoring well MW93-1A, which is located approximately 50 m northeast of the landfill.

- Sampling of one surface water station on the down-gradient side of the waste disposal site. The sampling station, Surface-Down, is located at a stream across the gravel road from the landfill, approximately 125 m to the southwest.

- Water level survey, well development and groundwater sampling from two monitoring wells located down-gradient of the landfill site. Those wells are designated MW93-2A and MW10-1A.

- Sampling of the primary and secondary leachate chambers. The removal/discharge of the leachate from those chambers was a planned contract activity, but was later deleted from the scope of work by ENVC and was not conducted during the 2015-16 Monitoring and Maintenance Program.

- Preparation of this report detailing the results of the work.

2.0 METHODOLOGY

2.1 Surface Water Monitoring

Surface water samples were collected from the two monitoring stations, one up-gradient of the site (Surface-Up) and one down-gradient of the site (Surface-Down) on December 8, 2015. The sampling locations are shown in **Figure 2** and on **Photo 1** and **Photo 2**.

Site conditions were noted and recorded at that time, including weather, physical water quality (i.e., clear, suspended materials, any sheens, odours) and approximate flow rates (**Table B5**). The pH, electrical conductivity, and temperature of surface waters were measured using calibrated, hand-held HACH water quality meters. Dissolved oxygen concentrations were also measured using a HACH water quality meter (**Table B9**).

2.2 Groundwater Monitoring

Groundwater samples were collected from three of the existing monitoring wells (MW10-1A, MW93-1A, and MW93-2A) on December 8, 2015. Section 3.2 of the OMM states that "The monitoring wells to be sampled are MW93-1A, MW93-2A and if possible MW93-3A". MW10-1A is currently being monitoring in lieu of MW93-3A. MW93-3A was decommissioned by Conestoga-Rovers and Associates (CRA) in 2010. The sampling locations are shown in **Figure 2** and on **Photo 3** through **Photo 5**. One field duplicate sample was collected from MW10-1A.

2.2.1 Water Level Measurements

The water level was measured in all monitoring wells at the time of the monitoring event. The height of the measuring point above ground surface (i.e., casing and riser stick up) was measured at each well prior to recording the water level. An electronic water level tape, with a stainless steel probe/sensor, was lowered into the well to measure the static water level, prior to well development.. General site conditions, including weather, were recorded at that time (**Table B6**).

2.2.2 Well Development and Field Measurements

Each well was purged and sampled using dedicated bailers. The goal was to remove a minimum of three well volumes, which was calculated using the static height of the water column in each well. The ability to remove three well volumes assumed that standing water was present in all wells at the time of sampling and that sufficient permeability existed to provide a steady recharge to each well during purging.

The physical condition of the development waters were noted, including colour, any sheens, presence of suspended material and any odours that may be detected (**Table B6**). The pH, electrical conductivity, and temperature of the purged water were measured in an open bucket that was periodically replenished. Field parameters were recorded using hand-held HACH meters as noted in the preceding section for surface water sampling (**Table B17**).

2.3 Leachate Monitoring

Leachate samples were collected from both the PLCS and SLCS (**Figure 2** and **Photo 6**) using dedicated bailers on December 8 and 12, 2015 and on January 28, 2016. Site conditions were noted and recorded at that time, including weather and physical leachate quality (i.e., colour, suspended materials, any sheens, odours) (**Table B3** and **Table B4**).

The pH, electrical conductivity, temperature, and dissolved oxygen of the leachate were measured and recorded (see **Table B24**) by lowering the probes into the collection system through the manhole access. Air quality around the open chambers was continuously monitored using a multi-gas meter.

2.4 Sample Collection and Handling

Surface water, groundwater and leachate samples were collected using pre-labeled sample bottles supplied by Maxxam Analytics. The sampling technicians wore disposable nitrile gloves during sample collection. Surface water samples were preserved, as required by the laboratory, without filtration, in order that chemical concentrations were reported as total concentration. Groundwater and leachate samples for dissolved metals analysis were field-filtered through 0.45 µ Nalgene disposable filters. Note that two sets of leachate samples were collected for metals analysis. The samples collected on December 8, 2015 were filtered and analyzed for dissolved metals to permit a direct comparison with dissolved metals in groundwater samples, as required by the OMM. A second set of leachate samples was collected on January 28, 2016 for analysis of total metals to permit a direct comparison with the discharge limits set out in the ECWSR.

All samples were preserved in the field. After sample collection, samples were placed in chilled coolers for transport to the laboratory. Chain-of-Custody forms were completed and submitted to the laboratory, specifying the chemical analyses required.

2.5 Laboratory Analysis

Surface water samples were submitted for analysis of general chemistry, total metals, trivalent and hexavalent chromium (Cr^{3+} and Cr^{6+}), benzene, toluene, ethylbenzene, and xylenes (BTEX),

total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs).

Groundwater samples were submitted for analysis of general chemistry, dissolved metals, BTEX, TPH, VOCs, PAHs, and PCBs.

Leachate samples collected on December 8, 2015 were submitted for analysis of general chemistry, dissolved metals, BTEX, TPH, VOCs, PAHs, and PCBs. Leachate samples collected on December 12, 2015 were submitted for toxicity analysis. Additional leachate samples were collected on January 28, 2016 and analyzed for total metals.

2.6 Inspection and Survey of Landfill Cap

A visual inspection of the landfill cover was completed on December 3, 2015. The following features were assessed:

- Height and density of vegetation on the slopes and top of the landfill;
- Signs of subsidence of the landfill or erosion of the slopes;
- Evidence of animal burrows or activity; and
- Condition of the landfill vents and drains.

Findings from the cover inspection are documented in **Table B1**, in accordance with the OMM Manual. Photographs from the inspection are shown in **Photo 7** and **Photo 8**.

An elevation control survey was conducted on March 21, 2016 using the existing control point network **(Photo 9)**. Results of the survey are tabulated in **Table B8** and compared to results from the survey completed in 2014.

2.7 Inspection of Groundwater Drainage System

A visual inspection of the groundwater drainage system was completed on December 3, 2015 and March 28, 2016 and assessed the following:

- Condition of the outflow drainage pipe and estimated flow rate; and
- Condition of the four clean out pipes including assessment of potential blockages and presence of water.

Findings from the cover inspection are documented in **Table B2**, in accordance with the OMM Manual. Photographs from the inspection are shown in **Photos 10** through **Photo 12**.

2.8 Data Compilation and Reporting

To be consistent with previous consultant's reports, all analytical data in this report were compared with guideline values adopted by previous consultants and ENVC. Tabulated analytical data are presented in **Appendix B**.

General chemistry, BTEX, TPH, PAHs, VOCs, and total metals in surface water were assessed in relation to the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the protection of Freshwater Aquatic Life (FAL).

TPH in surface water was assessed in relation to British Columbia Contaminated Site Regulation (B.C. Reg. 375/96) Schedule 6 Generic Numerical Water Standards for Aquatic Life (Aquatic Life Generic Standards - freshwater).

BTEX and TPH in groundwater were assessed in relation to the Atlantic PIRI Risk Based Corrective Action (RBCA) Version 3 (January 2015) Tier I Risk-Based Screening Levels (RBSLs) for a commercial site with non-potable water and coarse-grained soil.

General chemistry, PAHs, PCBs, VOCs, and dissolved metals in groundwater were assessed in relation to the Ontario Minister of the Environment (MOE) "Soil, Ground Water, and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", March 9, 2004, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.

Analytical results of leachate samples were assessed in relation to Schedule "A" of the *Environmental Control Water and Sewage Regulations, 2003* NLR 65/03 (ECWSR). Parameters not specified in Schedule "A" were assessed in relation to the CCME CWQGs for FAL.

3.0 MONITORING DATA

Field data and laboratory analytical results for December 8 and 12, 2015 and January 28, 2016 are presented in this section. Those data are compared with the applicable guideline values and results from previous sampling events dating back to 2008. Note that all chemical data tables referenced below are presented in **Appendix B**. Copies of the laboratory analytical reports are presented in **Appendix C. Appendix D** contains historical data from previous monitoring events.

3.1 Surface Water

Surface water sampling station Surface-Up is located east and hydraulically up-gradient from the landfill site **(Photo 1)**. Sampling station Surface-Down is down-gradient of the landfill site and is subject to potential impact from the site **(Photo 2)**. **Table B9** presents the field measurements of each surface water station. **Table B10** presents the general chemistry data, and **Table B11** through **Table B15** present the total metals, BTEX and TPH, VOCs, PAHs, and PCBs data for surface water samples collected during the December 8, 2015 sampling event. Any concentrations in excess of the stated guideline values are highlighted by shading in the data tables.

3.2 Groundwater

Monitoring well MW93-1A is located up-gradient of the site and represents the background groundwater quality around the landfill site **(Photo 4)**. Monitoring wells MW10-1A **(Photo 3)** and MW93-2A **(Photo 5)** are located on the site and down-gradient of the site respectively, and are subject to potential impact from the site. **Table B16** and **Table B17** present the volumes purged from the wells during development and the field measurements for each well. **Table B18** presents the general chemistry data, and **Table B19** through **Table B23** present the dissolved metals, BTEX and TPH, VOCs, PAHs, and PCBs data for groundwater samples collected during the December 8, 2015 sampling event. Any concentrations in excess of the stated guideline values are highlighted by shading in the data tables.

3.3 Leachate

The PLCS and SLCS are located on the west side of the landfill **(Photo 6)** and collect intercepted water from the landfill. **Table B24** presents the field measurements for the PLCS and SLCS during the December 8, 2015 sampling event. **Table B25** presents the general chemistry data, and **Table B26** through **Table B32** present the dissolved metals, total metals, BTEX and TPH, VOCs, PAHs, PCBs, and toxicology data for the leachate samples collected during the December 8 and 12, 2015 and January 28, 2016 sampling events. Any concentrations in excess of the stated guideline values are highlighted by shading in the data tables.

4.0 DISCUSSION

Surface water and groundwater results from the December 8, 2015 sampling event, and leachate results from the December 8 and 12, 2015 and January 28, 2016 sampling events were compared to applicable guidelines and historical data since 2008. Historical data are presented in **Appendix D**.

4.1 Surface Water

4.1.1 Total Metals

The sample collected from Surface-Down exceeded FAL guideline values for total aluminum (110 µg/L) and the sample collected from Surface-Up exceeded FAL guideline values for total iron (440 µg/L) (**Table B11**). The down-gradient sample from Surface-Down generally had slightly higher total metals concentrations in comparison with the Surface-Up sample, particularly calcium, magnesium, and sodium.

Historically, both samples from Surface-Up and Surface-Down have exceeded guideline values for aluminum and iron for the majority of sampling events since 2010. Both surface water stations have also exceeded guidelines for cadmium historically, but have had non-detectable levels of cadmium since November 2012. Surface-Down historically exceeded guideline values for lead and zinc several times between 2008 and September 2011, but has had non-detectable levels of lead and zinc since November 2012 (see **Table D13 in Appendix D**, CRA, 2015).

4.1.2 BTEX, TPH, VOCs, PAHs, and PCBs

BTEX/TPH (**Table B12**), VOCs (**Table B13**), PAHs (**Table B14**), and PCBs (**Table B15**) were below the stated guideline values for both surface water samples collected in December 2015.

Both surface water stations have normally shown non-detectable levels of BTEX, TPH, VOCs, PAHs, and PCBs. Low concentrations of phenanthrene were detected at Surface-Up in 2012 and at Surface-Down in 2009.

4.1.3 Quality Control

A comparison between field-measured and laboratory-measured values of pH and electrical conductivity is a meaningful quality control tool. In particular, field-measured pH is an essential parameter for comparison of surface water quality to guideline values. The American Public Health Association (APHA) Standard Method requires that pH be analyzed within 15 minutes of sampling and therefore, field determination is required for sampling. All laboratory-reported pH values will exceed the APHA Standard Method holding time.

The background sample from Surface-Up had a field-measured pH of 7.97 (**Table B9**) and a laboratory-measured value of 7.12 (**Table B10**), which are in poor agreement. Surface-Down had a field-measured pH of 6.82 (**Table B9**) and a laboratory-measured value of 7.06 (**Table B10**), which agree reasonably well. It is possible that some iron oxidation occurred during storage and transport of the sample Surface-Up to the laboratory to cause the observed reduction in pH. Both the field-measured and laboratory-measured pH values were within the acceptable range of 6.5 to 8.5 for FAL.

The field-measured electrical conductivity for Surface-Up and Surface-Down were 126 µS/cm and 128 µS/cm (**Table B9**) respectively, which compared well with the laboratory-measured values of 120 µS/cm for both samples (**Table B10**).

4.1.4 Interpretation

General chemistry data for the surface water sample down-gradient of the site (Surface-Down) show no obvious leachate impacts when compared with background surface water quality at Surface-Up. The measured concentrations of chloride, total alkalinity and total dissolved solids (TDS), which are typical indicator parameters for leachate impacts, were similar at both locations:

- Surface-Up: total alkalinity 9.3 mg/L, chloride 24 mg/L and TDS 62 mg/L; and
- Surface-Down: total alkalinity 9.1 mg/L, chloride 26 mg/L and TDS 66 mg/L.

Low concentrations of nitrate plus nitrite and non-detectable concentrations of ammonia-nitrogen in both samples also suggest the absence of leachate impacts in surface water.

4.2 Groundwater

4.2.1 General Chemistry and Dissolved Metals

None of the general chemistry parameters exceeded the stated guideline values for any groundwater samples that were analyzed (**Table B18**).

Trace metal concentrations are shown in **Table B19**, along with the concentrations of other metals that are considered to be major ions of the general chemistry suite (i.e., calcium, magnesium, sodium, potassium). None of the metals exceeded the stated guideline values.

4.2.2 BTEX, TPH, VOCs, PAHs, and PCBs

There were no petroleum hydrocarbons detected in any of the groundwater samples that were analyzed (**Table B20**). One VOC compound (1,2-dichloropropane) was detected at MW10-1A

(**Table B21**) and one PAH compound (perylene) was detected at that same location (**Table B22**). No PCBs were detected in any groundwater sample that was analyzed (**Table B23**).

4.2.3 Quality Control

A comparison between field-measured and laboratory-measured values of pH and electrical conductivity is a meaningful quality control tool as noted in the preceding section for surface water sampling (Section 4.1.3).

The pH of background groundwater at MW93-1A was 7.35 (**Table B17**), which was lower than the laboratory-measured value of 8.01 (**Table B18**). The groundwater sample from MW93-2A had a field-measured pH of 6.48 (**Table B17**) and a laboratory-measured pH of 8.0 (**Table B18**).The increase in pH from field to laboratory suggests degassing of CO_2 may have been responsible. The groundwater sample from MW10-1A had a field-measured pH of 7.61 (**Table B17**) and a laboratory-measured pH of 7.25 (**Table B18**). The reduction in pH from field to laboratory suggests iron oxidation and consumption of alkalinity.

The electrical conductivity of background groundwater from MW93-1A was 616 µS/cm. The electrical conductivity of groundwater from the two wells that are located hydraulically down-gradient were 256 µS/cm at MW93-2A and 199 µS/cm at MW10-1A. Field-measured values agreed well with laboratory-measured values for all three samples.

4.2.4 Interpretation

Depths to groundwater and calculated groundwater elevations for the background well (MW93-1A) and the two down-gradient wells (MW93-2A and MW10-1A) are presented in **Table B16**. Those wells were completed to depths of between 2.86 m and 4.73 m below ground surface and each monitor shallow groundwater quality near the footprint of the landfill. The inferred direction of average groundwater flow is toward the southwest, as shown in **Figure 3**.

One would expect the chemical concentrations of groundwater to increase in the direction of flow, however, the groundwater sample from MW93-1A (up-gradient of the landfill) had higher concentrations of almost all major and minor ions compared with the two down-gradient wells, MW93-2A and MW10-1A. For example, note the concentrations of total alkalinity as well as chloride and TDS at each well location:

- MW93-1A: total alkalinity 280 mg/L, chloride 11 mg/L and TDS 350 mg/L;
- MW93-2A: total alkalinity 14 mg/L, chloride 31 mg/L and TDS 150 mg/L; and
- MW10-1A: total alkalinity 72 mg/L, chloride 11 mg/L and TDS 130 mg/L.

Dissolved iron was the most abundant trace metal at MW93-2A (7,770 µg/L), with a significant concentration of iron being detected at MW10-1A (1,100 µg/L) and no detectable iron at

MW93-1A (< 50 µg/L). The sample from MW93-2A also had high colour (36 TCUs) compared with lower colour at MW10-1A (7.4 TCUs) and no colour at MW93-1A (< 5 TCUs). It is Fracflow's opinion that oxidation of ferrous iron is responsible for the reduction in alkalinity and the production of colour at the down-gradient wells. A known local source of high iron is leachate, as discussed in a later section of this report.

The contrasting chemistry of shallow groundwater to the northeast of the landfill may be the result of the hydraulic boundary condition created by the groundwater drainage system that was installed in 2009 (AMEC, 2009). A large amount of fluid was regularly pumped from the SLCS in 2006/2007 and the consultant reported that water other than leachate was entering the SLCS at that time. The consultant determined that groundwater to the north of the landfill was periodically above the base of the SLCS and may have been entering the landfill through perforations in the SLCS. A trench/drainage system was installed along the north side of the landfill to maintain groundwater at or below a design elevation of 14.11m with a slope that provides for continuous drainage towards Placentia Bay. If that drainage system is functioning as per design, the perturbation in the flow system could have changed the nature of groundwater and surface water interactions, mixing relationships and groundwater chemistry in the area.

4.3 Leachate

4.3.1 General Chemistry and Metals

None of the general chemistry parameters exceeded the stated guideline values for either of the leachate samples collected on December 8, 2015 (**Table B25**).

Two sets of leachate samples were collected for metals analysis. The samples collected on December 8, 2015 were filtered and analyzed for dissolved metals (**Table B26**) to permit a direct comparison with dissolved metals in groundwater samples, as required by the OMM. A second set of leachate samples was collected on January 28, 2016 for analysis of total metals (**Table B27**) to permit a direct comparison with the discharge limits set out in the ECWSR.

The concentrations of total metals (January 28, 2016 sample) and dissolved metals (December 8, 2015 sample) in the SLCS samples were similar. The only total metal to exceed the ECWSR was iron. The concentration of total iron in leachate from the SLCS was 24,000 ug/L compared with a guideline value of 10,000 µg/L.

No metal in total form in the leachate samples from the PLCS (January 28, 2016 sample) exceeded the ECWSR. The concentrations of total and dissolved metals in the PLCS were distinctly different. Dissolved iron in the PLCS sample collected on December 8, 2015 was 11,000 µg/L compared with only 540 µg/L in total form on January 28, 2016.

4.3.2 BTEX, TPH, VOCs, PAHs, PCBs and Toxicity

Leachate samples collected from both the PLCS and SLCS had non-detectable levels of BTEX/TPH (**Table B28**), VOCs (**Table B29**) and PCBs (**Table B31**).

Several PAH compounds were detected in each of the leachate samples that were analyzed (**Table B30**). Anthracene, benzo(a)anthracene, flouranthene, and pyrene were detected in both the PLCS and the SLCS. Phenanthrene was also detected in the PLCS. There are no PAH guidelines specified under the ECWSR, but the concentrations of all PAHs that were detected exceeded their respective CCME CWQGs for FAL (excluding low levels of acenaphthene and fluorene in PLCS, and chrysene as there is no guideline value).

Leachate samples for toxicity testing were collected from the PLCS and SLCS chambers on December 12, 2015. Both samples were submitted to Maxxam Analytics for the required testing, as specified under Section 3.2 of the OMM Manual. Both samples were found to be non-toxic to rainbow trout (**Table B32**).

4.3.3 Quality Control

A comparison between field-measured and laboratory-measured values of pH and electrical conductivity is a meaningful quality control tool as noted in the preceding section for surface water sampling (Section 4.1.3).

Table B24 presents the field measurements collected during the December 8, 2015 sampling event from the PLCS and SLCS. Field-measured values of leachate pH for the PLCS and the SLCS were 7.86 and 7.65 respectively, which were 0.2 to 0.3 pH units higher than the laboratory-reported values. The good agreement between both pH data sets suggests that the leachate samples were well oxidized and not chemically reactive.

Field readings of electrical conductivity for the PLCS and SLCS were 372 µS/cm and 606 µS/cm respectively, which were much lower than the respective laboratory-measured values of 760 µS/cm and 990 µS/cm. The laboratory-measured conductivities correlate correctly with the Total Dissolved Solids (TDS) concentrations and are considered to be accurate. The difference between field-measured and laboratory-measured conductivities could be due to a matrix interference effect. Instrument error is unlikely given the good agreement between field-measured and laboratory-measured conductivity for surface water and groundwater samples.

4.3.4 Interpretation

The concentrations of total metals (January 28, 2016 sample) and dissolved metals (December 8, 2015 sample) in the SLCS samples were similar, but the concentrations of total and dissolved metals in the PLCS were distinctly different. Since the concentration of dissolved

iron cannot exceed the concentration of total iron, the concentration of total iron in the December 8 sample would have been at least 11,000 µg/L. The decrease in total iron by a factor of 20 or more from one event to the other is indicative of chemical dilution by freshwater leakage into the PLCS chamber. Fracflow does not consider that significant dilution occurred based on the rainfall, precipitation and temperature records provided by Environment Canada (St. John's Airport). These records show the total accumulated precipitation for the five days preceding the sampling event on January 28 was approximately 11.7 mm. Since the surface area of each chamber cover is approximately 0.33 m^2, the total volume of rainfall that could have leaked directly into each valve chamber, through their respective covers, would have been in the order of 0.0039 m^3. The estimated volume of the PLCS valve chamber is 4.6 m^3 and the estimated volume of the SLCS valve chamber is approximately 4.0 m^3. Chemical dilution by direct infiltration of precipitation through either cover could only have amounted to a fraction of a percentage of the total volume of fluid stored in each valve chamber.

There were notable differences in chemistry between the PLCS and the SLCS samples in December 2015, and differences in chemistry compared with the previous years report (CRA, 2015). For example, the TDS concentrations in the PLCS and SLCS samples were 520 mg/L and 620 mg/L in December 2015, which is significantly higher than the respective values of 180 mg/L and 390 mg/L detected in November 2014. Additionally, dissolved iron was 11,000 µg/L in the PLCS and 22,000 µg/L in the SLCS in December 2015, while the respective values for total iron were only 62 µg/L and 130 µg/L in November 2014. The higher TDS and dissolved iron in the SLCS in both years suggest that a source water other than the PLCS is affecting leachate quality in the SLCS. Possible perforations in the SLCS were previously reported and were responsible for the installation of a trench/drainage system to control groundwater levels on the northeast side of the landfill (AMEC, 2009).

4.4 Inspection and Survey of Landfill Cap

Results of the landfill cover inspection, conducted on December 3, 2015, are presented in **Table B1**. The vegetation height ranged from 0 m to 2.0 m (generally alders), which exceeded the OMM requirement of a maximum vegetation height of 0.3 m. Alder density ranged between 0 to 8 plants per square metre on the top of the landfill, and 5 to 10 plants per square metre on the slopes. Approximately 90% to 95% of the landfill area is covered by alders (**Photo 7 and 8**).

Evidence of rodent activity on the landfill surface was noted in the form of clumps of dead grass, but no obvious burrows were observed. Large animal activity on the landfill was noted in the form of beaten grass trails.

There was no visible evidence of landfill subsidence. Results of the elevation control survey are presented in **Table B8**. Control point elevations surveyed in March 2016 decreased slightly an average of approximately 2.4 cm from the elevations surveyed in 2014. The difference in elevation indicates that limited settlement of the landfill is occurring. The survey control points

were observed to be in good condition, but were difficult to locate as the flags at the control points had been damaged or knocked down, as shown in **Photo 9**.

4.5 Inspection of Groundwater Drainage System

Results of the groundwater drainage system inspection, conducted on December 3, 2015 and March 28, 2016, are summarized in **Table B2**. The outflow drainage pipe, located on the asphalt plant property, was in good condition, although as noted previously by CRA, the rodent screen had been removed or destroyed. Flow from the outflow drainage pipe was approximately 1.0 L/min to 2.0 L/min and contained some iron floc, as shown in **Photo 11**. Due to the asphalt plant being closed for the season, the outflow pipe could not be accessed during the sampling event on December 8, 2015 to replace the screen. Therefore, the rodent screen was replaced during a site visit on March 28, 2016 using a double layer of geotextile mesh and heavy duty zip ties (**Photo 12**).

The clean out pipes were inspected on March 28, 2016. There were no blockages observed and the pipes were dry. CO4 could not be inspected as snow melt had caused the clean out pipe cover to be covered by water. The interior 4" drain cap of CO2 was cracked, shown in **Photo 10**. The GPS coordinates for CO1, CO2, and CO3 obtained from the previous years report (CRA, 2015) were not in the actual locations and have been corrected in **Table B7**. Overall, it appeared that the groundwater drainage system was functioning properly.

The PLCS and SLCS were inspected during the sampling events. Results from the inspection and sampling are presented in **Table B3** and **Table B4**. The outer metal and inner plastic gasket manhole covers of the PLCS and SLCS were in good condition. The PLCS and SLCS valves could not be inspected at the time of sampling as the chambers were filled with leachate. However, it was observed by CRA during the December 2014 Site visit that the PLCS and SLCS valves were permanently in the open position with the discharge hose no longer connected to the PLCS valve.

4.6 Vegetation Control

Large vegetation heights and densities, typically alders, were observed to have reached approximately 1.5 to 2.0 metres in height during the site inspection on December 3, 2015 (**Photo 7** and **Photo 8**). Therefore, cutting of vegetation was required to be compliant with the OMM recommended height restriction of 0.3 metres.

Removal of vegetation on and around the landfill cap was completed by the contractor and overseen by Fracflow staff from March 23 to April 4, 2016. A final site visit was conducted on April 11, 2016 by Fracflow staff to observe and document the quality of the work completed by the contractor (**Photo 13** through **Photo 16**). Vegetation control measures included brush cutting and mulching of alders, trimming of alder stumps, and mulching and raking of grass. Vegetation

on and around the landfill cap has been cut in accordance with the contract documents and is compliant with the OMM manual.

5.0 SUMMARY AND RECOMMENDATIONS

The conclusions and recommendations arising from the work conducted and overseen by Fracflow for the 2015-16 Monitoring and Maintenance Program at the Come By Chance Secure Landfill are summarized below.

5.1 Summary

5.1.1 Surface Water

Results from the December 8, 2015 sampling event show that the up-gradient surface water sample (Surface-Up) exceeded the CCME CWQGs for FAL for iron, and the down-gradient surface water sample (Surface-Down) exceeded the CCME CWQGs for FAL for aluminum. Results for BTEX, TPH, VOCs, PAHs, and PCBs were non-detectable for both surface water samples, and no other guidelines were exceeded. There was no evidence of any leachate impacts to surface water quality.

5.1.2 Groundwater

None of the general chemistry or dissolved metals parameters exceeded the stated guideline values for any groundwater sample. There were no petroleum hydrocarbons detected in any of the groundwater samples that were analyzed. One VOC compound (1,2-dichloropropane) was detected at MW10-1A and one PAH compound (perylene) was detected at that same location. No PCBs were detected in any groundwater sample that was analyzed.

Based on the depths to groundwater and calculated groundwater elevations for the background well (MW93-1A) and the two down-gradient wells (MW93-2A and MW10-1A), the inferred direction of average groundwater flow is toward the southwest. One would expect the chemical concentrations of groundwater to increase in the direction of flow, however, the groundwater sample from MW93-1A (up-gradient of the landfill) had higher concentrations of almost all major and minor ions compared with the two down-gradient wells, MW93-2A and MW10-1A. The contrasting chemistry of shallow groundwater to the northeast of the landfill may be the result of the hydraulic boundary condition created by the groundwater drainage system that was installed in 2009 (AMEC, 2009).

Dissolved iron was the most abundant trace metal in groundwater on the down-gradient side of the landfill. The concentration of dissolved iron at MW93-2A was 7,770 µg/L and the concentration of dissolved iron at MW10-1A was 1,100 µg/L. There was no detectable iron in background groundwater at MW93-1A. The sample from MW93-2A also had high colour (36 TCUs) compared with lower colour at MW10-1A (7.4 TCUs) and no colour at MW93-1A (< 5 TCUs). The oxidation of ferrous iron may be responsible for the reduction in alkalinity and

the production of colour at the down-gradient wells. A known local source of high iron is leachate.

5.1.3 Leachate

Results from the December 8, 2105 sampling event show no detectable concentrations of BTEX, TPH, VOCs or PCBs in either sample, and none of the general chemistry parameters exceeded the stated guidelines. Several PAH compounds were detected in both leachate samples. Anthracene, benzo(a)anthracene, flouranthene, and pyrene were detected in the PLCS and the SLCS. Phenanthrene was also detected in the PLCS. The concentrations of those PAH compounds exceeded the CCME CWQGs for FAL. However, both leachate samples from the December 12, 2015 sampling event were found to be non-toxic to rainbow trout. There are no PAH guidelines specified under the ECWSR.

Two sets of leachate samples were collected for metals analysis. The samples collected on December 8, 2015 were filtered and analyzed for dissolved metals to permit a direct comparison with dissolved metals in groundwater samples, as required by the OMM. A second set of leachate samples was collected on January 28, 2016 for analysis of total metals to permit a direct comparison with the discharge limits set out in the ECWSR. The concentrations of total metals (January 28, 2016 sample) and dissolved metals (December 8, 2015 sample) in the SLCS samples were similar. The only total metal to exceed the ECWSR was iron. The concentration of total iron in leachate from the SLCS was 24,000 ug/L compared with a guideline value of 10,000 µg/L. No metal in total form in the leachate samples from the PLCS (January 28, 2016 sample) exceeded the ECWSR. The concentrations of total and dissolved metals in the PLCS were distinctly different. Dissolved iron in the PLCS sample collected on December 8, 2015 was 11,000 µg/L compared with only 540 µg/L in total form on January 28, 2016. Since the concentration of dissolved iron cannot exceed the concentration of total iron, the concentration of total iron in the December 8 sample would have been at least 11,000 µg/L. The decrease in total iron by a factor of 20 or more from one event to the other is indicative of chemical dilution by freshwater leakage into the PLCS chamber. Fracflow does not consider that significant dilution occurred based on the rainfall, precipitation and temperature records provided by Environment Canada (St. John's Airport). These records show the total accumulated precipitation for the five days preceding the sampling event on January 28 was approximately 11.7 mm. Since the surface area of each chamber cover is approximately 0.33 m^2, the total volume of rainfall that could have leaked directly into each valve chamber, through their respective covers, would have been in the order of 0.0039 m^3. The estimated volume of the PLCS valve chamber is 4.6 m^3 and the estimated volume of the SLCS valve chamber is approximately 4.0 m^3. Chemical dilution by direct infiltration of precipitation through either cover could only have amounted to a fraction of a percentage of the total volume of fluid stored in each valve chamber.

The differences in chemistry between the PLCS and the SLCS samples in December 2015, and notable differences in chemistry compared with the previous year's results suggest that a source

water other than the PLCS is affecting leachate quality in the SLCS. Possible perforations in the SLCS were previously reported. A trench/drainage system was installed in 2009 to lower groundwater levels on the northeast side of the landfill and prevent groundwater from entering the SLCS. It stands to reason that such perforations would represent a pathway for leachate to leak from the SLCS and into the groundwater system.

5.1.4 Site Inspections

Large vegetation heights and densities, typically alders, were observed to have reached approximately 1.5 to 2.0 metres in height during the site inspection on December 3, 2015. Therefore, cutting of vegetation was required to be compliant with the OMM recommended height restriction of 0.3 metres. Removal of vegetation on and around the landfill cap was completed by the contractor and overseen by Fracflow staff from March 23 to April 4, 2016. A final site visit was conducted on April 11, 2016 by Fracflow staff to observe and document the quality of the work completed by the contractor. Vegetation control measures included brush cutting and mulching of alders, trimming of alder stumps, and mulching and raking of grass. Vegetation on and around the landfill cap has been cut in accordance with the contract documents and is compliant with the OMM manual.

Evidence of rodent activity on the landfill surface was noted in the form of clumps of dead grass, but no obvious burrows were observed. Large animal activity on the landfill was noted in the form of beaten grass trails. There was no obvious landfill subsidence observed by either inspection or the elevation control survey. The two landfill vents were in good condition.

The outflow drainage pipe and clean out pipes were in generally good condition. The rodent screen on the outflow drainage pipe was missing during the December 2015 inspection, but was replaced in March 2016. The inner plastic cap on clean out pipe CO2 was cracked. Overall, it appeared that the groundwater drainage system was functioning properly.

The manhole covers of the PLCS and SLCS were in good condition. The valves inside the leachate collection chambers could not be inspected at the time of sampling because the chambers were filled with leachate. However, it was observed by CRA during the December 2014 Site visit that the PLCS and SLCS valves were permanently in the open position with the discharge hose no longer connected to the PLCS valve.

5.2 Recommendations

The following recommendations are presented for consideration by ENVC.

- Annual surface water, groundwater and leachate monitoring should be continued at this site. Historically, periods between successive monitoring events have varied between four and fourteen months and individual monitoring events have been conducted at

different times of the year. That finding limits the ability to separate seasonal variability in water quality from trends that would otherwise reflect mixing with leachate and general evolution of the leachate plume. Monitoring should be conducted during the same month of each year in order to minimize seasonal variability and track developing water quality trends.

- PCBs have not been detected in surface water or groundwater at this site since monitoring began. It would, therefore, be reasonable to conduct sampling of both media for PCB analysis once every two years.

- Section 3.2 and subsequent sections of the OMM states that "The monitoring wells to be sampled are MW93-1A, MW93-2A and if possible MW93-3A". MW10-1A is currently being monitoring in lieu of MW93-3A. MW93-3A was decommissioned by CRA in 2010. The OMM manual should be updated to reflect these changes.

- Field-measured pH is an essential parameter for comparison of surface water and groundwater quality to guideline values. The APHA Standard Method requires that pH be analyzed within 15 minutes of sampling and, therefore, field determination is required for compliance. All laboratory-reported pH values will exceed the APHA Standard Method holding time.

- The OMM Manual does not specify whether or not leachate samples should be analyzed for total or dissolved metals. Leachate samples from the PLCS and the SLCS should be analyzed for both total metals and dissolved metals, including ferrous iron. Only dissolved metals concentrations reflect the mobile fraction. A portion of the metals associated with particulate matter in the leachate may settle out during discharge to the drainage ditch and will be naturally filtered if infiltration into the subsurface occurs. It is necessary to compare the dissolved metals in the leachate samples with dissolved metals in groundwater at the background location, as part of the process outlined in the OMM Manual for assessing suitability of leachate for on-site discharge (Section 3.2). The metals in groundwater are field-filtered to permit quantification of the dissolved fraction and that necessitated the same procedure for leachate. As noted in Section 6.3 of the OMM Manual, if the leachate quality in the SLCS and the PLCS are different in analytical concentrations, this could indicate that source water other than the PLCS is affecting the leachate in the SLCS. The only way to make that determination using trace metals data is to examine the dissolved/mobile fractions. Also, since ferrous iron is expected to be present, samples for general chemistry analysis should be analyzed on a RUSH basis otherwise the ferrous iron in the un-preserved samples that are used for general chemistry analysis will oxidize to ferric iron. The oxidation process can lower pH and alkalinity, and increase turbidity and colour such that the laboratory-reported values will not be representative of field conditions. The OMM Manual should be revised to state the type of metals analysis to be performed.

- As with the leachate, ferrous iron is expected to be present in groundwater at MW93-2A. Fracflow recommends that future samples from MW93-2A be analyzed on a RUSH basis to reduce the effects of iron oxidation in the un-preserved general chemistry and TDS bottles. In addition, samples from that well should also be analyzed for ferrous iron and dissolved oxygen should be measured in the field.

- The OMM Manual states that leachate can be collected and disposed of by an approved liquid waste management company. In 2014, approximately 18,331 Litres (L) were pumped from the PLCS valve chamber with a final measured in-flow rate of 14.4 Lpm, while approximately 15,592 L were pumped from the SLCS valve chamber with a final measured in-flow rate of 11.5 Lpm. However, given those volumes of leachate, Fracflow recommends that a temporary treatment system be designed for on-site processing of leachate if required.

- The valves inside the leachate collection chambers should be inspected and repaired and/or replaced if necessary during the next pumping event. It was observed by CRA during the December 2014 Site visit that the PLCS and SLCS valves were permanently in the open position with the discharge hose no longer connected to the PLCS valve.

- The cracked plastic drain cap at clean out CO2 should be replaced to prevent potential infiltration of surface water. The flags marking the elevation control points should be fixed or replaced to facilitate location of the control points.

- Consultants retained by ENVC should be responsible for updating the Excel spreadsheet databases during future sampling events. ENVC should provide the electronic data tables and request that consultants update the tables and develop plots to trend key parameters.

- All future monitoring reports should include an illustration that shows the water table and inferred directions of groundwater flow.

- Solid-state data loggers that measure both pressure head, temperature and fluid conductivity should be installed in the PLCS and the SLCS, and a rain gauge should be installed on the landfill mound. Data should be recorded continuously over a period of several months and then downloaded and reviewed before the next monitoring event. Any correlations between precipitation events and changes in fluid level, temperature and conductivity will help in evaluating the nature and significance of any leakage into or out of the PLCS and SLCS. The need for further investigations would be planned based on the findings of that assessment.

6.0 REFERENCES

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Newfoundland & Labrador Department of Environment & Conservation, Pollution Prevention Division (June 2012), *Come By Chance Secure Landfill - Operations, Maintenance and Monitoring (OMM) Manual.*

Ontario Ministry of the Environment (MOE, 2011), *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.*

APPENDIX A

Figures and Photos

Figures

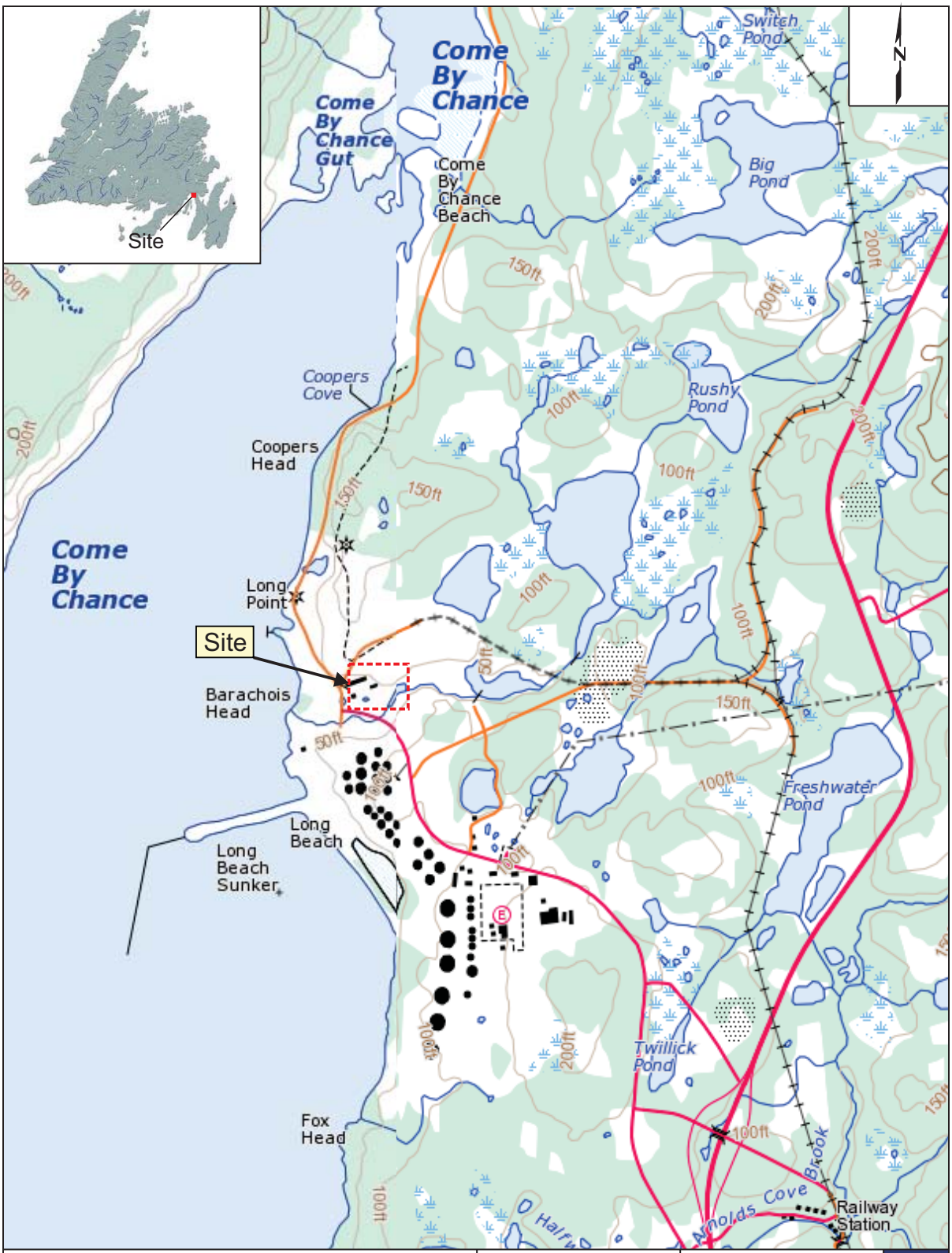

Figure 1 Location of Come By Chance Secure Landfill, Come By Chance, NL.

Project No.	Document Reference
3073C	FFC-NL-3073C-2-RP
Location	Date
Come By Chance, NL	May 2016

FFC

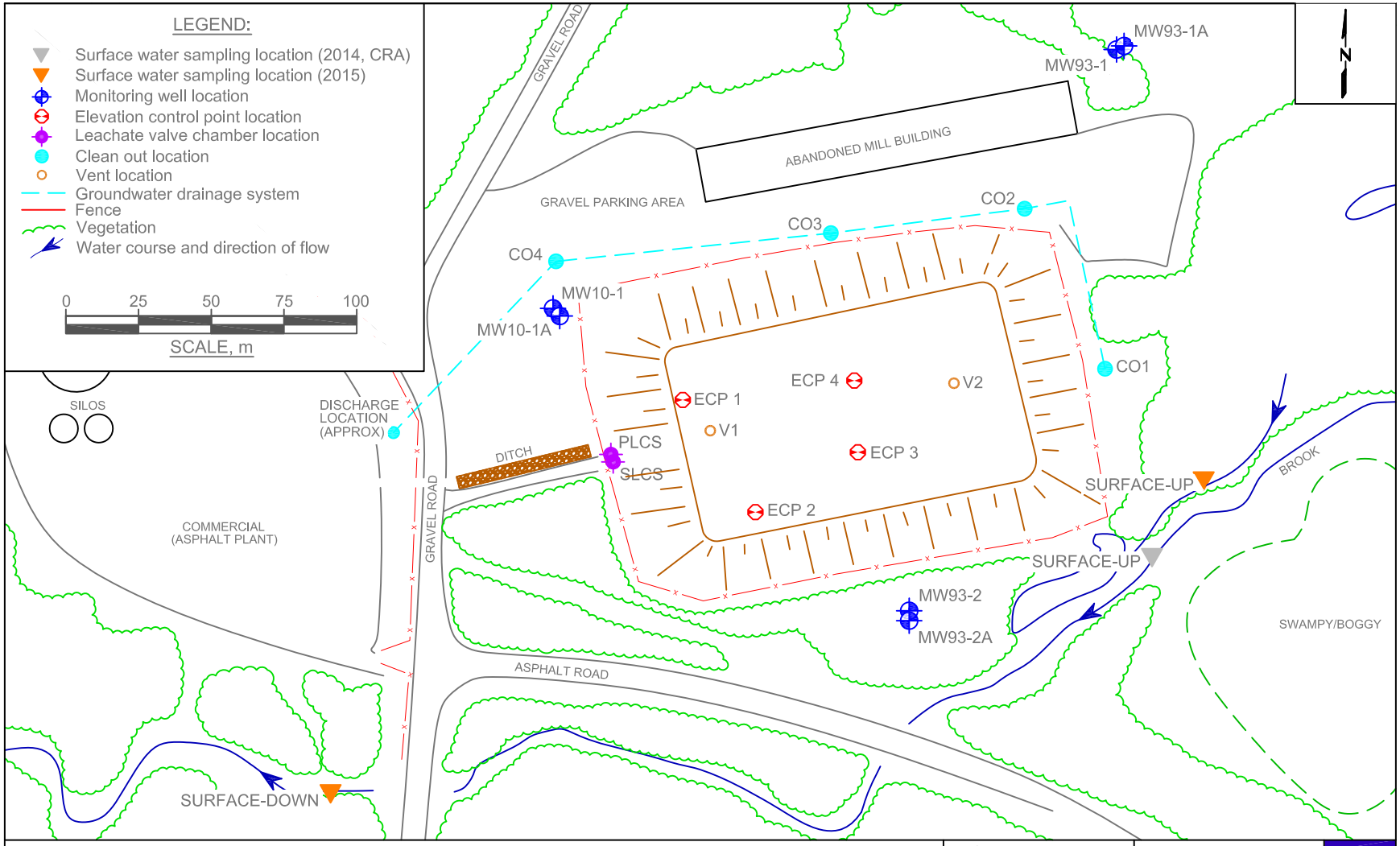

Figure 2 Come By Chance Secure Landfill site plan.

Project No.	Document Reference
3073C	FFC-NL-3073C-2-RP
Location	Date
Come By Chance, NL	May 2016

FFC

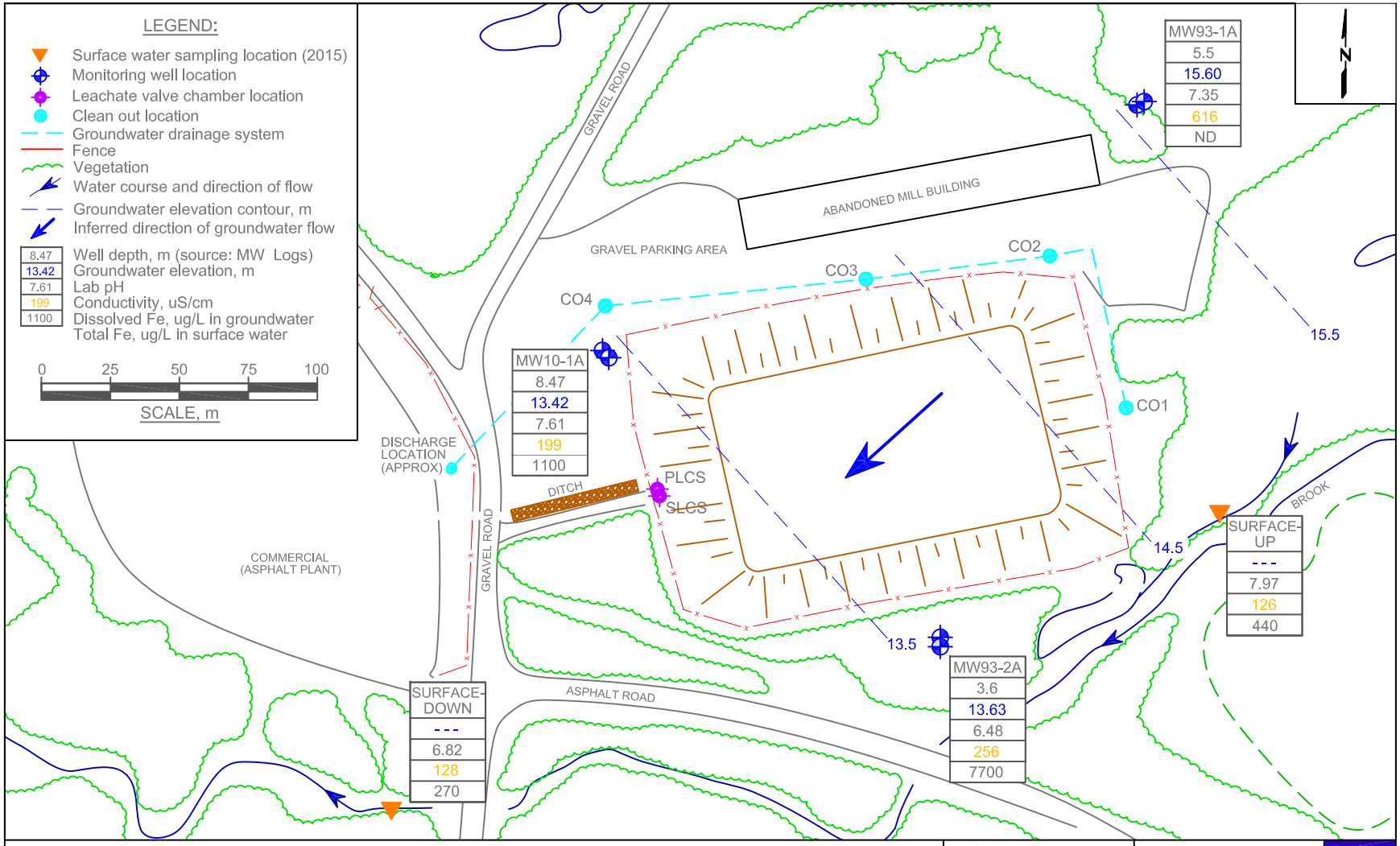

Figure 3 Inferred direction of groundwater flow.

Project No. 3073C	Document Reference FFC-NL-3073C-2-RP
Location Come By Chance, NL	Date May 2016

FFC

Photos

Photo 1 View of the stream up-gradient of the site, where sample SURF-UP was collected during the December 2015 sampling event.

Photo 2 View of the stream down-gradient of the site, where sample SURF-DOWN was collected during the December 2015 sampling event.

Photo 3 View of MW10-1A during the December 2015 sampling event.

Photo 4 View of MW93-1A during the December 2015 sampling event.

Photo 5 View of MW93-2A during the December 2015 sampling event.

Photo 6 View of the PLCS and SLCS chambers during the December 2015 sampling event.

Photo 7 View, looking east, showing the vegetative overgrowth during the landfill cover inspection (December 2015).

Photo 8 View, looking west, showing the vegetative overgrowth during the landfill cover inspection (December 2015).

Photo 9 View of survey flags for elevation control points ECP3 and ECP4 (March 2016).

Photo 10 View of groundwater drainage system clean out CO2. Note the 4" drain cap is damaged.

Photo 11 View of the groundwater drainage system outflow with visual evidence of iron floc deposits (December 2015).

Photo 12 View of the groundwater drainage system outflow with a new rodent screen installed (March 2016).

Photo 13 View, looking west, of the landfill cap following completion of vegetation control (April 2016).

Photo 14 View, looking north, of the landfill cap following completion of vegetation control (April 2016).

Photo 15 View, looking east, of the landfill cap following completion of vegetation control (April 2016).

Photo 16 View, looking south, of the landfill cap following completion of vegetation control (April 2016).

APPENDIX B

Data Tables

Table B1 Landfill Cap Inspection Form, 2015/16 Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, NL.

Date	Weather	Landfill Cap Inspection						Elevation Survey Control Points			
		Vegetation Height (m)	Vent Condition		Evidence of Erosion / Animal Burrows	Condition of Slopes	Condition of Lateral Drains	ECP 1	ECP 2	ECP 3	ECP 4
			V1	V2							
3-Dec-15	Overcast, light rain, 4°C.	0 - 2.0 m	Good	Good	Beaten grass trails from animal movement, no evident burrows or erosion.	No evidence of erosion/subsidence.	Good, no excessive settlement noted in the ground surface above the french drain.	Good	Good	Good	Good
								Survey flags should be repaired/replaced			

Notes:

1. Elevations measured using an assumed benchmark of 15.960 m at top of PLCS valve chamber.
2. ECP = Elevation Control Point

Table B2 Groundwater Drainage System Inspection Form, 2015/16 Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, NL.

Date	Weather	Outflow Drainage Pipe Condition	Outflow Drainage Pipe Flow Rate (L/min)	Clean Out Pipe Condition			
				CO1	CO2	CO3	CO4
3-Dec-15	Overcast, light rain, 4°C.	Good condition. No rodent cover present.	1.0 - 2.0	---	---	---	---
28-Mar-16	Overcast, patchy snow cover, 2°C.	Rodent cover replaced	1.0 - 2.0	No blockages, dry.	No blockages, dry. Inner plastic cap cracked.	No blockages, dry.	Unknown*

Notes:

1. CO = Clean out

* Could not be inspected due to standing water over CO4.

Table B3 Primary Leachate Collection System (PLCS) Sampling and Pumping Information, 2015/16 Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, NL.

PLCS Leachate Sampling						PLCS Pumping Event				
Date	**Weather**	**Valve Condition**	**Initial Head (mbTOVC)**	**Sample Condition**	**Analysis Conducted**	**Date**	**Weather**	**Valve Condition**	**Final Flow Rate (L/min)**	**Pumping Time (hrs)**
8-Dec-15	Overcast, 0°C.	Unknown *	0.60	Tea coloured, no odours or sheens	Gen. chemistry, total metals, dissolved metals, BTEX, TPH, VOC, PAH, PCB	Leachate pumping event not conducted.				
12-Dec-15	Overcast, 5°C.	Unknown *	0.60	Tea coloured, no odours or sheens	Toxicity	Leachate pumping event not conducted.				
28-Jan-16	Sunny, approx. 1" of snow cover, -5°C.	Unknown *	0.60	Tea coloured, no odours or sheens	Total Metals	Leachate pumping event not conducted.				

Notes:

1. mbTOVC = metres below top of valve chamber
2. * Unable to inspect valve condition during sampling as the PLCS valve chamber was filled with leachate.

Table B4 Secondary Leachate Collection System (SLCS) Sampling and Pumping Information, 2015/16 Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, NL.

SLCS Leachate Sampling						SLCS Pumping Event				
Date	**Weather**	**Valve Condition**	**Initial Head (mbTOVC)**	**Sample Condition**	**Analysis Conducted**	**Date**	**Weather**	**Valve Condition**	**Final Flow Rate (L/min)**	**Pumping Time (hrs)**
8-Dec-15	Overcast, 0°C.	Unknown *	0.59	Tea coloured, no odours or sheens	Gen. chemistry, total metals, dissolved metals, BTEX, TPH, VOC, PAH, PCB	Leachate pumping event not conducted.				
12-Dec-15	Overcast, 5°C.	Unknown *	0.59	Tea coloured, no odours or sheens	Toxicity	Leachate pumping event not conducted.				
28-Jan-16	Sunny, approx. 1" of snow cover, -5°C.	Unknown *	0.60	Tea coloured, no odours or sheens	Total Metals	Leachate pumping event not conducted.				

Notes:

1. mbTOVC = metres below top of valve chamber
2. * Unable to inspect valve condition during sampling as the SLCS valve chamber was filled with leachate.

Table B5 Surface Water Sampling and Analysis Information, 2015/16 Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, NL.

Date	Weather	Surface Water Samples					
		Surface Up			Surface Down		
		Sample Condition	Approx. Flow Rate	Analysis Conducted	Sample Condition	Approx. Flow Rate	Analysis Conducted
8-Dec-15	Overcast, 0°C.	Clear, Low TSS, No odours, No sheens.	Calm, no movement at surface.	Gen. chemistry, total metals, chromium (3+ and VI), BTEX, TPH, VOC, PAH, PCB	Clear, Low TSS, No odours, No sheens.	500 Lpm	Gen. chemistry, total metals, chromium (3+ and VI), BTEX, TPH, VOC, PAH, PCB

Table B6 Groundwater Sampling and Analysis Information, 2015/16 Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, NL.

Date	Weather	Groundwater Samples								
		MW93-1A			MW93-2A			MW10-1A		
		Water Depth (mbTOC)	Sample Condition	Analysis Conducted	Water Depth (mbTOC)	Sample Condition	Analysis Conducted	Water Depth (mbTOC)	Sample Condition	Analysis Conducted
8-Dec-15	Overcast, 0°C.	2.045	Light brown, Moderate TSS, No sheen, No odours. Well almost dry after 3 well volumes.	Gen. chemistry, dissolved metals, BTEX, TPH, VOC, PAH, PCB	1.625	Reddish brown, Moderate TSS, No sheen, No odours.	Gen. chemistry, dissolved metals, BTEX, TPH, VOC, PAH, PCB	3.475	Light brown, Low TSS, no sheen, no odours.	Gen. chemistry, dissolved metals, BTEX, TPH, VOC, PAH, PCB

Notes:

1. mbtoc = metres below top of PVC casing

Table B7 GPS coordinates of key site features.

ID	Northing m	Easting m
PLCS	5299282.569	724372.496
SLCS	5299280.034	724373.295
MW93-1	5299421.760	724546.360
MW93-1A	5299422.020	724548.440
MW93-2	5299235.085	724470.927
MW93-2A	5299232.673	724472.066
MW10-1	5299332.811	724352.601
MW10-1A	5299330.374	724354.471
SURFACE UP	5299241.840	724543.520
SURFACE DOWN	5299166.473	724273.883
ECP 1	5299300.345	724396.495
ECP 2	5299262.242	724421.331
ECP 3	5299284.519	724455.814
ECP 4	5299308.292	724454.469
CLEAN-OUT 1	5299312.040	724542.394
CLEAN-OUT 2	5299367.086	724514.748
CLEAN-OUT 3	5299358.686	724448.126
CLEAN-OUT 4	5299348.991	724353.634
VENT 1	5299290.775	724406.665
VENT 2	5299307.780	724490.445

GPS coordinates collected using a Topcon GRS-1 in December 2016.
All points recorded using UTM Zone 21 coordinate system.

Table B8 Elevation control point survey data.

ID	Original Elevation	2014		2016	
		Survey Elevation	Difference	Survey Elevation	Difference
	m	m	m	m	m
PLCS	15.960	-	-	-	-
ECP1	20.439	20.424	0.015	20.421	0.018
ECP2	20.442	20.429	0.013	20.416	0.026
ECP3	20.935	20.959	-0.024	20.928	0.007
ECP4	21.212	21.219	-0.007	21.171	0.041

All elevations surveyed to benchmark PLCS.

Differences calculated in relation to original elevation (positive indicates amount of settlement).

Table B9 Field measurements for surface water samples.

ID	Location	Date	pH	Conductivity	Dissolved Oxygen	Temperature
			pH units	µS/cm	mg/L	°C
SURFACE UP	Brook on the south-east corner of landfill.	08-Dec-15	7.97	125.8	12.27	2.3
SURFACE DOWN	West of landfill, on the opposite side of Main Road.	08-Dec-15	6.82	128.4	13.12	2.0

Table B10 Surface water analytical results - general chemistry.

Maxxam ID	Units	Guideline *	RDL	BMW241	RDL	BMW242
Sampling Date				08-Dec-15		08-Dec-15
COC Number				540682-01-01		540682-01-01
Fracflow Sample ID				3073-CBC-SURF-UP		3073-CBC-SURF-DOWN
Calculated Parameters						
Anion Sum	me/L	-	N/A	1.02	N/A	1.12
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	1.0	9.3	1.0	9.1
Calculated TDS	mg/L	-	1.0	62	1.0	66
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	1.0	ND	1.0	ND
Cation Sum	me/L	-	N/A	1.04	N/A	1.09
Hardness (CaCO3)	mg/L	-	1.0	22	1.0	23
Ion Balance (% Difference)	%	-	N/A	0.970	N/A	1.36
Langelier Index (@ 20C)	N/A	-		-2.42		-2.47
Langelier Index (@ 4C)	N/A	-		-2.67		-2.72
Nitrate (N)	mg/L	-	0.050	0.10	0.050	0.072
Saturation pH (@ 20C)	N/A	-		9.54		9.53
Saturation pH (@ 4C)	N/A	-		9.79		9.79
Inorganics						
Total Alkalinity (Total as CaCO3)	mg/L	-	5.0	9.3	5.0	9.1
Dissolved Chloride (Cl)	mg/L	120	1.0	24	1.0	26
Colour	TCU	-	10	44	5.0	47
Nitrate + Nitrite (N)	mg/L	-	0.050	0.10	0.050	0.072
Nitrite (N)	mg/L	0.06	0.010	ND	0.010	ND
Nitrogen (Ammonia Nitrogen)	mg/L	-	0.050	ND	0.050	ND
Total Organic Carbon (C)	mg/L	-	0.5	7.16	0.5	7.8
Orthophosphate (P)	mg/L	-	0.010	ND	0.010	ND
pH	pH	6.5 - 9.0	N/A	7.12	N/A	7.06
Field Measured pH	pH	6.5 - 9.0	N/A	7.97	N/A	6.82
Reactive Silica (SiO2)	mg/L	-	0.50	2.3	0.50	2.3
Dissolved Sulphate (SO4)	mg/L	-	2.0	7.0	2.0	8.8
Turbidity	NTU	-	0.10	1.2	0.10	1.7
Conductivity	uS/cm	-	1.0	120	1.0	120

** Guideline refers to the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life (FAL) (Updated 2007).*

RDL = Reportable Detection Limit.

ND = Not detected.

N/A = Not Applicable.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B11 Surface water analytical results - total metals, plus chromium (trivalent and hexavalent).

Maxxam ID	Units	Guideline *	RDL	BMW241	RDL	BMW242
Sampling Date				08-Dec-15		08-Dec-15
COC Number				540682-01-01		540682-01-01
Fracflow Sample ID				3073-CBC-SURF-UP		3073-CBC-SURF-DOWN
Metals						
Total Aluminum (Al)	ug/L	100 (1)	5.0	99	5.0	**110**
Total Antimony (Sb)	ug/L	-	1.0	ND	1.0	ND
Total Arsenic (As)	ug/L	5	1.0	ND	1.0	ND
Total Barium (Ba)	ug/L	-	1.0	9.1	1.0	9.3
Total Beryllium (Be)	ug/L	-	1.0	ND	1.0	ND
Total Bismuth (Bi)	ug/L	-	2.0	ND	2.0	ND
Total Boron (B)	ug/L	1500	50	ND	50	ND
Total Cadmium (Cd)	ug/L	0.04	0.010	ND	0.010	ND
Total Calcium (Ca)	ug/L	-	100	6400	100	6800
Total Chromium (Cr)	ug/L	-	1.0	ND	1.0	ND
Chromium (+3)	mg/L	0.001	0.0089	ND	0.0089	ND
Chromium (VI)	ug/L	0.50	1	ND	1	ND
Total Cobalt (Co)	ug/L	-	0.40	ND	0.40	ND
Total Copper (Cu)	ug/L	2 (2)	2.0	ND	2.0	ND
Total Iron (Fe)	ug/L	300	50	**440**	50	270
Total Lead (Pb)	ug/L	1 (2)	0.50	ND	0.50	ND
Total Magnesium (Mg)	ug/L	-	100	1300	100	1500
Total Manganese (Mn)	ug/L	-	2.0	88	2.0	66
Total Molybdenum (Mo)	ug/L	73	2.0	ND	2.0	ND
Total Nickel (Ni)	ug/L	25 (2)	2.0	ND	2.0	ND
Total Phosphorus (P)	ug/L	-	100	ND	100	ND
Total Potassium (K)	ug/L	-	100	550	100	430
Total Selenium (Se)	ug/L	1	1.0	ND	1.0	ND
Total Silver (Ag)	ug/L	0.1	0.10	ND	0.10	ND
Total Sodium (Na)	ug/L	-	100	13000	100	14000
Total Strontium (Sr)	ug/L	-	2.0	19	2.0	20
Total Thallium (Tl)	ug/L	0.8	0.10	ND	0.10	ND
Total Tin (Sn)	ug/L	-	2.0	ND	2.0	ND
Total Titanium (Ti)	ug/L	-	2.0	11	2.0	ND
Total Uranium (U)	ug/L	15	0.10	ND	0.10	ND
Total Vanadium (V)	ug/L	-	2.0	ND	2.0	ND
Total Zinc (Zn)	ug/L	30	5.0	ND	5.0	ND

** Guideline refers to the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life (FAL) (Updated 2007).*

RDL = Reportable Detection Limit.

ND = Not detected.

(1) Aluminum guideline: 5 µg/L if pH <6.5; 100 µg/L if pH ≥ 6.5.

(2) Guideline calculated as a function of water hardness.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B12 Surface water analytical results - BTEX and TPH.

Maxxam ID	**Units**	**RDL**	**Guideline ***	BMK622	BMK623
Sampling Date				08-Dec-15	08-Dec-15
COC Number				C#5406820101	C#5406820101
Fracflow Sample ID				3073-CBC-SURF-UP	3073-CBC-SURF-DOWN
Petroleum Hydrocarbons					
Benzene	mg/L	0.0010	4	ND	ND
Toluene	mg/L	0.0010	0.39	ND	ND
Ethylbenzene	mg/L	0.0010	2	ND	ND
Total Xylenes	mg/L	0.0020	-	ND	ND
C6 - C10 (less BTEX)	mg/L	0.010	-	ND	ND
>C10-C16 Hydrocarbons	mg/L	0.050	-	ND	ND
>C16-C21 Hydrocarbons	mg/L	0.050	-	ND	ND
>C21-<C32 Hydrocarbons	mg/L	0.10	-	ND	ND
Modified TPH (Tier1)	mg/L	0.10	-	ND	ND
Reached Baseline at C32	mg/L	N/A		Yes	Yes

** Guideline refers to the British Columbia Contaminated Site Regulation (B.C. Reg. 375/96) Schedule 6 Generic Numerical Water Standards for Aquatic Life (Aquatic Life Generic Standards - freshwater).*

RDL = Reported Detection Limit.
ND = Not detected.
Shaded / Bold - Indicates parameter is above applicable criteria.

Table B13 Surface water analytical results - volatile organic compounds (VOCs).

Maxxam ID	Units	RDL	Guideline *	BMW241	BMW242
Sampling Date				08-Dec-15	08-Dec-15
COC Number				540682-01-01	540682-01-01
Fracflow Sample ID				3073-CBC-SURF-UP	3073-CBC-SURF-DOWN
Chlorobenzenes					
1,2-Dichlorobenzene	ug/L	0.50	0.7	ND	ND
1,3-Dichlorobenzene	ug/L	1.0	150	ND	ND
1,4-Dichlorobenzene	ug/L	1.0	26	ND	ND
Chlorobenzene	ug/L	1.0	-	ND	ND
Volatile Organics					
1,1,1-Trichloroethane	ug/L	1.0	-	ND	ND
1,1,2,2-Tetrachloroethane	ug/L	0.50	-	ND	ND
1,1,2-Trichloroethane	ug/L	1.0	-	ND	ND
1,1-Dichloroethane	ug/L	2.0	-	ND	ND
1,1-Dichloroethylene	ug/L	0.50	-	ND	ND
1,2-Dichloroethane	ug/L	1.0	100	ND	ND
1,2-Dichloropropane	ug/L	0.50	-	ND	ND
Benzene	ug/L	1.0	370	ND	ND
Bromodichloromethane	ug/L	1.0	-	ND	ND
Bromoform	ug/L	1.0	-	ND	ND
Bromomethane	ug/L	0.50	-	ND	ND
Carbon Tetrachloride	ug/L	0.50	13.3	ND	ND
Chloroethane	ug/L	8.0	-	ND	ND
Chloroform	ug/L	1.0	1.8	ND	ND
Chloromethane	ug/L	8.0	-	ND	ND
cis-1,2-Dichloroethylene	ug/L	0.50	-	ND	ND
cis-1,3-Dichloropropene	ug/L	0.50	-	ND	ND
Dibromochloromethane	ug/L	1.0	-	ND	ND
Ethylbenzene	ug/L	1.0	90	ND	ND
Ethylene Dibromide	ug/L	0.20	-	ND	ND
Methyl t-butyl ether (MTBE)	ug/L	2.0	10000	ND	ND
Methylene Chloride(Dichloromethane)	ug/L	3.0	98.1	ND	ND
o-Xylene	ug/L	1.0	-	ND	ND
p+m-Xylene	ug/L	2.0	-	ND	ND
Styrene	ug/L	1.0	72	ND	ND
Tetrachloroethylene	ug/L	1.0	-	ND	ND
Toluene	ug/L	1.0	2	ND	ND
Total Trihalomethanes	ug/L	1.0	-	ND	ND
Total Xylenes	ug/L	1.0	-	ND	ND
trans-1,2-Dichloroethylene	ug/L	0.50	-	ND	ND
trans-1,3-Dichloropropene	ug/L	0.50	-	ND	ND
Trichloroethylene	ug/L	1.0	-	ND	ND
Trichlorofluoromethane (FREON 11)	ug/L	8.0	-	ND	ND
Vinyl Chloride	ug/L	0.50	-	ND	ND

** Guideline refers to the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life (FAL) (Updated 2007).*

RDL = Reportable Detection Limit.

ND = Not detected.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B14 Surface water analytical results - polycyclic aromatic hydrocarbons (PAHs)

Maxxam ID	**Units**	**RDL**	**Guideline ***	BMW241	BMW242
Sampling Date				08-Dec-15	08-Dec-15
COC Number				540682-01-01	540682-01-01
Fracflow Sample ID				3073-CBC-SURF-UP	3073-CBC-SURF-DOWN
Polyaromatic Hydrocarbons					
1-Methylnaphthalene	ug/L	0.050	-	ND	ND
2-Methylnaphthalene	ug/L	0.050	-	ND	ND
Acenaphthene	ug/L	0.010	5.8	ND	ND
Acenaphthylene	ug/L	0.010	-	ND	ND
Anthracene	ug/L	0.010	0.012	ND	ND
Benzo(a)anthracene	ug/L	0.010	0.018	ND	ND
Benzo(a)pyrene	ug/L	0.010	0.015	ND	ND
Benzo(b)fluoranthene	ug/L	0.010	-	ND	ND
Benzo(g,h,i)perylene	ug/L	0.010	-	ND	ND
Benzo(j)fluoranthene	ug/L	0.010	-	ND	ND
Benzo(k)fluoranthene	ug/L	0.010	-	ND	ND
Chrysene	ug/L	0.010	-	ND	ND
Dibenz(a,h)anthracene	ug/L	0.010	-	ND	ND
Fluoranthene	ug/L	0.010	0.04	ND	ND
Fluorene	ug/L	0.010	3	ND	ND
Indeno(1,2,3-cd)pyrene	ug/L	0.010	-	ND	ND
Naphthalene	ug/L	0.20	1.1	ND	ND
Perylene	ug/L	0.010	-	ND	ND
Phenanthrene	ug/L	0.010	0.4	ND	ND
Pyrene	ug/L	0.010	0.025	ND	ND

** Guideline refers to the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life (FAL) (Updated 2007).*

RDL = Reportable Detection Limit.

ND = Not detected.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B15 Surface water analytical results - polychlorinated biphenyls (PCBs).

Maxxam ID	**Units**	**RDL**	**Guideline ***	BMW241	BMW242
Sampling Date				08-Dec-15	08-Dec-15
COC Number				540682-01-01	540682-01-01
Fracflow Sample ID				3073-CBC-SURF-UP	3073-CBC-SURF-DOWN
PCBs					
Aroclor 1016	ug/L	0.050	-	ND	ND
Aroclor 1221	ug/L	0.050	-	ND	ND
Aroclor 1232	ug/L	0.050	-	ND	ND
Aroclor 1248	ug/L	0.050	-	ND	ND
Aroclor 1242	ug/L	0.050	-	ND	ND
Aroclor 1254	ug/L	0.050	-	ND	ND
Aroclor 1260	ug/L	0.050	-	ND	ND
Calculated Total PCB	ug/L	0.050	-	ND	ND

** Guideline refers to the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life (FAL) (Updated 2007).*

RDL = Reportable Detection Limit.

ND = Not detected.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B16 Volumes of fluid removed during well development.

ID	Date	Ground Surface Elevation	Depth to End of Well	Static Water Level	Groundwater Elevation	Height of Water Column	One Well Volume	Volume Purged
		m amsl	m bgs	m bgs	m amsl	m	L	L
MW93-1A	08-Dec-15	16.31	4.735	0.710	15.600	4.025	8.2	24.0
MW93-2A	08-Dec-15	14.31	2.860	0.685	13.625	2.175	4.4	13.2
MW10-1A	08-Dec-15	16.00	3.810	2.585	13.415	1.225	2.5	9.0

amsl: Above mean sea level.
bgs: Below ground surface.

Table B17 Field measurements for groundwater samples.

ID	Date	pH	Conductivity	Temperature
		pH units	µS/cm	°C
MW93-1A	08-Dec-15	7.35	616	7.4
MW93-2A	08-Dec-15	6.48	256.0	7.5
MW10-1A	08-Dec-15	7.61	199.4	7.9

Table B18 Groundwater analytical results - general chemistry.

Maxxam ID	Units	Guideline *	RDL	BMW243	RDL	BMW244	RDL	BMW245	BMW246
Sampling Date				08-Dec-15		08-Dec-15		08-Dec-15	08-Dec-15
COC Number				540682-01-01		540682-01-01		540682-01-01	540682-01-01
Fracflow Sample ID				3073-CBC-MW-93-1A		3073-CBC-MW93-2A		3073-CBC-MW10-1A	3073-CBC-MW-DUP1
Calculated Parameters									
Anion Sum	me/L	-	N/A	6.60	N/A	2.22	N/A	2.22	2.20
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	1.0	270	1.0	14	1.0	72	71
Calculated TDS	mg/L	-	1.0	350	1.0	150	1.0	130	130
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	1.0	2.6	1.0	ND	1.0	ND	ND
Cation Sum	me/L	-	N/A	6.46	N/A	2.31	N/A	2.05	2.05
Hardness (CaCO3)	mg/L	-	1.0	150	1.0	60	1.0	85	85
Ion Balance (% Difference)	%	-	N/A	1.07	N/A	1.99	N/A	3.98	3.53
Langelier Index (@ 20C)	N/A	-		0.561		-2.85		-0.792	-0.799
Langelier Index (@ 4C)	N/A	-		0.312		-3.10		-1.04	-1.05
Nitrate (N)	mg/L	-	0.050	ND	0.050	ND	0.050	0.11	0.11
Saturation pH (@ 20C)	N/A	-		7.45		9.02		8.04	8.05
Saturation pH (@ 4C)	N/A	-		7.69		9.28		8.30	8.30
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	-	25	280	5.0	14	5.0	72	71
Dissolved Chloride (Cl)	mg/L	2300	1.0	11	1.0	31	1.0	11	11
Colour	TCU	-	5.0	ND	5.0	36	5.0	7.4	8.1
Nitrate + Nitrite (N)	mg/L	-	0.050	ND	0.050	ND	0.050	0.11	0.11
Nitrite (N)	mg/L	-	0.010	ND	0.010	ND	0.010	ND	ND
Nitrogen (Ammonia Nitrogen)	mg/L	-	0.050	ND	0.050	0.36	0.050	0.13	0.11
Total Organic Carbon (C)	mg/L		0.500	1.680	0.500	10.7	0.500	14.9	18.5
Orthophosphate (P)	mg/L	-	0.010	0.011	0.010	0.012	0.010	0.012	0.012
pH	pH	-	N/A	8.01	N/A	6.18	N/A	7.25	7.25
Field Measured pH	pH	-	N/A	7.35	N/A	6.48	N/A	7.61	-
Reactive Silica (SiO2)	mg/L	-	0.50	4.4	0.50	8.0	0.50	9.7	10
Dissolved Sulphate (SO4)	mg/L	-	2.0	35	10	51	2.0	22	22
Turbidity	NTU	-	1.0	>1000	1.0	160	1.0	710	>1000
Conductivity	uS/cm	-	1.0	580	1.0	250	1.0	200	200

** Guideline refers to the Ontario Ministry of the Environment (MOE) "Soil, Ground Water, and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.*

RDL = Reportable Detection Limit.

ND = Not detected.

N/A = Not Applicable.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B19 Groundwater analytical results - dissolved metals.

Maxxam ID	Units	Guideline *	RDL	BMW243	BMW244	BMW245	BMW246
Sampling Date				08-Dec-15	08-Dec-15	08-Dec-15	08-Dec-15
COC Number				540682-01-01	540682-01-01	540682-01-01	540682-01-01
Fracflow Sample ID				3073-CBC-MW-93-1A	3073-CBC-MW93-2A	3073-CBC-MW10-1A	3073-CBC-MW-DUP1
Metals							
Dissolved Aluminum (Al)	ug/L	-	5.0	33	170	32	33
Dissolved Antimony (Sb)	ug/L	20000	1.0	ND	ND	ND	ND
Dissolved Arsenic (As)	ug/L	1900	1.0	ND	ND	ND	ND
Dissolved Barium (Ba)	ug/L	29000	1.0	74	54	39	38
Dissolved Beryllium (Be)	ug/L	67	1.0	ND	ND	ND	ND
Dissolved Bismuth (Bi)	ug/L	-	2.0	ND	ND	ND	ND
Dissolved Boron (B)	ug/L	45000	50	59	110	ND	ND
Dissolved Cadmium (Cd)	ug/L	2.7	0.010	ND	0.80	0.030	0.028
Dissolved Calcium (Ca)	ug/L	-	100	35000	15000	28000	29000
Dissolved Chromium (Cr)	ug/L	810	1.0	ND	ND	ND	ND
Dissolved Cobalt (Co)	ug/L	66	0.40	2.5	2.9	6.3	6.2
Dissolved Copper (Cu)	ug/L	87	2.0	ND	ND	5.8	5.6
Dissolved Iron (Fe)	ug/L	-	50	ND	7700	1100	1100
Dissolved Lead (Pb)	ug/L	25	0.50	ND	ND	ND	ND
Dissolved Magnesium (Mg)	ug/L	-	100	16000	5200	3300	3200
Dissolved Manganese (Mn)	ug/L	-	2.0	68	5700	590	590
Dissolved Molybdenum (Mo)	ug/L	9200	2.0	18	ND	ND	ND
Dissolved Nickel (Ni)	ug/L	490	2.0	3.1	2.6	6.4	6.5
Dissolved Phosphorus (P)	ug/L	-	100	ND	ND	ND	ND
Dissolved Potassium (K)	ug/L	-	100	2400	1500	710	690
Dissolved Selenium (Se)	ug/L	63	1.0	ND	ND	ND	ND
Dissolved Silver (Ag)	ug/L	1.5	0.10	ND	ND	ND	ND
Dissolved Sodium (Na)	ug/L	2300000	100	77000	18000	6600	6600
Dissolved Strontium (Sr)	ug/L	-	2.0	230	68	68	67
Dissolved Thallium (Tl)	ug/L	510	0.10	ND	ND	ND	ND
Dissolved Tin (Sn)	ug/L	-	2.0	ND	ND	ND	ND
Dissolved Titanium (Ti)	ug/L	-	2.0	ND	ND	ND	ND
Dissolved Uranium (U)	ug/L	420	0.10	5.0	ND	ND	ND
Dissolved Vanadium (V)	ug/L	250	2.0	ND	ND	ND	ND
Dissolved Zinc (Zn)	ug/L	1100	5.0	ND	290	8.4	7.7

** Guideline refers to the Ontario Ministry of the Environment (MOE) "Soil, Ground Water, and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.*

RDL = Reportable Detection Limit.

ND = Not detected.

N/A = Not Applicable.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B20 Groundwater analytical results - BTEX and TPH.

Maxxam ID	**Units**	**RDL**	**Guideline ***	BMK624	BMK625	BMK626	BMK627
Sampling Date				08-Dec-15	08-Dec-15	08-Dec-15	08-Dec-15
COC Number				C#5406820101	C#5406820101	C#5406820101	C#5406820101
Fracflow Sample ID				3073-CBC-MW-93-1A	3073-CBC-MW93-2A	3073-CBC-MW10-1A	3073-CBC-MW-DUP1
Petroleum Hydrocarbons							
Benzene	mg/L	0.0010	20	ND	ND	ND	ND
Toluene	mg/L	0.0010	20	ND	ND	ND	ND
Ethylbenzene	mg/L	0.0010	20	ND	ND	ND	ND
Total Xylenes	mg/L	0.0020	20	ND	ND	ND	ND
C6 - C10 (less BTEX)	mg/L	0.010	-	ND	ND	ND	ND
>C10-C16 Hydrocarbons	mg/L	0.050	-	ND	ND	ND	ND
>C16-C21 Hydrocarbons	mg/L	0.050	-	ND	ND	ND	ND
>C21-<C32 Hydrocarbons	mg/L	0.10	-	ND	ND	ND	ND
Modified TPH (Tier1)	mg/L	0.10	20	ND	ND	ND	ND
Reached Baseline at C32	mg/L	N/A	-	Yes	Yes	Yes	Yes

** Guideline refers to Atlantic Risk Based Corrective Action (RBCA) Version 3 (January 2015) Tier 1 Risk Based Screening Levels (RBSLs) for a commercial site with non-potable water and coarse-grained soil.*

RDL - Reported Detection Limit.

ND = Not detected.

N/A = Not applicable.

(1) TEH sample contained sediment.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B21 Groundwater analytical results - volatile organic compounds (VOCs).

Maxxam ID	Units	RDL	Guideline *	BMW243	BMW244	BMW245	BMW246
Sampling Date				08-Dec-15	08-Dec-15	08-Dec-15	08-Dec-15
COC Number				540682-01-01	540682-01-01	540682-01-01	540682-01-01
Fracflow Sample ID				3073-CBC-MW-93-1A	3073-CBC-MW93-2A	3073-CBC-MW10-1A	3073-CBC-MW-DUP1
Chlorobenzenes							
1,2-Dichlorobenzene	ug/L	0.50	4600	ND	ND	ND	ND
1,3-Dichlorobenzene	ug/L	1.0	9600	ND	ND	ND	ND
1,4-Dichlorobenzene	ug/L	1.0	8	ND	ND	ND	ND
Chlorobenzene	ug/L	1.0	630	ND	ND	ND	ND
Volatile Organics							
1,1,1-Trichloroethane	ug/L	1.0	640	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ug/L	0.50	3.2	ND	ND	ND	ND
1,1,2-Trichloroethane	ug/L	1.0	4.7	ND	ND	ND	ND
1,1-Dichloroethane	ug/L	2.0	320	ND	ND	ND	ND
1,1-Dichloroethylene	ug/L	0.50	1.6	ND	ND	ND	ND
1,2-Dichloroethane	ug/L	1.0	1.6	ND	ND	ND	ND
1,2-Dichloropropane	ug/L	0.50	16	ND	ND	3.9	3.0
Benzene	ug/L	1.0	44	ND	ND	ND	ND
Bromodichloromethane	ug/L	1.0	85000	ND	ND	ND	ND
Bromoform	ug/L	1.0	380	ND	ND	ND	ND
Bromomethane	ug/L	0.50	5.6	ND	ND	ND	ND
Carbon Tetrachloride	ug/L	0.50	0.79	ND	ND	ND	ND
Chloroethane	ug/L	8.0	-	ND	ND	ND	ND
Chloroform	ug/L	1.0	2.4	ND	ND	ND	ND
Chloromethane	ug/L	8.0	-	ND	ND	ND	ND
cis-1,2-Dichloroethylene	ug/L	0.50	1.6	ND	ND	ND	ND
cis-1,3-Dichloropropene	ug/L	0.50	5.2	ND	ND	ND	ND
Dibromochloromethane	ug/L	1.0	82000	ND	ND	ND	ND
Ethylbenzene	ug/L	1.0	2300	ND	ND	ND	ND
Ethylene Dibromide	ug/L	0.20	0.25	ND	ND	ND	ND
Methyl t-butyl ether (MTBE)	ug/L	2.0	190	ND	ND	ND	ND
Methylene Chloride(Dichloromethane)	ug/L	3.0	610	ND	ND	ND	ND
o-Xylene	ug/L	1.0	-	ND	ND	ND	ND
p+m-Xylene	ug/L	2.0	-	ND	ND	ND	ND
Styrene	ug/L	1.0	1300	ND	ND	ND	ND
Tetrachloroethylene	ug/L	1.0	1.6	ND	ND	ND	ND
Toluene	ug/L	1.0	18000	ND	ND	ND	ND
Total Trihalomethanes	ug/L	1.0	-	ND	ND	ND	ND
Total Xylenes	ug/L	1.0	4200	ND	ND	ND	ND
trans-1,2-Dichloroethylene	ug/L	0.50	1.6	ND	ND	ND	ND
trans-1,3-Dichloropropene	ug/L	0.50	5.2	ND	ND	ND	ND
Trichloroethylene	ug/L	1.0	1.6	ND	ND	ND	ND
Trichlorofluoromethane (FREON 11)	ug/L	8.0	2500	ND	ND	ND	ND
Vinyl Chloride	ug/L	0.50	0.5	ND	ND	ND	ND

** Guideline refers to the Ontario Ministry of the Environment (MOE) "Soil, Ground Water, and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.*

RDL = Reportable Detection Limit.

ND = Not detected.

(1) VOC sample contained sediment.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B22 Groundwater analytical results - polycyclic aromatic hydrocarbons (PAHs).

Maxxam ID	**Units**	**RDL**	**Guideline ***	BMW243	BMW244	BMW245	BMW246
Sampling Date				08-Dec-15	08-Dec-15	08-Dec-15	08-Dec-15
COC Number				540682-01-01	540682-01-01	540682-01-01	540682-01-01
Fracflow Sample ID				3073-CBC-MW-93-1A	3073-CBC-MW93-2A	3073-CBC-MW10-1A	3073-CBC-MW-DUP1
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	ug/L	0.050	1800	ND	ND	ND	ND
2-Methylnaphthalene	ug/L	0.050	1800	ND	ND	ND	ND
Acenaphthene	ug/L	0.010	600	ND	ND	ND	ND
Acenaphthylene	ug/L	0.010	1.8	ND	ND	ND	ND
Anthracene	ug/L	0.010	2.4	ND	ND	ND	ND
Benzo(a)anthracene	ug/L	0.010	4.7	ND	ND	ND	ND
Benzo(a)pyrene	ug/L	0.010	0.81	ND	ND	ND	ND
Benzo(b)fluoranthene	ug/L	0.010	0.75	ND	ND	ND	ND
Benzo(g,h,i)perylene	ug/L	0.010	0.2	ND	ND	ND	ND
Benzo(j)fluoranthene	ug/L	0.010	-	ND	ND	ND	ND
Benzo(k)fluoranthene	ug/L	0.010	0.4	ND	ND	ND	ND
Chrysene	ug/L	0.010	1	ND	ND	ND	ND
Dibenz(a,h)anthracene	ug/L	0.010	0.52	ND	ND	ND	ND
Fluoranthene	ug/L	0.010	130	ND	ND	ND	ND
Fluorene	ug/L	0.010	400	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ug/L	0.010	0.2	ND	ND	ND	ND
Naphthalene	ug/L	0.20	1400	ND	ND	ND	ND
Perylene	ug/L	0.010	-	ND	ND	0.027	0.028
Phenanthrene	ug/L	0.010	580	0.013	ND	ND	ND
Pyrene	ug/L	0.010	68	ND	ND	ND	ND

** Guideline refers to the Ontario Ministry of the Environment (MOE) "Soil, Ground Water, and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.*

RDL = Reportable Detection Limit.

ND = Not detected.

(1) PAH sample contained sediment.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B23 Groundwater analytical results - polychlorinated biphenyls (PCBs).

Maxxam ID	Units	RDL	Guideline *	BMW243	BMW244	BMW245	BMW246
Sampling Date				08-Dec-15	08-Dec-15	08-Dec-15	08-Dec-15
COC Number				540682-01-01	540682-01-01	540682-01-01	540682-01-01
Fracflow Sample ID				3073-CBC-MW-93-1A	3073-CBC-MW93-2A	3073-CBC-MW10-1A	3073-CBC-MW-DUP1
PCBs							
Aroclor 1016	ug/L	0.050	-	ND	ND	ND	ND
Aroclor 1221	ug/L	0.050	-	ND	ND	ND	ND
Aroclor 1232	ug/L	0.050	-	ND	ND	ND	ND
Aroclor 1248	ug/L	0.050	-	ND	ND	ND	ND
Aroclor 1242	ug/L	0.050	-	ND	ND	ND	ND
Aroclor 1254	ug/L	0.050	-	ND	ND	ND	ND
Aroclor 1260	ug/L	0.050	-	ND	ND	ND	ND
Calculated Total PCB	ug/L	0.050	7.8	ND	ND	ND	ND

** Guideline refers to the Ontario Ministry of the Environment (MOE) "Soil, Ground Water, and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.*

RDL = Reportable Detection Limit.

ND = Not detected.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B24 Field measurements for leachate samples.

ID	Date	Fluid Depth	pH	Conductivity	Dissolved Oxygen	Temperature
		m btoc	pH units	µS/cm	mg/L	°C
PLCS	08-Dec-15	0.60	7.86	372	11.5	4.6
SLCS	08-Dec-15	0.59	7.65	606	11.17	4.6

Table B25 Leachate analytical results - general chemistry.

Maxxam ID	Units	Guideline *		RDL	BMW247	BMW248
Sampling Date		NLR 65/03	CCME CWQGs FAL		08-Dec-15	08-Dec-15
COC Number					540682-01-01	540682-01-01
Fracflow Sample ID					3073-CBC-PLCS	3073-CBC-SLCS
Calculated Parameters						
Anion Sum	me/L	-	-	N/A	9.27	11.4
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	1.0	390	490
Calculated TDS	mg/L	1000	-	1.0	520	620
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	1.0	1.8	ND
Cation Sum	me/L	-	-	N/A	11.0	12.2
Hardness (CaCO3)	mg/L	-	-	1.0	460	500
Ion Balance (% Difference)	%	-	-	N/A	8.40	3.48
Langelier Index (@ 20C)	N/A	-	-		0.945	0.681
Langelier Index (@ 4C)	N/A	-	-		0.697	0.434
Nitrate (N)	mg/L	10	-	0.050	0.22	ND
Saturation pH (@ 20C)	N/A	-	-		6.74	6.63
Saturation pH (@ 4C)	N/A	-	-		6.98	6.88
Inorganics						
Total Alkalinity (Total as CaCO3)	mg/L	-	-	25	390	490
Dissolved Chloride (Cl)	mg/L	-	120	1.0	33	40
Colour	TCU	-	-	5.0	9.6	12
Nitrate + Nitrite (N)	mg/L	-	-	0.050	0.23	ND
Nitrite (N)	mg/L	-	-	0.010	0.011	ND
Nitrogen (Ammonia Nitrogen)	mg/L	2	See note	0.050	0.56	0.21
Total Organic Carbon (C)	mg/L	-	-	0.500	19.6	13.3
Orthophosphate (P)	mg/L	-	-	0.010	0.014	0.016
pH	pH	5.5-9.0	6.5 - 9.0	N/A	7.68	7.31
Field Measured pH	pH	5.5-9.0	6.5 - 9.0	N/A	7.86	7.65
Reactive Silica (SiO2)	mg/L	-	-	0.50	12	14
Dissolved Sulphate (SO4)	mg/L	-	-	2.0	26	21
Turbidity	NTU	-	-	1.0	46	190
Conductivity	uS/cm	-	-	1.0	760	990

** Guideline refers to either the Newfoundland and Labrador Regulation 65/03, Environmental Control Water and Sewage Regulations, 2003, Schedule "A", under the Water Resources Act, or the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life (FAL).*

Guideline for total ammonia is pH and temperature dependent.

RDL = Reportable Detection Limit.

ND = Not detected.

N/A = Not Applicable.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B26 Leachate analytical results - dissolved metals.

Maxxam ID	Units	Guideline *		RDL	BMW247	RDL	BMW248
Sampling Date					08-Dec-15		08-Dec-15
COC Number		NLR 65/03	CCME WQG FAL		540682-01-01		540682-01-01
Fracflow Sample ID					3073-CBC-PLCS		3073-CBC-SLCS
Metals							
Dissolved Aluminum (Al)	ug/L	-	100 (1)	5.0	45	5.0	17
Dissolved Antimony (Sb)	ug/L	-	-	1.0	ND	1.0	ND
Dissolved Arsenic (As)	ug/L	500	5	1.0	ND	1.0	ND
Dissolved Barium (Ba)	ug/L	5000	-	1.0	84	1.0	95
Dissolved Beryllium (Be)	ug/L	-	-	1.0	ND	1.0	ND
Dissolved Bismuth (Bi)	ug/L	-	-	2.0	ND	2.0	ND
Dissolved Boron (B)	ug/L	5000	1500	50	**2700**	50	**2600**
Dissolved Cadmium (Cd)	ug/L	50	0.04	0.10	ND (2)	0.010	ND
Dissolved Calcium (Ca)	ug/L	-	-	100	140000	100	150000
Dissolved Chromium (Cr)	ug/L	-	-	1.0	ND	1.0	ND
Dissolved Cobalt (Co)	ug/L	-	-	0.40	ND	0.40	ND
Dissolved Copper (Cu)	ug/L	300	4 (3)	2.0	ND	2.0	ND
Dissolved Iron (Fe)	ug/L	10000	300	50	**11000**	50	**22000**
Dissolved Lead (Pb)	ug/L	200	7 (3)	0.50	ND	0.50	ND
Dissolved Magnesium (Mg)	ug/L	-	-	100	28000	100	30000
Dissolved Manganese (Mn)	ug/L	-	-	2.0	6400	2.0	7300
Dissolved Molybdenum (Mo)	ug/L	-	73	2.0	ND	2.0	2.9
Dissolved Nickel (Ni)	ug/L	500	150 (3)	2.0	ND	2.0	ND
Dissolved Phosphorus (P)	ug/L	0.5	-	100	ND	100	ND
Dissolved Potassium (K)	ug/L	-	-	100	6500	100	11000
Dissolved Selenium (Se)	ug/L	10	1	1.0	ND	1.0	ND
Dissolved Silver (Ag)	ug/L	50	0.1	0.10	ND	0.10	ND
Dissolved Sodium (Na)	ug/L	-	-	100	25000	100	27000
Dissolved Strontium (Sr)	ug/L	-	-	2.0	350	2.0	380
Dissolved Thallium (Tl)	ug/L	-	0.8	0.10	ND	0.10	ND
Dissolved Tin (Sn)	ug/L	-	-	2.0	ND	2.0	ND
Dissolved Titanium (Ti)	ug/L	-	-	2.0	ND	2.0	ND
Dissolved Uranium (U)	ug/L	-	15	0.10	0.96	0.10	3.1
Dissolved Vanadium (V)	ug/L	-	-	2.0	ND	2.0	ND
Dissolved Zinc (Zn)	ug/L	500	30	5.0	5.8	5.0	5.1

* Guideline refers to either the Newfoundland and Labrador Regulation 65/03, Environmental Control Water and Sewage Regulations, 2003, Schedule "A", under the Water Resources Act, or the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life (FAL).

RDL = Reportable Detection Limit.

ND = Not detected

(1) Aluminum guideline: 5 µg/L if pH <6.5; 100 µg/L if pH ≥ 6.5.

(2) Elevated reporting limit due to sample matrix.

(3) Guideline calculated as a function of water hardness.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B27 Leachate analytical results - total metals.

Maxxam ID	Units	Guideline *		RDL	BTD140	BTD141
Sampling Date		NLR 65/03	CCME WQG FAL		28-Jan-16	28-Jan-16
COC Number					D 06086	D 06086
Fracflow Sample ID					3073-CBC-PLCS-1	3073-CBC-SLCS-1
Metals						
Total Aluminum (Al)	ug/L	-	100 (1)	5.0	34	16
Total Antimony (Sb)	ug/L	-	-	1.0	ND	ND
Total Arsenic (As)	ug/L	500	5	1.0	ND	ND
Total Barium (Ba)	ug/L	5000	-	1.0	15	98
Total Beryllium (Be)	ug/L	-	-	1.0	ND	ND
Total Bismuth (Bi)	ug/L	-	-	2.0	ND	ND
Total Boron (B)	ug/L	5000	1500	50	810	**2600**
Total Cadmium (Cd)	ug/L	50	0.04	0.010	ND	ND
Total Calcium (Ca)	ug/L	-	-	100	60000	140000
Total Chromium (Cr)	ug/L	-	-	1.0	ND	ND
Total Cobalt (Co)	ug/L	-	-	0.40	ND	ND
Total Copper (Cu)	ug/L	300	2 (2)	2.0	ND	ND
Total Iron (Fe)	ug/L	10000	300	50	**540**	**24000**
Total Lead (Pb)	ug/L	200	1 (2)	0.50	ND	ND
Total Magnesium (Mg)	ug/L	-	-	100	9700	29000
Total Manganese (Mn)	ug/L	-	-	2.0	470	7300
Total Molybdenum (Mo)	ug/L	-	73	2.0	ND	2.6
Total Nickel (Ni)	ug/L	500	25 (2)	2.0	ND	ND
Total Phosphorus (P)	ug/L	0.5	-	100	ND	ND
Total Potassium (K)	ug/L	-	-	100	7300	12000
Total Selenium (Se)	ug/L	10	1	1.0	ND	ND
Total Silver (Ag)	ug/L	50	0.1	0.10	ND	ND
Total Sodium (Na)	ug/L	-	-	100	14000	26000
Total Strontium (Sr)	ug/L	-	-	2.0	140	380
Total Thallium (Tl)	ug/L	-	0.8	0.10	ND	ND
Total Tin (Sn)	ug/L	-	-	2.0	ND	ND
Total Titanium (Ti)	ug/L	-	-	2.0	ND	ND
Total Uranium (U)	ug/L	-	15	0.10	0.39	3.0
Total Vanadium (V)	ug/L	-	-	2.0	ND	ND
Total Zinc (Zn)	ug/L	500	30	5.0	ND	6.8

** Guideline refers to either the Newfoundland and Labrador Regulation 65/03, Environmental Control Water and Sewage Regulations, 2003, Schedule "A", under the Water Resources Act, or the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life (FAL).*

RDL = Reportable Detection Limit.

ND = Not detected.

(1) Aluminum guideline: 5 µg/L if pH <6.5; 100 µg/L if pH ≥ 6.5.

(2) Guideline calculated as a function of water hardness. Guidelines listed are used by CCME when hardness is unknown.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B28 Leachate analytical results - BTEX and TPH.

Maxxam ID	Units	RDL	Guideline *		BMK628	BMK629
Sampling Date			NLR 65/03	CCME WQG FAL	08-Dec-15	08-Dec-15
COC Number					C#5406820101	C#5406820101
Fracflow Sample ID					3073-CBC-PLCS	3073-CBC-SLCS
Petroleum Hydrocarbons						
Benzene	mg/L	0.0010	-	0.37	ND	ND
Toluene	mg/L	0.0010	-	0.002	ND	ND
Ethylbenzene	mg/L	0.0010	-	0.09	ND	ND
Total Xylenes	mg/L	0.0020	-	-	ND	ND
C6 - C10 (less BTEX)	mg/L	0.010	-	-	ND	ND
>C10-C16 Hydrocarbons	mg/L	0.050	-	-	ND	ND
>C16-C21 Hydrocarbons	mg/L	0.050	-	-	ND	ND
>C21-<C32 Hydrocarbons	mg/L	0.10	-	-	ND	ND
Modified TPH (Tier1)	mg/L	0.10	-	-	ND	ND
Reached Baseline at C32	mg/L	N/A			Yes	Yes

** Guideline refers to either the Newfoundland and Labrador Regulation 65/03, Environmental Control Water and Sewage Regulations, 2003, Schedule "A", under the Water Resources Act, or the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life (FAL).*

RDL = Reported Detection Limit.

ND = Not detected.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B29 Leachate analytical results - volatile organic compounds (VOCs).

Maxxam ID	Units	RDL	Guideline *		BMW247	BMW248
Sampling Date			NLR 65/03	CCME WQG FAL	08-Dec-15	08-Dec-15
COC Number					540682-01-01	540682-01-01
Fracflow Sample ID					3073-CBC-PLCS	3073-CBC-SLCS
Chlorobenzenes						
1,2-Dichlorobenzene	ug/L	0.50	-	0.7	ND	ND
1,3-Dichlorobenzene	ug/L	1.0	-	150	ND	ND
1,4-Dichlorobenzene	ug/L	1.0	-	26	ND	ND
Chlorobenzene	ug/L	1.0	-	-	ND	ND
Volatile Organics						
1,1,1-Trichloroethane	ug/L	1.0	-	-	ND	ND
1,1,2,2-Tetrachloroethane	ug/L	0.50	-	-	ND	ND
1,1,2-Trichloroethane	ug/L	1.0	-	-	ND	ND
1,1-Dichloroethane	ug/L	2.0	-	-	ND	ND
1,1-Dichloroethylene	ug/L	0.50	-	-	ND	ND
1,2-Dichloroethane	ug/L	1.0	-	100	ND	ND
1,2-Dichloropropane	ug/L	0.50	-	-	ND	ND
Benzene	ug/L	1.0	-	370	ND	ND
Bromodichloromethane	ug/L	1.0	-	-	ND	ND
Bromoform	ug/L	1.0	-	-	ND	ND
Bromomethane	ug/L	0.50	-	-	ND	ND
Carbon Tetrachloride	ug/L	0.50	-	-	ND	ND
Chloroethane	ug/L	8.0	-	-	ND	ND
Chloroform	ug/L	1.0	-	1.8	ND	ND
Chloromethane	ug/L	8.0	-	-	ND	ND
cis-1,2-Dichloroethylene	ug/L	0.50	-	-	ND	ND
cis-1,3-Dichloropropene	ug/L	0.50	-	-	ND	ND
Dibromochloromethane	ug/L	1.0	-	-	ND	ND
Ethylbenzene	ug/L	1.0	-	90	ND	ND
Ethylene Dibromide	ug/L	0.20	-	-	ND	ND
Methyl t-butyl ether (MTBE)	ug/L	2.0	-	10000	ND	ND
Methylene Chloride(Dichloromethane)	ug/L	3.0	-	98.1	ND	ND
o-Xylene	ug/L	1.0	-	-	ND	ND
p+m-Xylene	ug/L	2.0	-	-	ND	ND
Styrene	ug/L	1.0	-	72	ND	ND
Tetrachloroethylene	ug/L	1.0	-	-	ND	ND
Toluene	ug/L	1.0	-	2	ND	ND
Total Trihalomethanes	ug/L	1.0	-	-	ND	ND
Total Xylenes	ug/L	1.0	-	-	ND	ND
trans-1,2-Dichloroethylene	ug/L	0.50	-	-	ND	ND
trans-1,3-Dichloropropene	ug/L	0.50	-	-	ND	ND
Trichloroethylene	ug/L	1.0	-	-	ND	ND
Trichlorofluoromethane (FREON 11)	ug/L	8.0	-	-	ND	ND
Vinyl Chloride	ug/L	0.50	-	-	ND	ND

** Guideline refers to either the Newfoundland and Labrador Regulation 65/03, Environmental Control Water and Sewage Regulations, 2003, Schedule "A", under the Water Resources Act, or the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life (FAL).*

RDL = Reportable Detection Limit.

ND = Not detected.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B30 Leachate analytical results - polycyclic aromatic hydrocarbons (PAHs).

Maxxam ID	Units	RDL	Guideline *		BMW247	RDL	BMW248
Sampling Date			NLR 65/03	CCME WQG FAL	08-Dec-15		08-Dec-15
COC Number					540682-01-01		540682-01-01
Fracflow Sample ID					3073-CBC-PLCS		3073-CBC-SLCS
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	ug/L	0.050	-	-	ND	0.050	ND
2-Methylnaphthalene	ug/L	0.050	-	-	ND	0.050	ND
Acenaphthene	ug/L	0.010	-	5.8	0.076	0.030	ND (1)
Acenaphthylene	ug/L	0.010	-	-	ND	0.010	ND
Anthracene	ug/L	0.010	-	0.012	**0.33**	0.010	**0.13**
Benzo(a)anthracene	ug/L	0.010	-	0.018	**0.066**	0.010	**0.045**
Benzo(a)pyrene	ug/L	0.010	-	0.015	ND	0.010	ND
Benzo(b)fluoranthene	ug/L	0.010	-	-	ND	0.010	ND
Benzo(g,h,i)perylene	ug/L	0.010	-	-	ND	0.010	ND
Benzo(j)fluoranthene	ug/L	0.010	-	-	ND	0.010	ND
Benzo(k)fluoranthene	ug/L	0.010	-	-	ND	0.010	ND
Chrysene	ug/L	0.010	-	-	0.10	0.010	0.070
Dibenz(a,h)anthracene	ug/L	0.010	-	-	ND	0.010	ND
Fluoranthene	ug/L	0.010	-	0.04	**0.28**	0.010	**0.23**
Fluorene	ug/L	0.010	-	3	0.14	0.040	ND (1)
Indeno(1,2,3-cd)pyrene	ug/L	0.010	-	-	ND	0.010	ND
Naphthalene	ug/L	0.20	-	1.1	ND	0.20	ND
Perylene	ug/L	0.010	-	-	ND	0.010	ND
Phenanthrene	ug/L	0.010	-	0.4	**0.59**	0.060	ND (1)
Pyrene	ug/L	0.010	-	0.025	**1.4**	0.010	**1.2**

** Guideline refers to either the Newfoundland and Labrador Regulation 65/03, Environmental Control Water and Sewage Regulations, 2003, Schedule "A", under the Water Resources Act, or the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life (FAL).*

RDL = Reportable Detection Limit.

ND = Not detected.

(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

(2) PAH sample contained sediment.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B31 Leachate analytical results - polychlorinated biphenyls (PCBs).

Maxxam ID	Units	RDL	Guideline *		BMW247	BMW248
Sampling Date			NLR 65/03	CCME WQG FAL	08-Dec-15	08-Dec-15
COC Number					540682-01-01	540682-01-01
Fracflow Sample ID					3073-CBC-PLCS	3073-CBC-SLCS
PCBs						
Aroclor 1016	ug/L	0.050	-	-	ND	ND
Aroclor 1221	ug/L	0.050	-	-	ND	ND
Aroclor 1232	ug/L	0.050	-	-	ND	ND
Aroclor 1248	ug/L	0.050	-	-	ND	ND
Aroclor 1242	ug/L	0.050	-	-	ND	ND
Aroclor 1254	ug/L	0.050	-	-	ND	ND
Aroclor 1260	ug/L	0.050	-	-	ND	ND
Calculated Total PCB	ug/L	0.050	-	-	ND	ND

** Guideline refers to either the Newfoundland and Labrador Regulation 65/03, Environmental Control Water and Sewage Regulations, 2003, Schedule "A", under the Water Resources Act, or the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life (FAL).*

RDL = Reportable Detection Limit.

ND = Not detected.

Shaded / Bold - Indicates parameter is above applicable criteria.

Table B32 Leachate analytical results - toxicology.

Maxxam ID	**Units**		BV6410	BV6412
Sampling Date			12-Dec-15	12-Dec-15
COC Number			NA	NA
Fracflow Sample ID			3073-CBC-PLSC	3073-CBC-SLCS
Toxicology - Rainbow Trout - LC50 (acute-96h)				
Atypical Behaviour	%	24 hrs	0	0
		48 hrs	0	0
		72 hrs	0	0
		96 hrs	0	0
Mortality	%	24 hrs	0	0
		48 hrs	0	0
		72 hrs	0	0
		96 hrs	0	0
Comment			No toxic	No toxic

APPENDIX C

Laboratory Analytical Reports

Site Location: COME BY CHANCE SECURE LANDFILL
Your C.O.C. #: 540682-01-01

Attention:Ingrid Lawlor

Fracflow Consultants Inc
154 Major's Path
St. John's, NL
A1A 5A1

Report Date: 2015/12/30
Report #: R3835710
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5P5115
Received: 2015/12/10, 10:31

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide (1)	8	N/A	2015/12/15	N/A	SM 22 4500-CO2 D
Alkalinity (1)	7	N/A	2015/12/17	ATL SOP 00013	EPA 310.2 R1974 m
Alkalinity (1)	1	N/A	2015/12/18	ATL SOP 00013	EPA 310.2 R1974 m
Chloride (1)	8	N/A	2015/12/18	ATL SOP 00014	SM 22 4500-Cl- E m
Colour (1)	8	N/A	2015/12/17	ATL SOP 00020	SM 22 2120C m
Chromium 3+ by calculation (1)	2	2015/12/11	2015/12/21		Auto Calc.
Chromium (VI) in Water (2)	2	N/A	2015/12/18	CAM SOP-00436	EPA 7199 m
Conductance - water (1)	8	N/A	2015/12/14	ATL SOP 00004	SM 22 2510B m
Hardness (calculated as CaCO3) (1)	3	N/A	2015/12/15	ATL SOP 00048	SM 22 2340 B
Hardness (calculated as CaCO3) (1)	3	N/A	2015/12/16	ATL SOP 00048	SM 22 2340 B
Hardness (calculated as CaCO3) (1)	2	N/A	2015/12/17	ATL SOP 00048	SM 22 2340 B
Metals Water Diss. MS (as rec'd) (1)	3	N/A	2015/12/14	ATL SOP 00058	EPA 6020A R1 m
Metals Water Diss. MS (as rec'd) (1)	3	N/A	2015/12/15	ATL SOP 00058	EPA 6020A R1 m
Metals Water Total MS (1)	2	2015/12/16	2015/12/16	ATL SOP 00058	EPA 6020A R1 m
Ion Balance (% Difference) (1)	8	N/A	2015/12/19		Auto Calc.
Anion and Cation Sum (1)	8	N/A	2015/12/18		Auto Calc.
Nitrogen Ammonia - water (1)	8	N/A	2015/12/17	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite (1)	8	N/A	2015/12/18	ATL SOP 00016	USGS SOPINCF0452.2 m
Nitrogen - Nitrite (1)	8	N/A	2015/12/17	ATL SOP 00017	SM 22 4500-NO2- B m
Nitrogen - Nitrate (as N) (1)	8	N/A	2015/12/19	ATL SOP 00018	ASTM D3867
PAH in Water by GC/MS (SIM) (1)	8	2015/12/15	2015/12/19	ATL SOP 00103	EPA 8270D 2007 m
PCBs in water by GC/ECD (1)	8	2015/12/14	2015/12/15	ATL SOP 00107	EPA 8082A m
PCB Aroclor sum (water) (1)	8	N/A	2015/12/15		Auto Calc.
pH (1, 3)	8	N/A	2015/12/14	ATL SOP 00003	SM 22 4500-H+ B m
Phosphorus - ortho (1)	8	N/A	2015/12/18	ATL SOP 00021	EPA 365.2 m
Sat. pH and Langelier Index (@ 20C) (1)	8	N/A	2015/12/19	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C) (1)	8	N/A	2015/12/19	ATL SOP 00049	Auto Calc.
Reactive Silica (1)	8	N/A	2015/12/17	ATL SOP 00022	EPA 366.0 m
Sulphate (1)	8	N/A	2015/12/17	ATL SOP 00023	EPA 375.4 R1978 m
Total Dissolved Solids (TDS calc) (1)	8	N/A	2015/12/19		Auto Calc.

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Site Location: COME BY CHANCE SECURE LANDFILL
Your C.O.C. #: 540682-01-01

Attention:Ingrid Lawlor

Fracflow Consultants Inc
154 Major's Path
St. John's, NL
A1A 5A1

Report Date: 2015/12/30
Report #: R3835710
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5P5115
Received: 2015/12/10, 10:31

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Turbidity (1)	8	N/A	2015/12/17	ATL SOP 00011	EPA 180.1 R2 m
Volatile Organic Compounds in Water (1)	8	N/A	2015/12/14	ATL SOP 00133	EPA 8260C R3 m

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 Maxxam Bedford
(2) This test was performed by Maxxam Analytics Mississauga
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Leonard Muise, Project Manager
Email: LMuise@maxxam.ca
Phone# (902)420-0203 Ext:236
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

Maxxam ID		BMW241		BMW242		
Sampling Date		2015/12/08		2015/12/08		
COC Number		540682-01-01		540682-01-01		
	UNITS	**3073-CBC-SURF-UP**	**RDL**	**3073-CBC-SURF-DOWN**	**RDL**	**QC Batch**
Calculated Parameters						
Anion Sum	me/L	1.02	N/A	1.12	N/A	4308882
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	9.3	1.0	9.1	1.0	4308879
Calculated TDS	mg/L	62	1.0	66	1.0	4308887
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	ND	1.0	4308879
Cation Sum	me/L	1.04	N/A	1.09	N/A	4308882
Hardness (CaCO3)	mg/L	22	1.0	23	1.0	4308880
Ion Balance (% Difference)	%	0.970	N/A	1.36	N/A	4308881
Langelier Index (@ 20C)	N/A	-2.42		-2.47		4308885
Langelier Index (@ 4C)	N/A	-2.67		-2.72		4308886
Nitrate (N)	mg/L	0.10	0.050	0.072	0.050	4308883
Saturation pH (@ 20C)	N/A	9.54		9.53		4308885
Saturation pH (@ 4C)	N/A	9.79		9.79		4308886
Inorganics						
Total Alkalinity (Total as CaCO3)	mg/L	9.3	5.0	9.1	5.0	4315915
Dissolved Chloride (Cl)	mg/L	24	1.0	26	1.0	4315918
Colour	TCU	44	10	47	5.0	4315924
Nitrate + Nitrite (N)	mg/L	0.10	0.050	0.072	0.050	4315927
Nitrite (N)	mg/L	ND	0.010	ND	0.010	4315929
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	ND	0.050	4316384
Orthophosphate (P)	mg/L	ND	0.010	ND	0.010	4315925
pH	pH	7.12	N/A	7.06	N/A	4311866
Reactive Silica (SiO2)	mg/L	2.3	0.50	2.3	0.50	4315921
Dissolved Sulphate (SO4)	mg/L	7.0	2.0	8.8	2.0	4315920
Turbidity	NTU	1.2	0.10	1.7	0.10	4317961
Conductivity	uS/cm	120	1.0	120	1.0	4311862
Metals						
Total Aluminum (Al)	ug/L	99	5.0	110	5.0	4314489
Total Antimony (Sb)	ug/L	ND	1.0	ND	1.0	4314489
Total Arsenic (As)	ug/L	ND	1.0	ND	1.0	4314489
Total Barium (Ba)	ug/L	9.1	1.0	9.3	1.0	4314489
Total Beryllium (Be)	ug/L	ND	1.0	ND	1.0	4314489
Total Bismuth (Bi)	ug/L	ND	2.0	ND	2.0	4314489
Total Boron (B)	ug/L	ND	50	ND	50	4314489

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

Maxxam ID		BMW241		BMW242		
Sampling Date		2015/12/08		2015/12/08		
COC Number		540682-01-01		540682-01-01		
	UNITS	**3073-CBC-SURF-UP**	**RDL**	**3073-CBC-SURF-DOWN**	**RDL**	**QC Batch**
Total Cadmium (Cd)	ug/L	ND	0.010	ND	0.010	4314489
Total Calcium (Ca)	ug/L	6400	100	6800	100	4314489
Total Chromium (Cr)	ug/L	ND	1.0	ND	1.0	4314489
Total Cobalt (Co)	ug/L	ND	0.40	ND	0.40	4314489
Total Copper (Cu)	ug/L	ND	2.0	ND	2.0	4314489
Total Iron (Fe)	ug/L	440	50	270	50	4314489
Total Lead (Pb)	ug/L	ND	0.50	ND	0.50	4314489
Total Magnesium (Mg)	ug/L	1300	100	1500	100	4314489
Total Manganese (Mn)	ug/L	88	2.0	66	2.0	4314489
Total Molybdenum (Mo)	ug/L	ND	2.0	ND	2.0	4314489
Total Nickel (Ni)	ug/L	ND	2.0	ND	2.0	4314489
Total Phosphorus (P)	ug/L	ND	100	ND	100	4314489
Total Potassium (K)	ug/L	550	100	430	100	4314489
Total Selenium (Se)	ug/L	ND	1.0	ND	1.0	4314489
Total Silver (Ag)	ug/L	ND	0.10	ND	0.10	4314489
Total Sodium (Na)	ug/L	13000	100	14000	100	4314489
Total Strontium (Sr)	ug/L	19	2.0	20	2.0	4314489
Total Thallium (Tl)	ug/L	ND	0.10	ND	0.10	4314489
Total Tin (Sn)	ug/L	ND	2.0	ND	2.0	4314489
Total Titanium (Ti)	ug/L	11	2.0	ND	2.0	4314489
Total Uranium (U)	ug/L	ND	0.10	ND	0.10	4314489
Total Vanadium (V)	ug/L	ND	2.0	ND	2.0	4314489
Total Zinc (Zn)	ug/L	ND	5.0	ND	5.0	4314489

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

Maxxam ID		BMW243		BMW244		BMW245		
Sampling Date		2015/12/08		2015/12/08		2015/12/08		
COC Number		540682-01-01		540682-01-01		540682-01-01		
	UNITS	**3073-CBC-MW-93-1A**	**RDL**	**3073-CBC-MW93-2A**	**RDL**	**3073-CBC-MW10-1A**	**RDL**	**QC Batch**
Calculated Parameters								
Anion Sum	me/L	6.60	N/A	2.22	N/A	2.22	N/A	4308882
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	270	1.0	14	1.0	72	1.0	4308879
Calculated TDS	mg/L	350	1.0	150	1.0	130	1.0	4308887
Carb. Alkalinity (calc. as CaCO3)	mg/L	2.6	1.0	ND	1.0	ND	1.0	4308879
Cation Sum	me/L	6.46	N/A	2.31	N/A	2.05	N/A	4308882
Hardness (CaCO3)	mg/L	150	1.0	60	1.0	85	1.0	4308880
Ion Balance (% Difference)	%	1.07	N/A	1.99	N/A	3.98	N/A	4308881
Langelier Index (@ 20C)	N/A	0.561		-2.85		-0.792		4308885
Langelier Index (@ 4C)	N/A	0.312		-3.10		-1.04		4308886
Nitrate (N)	mg/L	ND	0.050	ND	0.050	0.11	0.050	4308883
Saturation pH (@ 20C)	N/A	7.45		9.02		8.04		4308885
Saturation pH (@ 4C)	N/A	7.69		9.28		8.30		4308886
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	280	25	14	5.0	72	5.0	4315915
Dissolved Chloride (Cl)	mg/L	11	1.0	31	1.0	11	1.0	4315918
Colour	TCU	ND	5.0	36	5.0	7.4	5.0	4315924
Nitrate + Nitrite (N)	mg/L	ND	0.050	ND	0.050	0.11	0.050	4315927
Nitrite (N)	mg/L	ND	0.010	ND	0.010	ND	0.010	4315929
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	0.36	0.050	0.13	0.050	4316384
Orthophosphate (P)	mg/L	0.011	0.010	0.012	0.010	0.012	0.010	4315925
pH	pH	8.01	N/A	6.18	N/A	7.25	N/A	4311866
Reactive Silica (SiO2)	mg/L	4.4	0.50	8.0	0.50	9.7	0.50	4315921
Dissolved Sulphate (SO4)	mg/L	35	2.0	51	10	22	2.0	4315920
Turbidity	NTU	>1000	1.0	160	1.0	710	1.0	4317961
Conductivity	uS/cm	580	1.0	250	1.0	200	1.0	4311862
Metals								
Dissolved Aluminum (Al)	ug/L	33	5.0	170	5.0	32	5.0	4311580
Dissolved Antimony (Sb)	ug/L	ND	1.0	ND	1.0	ND	1.0	4311580
Dissolved Arsenic (As)	ug/L	ND	1.0	ND	1.0	ND	1.0	4311580
Dissolved Barium (Ba)	ug/L	74	1.0	54	1.0	39	1.0	4311580
Dissolved Beryllium (Be)	ug/L	ND	1.0	ND	1.0	ND	1.0	4311580
Dissolved Bismuth (Bi)	ug/L	ND	2.0	ND	2.0	ND	2.0	4311580
Dissolved Boron (B)	ug/L	59	50	110	50	ND	50	4311580

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

Maxxam ID		BMW243		BMW244		BMW245		
Sampling Date		2015/12/08		2015/12/08		2015/12/08		
COC Number		540682-01-01		540682-01-01		540682-01-01		
	UNITS	**3073-CBC-MW-93-1A**	**RDL**	**3073-CBC-MW93-2A**	**RDL**	**3073-CBC-MW10-1A**	**RDL**	**QC Batch**
Dissolved Cadmium (Cd)	ug/L	ND	0.010	0.80	0.010	0.030	0.010	4311580
Dissolved Calcium (Ca)	ug/L	35000	100	15000	100	28000	100	4311580
Dissolved Chromium (Cr)	ug/L	ND	1.0	ND	1.0	ND	1.0	4311580
Dissolved Cobalt (Co)	ug/L	2.5	0.40	2.9	0.40	6.3	0.40	4311580
Dissolved Copper (Cu)	ug/L	ND	2.0	ND	2.0	5.8	2.0	4311580
Dissolved Iron (Fe)	ug/L	ND	50	7700	50	1100	50	4311580
Dissolved Lead (Pb)	ug/L	ND	0.50	ND	0.50	ND	0.50	4311580
Dissolved Magnesium (Mg)	ug/L	16000	100	5200	100	3300	100	4311580
Dissolved Manganese (Mn)	ug/L	68	2.0	5700	2.0	590	2.0	4311580
Dissolved Molybdenum (Mo)	ug/L	18	2.0	ND	2.0	ND	2.0	4311580
Dissolved Nickel (Ni)	ug/L	3.1	2.0	2.6	2.0	6.4	2.0	4311580
Dissolved Phosphorus (P)	ug/L	ND	100	ND	100	ND	100	4311580
Dissolved Potassium (K)	ug/L	2400	100	1500	100	710	100	4311580
Dissolved Selenium (Se)	ug/L	ND	1.0	ND	1.0	ND	1.0	4311580
Dissolved Silver (Ag)	ug/L	ND	0.10	ND	0.10	ND	0.10	4311580
Dissolved Sodium (Na)	ug/L	77000	100	18000	100	6600	100	4311580
Dissolved Strontium (Sr)	ug/L	230	2.0	68	2.0	68	2.0	4311580
Dissolved Thallium (Tl)	ug/L	ND	0.10	ND	0.10	ND	0.10	4311580
Dissolved Tin (Sn)	ug/L	ND	2.0	ND	2.0	ND	2.0	4311580
Dissolved Titanium (Ti)	ug/L	ND	2.0	ND	2.0	ND	2.0	4311580
Dissolved Uranium (U)	ug/L	5.0	0.10	ND	0.10	ND	0.10	4311580
Dissolved Vanadium (V)	ug/L	ND	2.0	ND	2.0	ND	2.0	4311580
Dissolved Zinc (Zn)	ug/L	ND	5.0	290	5.0	8.4	5.0	4311580

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

Maxxam ID		BMW246		BMW247			BMW248		
Sampling Date		2015/12/08		2015/12/08			2015/12/08		
COC Number		540682-01-01		540682-01-01			540682-01-01		
	UNITS	**3073-CBC-MW-DUP1**	**RDL**	**3073-CBC-PLCS**	**RDL**	**QC Batch**	**3073-CBC-SLCS**	**RDL**	**QC Batch**
Calculated Parameters									
Anion Sum	me/L	2.20	N/A	9.27	N/A	4308882	11.4	N/A	4308882
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	71	1.0	390	1.0	4308879	490	1.0	4308879
Calculated TDS	mg/L	130	1.0	520	1.0	4308887	620	1.0	4308887
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	1.8	1.0	4308879	ND	1.0	4308879
Cation Sum	me/L	2.05	N/A	11.0	N/A	4308882	12.2	N/A	4308882
Hardness (CaCO3)	mg/L	85	1.0	460	1.0	4308880	500	1.0	4308880
Ion Balance (% Difference)	%	3.53	N/A	8.40	N/A	4308881	3.48	N/A	4308881
Langelier Index (@ 20C)	N/A	-0.799		0.945		4308885	0.681		4308885
Langelier Index (@ 4C)	N/A	-1.05		0.697		4308886	0.434		4308886
Nitrate (N)	mg/L	0.11	0.050	0.22	0.050	4308883	ND	0.050	4308883
Saturation pH (@ 20C)	N/A	8.05		6.74		4308885	6.63		4308885
Saturation pH (@ 4C)	N/A	8.30		6.98		4308886	6.88		4308886
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	71	5.0	390	25	4315915	490	25	4315935
Dissolved Chloride (Cl)	mg/L	11	1.0	33	1.0	4315918	40	1.0	4315936
Colour	TCU	8.1	5.0	9.6	5.0	4315924	12	5.0	4315948
Nitrate + Nitrite (N)	mg/L	0.11	0.050	0.23	0.050	4315927	ND	0.050	4315952
Nitrite (N)	mg/L	ND	0.010	0.011	0.010	4315929	ND	0.010	4315957
Nitrogen (Ammonia Nitrogen)	mg/L	0.11	0.050	0.56	0.050	4316384	0.21	0.050	4316384
Orthophosphate (P)	mg/L	0.012	0.010	0.014	0.010	4315925	0.016	0.010	4315950
pH	pH	7.25	N/A	7.68	N/A	4311866	7.31	N/A	4311866
Reactive Silica (SiO2)	mg/L	10	0.50	12	0.50	4315921	14	0.50	4315941
Dissolved Sulphate (SO4)	mg/L	22	2.0	26	2.0	4315920	21	2.0	4315939
Turbidity	NTU	>1000	1.0	46	0.10	4317964	190	1.0	4317964
Conductivity	uS/cm	200	1.0	760	1.0	4311862	990	1.0	4311862
Metals									
Dissolved Aluminum (Al)	ug/L	33	5.0	45	5.0	4311580	17	5.0	4311580
Dissolved Antimony (Sb)	ug/L	ND	1.0	ND	1.0	4311580	ND	1.0	4311580
Dissolved Arsenic (As)	ug/L	ND	1.0	ND	1.0	4311580	ND	1.0	4311580
Dissolved Barium (Ba)	ug/L	38	1.0	84	1.0	4311580	95	1.0	4311580
Dissolved Beryllium (Be)	ug/L	ND	1.0	ND	1.0	4311580	ND	1.0	4311580
Dissolved Bismuth (Bi)	ug/L	ND	2.0	ND	2.0	4311580	ND	2.0	4311580
Dissolved Boron (B)	ug/L	ND	50	2700	50	4311580	2600	50	4311580

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

Maxxam ID		BMW246		BMW247			BMW248		
Sampling Date		2015/12/08		2015/12/08			2015/12/08		
COC Number		540682-01-01		540682-01-01			540682-01-01		
	UNITS	**3073-CBC-MW-DUP1**	**RDL**	**3073-CBC-PLCS**	**RDL**	**QC Batch**	**3073-CBC-SLCS**	**RDL**	**QC Batch**
Dissolved Cadmium (Cd)	ug/L	0.028	0.010	ND (1)	0.10	4311580	ND	0.010	4311580
Dissolved Calcium (Ca)	ug/L	29000	100	140000	100	4311580	150000	100	4311580
Dissolved Chromium (Cr)	ug/L	ND	1.0	ND	1.0	4311580	ND	1.0	4311580
Dissolved Cobalt (Co)	ug/L	6.2	0.40	ND	0.40	4311580	ND	0.40	4311580
Dissolved Copper (Cu)	ug/L	5.6	2.0	ND	2.0	4311580	ND	2.0	4311580
Dissolved Iron (Fe)	ug/L	1100	50	11000	50	4311580	22000	50	4311580
Dissolved Lead (Pb)	ug/L	ND	0.50	ND	0.50	4311580	ND	0.50	4311580
Dissolved Magnesium (Mg)	ug/L	3200	100	28000	100	4311580	30000	100	4311580
Dissolved Manganese (Mn)	ug/L	590	2.0	6400	2.0	4311580	7300	2.0	4311580
Dissolved Molybdenum (Mo)	ug/L	ND	2.0	ND	2.0	4311580	2.9	2.0	4311580
Dissolved Nickel (Ni)	ug/L	6.5	2.0	ND	2.0	4311580	ND	2.0	4311580
Dissolved Phosphorus (P)	ug/L	ND	100	ND	100	4311580	ND	100	4311580
Dissolved Potassium (K)	ug/L	690	100	6500	100	4311580	11000	100	4311580
Dissolved Selenium (Se)	ug/L	ND	1.0	ND	1.0	4311580	ND	1.0	4311580
Dissolved Silver (Ag)	ug/L	ND	0.10	ND	0.10	4311580	ND	0.10	4311580
Dissolved Sodium (Na)	ug/L	6600	100	25000	100	4311580	27000	100	4311580
Dissolved Strontium (Sr)	ug/L	67	2.0	350	2.0	4311580	380	2.0	4311580
Dissolved Thallium (Tl)	ug/L	ND	0.10	ND	0.10	4311580	ND	0.10	4311580
Dissolved Tin (Sn)	ug/L	ND	2.0	ND	2.0	4311580	ND	2.0	4311580
Dissolved Titanium (Ti)	ug/L	ND	2.0	ND	2.0	4311580	ND	2.0	4311580
Dissolved Uranium (U)	ug/L	ND	0.10	0.96	0.10	4311580	3.1	0.10	4311580
Dissolved Vanadium (V)	ug/L	ND	2.0	ND	2.0	4311580	ND	2.0	4311580
Dissolved Zinc (Zn)	ug/L	7.7	5.0	5.8	5.0	4311580	5.1	5.0	4311580

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected
(1) Elevated reporting limit due to sample matrix.

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

ATLANTIC VOC IN WATER (WATER)

Maxxam ID		BMW241	BMW242	BMW243		
Sampling Date		2015/12/08	2015/12/08	2015/12/08		
COC Number		540682-01-01	540682-01-01	540682-01-01		
	UNITS	**3073-CBC-SURF-UP**	**3073-CBC-SURF-DOWN**	**3073-CBC-MW-93-1A**	**RDL**	**QC Batch**
Chlorobenzenes						
1,2-Dichlorobenzene	ug/L	ND	ND	ND	0.50	4311601
1,3-Dichlorobenzene	ug/L	ND	ND	ND	1.0	4311601
1,4-Dichlorobenzene	ug/L	ND	ND	ND	1.0	4311601
Chlorobenzene	ug/L	ND	ND	ND	1.0	4311601
Volatile Organics						
1,1,1-Trichloroethane	ug/L	ND	ND	ND	1.0	4311601
1,1,2,2-Tetrachloroethane	ug/L	ND	ND	ND	0.50	4311601
1,1,2-Trichloroethane	ug/L	ND	ND	ND	1.0	4311601
1,1-Dichloroethane	ug/L	ND	ND	ND	2.0	4311601
1,1-Dichloroethylene	ug/L	ND	ND	ND	0.50	4311601
1,2-Dichloroethane	ug/L	ND	ND	ND	1.0	4311601
1,2-Dichloropropane	ug/L	ND	ND	ND	0.50	4311601
Benzene	ug/L	ND	ND	ND	1.0	4311601
Bromodichloromethane	ug/L	ND	ND	ND	1.0	4311601
Bromoform	ug/L	ND	ND	ND	1.0	4311601
Bromomethane	ug/L	ND	ND	ND	0.50	4311601
Carbon Tetrachloride	ug/L	ND	ND	ND	0.50	4311601
Chloroethane	ug/L	ND	ND	ND	8.0	4311601
Chloroform	ug/L	ND	ND	ND	1.0	4311601
Chloromethane	ug/L	ND	ND	ND	8.0	4311601
cis-1,2-Dichloroethylene	ug/L	ND	ND	ND	0.50	4311601
cis-1,3-Dichloropropene	ug/L	ND	ND	ND	0.50	4311601
Dibromochloromethane	ug/L	ND	ND	ND	1.0	4311601
Ethylbenzene	ug/L	ND	ND	ND	1.0	4311601
Ethylene Dibromide	ug/L	ND	ND	ND	0.20	4311601
Methyl t-butyl ether (MTBE)	ug/L	ND	ND	ND	2.0	4311601
Methylene Chloride(Dichloromethane)	ug/L	ND	ND	ND	3.0	4311601
o-Xylene	ug/L	ND	ND	ND	1.0	4311601
p+m-Xylene	ug/L	ND	ND	ND	2.0	4311601
Styrene	ug/L	ND	ND	ND	1.0	4311601
Tetrachloroethylene	ug/L	ND	ND	ND	1.0	4311601
Toluene	ug/L	ND	ND	ND	1.0	4311601
Total Trihalomethanes	ug/L	ND	ND	ND	1.0	4311601
Total Xylenes	ug/L	ND	ND	ND	1.0	4311601

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

ATLANTIC VOC IN WATER (WATER)

Maxxam ID		BMW241	BMW242	BMW243		
Sampling Date		2015/12/08	2015/12/08	2015/12/08		
COC Number		540682-01-01	540682-01-01	540682-01-01		
	UNITS	**3073-CBC-SURF-UP**	**3073-CBC-SURF-DOWN**	**3073-CBC-MW-93-1A**	**RDL**	**QC Batch**
trans-1,2-Dichloroethylene	ug/L	ND	ND	ND	0.50	4311601
trans-1,3-Dichloropropene	ug/L	ND	ND	ND	0.50	4311601
Trichloroethylene	ug/L	ND	ND	ND	1.0	4311601
Trichlorofluoromethane (FREON 11)	ug/L	ND	ND	ND	8.0	4311601
Vinyl Chloride	ug/L	ND	ND	ND	0.50	4311601
Surrogate Recovery (%)						
4-Bromofluorobenzene	%	96	96	98 (1)		4311601
D4-1,2-Dichloroethane	%	103	104	101		4311601
D8-Toluene	%	96	96	96		4311601

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected
(1) VOC sample contained sediment.

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

ATLANTIC VOC IN WATER (WATER)

Maxxam ID		BMW244	BMW245	BMW246	BMW247		
Sampling Date		2015/12/08	2015/12/08	2015/12/08	2015/12/08		
COC Number		540682-01-01	540682-01-01	540682-01-01	540682-01-01		
	UNITS	**3073-CBC-MW93-2A**	**3073-CBC-MW10-1A**	**3073-CBC-MW-DUP1**	**3073-CBC-PLCS**	**RDL**	**QC Batch**
Chlorobenzenes							
1,2-Dichlorobenzene	ug/L	ND	ND	ND	ND	0.50	4311601
1,3-Dichlorobenzene	ug/L	ND	ND	ND	ND	1.0	4311601
1,4-Dichlorobenzene	ug/L	ND	ND	ND	ND	1.0	4311601
Chlorobenzene	ug/L	ND	ND	ND	ND	1.0	4311601
Volatile Organics							
1,1,1-Trichloroethane	ug/L	ND	ND	ND	ND	1.0	4311601
1,1,2,2-Tetrachloroethane	ug/L	ND	ND	ND	ND	0.50	4311601
1,1,2-Trichloroethane	ug/L	ND	ND	ND	ND	1.0	4311601
1,1-Dichloroethane	ug/L	ND	ND	ND	ND	2.0	4311601
1,1-Dichloroethylene	ug/L	ND	ND	ND	ND	0.50	4311601
1,2-Dichloroethane	ug/L	ND	ND	ND	ND	1.0	4311601
1,2-Dichloropropane	ug/L	ND	3.9	3.0	ND	0.50	4311601
Benzene	ug/L	ND	ND	ND	ND	1.0	4311601
Bromodichloromethane	ug/L	ND	ND	ND	ND	1.0	4311601
Bromoform	ug/L	ND	ND	ND	ND	1.0	4311601
Bromomethane	ug/L	ND	ND	ND	ND	0.50	4311601
Carbon Tetrachloride	ug/L	ND	ND	ND	ND	0.50	4311601
Chloroethane	ug/L	ND	ND	ND	ND	8.0	4311601
Chloroform	ug/L	ND	ND	ND	ND	1.0	4311601
Chloromethane	ug/L	ND	ND	ND	ND	8.0	4311601
cis-1,2-Dichloroethylene	ug/L	ND	ND	ND	ND	0.50	4311601
cis-1,3-Dichloropropene	ug/L	ND	ND	ND	ND	0.50	4311601
Dibromochloromethane	ug/L	ND	ND	ND	ND	1.0	4311601
Ethylbenzene	ug/L	ND	ND	ND	ND	1.0	4311601
Ethylene Dibromide	ug/L	ND	ND	ND	ND	0.20	4311601
Methyl t-butyl ether (MTBE)	ug/L	ND	ND	ND	ND	2.0	4311601
Methylene Chloride(Dichloromethane)	ug/L	ND	ND	ND	ND	3.0	4311601
o-Xylene	ug/L	ND	ND	ND	ND	1.0	4311601
p+m-Xylene	ug/L	ND	ND	ND	ND	2.0	4311601
Styrene	ug/L	ND	ND	ND	ND	1.0	4311601
Tetrachloroethylene	ug/L	ND	ND	ND	ND	1.0	4311601
Toluene	ug/L	ND	ND	ND	ND	1.0	4311601
Total Trihalomethanes	ug/L	ND	ND	ND	ND	1.0	4311601
Total Xylenes	ug/L	ND	ND	ND	ND	1.0	4311601

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

ATLANTIC VOC IN WATER (WATER)

Maxxam ID		BMW244	BMW245	BMW246	BMW247		
Sampling Date		2015/12/08	2015/12/08	2015/12/08	2015/12/08		
COC Number		540682-01-01	540682-01-01	540682-01-01	540682-01-01		
	UNITS	**3073-CBC-MW93-2A**	**3073-CBC-MW10-1A**	**3073-CBC-MW-DUP1**	**3073-CBC-PLCS**	**RDL**	**QC Batch**
trans-1,2-Dichloroethylene	ug/L	ND	ND	ND	ND	0.50	4311601
trans-1,3-Dichloropropene	ug/L	ND	ND	ND	ND	0.50	4311601
Trichloroethylene	ug/L	ND	ND	ND	ND	1.0	4311601
Trichlorofluoromethane (FREON 11)	ug/L	ND	ND	ND	ND	8.0	4311601
Vinyl Chloride	ug/L	ND	ND	ND	ND	0.50	4311601
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	96	98 (1)	100 (1)	96		4311601
D4-1,2-Dichloroethane	%	104	105	105	107		4311601
D8-Toluene	%	96	93	96	94		4311601

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected
(1) VOC sample contained sediment.

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

ATLANTIC VOC IN WATER (WATER)

Maxxam ID		BMW248		
Sampling Date		2015/12/08		
COC Number		540682-01-01		
	UNITS	**3073-CBC-SLCS**	**RDL**	**QC Batch**
Chlorobenzenes				
1,2-Dichlorobenzene	ug/L	ND	0.50	4311601
1,3-Dichlorobenzene	ug/L	ND	1.0	4311601
1,4-Dichlorobenzene	ug/L	ND	1.0	4311601
Chlorobenzene	ug/L	ND	1.0	4311601
Volatile Organics				
1,1,1-Trichloroethane	ug/L	ND	1.0	4311601
1,1,2,2-Tetrachloroethane	ug/L	ND	0.50	4311601
1,1,2-Trichloroethane	ug/L	ND	1.0	4311601
1,1-Dichloroethane	ug/L	ND	2.0	4311601
1,1-Dichloroethylene	ug/L	ND	0.50	4311601
1,2-Dichloroethane	ug/L	ND	1.0	4311601
1,2-Dichloropropane	ug/L	ND	0.50	4311601
Benzene	ug/L	ND	1.0	4311601
Bromodichloromethane	ug/L	ND	1.0	4311601
Bromoform	ug/L	ND	1.0	4311601
Bromomethane	ug/L	ND	0.50	4311601
Carbon Tetrachloride	ug/L	ND	0.50	4311601
Chloroethane	ug/L	ND	8.0	4311601
Chloroform	ug/L	ND	1.0	4311601
Chloromethane	ug/L	ND	8.0	4311601
cis-1,2-Dichloroethylene	ug/L	ND	0.50	4311601
cis-1,3-Dichloropropene	ug/L	ND	0.50	4311601
Dibromochloromethane	ug/L	ND	1.0	4311601
Ethylbenzene	ug/L	ND	1.0	4311601
Ethylene Dibromide	ug/L	ND	0.20	4311601
Methyl t-butyl ether (MTBE)	ug/L	ND	2.0	4311601
Methylene Chloride(Dichloromethane)	ug/L	ND	3.0	4311601
o-Xylene	ug/L	ND	1.0	4311601
p+m-Xylene	ug/L	ND	2.0	4311601
Styrene	ug/L	ND	1.0	4311601
Tetrachloroethylene	ug/L	ND	1.0	4311601
Toluene	ug/L	ND	1.0	4311601
Total Trihalomethanes	ug/L	ND	1.0	4311601
Total Xylenes	ug/L	ND	1.0	4311601

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

ATLANTIC VOC IN WATER (WATER)

Maxxam ID		BMW248		
Sampling Date		2015/12/08		
COC Number		540682-01-01		
	UNITS	**3073-CBC-SLCS**	**RDL**	**QC Batch**
trans-1,2-Dichloroethylene	ug/L	ND	0.50	4311601
trans-1,3-Dichloropropene	ug/L	ND	0.50	4311601
Trichloroethylene	ug/L	ND	1.0	4311601
Trichlorofluoromethane (FREON 11)	ug/L	ND	8.0	4311601
Vinyl Chloride	ug/L	ND	0.50	4311601
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	95		4311601
D4-1,2-Dichloroethane	%	111		4311601
D8-Toluene	%	96		4311601

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

RESULTS OF ANALYSES OF WATER

Maxxam ID		BMW241	BMW242		
Sampling Date		2015/12/08	2015/12/08		
COC Number		540682-01-01	540682-01-01		
	UNITS	**3073-CBC-SURF-UP**	**3073-CBC-SURF-DOWN**	**RDL**	**QC Batch**
Calculated Parameters					
Chromium (+3)	mg/L	ND	ND	0.001	4309236

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		BMW241	BMW242		
Sampling Date		2015/12/08	2015/12/08		
COC Number		540682-01-01	540682-01-01		
	UNITS	**3073-CBC-SURF-UP**	**3073-CBC-SURF-DOWN**	**RDL**	**QC Batch**
Metals					
Chromium (VI)	ug/L	ND	ND	0.50	4315542

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Sampler Initials: GB

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		BMW241	BMW242	BMW243	BMW244		
Sampling Date		2015/12/08	2015/12/08	2015/12/08	2015/12/08		
COC Number		540682-01-01	540682-01-01	540682-01-01	540682-01-01		
	UNITS	**3073-CBC-SURF-UP**	**3073-CBC-SURF-DOWN**	**3073-CBC-MW-93-1A**	**3073-CBC-MW93-2A**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	ug/L	ND	ND	ND	ND	0.050	4311651
2-Methylnaphthalene	ug/L	ND	ND	ND	ND	0.050	4311651
Acenaphthene	ug/L	ND	ND	ND	ND	0.010	4311651
Acenaphthylene	ug/L	ND	ND	ND	ND	0.010	4311651
Anthracene	ug/L	ND	ND	ND	ND	0.010	4311651
Benzo(a)anthracene	ug/L	ND	ND	ND	ND	0.010	4311651
Benzo(a)pyrene	ug/L	ND	ND	ND	ND	0.010	4311651
Benzo(b)fluoranthene	ug/L	ND	ND	ND	ND	0.010	4311651
Benzo(g,h,i)perylene	ug/L	ND	ND	ND	ND	0.010	4311651
Benzo(j)fluoranthene	ug/L	ND	ND	ND	ND	0.010	4311651
Benzo(k)fluoranthene	ug/L	ND	ND	ND	ND	0.010	4311651
Chrysene	ug/L	ND	ND	ND	ND	0.010	4311651
Dibenz(a,h)anthracene	ug/L	ND	ND	ND	ND	0.010	4311651
Fluoranthene	ug/L	ND	ND	ND	ND	0.010	4311651
Fluorene	ug/L	ND	ND	ND	ND	0.010	4311651
Indeno(1,2,3-cd)pyrene	ug/L	ND	ND	ND	ND	0.010	4311651
Naphthalene	ug/L	ND	ND	ND	ND	0.20	4311651
Perylene	ug/L	ND	ND	ND	ND	0.010	4311651
Phenanthrene	ug/L	ND	ND	0.013	ND	0.010	4311651
Pyrene	ug/L	ND	ND	ND	ND	0.010	4311651
Surrogate Recovery (%)							
D10-Anthracene	%	71	78	85	67		4311651
D14-Terphenyl	%	73	88	73 (1)	69 (1)		4311651
D8-Acenaphthylene	%	77	93	92	73		4311651

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected
(1) PAH sample contained sediment.

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Sampler Initials: GB

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		BMW245	BMW246	BMW247		BMW248		
Sampling Date		2015/12/08	2015/12/08	2015/12/08		2015/12/08		
COC Number		540682-01-01	540682-01-01	540682-01-01		540682-01-01		
	UNITS	**3073-CBC-MW10-1A**	**3073-CBC-MW-DUP1**	**3073-CBC-PLCS**	**RDL**	**3073-CBC-SLCS**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons								
1-Methylnaphthalene	ug/L	ND	ND	ND	0.050	ND	0.050	4311651
2-Methylnaphthalene	ug/L	ND	ND	ND	0.050	ND	0.050	4311651
Acenaphthene	ug/L	ND	ND	0.076	0.010	ND (1)	0.030	4311651
Acenaphthylene	ug/L	ND	ND	ND	0.010	ND	0.010	4311651
Anthracene	ug/L	ND	ND	0.33	0.010	0.13	0.010	4311651
Benzo(a)anthracene	ug/L	ND	ND	0.066	0.010	0.045	0.010	4311651
Benzo(a)pyrene	ug/L	ND	ND	ND	0.010	ND	0.010	4311651
Benzo(b)fluoranthene	ug/L	ND	ND	ND	0.010	ND	0.010	4311651
Benzo(g,h,i)perylene	ug/L	ND	ND	ND	0.010	ND	0.010	4311651
Benzo(j)fluoranthene	ug/L	ND	ND	ND	0.010	ND	0.010	4311651
Benzo(k)fluoranthene	ug/L	ND	ND	ND	0.010	ND	0.010	4311651
Chrysene	ug/L	ND	ND	0.10	0.010	0.070	0.010	4311651
Dibenz(a,h)anthracene	ug/L	ND	ND	ND	0.010	ND	0.010	4311651
Fluoranthene	ug/L	ND	ND	0.28	0.010	0.23	0.010	4311651
Fluorene	ug/L	ND	ND	0.14	0.010	ND (1)	0.040	4311651
Indeno(1,2,3-cd)pyrene	ug/L	ND	ND	ND	0.010	ND	0.010	4311651
Naphthalene	ug/L	ND	ND	ND	0.20	ND	0.20	4311651
Perylene	ug/L	0.027	0.028	ND	0.010	ND	0.010	4311651
Phenanthrene	ug/L	ND	ND	0.59	0.010	ND (1)	0.060	4311651
Pyrene	ug/L	ND	ND	1.4	0.010	1.2	0.010	4311651
Surrogate Recovery (%)								
D10-Anthracene	%	71	83	102		89		4311651
D14-Terphenyl	%	79 (2)	80 (2)	98 (2)		93 (2)		4311651
D8-Acenaphthylene	%	83	83	108		103		4311651

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.
(2) PAH sample contained sediment.

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Sampler Initials: GB

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		BMW241	BMW242	BMW243	BMW244		
Sampling Date		2015/12/08	2015/12/08	2015/12/08	2015/12/08		
COC Number		540682-01-01	540682-01-01	540682-01-01	540682-01-01		
	UNITS	**3073-CBC-SURF-UP**	**3073-CBC-SURF-DOWN**	**3073-CBC-MW-93-1A**	**3073-CBC-MW93-2A**	**RDL**	**QC Batch**
PCBs							
Aroclor 1016	ug/L	ND	ND	ND	ND	0.050	4311587
Aroclor 1221	ug/L	ND	ND	ND	ND	0.050	4311587
Aroclor 1232	ug/L	ND	ND	ND	ND	0.050	4311587
Aroclor 1248	ug/L	ND	ND	ND	ND	0.050	4311587
Aroclor 1242	ug/L	ND	ND	ND	ND	0.050	4311587
Aroclor 1254	ug/L	ND	ND	ND	ND	0.050	4311587
Aroclor 1260	ug/L	ND	ND	ND	ND	0.050	4311587
Calculated Total PCB	ug/L	ND	ND	ND	ND	0.050	4309237
Surrogate Recovery (%)							
Decachlorobiphenyl	%	80 (1)	77 (1)	49 (2)	71 (1)		4311587

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected
(1) PCB:Unidentified (possibly halogenated) compounds detected.
(2) PCB sample contained sediment. PCB:Unidentified (possibly halogenated) compounds detected.

Maxxam ID		BMW245	BMW246	BMW247	BMW248		
Sampling Date		2015/12/08	2015/12/08	2015/12/08	2015/12/08		
COC Number		540682-01-01	540682-01-01	540682-01-01	540682-01-01		
	UNITS	**3073-CBC-MW10-1A**	**3073-CBC-MW-DUP1**	**3073-CBC-PLCS**	**3073-CBC-SLCS**	**RDL**	**QC Batch**
PCBs							
Aroclor 1016	ug/L	ND	ND	ND	ND	0.050	4311587
Aroclor 1221	ug/L	ND	ND	ND	ND	0.050	4311587
Aroclor 1232	ug/L	ND	ND	ND	ND	0.050	4311587
Aroclor 1248	ug/L	ND	ND	ND	ND	0.050	4311587
Aroclor 1242	ug/L	ND	ND	ND	ND	0.050	4311587
Aroclor 1254	ug/L	ND	ND	ND	ND	0.050	4311587
Aroclor 1260	ug/L	ND	ND	ND	ND	0.050	4311587
Calculated Total PCB	ug/L	ND	ND	ND	ND	0.050	4309237
Surrogate Recovery (%)							
Decachlorobiphenyl	%	64	58	79	78		4311587

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B5P5115
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GENERAL COMMENTS

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

Package 1	4.4°C

Sample BMW247-01 : Poor RCAp Ion Balance due to sample matrix. Possibly due to fine particulate matter.

Results relate only to the items tested.

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
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Sampler Initials: GB

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4311580	BAN	Matrix Spike	Dissolved Aluminum (Al)	2015/12/14		99	%	80 - 120
			Dissolved Antimony (Sb)	2015/12/14		99	%	80 - 120
			Dissolved Arsenic (As)	2015/12/14		97	%	80 - 120
			Dissolved Barium (Ba)	2015/12/14		NC	%	80 - 120
			Dissolved Beryllium (Be)	2015/12/14		98	%	80 - 120
			Dissolved Bismuth (Bi)	2015/12/14		103	%	80 - 120
			Dissolved Boron (B)	2015/12/14		99	%	80 - 120
			Dissolved Cadmium (Cd)	2015/12/14		102	%	80 - 120
			Dissolved Calcium (Ca)	2015/12/14		NC	%	80 - 120
			Dissolved Chromium (Cr)	2015/12/14		98	%	80 - 120
			Dissolved Cobalt (Co)	2015/12/14		99	%	80 - 120
			Dissolved Copper (Cu)	2015/12/14		99	%	80 - 120
			Dissolved Iron (Fe)	2015/12/14		NC	%	80 - 120
			Dissolved Lead (Pb)	2015/12/14		100	%	80 - 120
			Dissolved Magnesium (Mg)	2015/12/14		106	%	80 - 120
			Dissolved Manganese (Mn)	2015/12/14		NC	%	80 - 120
			Dissolved Molybdenum (Mo)	2015/12/14		102	%	80 - 120
			Dissolved Nickel (Ni)	2015/12/14		100	%	80 - 120
			Dissolved Phosphorus (P)	2015/12/14		104	%	80 - 120
			Dissolved Potassium (K)	2015/12/14		102	%	80 - 120
			Dissolved Selenium (Se)	2015/12/14		99	%	80 - 120
			Dissolved Silver (Ag)	2015/12/14		99	%	80 - 120
			Dissolved Sodium (Na)	2015/12/14		102	%	80 - 120
			Dissolved Strontium (Sr)	2015/12/14		NC	%	80 - 120
			Dissolved Thallium (Tl)	2015/12/14		102	%	80 - 120
			Dissolved Tin (Sn)	2015/12/14		101	%	80 - 120
			Dissolved Titanium (Ti)	2015/12/14		104	%	80 - 120
			Dissolved Uranium (U)	2015/12/14		111	%	80 - 120
			Dissolved Vanadium (V)	2015/12/14		99	%	80 - 120
			Dissolved Zinc (Zn)	2015/12/14		103	%	80 - 120
4311580	BAN	Spiked Blank	Dissolved Aluminum (Al)	2015/12/14		99	%	80 - 120
			Dissolved Antimony (Sb)	2015/12/14		98	%	80 - 120
			Dissolved Arsenic (As)	2015/12/14		98	%	80 - 120
			Dissolved Barium (Ba)	2015/12/14		97	%	80 - 120
			Dissolved Beryllium (Be)	2015/12/14		96	%	80 - 120
			Dissolved Bismuth (Bi)	2015/12/14		102	%	80 - 120
			Dissolved Boron (B)	2015/12/14		100	%	80 - 120
			Dissolved Cadmium (Cd)	2015/12/14		102	%	80 - 120
			Dissolved Calcium (Ca)	2015/12/14		102	%	80 - 120
			Dissolved Chromium (Cr)	2015/12/14		100	%	80 - 120
			Dissolved Cobalt (Co)	2015/12/14		101	%	80 - 120
			Dissolved Copper (Cu)	2015/12/14		101	%	80 - 120
			Dissolved Iron (Fe)	2015/12/14		105	%	80 - 120
			Dissolved Lead (Pb)	2015/12/14		99	%	80 - 120
			Dissolved Magnesium (Mg)	2015/12/14		107	%	80 - 120
			Dissolved Manganese (Mn)	2015/12/14		100	%	80 - 120
			Dissolved Molybdenum (Mo)	2015/12/14		101	%	80 - 120
			Dissolved Nickel (Ni)	2015/12/14		102	%	80 - 120
			Dissolved Phosphorus (P)	2015/12/14		106	%	80 - 120
			Dissolved Potassium (K)	2015/12/14		103	%	80 - 120
			Dissolved Selenium (Se)	2015/12/14		99	%	80 - 120
			Dissolved Silver (Ag)	2015/12/14		99	%	80 - 120
			Dissolved Sodium (Na)	2015/12/14		104	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Strontium (Sr)	2015/12/14		99	%	80 - 120
			Dissolved Thallium (Tl)	2015/12/14		101	%	80 - 120
			Dissolved Tin (Sn)	2015/12/14		99	%	80 - 120
			Dissolved Titanium (Ti)	2015/12/14		107	%	80 - 120
			Dissolved Uranium (U)	2015/12/14		108	%	80 - 120
			Dissolved Vanadium (V)	2015/12/14		99	%	80 - 120
			Dissolved Zinc (Zn)	2015/12/14		103	%	80 - 120
4311580	BAN	Method Blank	Dissolved Aluminum (Al)	2015/12/14	ND, RDL=5.0		ug/L	
			Dissolved Antimony (Sb)	2015/12/14	ND, RDL=1.0		ug/L	
			Dissolved Arsenic (As)	2015/12/14	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2015/12/14	ND, RDL=1.0		ug/L	
			Dissolved Beryllium (Be)	2015/12/14	ND, RDL=1.0		ug/L	
			Dissolved Bismuth (Bi)	2015/12/14	ND, RDL=2.0		ug/L	
			Dissolved Boron (B)	2015/12/14	ND, RDL=50		ug/L	
			Dissolved Cadmium (Cd)	2015/12/14	ND, RDL=0.010		ug/L	
			Dissolved Calcium (Ca)	2015/12/14	ND, RDL=100		ug/L	
			Dissolved Chromium (Cr)	2015/12/14	ND, RDL=1.0		ug/L	
			Dissolved Cobalt (Co)	2015/12/14	ND, RDL=0.40		ug/L	
			Dissolved Copper (Cu)	2015/12/14	ND, RDL=2.0		ug/L	
			Dissolved Iron (Fe)	2015/12/14	ND, RDL=50		ug/L	
			Dissolved Lead (Pb)	2015/12/14	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2015/12/14	ND, RDL=100		ug/L	
			Dissolved Manganese (Mn)	2015/12/14	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2015/12/14	ND, RDL=2.0		ug/L	
			Dissolved Nickel (Ni)	2015/12/14	ND, RDL=2.0		ug/L	
			Dissolved Phosphorus (P)	2015/12/14	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2015/12/14	ND, RDL=100		ug/L	
			Dissolved Selenium (Se)	2015/12/14	ND, RDL=1.0		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Silver (Ag)	2015/12/14	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2015/12/14	ND, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2015/12/14	ND, RDL=2.0		ug/L	
			Dissolved Thallium (Tl)	2015/12/14	ND, RDL=0.10		ug/L	
			Dissolved Tin (Sn)	2015/12/14	ND, RDL=2.0		ug/L	
			Dissolved Titanium (Ti)	2015/12/14	ND, RDL=2.0		ug/L	
			Dissolved Uranium (U)	2015/12/14	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2015/12/14	ND, RDL=2.0		ug/L	
			Dissolved Zinc (Zn)	2015/12/14	ND, RDL=5.0		ug/L	
4311580	BAN	RPD	Dissolved Aluminum (Al)	2015/12/14	NC		%	20
			Dissolved Antimony (Sb)	2015/12/14	NC		%	20
			Dissolved Arsenic (As)	2015/12/14	NC		%	20
			Dissolved Barium (Ba)	2015/12/14	0.23		%	20
			Dissolved Beryllium (Be)	2015/12/14	NC		%	20
			Dissolved Bismuth (Bi)	2015/12/14	NC		%	20
			Dissolved Boron (B)	2015/12/14	NC		%	20
			Dissolved Cadmium (Cd)	2015/12/14	NC		%	20
			Dissolved Calcium (Ca)	2015/12/14	0.38		%	20
			Dissolved Chromium (Cr)	2015/12/14	NC		%	20
			Dissolved Cobalt (Co)	2015/12/14	NC		%	20
			Dissolved Copper (Cu)	2015/12/14	NC		%	20
			Dissolved Iron (Fe)	2015/12/14	2.4		%	20
			Dissolved Lead (Pb)	2015/12/14	NC		%	20
			Dissolved Magnesium (Mg)	2015/12/14	1.8		%	20
			Dissolved Manganese (Mn)	2015/12/14	2.2		%	20
			Dissolved Molybdenum (Mo)	2015/12/14	NC		%	20
			Dissolved Nickel (Ni)	2015/12/14	NC		%	20
			Dissolved Phosphorus (P)	2015/12/14	NC		%	20
			Dissolved Potassium (K)	2015/12/14	3.1		%	20
			Dissolved Selenium (Se)	2015/12/14	NC		%	20
			Dissolved Silver (Ag)	2015/12/14	NC		%	20
			Dissolved Sodium (Na)	2015/12/14	1.9		%	20
			Dissolved Strontium (Sr)	2015/12/14	0.51		%	20
			Dissolved Thallium (Tl)	2015/12/14	NC		%	20
			Dissolved Tin (Sn)	2015/12/14	NC		%	20
			Dissolved Titanium (Ti)	2015/12/14	NC		%	20
			Dissolved Uranium (U)	2015/12/14	NC		%	20
			Dissolved Vanadium (V)	2015/12/14	NC		%	20
			Dissolved Zinc (Zn)	2015/12/14	NC		%	20
4311587	LGE	Matrix Spike	Decachlorobiphenyl	2015/12/15		68	%	30 - 130
			Aroclor 1254	2015/12/15		83	%	30 - 130
4311587	LGE	Spiked Blank	Decachlorobiphenyl	2015/12/15		86	%	30 - 130
			Aroclor 1254	2015/12/15		86	%	30 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4311587	LGE	Method Blank	Decachlorobiphenyl	2015/12/15		75	%	30 - 130
			Aroclor 1016	2015/12/15	ND, RDL=0.050		ug/L	
			Aroclor 1221	2015/12/15	ND, RDL=0.050		ug/L	
			Aroclor 1232	2015/12/15	ND, RDL=0.050		ug/L	
			Aroclor 1248	2015/12/15	ND, RDL=0.050		ug/L	
			Aroclor 1242	2015/12/15	ND, RDL=0.050		ug/L	
			Aroclor 1254	2015/12/15	ND, RDL=0.050		ug/L	
			Aroclor 1260	2015/12/15	ND, RDL=0.050		ug/L	
4311587	LGE	RPD	Aroclor 1016	2015/12/15	NC		%	40
			Aroclor 1221	2015/12/15	NC		%	40
			Aroclor 1232	2015/12/15	NC		%	40
			Aroclor 1248	2015/12/15	NC		%	40
			Aroclor 1242	2015/12/15	NC		%	40
			Aroclor 1254	2015/12/15	NC		%	40
			Aroclor 1260	2015/12/15	NC		%	40
4311601	SHL	Matrix Spike	1,2-Dichlorobenzene	2015/12/14		92	%	70 - 130
			1,3-Dichlorobenzene	2015/12/14		92	%	70 - 130
			1,4-Dichlorobenzene	2015/12/14		92	%	70 - 130
			Chlorobenzene	2015/12/14		93	%	70 - 130
			1,1,1-Trichloroethane	2015/12/14		98	%	70 - 130
			1,1,2,2-Tetrachloroethane	2015/12/14		96	%	70 - 130
			1,1,2-Trichloroethane	2015/12/14		95	%	70 - 130
			1,1-Dichloroethane	2015/12/14		104	%	70 - 130
			1,1-Dichloroethylene	2015/12/14		105	%	70 - 130
			1,2-Dichloroethane	2015/12/14		93	%	70 - 130
			1,2-Dichloropropane	2015/12/14		95	%	70 - 130
			4-Bromofluorobenzene	2015/12/14		98	%	70 - 130
			Benzene	2015/12/14		92	%	70 - 130
			Bromodichloromethane	2015/12/14		99	%	70 - 130
			Bromoform	2015/12/14		93	%	70 - 130
			Bromomethane	2015/12/14		102	%	60 - 140
			Carbon Tetrachloride	2015/12/14		99	%	70 - 130
			Chloroethane	2015/12/14		103	%	60 - 140
			Chloroform	2015/12/14		99	%	70 - 130
			Chloromethane	2015/12/14		98	%	60 - 140
			cis-1,2-Dichloroethylene	2015/12/14		106	%	70 - 130
			cis-1,3-Dichloropropene	2015/12/14		85	%	70 - 130
			D4-1,2-Dichloroethane	2015/12/14		106	%	70 - 130
			D8-Toluene	2015/12/14		96	%	70 - 130
			Dibromochloromethane	2015/12/14		98	%	70 - 130
			Ethylbenzene	2015/12/14		88	%	70 - 130
			Ethylene Dibromide	2015/12/14		102	%	70 - 130
			Methyl t-butyl ether (MTBE)	2015/12/14		99	%	70 - 130
			Methylene Chloride(Dichloromethane)	2015/12/14		101	%	70 - 130
			o-Xylene	2015/12/14		88	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			p+m-Xylene	2015/12/14		91	%	70 - 130
			Styrene	2015/12/14		89	%	70 - 130
			Tetrachloroethylene	2015/12/14		90	%	70 - 130
			Toluene	2015/12/14		94	%	70 - 130
			trans-1,2-Dichloroethylene	2015/12/14		104	%	70 - 130
			trans-1,3-Dichloropropene	2015/12/14		86	%	70 - 130
			Trichloroethylene	2015/12/14		94	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2015/12/14		99	%	60 - 140
			Vinyl Chloride	2015/12/14		103	%	60 - 140
4311601	SHL	Spiked Blank	1,2-Dichlorobenzene	2015/12/14		97	%	70 - 130
			1,3-Dichlorobenzene	2015/12/14		98	%	70 - 130
			1,4-Dichlorobenzene	2015/12/14		97	%	70 - 130
			Chlorobenzene	2015/12/14		95	%	70 - 130
			1,1,1-Trichloroethane	2015/12/14		110	%	70 - 130
			1,1,2,2-Tetrachloroethane	2015/12/14		97	%	70 - 130
			1,1,2-Trichloroethane	2015/12/14		102	%	70 - 130
			1,1-Dichloroethane	2015/12/14		114	%	70 - 130
			1,1-Dichloroethylene	2015/12/14		116	%	70 - 130
			1,2-Dichloroethane	2015/12/14		104	%	70 - 130
			1,2-Dichloropropane	2015/12/14		106	%	70 - 130
			4-Bromofluorobenzene	2015/12/14		98	%	70 - 130
			Benzene	2015/12/14		103	%	70 - 130
			Bromodichloromethane	2015/12/14		108	%	70 - 130
			Bromoform	2015/12/14		96	%	70 - 130
			Bromomethane	2015/12/14		115	%	60 - 140
			Carbon Tetrachloride	2015/12/14		109	%	70 - 130
			Chloroethane	2015/12/14		113	%	60 - 140
			Chloroform	2015/12/14		108	%	70 - 130
			Chloromethane	2015/12/14		122	%	60 - 140
			cis-1,2-Dichloroethylene	2015/12/14		115	%	70 - 130
			cis-1,3-Dichloropropene	2015/12/14		97	%	70 - 130
			D4-1,2-Dichloroethane	2015/12/14		113	%	70 - 130
			D8-Toluene	2015/12/14		96	%	70 - 130
			Dibromochloromethane	2015/12/14		106	%	70 - 130
			Ethylbenzene	2015/12/14		94	%	70 - 130
			Ethylene Dibromide	2015/12/14		110	%	70 - 130
			Methyl t-butyl ether (MTBE)	2015/12/14		107	%	70 - 130
			Methylene Chloride(Dichloromethane)	2015/12/14		110	%	70 - 130
			o-Xylene	2015/12/14		93	%	70 - 130
			p+m-Xylene	2015/12/14		96	%	70 - 130
			Styrene	2015/12/14		94	%	70 - 130
			Tetrachloroethylene	2015/12/14		101	%	70 - 130
			Toluene	2015/12/14		104	%	70 - 130
			trans-1,2-Dichloroethylene	2015/12/14		114	%	70 - 130
			trans-1,3-Dichloropropene	2015/12/14		98	%	70 - 130
			Trichloroethylene	2015/12/14		105	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2015/12/14		109	%	60 - 140
			Vinyl Chloride	2015/12/14		114	%	60 - 140
4311601	SHL	Method Blank	1,2-Dichlorobenzene	2015/12/14	ND, RDL=0.50		ug/L	
			1,3-Dichlorobenzene	2015/12/14	ND, RDL=1.0		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,4-Dichlorobenzene	2015/12/14	ND, RDL=1.0		ug/L	
			Chlorobenzene	2015/12/14	ND, RDL=1.0		ug/L	
			1,1,1-Trichloroethane	2015/12/14	ND, RDL=1.0		ug/L	
			1,1,2,2-Tetrachloroethane	2015/12/14	ND, RDL=0.50		ug/L	
			1,1,2-Trichloroethane	2015/12/14	ND, RDL=1.0		ug/L	
			1,1-Dichloroethane	2015/12/14	ND, RDL=2.0		ug/L	
			1,1-Dichloroethylene	2015/12/14	ND, RDL=0.50		ug/L	
			1,2-Dichloroethane	2015/12/14	ND, RDL=1.0		ug/L	
			1,2-Dichloropropane	2015/12/14	ND, RDL=0.50		ug/L	
			4-Bromofluorobenzene	2015/12/14		97	%	70 - 130
			Benzene	2015/12/14	ND, RDL=1.0		ug/L	
			Bromodichloromethane	2015/12/14	ND, RDL=1.0		ug/L	
			Bromoform	2015/12/14	ND, RDL=1.0		ug/L	
			Bromomethane	2015/12/14	ND, RDL=0.50		ug/L	
			Carbon Tetrachloride	2015/12/14	ND, RDL=0.50		ug/L	
			Chloroethane	2015/12/14	ND, RDL=8.0		ug/L	
			Chloroform	2015/12/14	ND, RDL=1.0		ug/L	
			Chloromethane	2015/12/14	ND, RDL=8.0		ug/L	
			cis-1,2-Dichloroethylene	2015/12/14	ND, RDL=0.50		ug/L	
			cis-1,3-Dichloropropene	2015/12/14	ND, RDL=0.50		ug/L	
			D4-1,2-Dichloroethane	2015/12/14		109	%	70 - 130
			D8-Toluene	2015/12/14		95	%	70 - 130
			Dibromochloromethane	2015/12/14	ND, RDL=1.0		ug/L	
			Ethylbenzene	2015/12/14	ND, RDL=1.0		ug/L	
			Ethylene Dibromide	2015/12/14	ND, RDL=0.20		ug/L	
			Methyl t-butyl ether (MTBE)	2015/12/14	ND, RDL=2.0		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Methylene Chloride(Dichloromethane)	2015/12/14	ND, RDL=3.0		ug/L	
			o-Xylene	2015/12/14	ND, RDL=1.0		ug/L	
			p+m-Xylene	2015/12/14	ND, RDL=2.0		ug/L	
			Styrene	2015/12/14	ND, RDL=1.0		ug/L	
			Tetrachloroethylene	2015/12/14	ND, RDL=1.0		ug/L	
			Toluene	2015/12/14	ND, RDL=1.0		ug/L	
			Total Trihalomethanes	2015/12/14	ND, RDL=1.0		ug/L	
			Total Xylenes	2015/12/14	ND, RDL=1.0		ug/L	
			trans-1,2-Dichloroethylene	2015/12/14	ND, RDL=0.50		ug/L	
			trans-1,3-Dichloropropene	2015/12/14	ND, RDL=0.50		ug/L	
			Trichloroethylene	2015/12/14	ND, RDL=1.0		ug/L	
			Trichlorofluoromethane (FREON 11)	2015/12/14	ND, RDL=8.0		ug/L	
			Vinyl Chloride	2015/12/14	ND, RDL=0.50		ug/L	
4311601	SHL	RPD	1,2-Dichlorobenzene	2015/12/14	NC		%	40
			1,3-Dichlorobenzene	2015/12/14	NC		%	40
			1,4-Dichlorobenzene	2015/12/14	NC		%	40
			Chlorobenzene	2015/12/14	NC		%	40
			1,1,1-Trichloroethane	2015/12/14	NC		%	40
			1,1,2,2-Tetrachloroethane	2015/12/14	NC		%	40
			1,1,2-Trichloroethane	2015/12/14	NC		%	40
			1,1-Dichloroethane	2015/12/14	NC		%	40
			1,1-Dichloroethylene	2015/12/14	NC		%	40
			1,2-Dichloroethane	2015/12/14	NC		%	40
			1,2-Dichloropropane	2015/12/14	NC		%	40
			Benzene	2015/12/14	NC		%	40
			Bromodichloromethane	2015/12/14	NC		%	40
			Bromoform	2015/12/14	NC		%	40
			Bromomethane	2015/12/14	NC		%	40
			Carbon Tetrachloride	2015/12/14	NC		%	40
			Chloroethane	2015/12/14	NC		%	40
			Chloroform	2015/12/14	NC		%	40
			Chloromethane	2015/12/14	NC		%	40
			cis-1,2-Dichloroethylene	2015/12/14	NC		%	40
			cis-1,3-Dichloropropene	2015/12/14	NC		%	40
			Dibromochloromethane	2015/12/14	NC		%	40
			Ethylbenzene	2015/12/14	NC		%	40
			Ethylene Dibromide	2015/12/14	NC		%	40
			Methylene Chloride(Dichloromethane)	2015/12/14	NC		%	40
			o-Xylene	2015/12/14	NC		%	40

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			p+m-Xylene	2015/12/14	NC		%	40
			Styrene	2015/12/14	NC		%	40
			Tetrachloroethylene	2015/12/14	NC		%	40
			Toluene	2015/12/14	NC		%	40
			trans-1,2-Dichloroethylene	2015/12/14	NC		%	40
			trans-1,3-Dichloropropene	2015/12/14	NC		%	40
			Trichloroethylene	2015/12/14	NC		%	40
			Trichlorofluoromethane (FREON 11)	2015/12/14	NC		%	40
			Vinyl Chloride	2015/12/14	NC		%	40
4311651	KBT	Matrix Spike	D10-Anthracene	2015/12/17		91	%	30 - 130
			D14-Terphenyl	2015/12/17		87	%	30 - 130
			D8-Acenaphthylene	2015/12/17		92	%	30 - 130
			1-Methylnaphthalene	2015/12/17		93	%	30 - 130
			2-Methylnaphthalene	2015/12/17		99	%	30 - 130
			Acenaphthene	2015/12/17		101	%	30 - 130
			Acenaphthylene	2015/12/17		105	%	30 - 130
			Anthracene	2015/12/17		97	%	30 - 130
			Benzo(a)anthracene	2015/12/17		91	%	30 - 130
			Benzo(a)pyrene	2015/12/17		84	%	30 - 130
			Benzo(b)fluoranthene	2015/12/17		87	%	30 - 130
			Benzo(g,h,i)perylene	2015/12/17		85	%	30 - 130
			Benzo(j)fluoranthene	2015/12/17		86	%	30 - 130
			Benzo(k)fluoranthene	2015/12/17		84	%	30 - 130
			Chrysene	2015/12/17		95	%	30 - 130
			Dibenz(a,h)anthracene	2015/12/17		74	%	30 - 130
			Fluoranthene	2015/12/17		103	%	30 - 130
			Fluorene	2015/12/17		103	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2015/12/17		78	%	30 - 130
			Naphthalene	2015/12/17		84	%	30 - 130
			Perylene	2015/12/17		85	%	30 - 130
			Phenanthrene	2015/12/17		103	%	30 - 130
			Pyrene	2015/12/17		104	%	30 - 130
4311651	KBT	Spiked Blank	D10-Anthracene	2015/12/17		101	%	30 - 130
			D14-Terphenyl	2015/12/17		96	%	30 - 130
			D8-Acenaphthylene	2015/12/17		101	%	30 - 130
			1-Methylnaphthalene	2015/12/17		103	%	30 - 130
			2-Methylnaphthalene	2015/12/17		104	%	30 - 130
			Acenaphthene	2015/12/17		113	%	30 - 130
			Acenaphthylene	2015/12/17		116	%	30 - 130
			Anthracene	2015/12/17		117	%	30 - 130
			Benzo(a)anthracene	2015/12/17		109	%	30 - 130
			Benzo(a)pyrene	2015/12/17		97	%	30 - 130
			Benzo(b)fluoranthene	2015/12/17		98	%	30 - 130
			Benzo(g,h,i)perylene	2015/12/17		93	%	30 - 130
			Benzo(j)fluoranthene	2015/12/17		99	%	30 - 130
			Benzo(k)fluoranthene	2015/12/17		95	%	30 - 130
			Chrysene	2015/12/17		103	%	30 - 130
			Dibenz(a,h)anthracene	2015/12/17		81	%	30 - 130
			Fluoranthene	2015/12/17		121	%	30 - 130
			Fluorene	2015/12/17		119	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2015/12/17		88	%	30 - 130
			Naphthalene	2015/12/17		103	%	30 - 130
			Perylene	2015/12/17		96	%	30 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Phenanthrene	2015/12/17		128	%	30 - 130
			Pyrene	2015/12/17		119	%	30 - 130
4311651	KBT	Method Blank	D10-Anthracene	2015/12/17		113	%	30 - 130
			D14-Terphenyl	2015/12/17		103	%	30 - 130
			D8-Acenaphthylene	2015/12/17		108	%	30 - 130
			1-Methylnaphthalene	2015/12/17	ND, RDL=0.050		ug/L	
			2-Methylnaphthalene	2015/12/17	ND, RDL=0.050		ug/L	
			Acenaphthene	2015/12/17	ND, RDL=0.010		ug/L	
			Acenaphthylene	2015/12/17	ND, RDL=0.010		ug/L	
			Anthracene	2015/12/17	ND, RDL=0.010		ug/L	
			Benzo(a)anthracene	2015/12/17	ND, RDL=0.010		ug/L	
			Benzo(a)pyrene	2015/12/17	ND, RDL=0.010		ug/L	
			Benzo(b)fluoranthene	2015/12/17	ND, RDL=0.010		ug/L	
			Benzo(g,h,i)perylene	2015/12/17	ND, RDL=0.010		ug/L	
			Benzo(j)fluoranthene	2015/12/17	ND, RDL=0.010		ug/L	
			Benzo(k)fluoranthene	2015/12/17	ND, RDL=0.010		ug/L	
			Chrysene	2015/12/17	ND, RDL=0.010		ug/L	
			Dibenz(a,h)anthracene	2015/12/17	ND, RDL=0.010		ug/L	
			Fluoranthene	2015/12/17	ND, RDL=0.010		ug/L	
			Fluorene	2015/12/17	ND, RDL=0.010		ug/L	
			Indeno(1,2,3-cd)pyrene	2015/12/17	ND, RDL=0.010		ug/L	
			Naphthalene	2015/12/17	ND, RDL=0.20		ug/L	
			Perylene	2015/12/17	ND, RDL=0.010		ug/L	
			Phenanthrene	2015/12/17	ND, RDL=0.010		ug/L	
			Pyrene	2015/12/17	ND, RDL=0.010		ug/L	
4311651	KBT	RPD	1-Methylnaphthalene	2015/12/17	NC		%	40
			2-Methylnaphthalene	2015/12/17	NC		%	40
			Acenaphthene	2015/12/17	NC		%	40
			Acenaphthylene	2015/12/17	NC		%	40
			Anthracene	2015/12/17	NC		%	40
			Benzo(a)anthracene	2015/12/17	NC		%	40

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(a)pyrene	2015/12/17	NC		%	40
			Benzo(b)fluoranthene	2015/12/17	NC		%	40
			Benzo(g,h,i)perylene	2015/12/17	NC		%	40
			Benzo(j)fluoranthene	2015/12/17	NC		%	40
			Benzo(k)fluoranthene	2015/12/17	NC		%	40
			Chrysene	2015/12/17	NC		%	40
			Dibenz(a,h)anthracene	2015/12/17	NC		%	40
			Fluoranthene	2015/12/17	NC		%	40
			Fluorene	2015/12/17	NC		%	40
			Indeno(1,2,3-cd)pyrene	2015/12/17	NC		%	40
			Naphthalene	2015/12/17	NC		%	40
			Perylene	2015/12/17	NC		%	40
			Phenanthrene	2015/12/17	NC		%	40
			Pyrene	2015/12/17	NC		%	40
4311862	TMO	Spiked Blank	Conductivity	2015/12/14		102	%	80 - 120
4311862	TMO	Method Blank	Conductivity	2015/12/14	1.1, RDL=1.0		uS/cm	
4311862	TMO	RPD	Conductivity	2015/12/14	0.46		%	25
4311866	TMO	QC Standard	pH	2015/12/14		100	%	97 - 103
4311866	TMO	RPD	pH	2015/12/14	0.052		%	N/A
4314489	BAN	Matrix Spike	Total Aluminum (Al)	2015/12/16		92	%	80 - 120
			Total Antimony (Sb)	2015/12/16		101	%	80 - 120
			Total Arsenic (As)	2015/12/16		96	%	80 - 120
			Total Barium (Ba)	2015/12/16		100	%	80 - 120
			Total Beryllium (Be)	2015/12/16		103	%	80 - 120
			Total Bismuth (Bi)	2015/12/16		97	%	80 - 120
			Total Boron (B)	2015/12/16		103	%	80 - 120
			Total Cadmium (Cd)	2015/12/16		100	%	80 - 120
			Total Calcium (Ca)	2015/12/16		100	%	80 - 120
			Total Chromium (Cr)	2015/12/16		94	%	80 - 120
			Total Cobalt (Co)	2015/12/16		96	%	80 - 120
			Total Copper (Cu)	2015/12/16		92	%	80 - 120
			Total Iron (Fe)	2015/12/16		96	%	80 - 120
			Total Lead (Pb)	2015/12/16		97	%	80 - 120
			Total Magnesium (Mg)	2015/12/16		99	%	80 - 120
			Total Manganese (Mn)	2015/12/16		95	%	80 - 120
			Total Molybdenum (Mo)	2015/12/16		100	%	80 - 120
			Total Nickel (Ni)	2015/12/16		95	%	80 - 120
			Total Phosphorus (P)	2015/12/16		101	%	80 - 120
			Total Potassium (K)	2015/12/16		98	%	80 - 120
			Total Selenium (Se)	2015/12/16		97	%	80 - 120
			Total Silver (Ag)	2015/12/16		96	%	80 - 120
			Total Sodium (Na)	2015/12/16		NC	%	80 - 120
			Total Strontium (Sr)	2015/12/16		96	%	80 - 120
			Total Thallium (Tl)	2015/12/16		96	%	80 - 120
			Total Tin (Sn)	2015/12/16		104	%	80 - 120
			Total Titanium (Ti)	2015/12/16		98	%	80 - 120
			Total Uranium (U)	2015/12/16		101	%	80 - 120
			Total Vanadium (V)	2015/12/16		99	%	80 - 120
			Total Zinc (Zn)	2015/12/16		97	%	80 - 120
4314489	BAN	Spiked Blank	Total Aluminum (Al)	2015/12/16		97	%	80 - 120
			Total Antimony (Sb)	2015/12/16		103	%	80 - 120
			Total Arsenic (As)	2015/12/16		96	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Barium (Ba)	2015/12/16		102	%	80 - 120
			Total Beryllium (Be)	2015/12/16		101	%	80 - 120
			Total Bismuth (Bi)	2015/12/16		102	%	80 - 120
			Total Boron (B)	2015/12/16		102	%	80 - 120
			Total Cadmium (Cd)	2015/12/16		101	%	80 - 120
			Total Calcium (Ca)	2015/12/16		101	%	80 - 120
			Total Chromium (Cr)	2015/12/16		98	%	80 - 120
			Total Cobalt (Co)	2015/12/16		99	%	80 - 120
			Total Copper (Cu)	2015/12/16		96	%	80 - 120
			Total Iron (Fe)	2015/12/16		99	%	80 - 120
			Total Lead (Pb)	2015/12/16		101	%	80 - 120
			Total Magnesium (Mg)	2015/12/16		101	%	80 - 120
			Total Manganese (Mn)	2015/12/16		99	%	80 - 120
			Total Molybdenum (Mo)	2015/12/16		103	%	80 - 120
			Total Nickel (Ni)	2015/12/16		98	%	80 - 120
			Total Phosphorus (P)	2015/12/16		104	%	80 - 120
			Total Potassium (K)	2015/12/16		101	%	80 - 120
			Total Selenium (Se)	2015/12/16		97	%	80 - 120
			Total Silver (Ag)	2015/12/16		99	%	80 - 120
			Total Sodium (Na)	2015/12/16		101	%	80 - 120
			Total Strontium (Sr)	2015/12/16		100	%	80 - 120
			Total Thallium (Tl)	2015/12/16		100	%	80 - 120
			Total Tin (Sn)	2015/12/16		103	%	80 - 120
			Total Titanium (Ti)	2015/12/16		95	%	80 - 120
			Total Uranium (U)	2015/12/16		104	%	80 - 120
			Total Vanadium (V)	2015/12/16		101	%	80 - 120
			Total Zinc (Zn)	2015/12/16		98	%	80 - 120
4314489	BAN	Method Blank	Total Aluminum (Al)	2015/12/16	ND, RDL=5.0		ug/L	
			Total Antimony (Sb)	2015/12/16	ND, RDL=1.0		ug/L	
			Total Arsenic (As)	2015/12/16	ND, RDL=1.0		ug/L	
			Total Barium (Ba)	2015/12/16	ND, RDL=1.0		ug/L	
			Total Beryllium (Be)	2015/12/16	ND, RDL=1.0		ug/L	
			Total Bismuth (Bi)	2015/12/16	ND, RDL=2.0		ug/L	
			Total Boron (B)	2015/12/16	ND, RDL=50		ug/L	
			Total Cadmium (Cd)	2015/12/16	ND, RDL=0.010		ug/L	
			Total Calcium (Ca)	2015/12/16	ND, RDL=100		ug/L	
			Total Chromium (Cr)	2015/12/16	ND, RDL=1.0		ug/L	
			Total Cobalt (Co)	2015/12/16	ND, RDL=0.40		ug/L	
			Total Copper (Cu)	2015/12/16	ND, RDL=2.0		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Iron (Fe)	2015/12/16	ND, RDL=50		ug/L	
			Total Lead (Pb)	2015/12/16	ND, RDL=0.50		ug/L	
			Total Magnesium (Mg)	2015/12/16	ND, RDL=100		ug/L	
			Total Manganese (Mn)	2015/12/16	ND, RDL=2.0		ug/L	
			Total Molybdenum (Mo)	2015/12/16	ND, RDL=2.0		ug/L	
			Total Nickel (Ni)	2015/12/16	ND, RDL=2.0		ug/L	
			Total Phosphorus (P)	2015/12/16	ND, RDL=100		ug/L	
			Total Potassium (K)	2015/12/16	ND, RDL=100		ug/L	
			Total Selenium (Se)	2015/12/16	ND, RDL=1.0		ug/L	
			Total Silver (Ag)	2015/12/16	ND, RDL=0.10		ug/L	
			Total Sodium (Na)	2015/12/16	ND, RDL=100		ug/L	
			Total Strontium (Sr)	2015/12/16	ND, RDL=2.0		ug/L	
			Total Thallium (Tl)	2015/12/16	ND, RDL=0.10		ug/L	
			Total Tin (Sn)	2015/12/16	ND, RDL=2.0		ug/L	
			Total Titanium (Ti)	2015/12/16	ND, RDL=2.0		ug/L	
			Total Uranium (U)	2015/12/16	ND, RDL=0.10		ug/L	
			Total Vanadium (V)	2015/12/16	ND, RDL=2.0		ug/L	
			Total Zinc (Zn)	2015/12/16	ND, RDL=5.0		ug/L	
4314489	BAN	RPD	Total Arsenic (As)	2015/12/16	0.99		%	20
			Total Lead (Pb)	2015/12/16	NC		%	20
4315542	LLE	Matrix Spike	Chromium (VI)	2015/12/18		103	%	80 - 120
4315542	LLE	Spiked Blank	Chromium (VI)	2015/12/18		98	%	80 - 120
4315542	LLE	Method Blank	Chromium (VI)	2015/12/18	ND, RDL=0.50		ug/L	
4315542	LLE	RPD	Chromium (VI)	2015/12/18	NC		%	20
4315915	ARS	Matrix Spike	Total Alkalinity (Total as CaCO3)	2015/12/18		NC	%	80 - 120
4315915	ARS	Spiked Blank	Total Alkalinity (Total as CaCO3)	2015/12/17		100	%	80 - 120
4315915	ARS	Method Blank	Total Alkalinity (Total as CaCO3)	2015/12/17	ND, RDL=5.0		mg/L	
4315915	ARS	RPD	Total Alkalinity (Total as CaCO3)	2015/12/18	2.0		%	25
4315918	MCN	Matrix Spike	Dissolved Chloride (Cl)	2015/12/18		102	%	80 - 120
4315918	MCN	QC Standard	Dissolved Chloride (Cl)	2015/12/18		102	%	80 - 120
4315918	MCN	Spiked Blank	Dissolved Chloride (Cl)	2015/12/18		105	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4315918	MCN	Method Blank	Dissolved Chloride (Cl)	2015/12/18	ND, RDL=1.0		mg/L	
4315918	MCN	RPD	Dissolved Chloride (Cl)	2015/12/18	1.8		%	25
4315920	MCN	Matrix Spike	Dissolved Sulphate (SO4)	2015/12/17		NC	%	80 - 120
4315920	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2015/12/17		96	%	80 - 120
4315920	MCN	Method Blank	Dissolved Sulphate (SO4)	2015/12/17	ND, RDL=2.0		mg/L	
4315920	MCN	RPD	Dissolved Sulphate (SO4)	2015/12/17	2.5		%	25
4315921	ARS	Matrix Spike	Reactive Silica (SiO2)	2015/12/17		NC	%	80 - 120
4315921	ARS	Spiked Blank	Reactive Silica (SiO2)	2015/12/17		97	%	80 - 120
4315921	ARS	Method Blank	Reactive Silica (SiO2)	2015/12/17	ND, RDL=0.50		mg/L	
4315921	ARS	RPD	Reactive Silica (SiO2)	2015/12/17	0.58		%	25
4315924	ARS	Spiked Blank	Colour	2015/12/17		102	%	80 - 120
4315924	ARS	Method Blank	Colour	2015/12/17	ND, RDL=5.0		TCU	
4315924	ARS	RPD	Colour	2015/12/17	NC		%	20
4315925	ARS	Matrix Spike	Orthophosphate (P)	2015/12/18		95	%	80 - 120
4315925	ARS	Spiked Blank	Orthophosphate (P)	2015/12/18		100	%	80 - 120
4315925	ARS	Method Blank	Orthophosphate (P)	2015/12/18	ND, RDL=0.010		mg/L	
4315925	ARS	RPD	Orthophosphate (P)	2015/12/18	NC		%	25
4315927	ARS	Matrix Spike	Nitrate + Nitrite (N)	2015/12/18		109	%	80 - 120
4315927	ARS	Spiked Blank	Nitrate + Nitrite (N)	2015/12/18		105	%	80 - 120
4315927	ARS	Method Blank	Nitrate + Nitrite (N)	2015/12/18	ND, RDL=0.050		mg/L	
4315927	ARS	RPD	Nitrate + Nitrite (N)	2015/12/18	NC		%	25
4315929	ARS	Matrix Spike	Nitrite (N)	2015/12/17		96	%	80 - 120
4315929	ARS	Spiked Blank	Nitrite (N)	2015/12/17		101	%	80 - 120
4315929	ARS	Method Blank	Nitrite (N)	2015/12/17	ND, RDL=0.010		mg/L	
4315929	ARS	RPD	Nitrite (N)	2015/12/17	NC		%	25
4315935	ARS	Matrix Spike	Total Alkalinity (Total as CaCO3)	2015/12/18		NC	%	80 - 120
4315935	ARS	Spiked Blank	Total Alkalinity (Total as CaCO3)	2015/12/18		104	%	80 - 120
4315935	ARS	Method Blank	Total Alkalinity (Total as CaCO3)	2015/12/18	ND, RDL=5.0		mg/L	
4315935	ARS	RPD	Total Alkalinity (Total as CaCO3)	2015/12/18	NC		%	25
4315936	MCN	Matrix Spike	Dissolved Chloride (Cl)	2015/12/18		103	%	80 - 120
4315936	MCN	QC Standard	Dissolved Chloride (Cl)	2015/12/18		102	%	80 - 120
4315936	MCN	Spiked Blank	Dissolved Chloride (Cl)	2015/12/18		104	%	80 - 120
4315936	MCN	Method Blank	Dissolved Chloride (Cl)	2015/12/18	ND, RDL=1.0		mg/L	
4315936	MCN	RPD	Dissolved Chloride (Cl)	2015/12/18	3.9		%	25
4315939	MCN	Matrix Spike	Dissolved Sulphate (SO4)	2015/12/17		NC	%	80 - 120
4315939	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2015/12/17		91	%	80 - 120
4315939	MCN	Method Blank	Dissolved Sulphate (SO4)	2015/12/17	ND, RDL=2.0		mg/L	
4315939	MCN	RPD	Dissolved Sulphate (SO4)	2015/12/17	0.069		%	25
4315941	ARS	Matrix Spike	Reactive Silica (SiO2)	2015/12/17		NC	%	80 - 120
4315941	ARS	Spiked Blank	Reactive Silica (SiO2)	2015/12/17		99	%	80 - 120
4315941	ARS	Method Blank	Reactive Silica (SiO2)	2015/12/17	ND, RDL=0.50		mg/L	

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4315941	ARS	RPD	Reactive Silica (SiO2)	2015/12/17	0.22		%	25
4315948	ARS	Spiked Blank	Colour	2015/12/17		100	%	80 - 120
4315948	ARS	Method Blank	Colour	2015/12/17	ND, RDL=5.0		TCU	
4315948	ARS	RPD	Colour	2015/12/17	NC		%	20
4315950	ARS	Matrix Spike	Orthophosphate (P)	2015/12/18		101	%	80 - 120
4315950	ARS	Spiked Blank	Orthophosphate (P)	2015/12/18		98	%	80 - 120
4315950	ARS	Method Blank	Orthophosphate (P)	2015/12/18	ND, RDL=0.010		mg/L	
4315950	ARS	RPD	Orthophosphate (P)	2015/12/18	NC		%	25
4315952	ARS	Matrix Spike	Nitrate + Nitrite (N)	2015/12/18		103	%	80 - 120
4315952	ARS	Spiked Blank	Nitrate + Nitrite (N)	2015/12/18		102	%	80 - 120
4315952	ARS	Method Blank	Nitrate + Nitrite (N)	2015/12/18	ND, RDL=0.050		mg/L	
4315952	ARS	RPD	Nitrate + Nitrite (N)	2015/12/18	NC		%	25
4315957	ARS	Matrix Spike	Nitrite (N)	2015/12/17		97	%	80 - 120
4315957	ARS	Spiked Blank	Nitrite (N)	2015/12/17		90	%	80 - 120
4315957	ARS	Method Blank	Nitrite (N)	2015/12/17	ND, RDL=0.010		mg/L	
4315957	ARS	RPD	Nitrite (N)	2015/12/17	NC		%	25
4316384	ARS	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2015/12/17		103	%	80 - 120
4316384	ARS	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2015/12/17		91	%	80 - 120
4316384	ARS	Method Blank	Nitrogen (Ammonia Nitrogen)	2015/12/17	ND, RDL=0.050		mg/L	
4316384	ARS	RPD	Nitrogen (Ammonia Nitrogen)	2015/12/17	NC		%	20
4317961	TMO	QC Standard	Turbidity	2015/12/17		86	%	80 - 120
4317961	TMO	Method Blank	Turbidity	2015/12/17	ND, RDL=0.10		NTU	
4317961	TMO	RPD	Turbidity	2015/12/17	10		%	20
4317964	TMO	QC Standard	Turbidity	2015/12/17		85	%	80 - 120
4317964	TMO	Method Blank	Turbidity	2015/12/17	ND, RDL=0.10		NTU	
4317964	TMO	RPD	Turbidity	2015/12/17	5.9		%	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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

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FUNDAMENTAL LABORATORY ACCEPTANCE GUIDELINE

Invoice To:
Fracflow Consultants Inc
ATTN: Karen Andrews
154 Major's Path
St. John's, NL
A1A 5A1
Client Contact:
Ingrid Lawlor

Maxxam Job #:	B5P5115
Date Received:	2015/12/10
Your C.O.C. #:	540682-01-01
Maxxam Project Manager:	Leonard Muise
Quote #:	B57514

No discrepancies noted.

Report Comments

Received Date:	**2015/12/10**	**Time:**	**10:31**	**By:**	
Inspected Date:		**Time:**		**By:**	
FLAG Created Date:		**Time:**		**By:**	

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Maxxam Job #: B5P5115
Report Date: 2015/12/30

Fracflow Consultants Inc
Site Location: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

VALIDATION SIGNATURE PAGE

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

Cristina Carriere

Cristina Carriere, Scientific Services

Mike MacGillivray

Mike MacGillivray, Scientific Specialist (Inorganics)

RosMarie MacDonald

Rosemarie MacDonald, Scientific Specialist (Organics)

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Success Through Science®

Your Project #: DB5P5115
Your C.O.C. #: 08414886

Attention:BEDFORD CLIENT SERVICE

MAXXAM ANALYTICS
200 BLUEWATER ROAD, SUITE 105
BEDFORD, NS
CANADA B4B 1G9

Report Date: 2015/12/29
Report #: R2105776
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5B2475
Received: 2015/12/19, 12:10

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbon (Total Organic) (1)	8	N/A	2015/12/29	BBY6SOP-00003	SM 22 5310 C m

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) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Shanaz Akbar, Project Manager
Email: SAkbar@maxxam.ca
Phone# (604)639-2618
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B5B2475
Report Date: 2015/12/29

MAXXAM ANALYTICS
Client Project #: DB5P5115

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NW4364	NW4364	NW4365	NW4366	NW4367		
Sampling Date		2015/12/08	2015/12/08	2015/12/08	2015/12/08	2015/12/08		
COC Number		08414886	08414886	08414886	08414886	08414886		
	UNITS	3073-CBC-SURF-UP (BMW241)	3073-CBC-SURF-UP (BMW241) Lab-Dup	3073-CBC-SURF-DOWN (BMW242)	3073-CBC-MW-93-1A (BMW243)	3073-CBC-MW 93-2A (BMW244)	RDL	QC Batch
Misc. Inorganics								
Total Organic Carbon (C)	mg/L	7.16	7.35	7.80	1.68	10.7	0.50	8153156

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		NW4368	NW4369	NW4370	NW4371		
Sampling Date		2015/12/08	2015/12/08	2015/12/08	2015/12/08		
COC Number		08414886	08414886	08414886	08414886		
	UNITS	3073-CBC-MW 10-1A (BMW245)	3073-CBC-MW-DUP1 (BMW246)	3073-CBC-PLCS (BMW247)	3073-CBC-SLCS (BMW248)	RDL	QC Batch
Misc. Inorganics							
Total Organic Carbon (C)	mg/L	14.9	18.5	19.6	13.3	0.50	8153152

RDL = Reportable Detection Limit

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B5B2475
Report Date: 2015/12/29

MAXXAM ANALYTICS
Client Project #: DB5P5115

GENERAL COMMENTS

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

Package 1	2.7°C

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B5B2475
Report Date: 2015/12/29

QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: DB5P5115

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8153152	Total Organic Carbon (C)	2015/12/29	NC	80 - 120	106	80 - 120	<0.50	mg/L		
8153156	Total Organic Carbon (C)	2015/12/29	105	80 - 120	104	80 - 120	<0.50	mg/L	2.6	20

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.

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.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

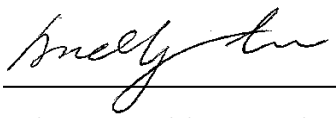
Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B5B2475
Report Date: 2015/12/29

MAXXAM ANALYTICS
Client Project #: DB5P5115

VALIDATION SIGNATURE PAGE

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



Andy Lu, Data Validation Coordinator

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Maxxam Analytics International Corporation o/a Maxxam Analytics
40-55 Elizabeth Ave, St. John's, NEWFOUNDLAND Canada A1A 1W9 Tel:(709) 754 0203 Toll-Free (Intl) 482-7227 Fax:(709) 754 8612 www.maxxam.ca

Chain Of Custody Record

Page 1 of 1

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#11664 Fracflow Consultants Inc	Company Name		Quotation #	B57514	Maxxam Job #	Bottle Order #:
Contact Name	Karen Andrews	Contact Name	Ingrid Lawlor/ Glenn Bursey	P.O. #		B5P5115	540682
Address	154 Major's Path St. John's NL A1A 5A1	Address		Project #	Come By Chance Secure Landfill	Chain Of Custody Record	Project Manager
Phone	(709) 739-7270 Fax (709) 753 5101	Phone	(709) 739-7270 Fax	Project Name		C#540682-01-01	Leonard Muise
Email	karen_ffc@nfld.net, ffc_nf@nfld.net	Email	ingrid_ffc@nfld.net, glenn_ffc@ns.aliantzinc.ca	Site #			
				Sampled By	GB/ IL		

Regulatory Criteria

Special Instructions

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Analysis Requested

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

Regular (Standard) TAT (X)
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number: _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	RBCA Hydrocarbons in Water	Atlantic VOC in Water	Atlantic RCAp-MS Total Metals in Water	PAH in Water by GC/MS (SIM)	PCBs in water by GC/ECD	Chromium 3+ by calculation	Chromium (VI) in Water	At. RCAp-MS Dissolved (FieldFilt) in W	Rainbow Trout-LC50 (acute toxicity-96h)		# of Bottles	Comments
1		3073-CBC-SURF-UP	Dec 8/15		WATER	N	N	X	X	X	X	X	X	X				16	
2		3073-CBC-SURF-DOWN	Dec 8/15		WATER	N	N	X	X	X	X	X	X	X				16	
3		3073-CBC-MW-93-1A	Dec 8/15		WATER	N	Y	X	X		X	X			X			15	
4		3073-CBC-MW93-2A	Dec 8/15		WATER	N	Y	X	X		X	X			X			15	
5		3073-CBC-~~MW93-3A~~ MW 10-1A	Dec 8/15		WATER	N	Y	X	X		X	X			X			15	
6		3073-CBC-MW-DUP1	Dec 8/15		WATER	N	Y	X	X		X	X			X			15	
7		3073-CBC-PLCS	Dec 8/15		LEACHATE	N	Y	X	X		X	X			X			15	
8		3073-CBC-SLCS	Dec 8/15		LEACHATE	N	Y	X	X		X	X			X			15	
9		3073-CBC-PLCS-Tox	Dec 8/15		LEACHATE	N										X		1X20L	sent to Quebec
10		3073-CBC-SLCS-Tox	Dec 8/15		LEACHATE	N										X		1X20L	sent to Quebec.

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
G. Glen Bursey	15/12/09	9:25	ERICA CHAFE	15/12/09	9:25		☐	4 3/4 4/4.5	☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

2015 DEC 10 10:31

TPH Must Done in NL

Your Project #: COME BY CHANCE SECURE LANDFILL
Your C.O.C. #: C#5406820101

Attention:Ingrid Lawlor

Fracflow Consultants Inc
154 Major's Path
St. John's, NL
A1A 5A1

Report Date: 2015/12/15
Report #: R3806636
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

MAXXAM JOB #: B5P2760
Received: 2015/12/09, 09:25

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
TEH in Water (PIRI)	8	2015/12/11	2015/12/14	ATL SOP 00198	Atl. RBCA v3 m
VPH in Water (PIRI)	8	N/A	2015/12/10	ATL SOP 00200	Atl. RBCA v3 m
ModTPH (T1) Calc. for Water	8	N/A	2015/12/14	N/A	Atl. RBCA v3 m

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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Rob Whelan, Laboratory Manager
Email: RWhelan@maxxam.ca
Phone# (709)754-0203
==========
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Maxxam Job #: B5P2760
Report Date: 2015/12/15

Fracflow Consultants Inc
Client Project #: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

RBCA HYDROCARBONS IN WATER (WATER)

Maxxam ID		BMK622	BMK623	BMK624	BMK625	
Sampling Date		2015/12/08	2015/12/08	2015/12/08	2015/12/08	
COC Number		C#5406820101	C#5406820101	C#5406820101	C#5406820101	
	UNITS	**3073-CBC-SURF-UP**	**3073-CBC-SURF-DOWN**	**3073-CBC-MW-93-1A**	**3073-CBC-MW93-2A**	**RDL**
Petroleum Hydrocarbons						
Benzene	mg/L	ND	ND	ND	ND	0.0010
Toluene	mg/L	ND	ND	ND	ND	0.0010
Ethylbenzene	mg/L	ND	ND	ND	ND	0.0010
Total Xylenes	mg/L	ND	ND	ND	ND	0.0020
C6 - C10 (less BTEX)	mg/L	ND	ND	ND	ND	0.010
>C10-C16 Hydrocarbons	mg/L	ND	ND	ND	ND	0.050
>C16-C21 Hydrocarbons	mg/L	ND	ND	ND	ND	0.050
>C21-<C32 Hydrocarbons	mg/L	ND	ND	ND	ND	0.10
Modified TPH (Tier1)	mg/L	ND	ND	ND	ND	0.10
Reached Baseline at C32	mg/L	Yes	Yes	Yes	Yes	N/A
Surrogate Recovery (%)						
Isobutylbenzene - Extractable	%	104	105	101	106	
n-Dotriacontane - Extractable	%	109	116	114 (1)	122 (1)	
Isobutylbenzene - Volatile	%	92	90	83	88	

RDL = Reportable Detection Limit
ND = Not detected
N/A = Not Applicable
(1) TEH sample contained sediment.

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Maxxam Job #: B5P2760
Report Date: 2015/12/15

Fracflow Consultants Inc
Client Project #: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

RBCA HYDROCARBONS IN WATER (WATER)

Maxxam ID		BMK626	BMK627	BMK628	BMK629	
Sampling Date		2015/12/08	2015/12/08	2015/12/08	2015/12/08	
COC Number		C#5406820101	C#5406820101	C#5406820101	C#5406820101	
	UNITS	**3073-CBC-MW10-1A**	**3073-CBC-MW-DUP1**	**3073-CBC-PLCS**	**3073-CBC-SLCS**	**RDL**
Petroleum Hydrocarbons						
Benzene	mg/L	ND	ND	ND	ND	0.0010
Toluene	mg/L	ND	ND	ND	ND	0.0010
Ethylbenzene	mg/L	ND	ND	ND	ND	0.0010
Total Xylenes	mg/L	ND	ND	ND	ND	0.0020
C6 - C10 (less BTEX)	mg/L	ND	ND	ND	ND	0.010
>C10-C16 Hydrocarbons	mg/L	ND	ND	ND	ND	0.050
>C16-C21 Hydrocarbons	mg/L	ND	ND	ND	ND	0.050
>C21-<C32 Hydrocarbons	mg/L	ND	ND	ND	ND	0.10
Modified TPH (Tier1)	mg/L	ND	ND	ND	ND	0.10
Reached Baseline at C32	mg/L	Yes	Yes	Yes	Yes	N/A
Surrogate Recovery (%)						
Isobutylbenzene - Extractable	%	105	103	102	101	
n-Dotriacontane - Extractable	%	115 (1)	114 (1)	108	109	
Isobutylbenzene - Volatile	%	97	92	84	74	

RDL = Reportable Detection Limit
ND = Not detected
N/A = Not Applicable
(1) TEH sample contained sediment.

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Maxxam Job #: B5P2760
Report Date: 2015/12/15

Fracflow Consultants Inc
Client Project #: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

GENERAL COMMENTS

Results relate only to the items tested.

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FUNDAMENTAL LABORATORY ACCEPTANCE GUIDELINE

Invoice To:
Fracflow Consultants Inc
ATTN: Karen Andrews
154 Major's Path
St. John's, NL
A1A 5A1
Client Contact:
Ingrid Lawlor

Maxxam Job #:	B5P2760
Date Received:	2015/12/09
Your C.O.C. #:	C#5406820101
Your Project #:	COME BY CHANCE SECURE LANDFILL
Maxxam Project Manager:	Rob Whelan
Quote #:	B57514

No discrepancies noted.

Report Comments

Received Date:	**2015/12/09**	**Time:**	**9:25**	**By:**	
Inspected Date:		**Time:**		**By:**	
FLAG Created Date:		**Time:**		**By:**	

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Maxxam Job #: B5P2760
Report Date: 2015/12/15

Fracflow Consultants Inc
Client Project #: COME BY CHANCE SECURE LANDFILL
Sampler Initials: GB

VALIDATION SIGNATURE PAGE

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

Paula Chaplin, Project Manager

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49-55 Elizabeth Ave, St. John's, NEWFOUNDLAND Canada A1A 1W9 Tel:(709) 754 0203 Toll-Free:(888) 492-7227 Fax:(709) 754 8612 www.maxxam.ca

Chain Of Custody Record

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#11664 Fracflow Consultants Inc	Company Name		Quotation #	B57514	Maxxam Job #	Bottle Order #:
Contact Name	Karen Andrews	Contact Name	Ingrid Lawlor/ Glenn Bursey	P.O. #		B5P2760	540682
Address	154 Major's Path St. John's NL A1A 5A1	Address		Project #	Come By Chance Secure Landfill	Chain Of Custody Record	Project Manager
Phone	(709) 739-7270 Fax: (709) 753-5101	Phone	(709) 739-7270 Fax:	Project Name		C#540682-01-01	Leonard Muise
Email	karen_ffc@nfld.net, ffc_nf@nfld.net	Email	ingrid_ffc@nfld.net, glenn_ffc@ns.aliantzinc.ca	Site #			
				Sampled By	GB/ IC		

Regulatory Criteria

Special Instructions

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

Regular (Standard) TAT ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (If applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number _____ *(call lab for #)* ☐

Analysis Requested

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered ? (Y/N)	RBCA Hydrocarbons in Water	Atlantic VOC in Water	Atlantic RCAp-MS Total Metals in Water	PAH in Water by GC/MS (SIM)	PCBs in water by GC/ECD	Chromium 3+ by calculation	Chromium (VI) in Water	At. RCAp-MS Dissolved (FieldFilt) in W	Rainbow Trout-LC50 (acute toxicity-96h)		# of Bottles	Comments
1		3073-CBC-SURF-UP	Dec 8/15		WATER	N	N	X	X	X	X	X	X	X				16	
2		3073-CBC-SURF-DOWN	Dec 8/15		WATER	N	N	X	X	X	X	X	X	X				16	
3		3073-CBC-MW-93-1A	Dec 8/15		WATER	N	Y	X	X		X	X			X			15	
4		3073-CBC-MW93-2A	Dec 8/15		WATER	N	Y	X	X		X	X			X			15	
5		3073-CBC-~~MW93-3A~~ MW10-1A	Dec 8/15		WATER	N	Y	X	X		X	X			X			15	
6		3073-CBC-MW-DUP1	Dec 8/15		WATER	N	Y	X	X		X	X			X			15	
7		3073-CBC-PLCS	Dec 8/15		LEACHATE	N	Y	X	X		X	X			X			15	
8		3073-CBC-SLCS	Dec 8/15		LEACHATE	N	Y	X	X		X	X			X			15	
9		3073-CBC-PLCS-Tox	Dec 8/15		LEACHATE	N										X		1x20L	
10		3073-CBC-SLCS-Tox	Dec 8/15		LEACHATE	N										X		1x20L	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
G. Glen Bursey	15/12/09	9:25		15/12/09	9:25		☐	4.3/4.4/4.5	☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Your Project #: COME BY CHANCE SECURE LANDFILL
Your C.O.C. #: 540682-01-01

Attention:Ingrid Lawlor

Fracflow Consultants Inc
154 Major's Path
St. John's, NL
A1A 5A1

Report Date: 2015/12/22
Report #: R3822957
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5P6586
Received: 2015/12/14, 09:23

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Rainbow Trout-LC50 (acute toxicity-96h) (1)	2	N/A	2015/12/16		

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 Bedford to Maxxam LCQ Ecotoxic

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Leonard Muise, Project Manager
Email: LMuise@maxxam.ca
Phone# (902)420-0203 Ext:236
==========
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Maxxam Job #: B5P6586
Report Date: 2015/12/22

Fracflow Consultants Inc
Client Project #: COME BY CHANCE SECURE LANDFILL
Sampler Initials: IL

RESULTS OF ANALYSES OF WATER

Maxxam ID		BND828	BND829	
Sampling Date		2015/12/12 09:00	2015/12/12 09:30	
COC Number		540682-01-01	540682-01-01	
	UNITS	**3073-CBC-PLCS-TOX**	**3073-CBC-SLCS-TOX**	**QC Batch**
Subcontracted Analysis				
Subcontract Parameter	N/A	ATTACHED	ATTACHED	4323599
QC Batch = Quality Control Batch				

Maxxam Analytics International Corporation o/a Maxxam Analytics 49-55 Elizabeth Ave, Suite 101A, St.John's, NL, Canada A1A 1W9 Tel: 709-754-0203 Toll Free: 888-492-7227 Fax: 709-754-8612 www.maxxamanalytics.com

Maxxam Job #: B5P6586
Report Date: 2015/12/22

Fracflow Consultants Inc
Client Project #: COME BY CHANCE SECURE LANDFILL
Sampler Initials: IL

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics 49-55 Elizabeth Ave, Suite 101A, St.John's, NL, Canada A1A 1W9 Tel: 709-754-0203 Toll Free: 888-492-7227 Fax: 709-754-8612 www.maxxamanalytics.com

FUNDAMENTAL LABORATORY ACCEPTANCE GUIDELINE

Invoice To:
Fracflow Consultants Inc
ATTN: Karen Andrews
154 Major's Path
St. John's, NL
A1A 5A1
Client Contact:
Ingrid Lawlor

Maxxam Job #:	B5P6586
Date Received:	2015/12/14
Your C.O.C. #:	540682-01-01
Your Project #:	COME BY CHANCE SECURE LANDFILL
Maxxam Project Manager:	Leonard Muise
Quote #:	B57514

No discrepancies noted.

Report Comments

Received Date:	**2015/12/14**	**Time:**	**09:23**	**By:**	
Inspected Date:		**Time:**		**By:**	
FLAG Created Date:		**Time:**		**By:**	

Maxxam Analytics International Corporation o/a Maxxam Analytics 49-55 Elizabeth Ave, Suite 101A, St.John's, NL, Canada A1A 1W9 Tel: 709-754-0203 Toll Free: 888-492-7227 Fax: 709-754-8612 www.maxxamanalytics.com

Maxxam Job #: B5P6586
Report Date: 2015/12/22

Fracflow Consultants Inc
Client Project #: COME BY CHANCE SECURE LANDFILL
Sampler Initials: IL

VALIDATION SIGNATURE PAGE

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

Eric Dearman, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Your Project #: B5P6586
Your C.O.C. #: N-A

Attention:Rob Whelan

Maxxam Analytics
200 Bluewater road
Bedford, NS
CANADA B4B 1G9

Report Date: 2015/12/21
Report #: R2090446
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B578962
Received: 2015/12/15, 15:00

Sample Matrix: WATER
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Primary Reference
Rainbow Trout - LC50 (acute-96h)*	2	N/A	2015/12/16	QUE SOP - 00408	EPS1/RM/13

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
Note: RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

* Maxxam is accredited as per the MDDELCC program.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Mathieu Letourneau, B. Sc., Chemist,
Email: MLetourneau@maxxam.ca
Phone# (418) 658-5784 Ext:6432

==========

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B578962
Report Date: 2015/12/21

Maxxam Analytics
Client Project #: B5P6586
Sampler Initials: VR

TOXICOLOGY (WATER)

Maxxam ID		BV6410	BV6412	
Sampling Date		2015/12/12 09:00	2015/12/12 09:00	
COC Number		N-A	N-A	
	Units	**3073-CBC-PLCS-TOX/BND828-01R**	**3073-CBC-SLCS-TOX/BND829-01R**	**QC Batch**
Rainbow Trout Bioassay				
LC50	%v/v	ATTACHED	ATTACHED	1551741
QC Batch = Quality Control Batch				

Maxxam Analytics International Corporation o/a Maxxam Analytique 2690, Avenue Dalton, Sainte-Foy, Québec G1P 3S4 Tél.: (418) 658-5784 Télécopieur: (418) 658-6594

Maxxam Job #: B578962
Report Date: 2015/12/21

Maxxam Analytics
Client Project #: B5P6586
Sampler Initials: VR

GENERAL COMMENTS

Condition of sample(s) upon receipt: GOOD

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytique 2690, Avenue Dalton, Sainte-Foy, Québec G1P 3S4 Tél.: (418) 658-5784 Télécopieur: (418) 658-6594

Maxxam Job #: B578962
Report Date: 2015/12/21

Maxxam Analytics
Client Project #: B5P6586
Sampler Initials: VR

VALIDATION SIGNATURE PAGE

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

Alain Dionne, B. Sc., Biologist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytique 2690, Avenue Dalton, Sainte-Foy, Québec G1P 3S4 Tél.: (418) 658-5784 Télécopieur: (418) 658-6594

MAXXAM ANALYTICS
49-55 Elizabeth Ave
St. John's, NEWFOUNDLAND, A1A 1W9
Tél. (709) 754 0203
Téléc. (709) 754 8612

Maxxam

Réquisition de sous-traitance

Fracflow Consultants Inc - St. John's
Chargé(e) de projet Maxxam Rob Whelan

À: Bedford to Maxxam LCQ Ecotoxic

Dossier B5P6586

☐ Oui ☐ Non Échantillon Internationnal/BioHazard (Si Oui, ajouter une copie certificat de transport et disposer par traitement de chaleur)
☐ Oui ☐ Non Protocole spécial (Si oui, spécifier _____)

Identification	Matrice	Analyse demandé(s)	Contenant	Échantillonné	Date Requise
BND828-01R \ 3073-CBC-PLCS-TOX	W	Environmental Sample Disposal	2	2015/12/12 09:00	2015/12/18
BND828-01R \ 3073-CBC-PLCS-TOX	W	Rainbow Trout-LC50 (acute toxicity-96h)	2	2015/12/12 09:00	2015/12/18
BND829-01R \ 3073-CBC-SLCS-TOX	W	Environmental Sample Disposal	2	2015/12/12 09:30	2015/12/18
BND829-01R \ 3073-CBC-SLCS-TOX	W	Rainbow Trout-LC50 (acute toxicity-96h)	2	2015/12/12 09:30	2015/12/18

	T° 1	T° 2	T° 3			
Glacière no. 1				Scellé légal présent	OUI	NON
				Scellé légal intact	OUI	NON
				Présence de glace à l'arrivée	OUI	NON
Glacière no. 2				Scellé légal présent	OUI	NON
				Scellé légal intact	OUI	NON
				Présence de glace à l'arrivée	OUI	NON
Glacière no. 3				Scellé légal présent	OUI	NON
				Scellé légal intact	OUI	NON
				Présence de glace à l'arrivée	OUI	NON

B5P6586 #6010

Réception Lieu Maxxam: Bedford to Maxxam LCQ Ecotoxic No de dossier _____

Désaisis par (signature) A Conigen (Lettres moulées) Andrea Conigan Date et heure 2015/12/14 9:30

Reçu par (signature) AL (Lettres moulées) AUDREY LAMY Date et heure 2015/12/15 15h0

PWO 5

NOTES:
1) S.V.P. veuillez nous contacter si le délai ne peut pas être respecté. Faire référence à l'Identification sur le rapport.
2) Inclure une copie de ce formulaire, bordereau du Client et un rapport signé à l'adresse RWhelan@maxxam.ca, et **Bedford.subcontract@MaxxamAnalytics.com**

Exigences pour le rapport:
National:
Régional:

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RESULTS OF RAINBOW TROUT - LC50 (ACUTE-96H)

Success Through Science®

Client : 2612 Maxxam Analytics, BEDFORD Job Number: B578962

Client Project Name & Number: B5P6586

Test Result:

96 hrs LC50 %v/v (95% CL): >100 (N/A) Statistical Method: Visual

Toxic Units: <1.0

Comment: no toxic

Sample Name : 3073-CBC-PLCS-TOX/BND828-01R

Description: yellow, opaque, no particule

Sample Collected: Dec 12, 2015 09:00 AM

Sample Collected By: VOTRE REPRESENTANT

Sample Received: Dec 15, 2015 03:00 PM

Analysis Start : Dec 16, 2015 01:00 PM

Sampling Method : Grab

Volume Received: 40L

pH: 7.1

Temperature : 14.0 °C

Sample Matrix : WATER

Sample Number: BV6410-01

Site Collection: 3073-CBC-PLCS-TOX

Temp.Upon Arrival: 5 °C Storage: 4°C

Dissolved Oxygen: 8.5 mg/L

Sample Conductance: 510 µS/cm

Concentration	Temperature (°C)	Temperature (°C)	pH (pH)	pH (pH)	Dissolved oxygen (mg/L)	Dissolved oxygen (mg/L)	Conductivity (uS/cm)	Atypical Behaviour (#)	Atypical Behaviour (%)	Mortality (#)	Mortality (%)
%v/v	Initial	96 hrs	Initial	96 hr	Initial	96 hrs	Initial	24 hrs	24 hrs	24 hrs	24 hrs
0	14.2	14.3	7.4	7.4	9.9	9.8	160	0	0	0	0
6.25	14.1	14.0	7.3	7.4	9.9	9.9	184	0	0	0	0
12.5	14.0	14.0	7.2	7.3	9.9	9.9	208	0	0	0	0
25	14.0	14.0	7.1	7.3	9.9	10.0	252	0	0	0	0
50	14.6	14.0	7.0	7.3	9.2	9.8	351	0	0	0	0
100	14.4	14.1	7.0	7.5	9.7	9.8	527	0	0	0	0

Concentration	Atypical Behaviour (#)	Atypical Behaviour (%)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)	Mortality (#)	Mortality (%)
%v/v	48 hrs	48 hrs	48 hrs	48 hrs	72 hrs	72 hrs	72 hrs	72 hrs	96 hrs	96 hrs	96 hrs	96 hrs
0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	0	0	0	0	0	0	0	0	0	0	0	0
12.5	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0

Comments : No discrepancies observed during the test. No change was made to the method.

Culture/Control/Dilution Water Dechlorinated municipal tap water

Hardness: 54 mg/l $CaCO_3$ Other parameters available on request.

Test Conditions Test concentration : 0,6.25,12.5,25,50,100 (%v/v)

Organisms per Vessel :	10	Test Temperature :	15 ± 1 °C	Solution Depth :	20 cm
Total # of Organisms Used :	60	Pre-aeration Time :	30 min.	Rate of Pre-aeration :	6.5±1 mL/min/L
Test Volume :	16 L	Vessel Volume :	20L	Test pH Adjusted:	No
Loading Density :	0.19 g/L	Photoperiod :	16 hours of of light; 8 hours of darkness		
Type de réservoir d'essai:	20L glass aquarium with polyethylene bag.				

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RESULTS OF RAINBOW TROUT - LC50 (ACUTE-96H)

Success Through Science®

Client : 2612 Maxxam Analytics, BEDFORD
Job Number: B578962
Client Project Name & Number: B5P6586
Sample Number: BV6410-01

Test Organism : Rainbow Trout *(Oncorhynchus mykiss)* Source : Piscicultures Les Arpents Verts

Culture Temperature :	15 ± 2 °C	Weight (Mean) +- SD :	0.31 ± 0.12 g	Length (Mean) +- SD :	3.23 ± 0.36 cm
Culture Water Renewal :	2 liters/min	Weight (Range) :	0.15 – 0.53 g	Length (Range) :	2.80 – 3.90 cm
Culture Photoperiod :	16 hours of of light; 8 hours of darkness			% Mortality within 7 days :	0.1%
Feeding rate and frequency :	1-2x a day; 1-5% of the body weights.				

Reference chemical:	Phenol	Test Date:	Dec 17, 2015
Test Endpoint 96 hrs LC50 (95% confidence interval) :	12.0 (9.00, 18.0)mg/L	Statistical Method :	Binomial
Historical Mean LC50 (warning limits) :	9.96 (7.97, 12.4) mg/L	Concentration :	0,4,6,9,13,18 mg/L

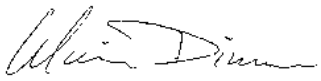
Test Method

QUE SOP - 00408. Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout. EPS1/RM/13 - Second Edition. Environment Canada. 2000. (Including Amendments: May 2007).

This is essentially a 96H static test. Ten individuals are submitted to different effluent concentrations in order to measure the LC50 in controlled temperature, light intensity and loading density.

Method Deviations : Aucune

Analyst : Guillaume Chandonnet



Verified By : Alain Dionne

Date: Dec 21, 2015 06:16 PM

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RESULTS OF RAINBOW TROUT - LC50 (ACUTE-96H)

Success Through Science®

Client : 2612 Maxxam Analytics, BEDFORD Job Number: B578962

Client Project Name & Number: B5P6586

Test Result:

96 hrs LC50 %v/v (95% CL): >100 (N/A) Statistical Method: Visual

Toxic Units: <1.0

Comment: no toxic

Sample Name : 3073-CBC-SLCS-TOX/BND829-01R

Description: orange, opaque,no particule

Sample Collected: Dec 12, 2015 09:00 AM

Sample Collected By: VOTRE REPRESENTANT

Sample Received: Dec 15, 2015 03:00 PM

Analysis Start : Dec 16, 2015 01:05 PM

Sampling Method : Grab

Volume Received: 40L

pH: 6.9

Temperature : 14.0 °C

Sample Matrix : WATER

Sample Number: BV6412-01

Site Collection: 3073-CBC-SLCS-TOX

Temp.Upon Arrival: 5 °C Storage: 4°C

Dissolved Oxygen: 6.8 mg/L

Sample Conductance: 690 µS/cm

Concentration	Temperature (°C)	Temperature (°C)	pH (pH)	pH (pH)	Dissolved oxygen (mg/L)	Dissolved oxygen (mg/L)	Conductivity (uS/cm)	Atypical Behaviour (#)	Atypical Behaviour (%)	Mortality (#)	Mortality (%)
%v/v	Initial	96 hrs	Initial	96 hr	Initial	96 hrs	Initial	24 hrs	24 hrs	24 hrs	24 hrs
0	14.5	14.6	7.7	8.0	9.8	9.4	163	0	0	0	0
6.25	14.6	14.4	7.5	7.9	9.7	9.6	198	0	0	0	0
12.5	14.6	14.0	7.4	7.8	9.7	10.0	232	0	0	0	0
25	14.4	14.0	7.2	7.7	9.4	9.4	301	0	0	0	0
50	14.9	14.0	7.0	7.6	8.5	9.4	447	0	0	0	0
100	14.9	14.1	6.8	7.8	8.4	9.9	712	0	0	0	0

Concentration	Atypical Behaviour (#)	Atypical Behaviour (%)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)	Mortality (#)	Mortality (%)
%v/v	48 hrs	48 hrs	48 hrs	48 hrs	72 hrs	72 hrs	72 hrs	72 hrs	96 hrs	96 hrs	96 hrs	96 hrs
0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	0	0	0	0	0	0	0	0	0	0	0	0
12.5	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0

Comments : No discrepancies observed during the test. No change was made to the method.

Culture/Control/Dilution Water Dechlorinated municipal tap water

Hardness: 54 mg/l $CaCO_3$ Other parameters available on request.

Test Conditions Test concentration : 0,6.25,12.5,25,50,100 (%v/v)

Organisms per Vessel :	10	Test Temperature :	15 ± 1 °C	Solution Depth :	20 cm
Total # of Organisms Used :	60	Pre-aeration Time :	30 min.	Rate of Pre-aeration :	6.5±1 mL/min/L
Test Volume :	16 L	Vessel Volume :	20L	Test pH Adjusted:	No
Loading Density :	0.20 g/L	Photoperiod :	16 hours of of light; 8 hours of darkness		
Type de réservoir d'essai:	20L glass aquarium with polyethylene bag.				

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RESULTS OF RAINBOW TROUT - LC50 (ACUTE-96H)

Success Through Science®

Client : 2612 Maxxam Analytics, BEDFORD | Job Number: B578962

Client Project Name & Number: B5P6586 | Sample Number: BV6412-01

Test Organism : Rainbow Trout *(Oncorhynchus mykiss)* Source : Piscicultures Les Arpents Verts

Culture Temperature :	15 ± 2 °C	Weight (Mean) +- SD :	0.32 ± 0.13 g	Length (Mean) +- SD :	3.19 ± 0.34 cm
Culture Water Renewal :	2 liters/min	Weight (Range) :	0.17 – 0.65 g	Length (Range) :	2.80 – 4.00 cm
Culture Photoperiod :	16 hours of of light; 8 hours of darkness			% Mortality within 7 days :	0.1%
Feeding rate and frequency :	1-2x a day; 1-5% of the body weights.				

Reference chemical:	Phenol	Test Date:	Dec 17, 2015
Test Endpoint 96 hrs LC50 (95% confidence interval) :	12.0 (9.00, 18.0)mg/L	Statistical Method :	Binomial
Historical Mean LC50 (warning limits) :	9.96 (7.97, 12.4) mg/L	Concentration :	0,4,6,9,13,18 mg/L

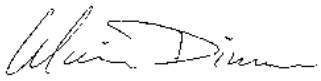
Test Method

QUE SOP - 00408. Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout. EPS1/RM/13 - Second Edition. Environment Canada. 2000. (Including Amendments: May 2007).

This is essentially a 96H static test. Ten individuals are submitted to different effluent concentrations in order to measure the LC50 in controlled temperature, light intensity and loading density.

Method Deviations : Aucune

Analyst : Guillaume Chandonnet



Verified By : Alain Dionne

Date: Dec 21, 2015 06:17 PM

Maxxam Analytics International Corporation o/a Maxxam Analytics
49-55 Elizabeth Ave, St. John's, NEWFOUNDLAND Canada A1A 1W9 Tel:(709) 754 0203 Toll-Free:(888) 492-7227 Fax:(709) 754 8612 www.maxxam.ca

Chain Of Custody Record

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#11664 Fracflow Consultants Inc	Company Name		Quotation #	B57514	Maxxam Job #	Bottle Order #:
Contact Name	Karen Andrews	Contact Name	Ingrid Lawlor/ Glenn Bursey	P.O. #		B5P6582	540682
Address	154 Major's Path St. John's NL A1A 5A1	Address		Project #	Come By Chance Secure Landfill	Chain Of Custody Record	Project Manager
Phone	(709) 739-7270 Fax: (709) 753-5101	Phone	(709) 739-7270 Fax:	Project Name		C#540682-01-01	Leonard Mulse
Email	karen_ffc@nfld.net, ffc_nf@nfld.net	Email	ingrid_ffc@nfld.net, glenn_ffc@ns.aliantzinc.ca	Site #			
				Sampled By			

Regulatory Criteria

Special Instructions

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Analysis Requested

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

Regular (Standard) TAT ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: _____ Time Required: _____
Rush Confirmation Number _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	RBCA Hydrocarbons in Water	Atlantic VOC in Water	Atlantic RCAp-MS Total Metals in Water	PAH in Water by GC/MS (SIM)	PCBs in water by GC/ECD	Chromium 3+ by calculation	Chromium (VI) in Water	At. RCAp-MS Dissolved (FieldFil) in W	Rainbow Trout-LC50 (acute toxicity-96h)		# of Bottles	Comments
1		~~3073-CBC-SURF-UP~~						X	X	X	X	X	X	X					
2		~~3073-CBC-SURF-DOWN~~						X	X	X	X	X	X	X					
3		~~3073-CBC-MW-93-1A~~						X	X		X	X			X				
4		~~3073-CBC-MW93-2A~~						X	X		X	X			X				
5		~~3073-CBC-MW93-3A~~						X	X		X	X			X				
6		~~3073-CBC-MW-DUP1~~						X	X		X	X			X				
7		~~3073-CBC-PLCS~~						X	X		X	X			X				
8		~~3073-CBC-SLCS~~						X	X		X	X			X				
9		3073-CBC-PLCS-Tox	DEC 12/15	9:00	LEACHATE											X		2x20 litre	
10		3073-CBC-SLCS-Tox	DEC 12/15	9:30	LEACHATE											X		2x20 litre	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
Ingrid Lawlor / INGRID LAWLOR	DEC 14/15	9:23		15/12/14	9:23		☐	3.3/3.2/3.3	☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Your Project #: 3073
Site Location: COME BY CHANCE
Your C.O.C. #: D 06086

Attention:Ingrid Lawlor

Fracflow Consultants Inc
154 Major's Path
St. John's, NL
A1A 5A1

Report Date: 2016/02/10
Report #: R3890740
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B619099
Received: 2016/01/29, 10:13

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Metals Water Total MS	1	2016/02/03	2016/02/03	ATL SOP 00058	EPA 6020A R1 m
Metals Water Total MS	1	2016/02/03	2016/02/04	ATL SOP 00058	EPA 6020A R1 m

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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Leonard Muise, Project Manager
Email: LMuise@maxxam.ca
Phone# (902)420-0203 Ext:236
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B619099
Report Date: 2016/02/10

Fracflow Consultants Inc
Client Project #: 3073
Site Location: COME BY CHANCE
Sampler Initials: IL

ELEMENTS BY ICP/MS (WATER)

Maxxam ID		BTD140	BTD141		
Sampling Date		2016/01/28 09:40	2016/01/28 10:40		
COC Number		D 06086	D 06086		
	UNITS	**3073-CBC-PLCS-1**	**3073-CBC-SLCS-1**	**RDL**	**QC Batch**
Metals					
Total Aluminum (Al)	ug/L	34	16	5.0	4368036
Total Antimony (Sb)	ug/L	ND	ND	1.0	4368036
Total Arsenic (As)	ug/L	ND	ND	1.0	4368036
Total Barium (Ba)	ug/L	15	98	1.0	4368036
Total Beryllium (Be)	ug/L	ND	ND	1.0	4368036
Total Bismuth (Bi)	ug/L	ND	ND	2.0	4368036
Total Boron (B)	ug/L	810	2600	50	4368036
Total Cadmium (Cd)	ug/L	ND	ND	0.010	4368036
Total Calcium (Ca)	ug/L	60000	140000	100	4368036
Total Chromium (Cr)	ug/L	ND	ND	1.0	4368036
Total Cobalt (Co)	ug/L	ND	ND	0.40	4368036
Total Copper (Cu)	ug/L	ND	ND	2.0	4368036
Total Iron (Fe)	ug/L	540	24000	50	4368036
Total Lead (Pb)	ug/L	ND	ND	0.50	4368036
Total Magnesium (Mg)	ug/L	9700	29000	100	4368036
Total Manganese (Mn)	ug/L	470	7300	2.0	4368036
Total Molybdenum (Mo)	ug/L	ND	2.6	2.0	4368036
Total Nickel (Ni)	ug/L	ND	ND	2.0	4368036
Total Phosphorus (P)	ug/L	ND	ND	100	4368036
Total Potassium (K)	ug/L	7300	12000	100	4368036
Total Selenium (Se)	ug/L	ND	ND	1.0	4368036
Total Silver (Ag)	ug/L	ND	ND	0.10	4368036
Total Sodium (Na)	ug/L	14000	26000	100	4368036
Total Strontium (Sr)	ug/L	140	380	2.0	4368036
Total Thallium (Tl)	ug/L	ND	ND	0.10	4368036
Total Tin (Sn)	ug/L	ND	ND	2.0	4368036
Total Titanium (Ti)	ug/L	ND	ND	2.0	4368036
Total Uranium (U)	ug/L	0.39	3.0	0.10	4368036
Total Vanadium (V)	ug/L	ND	ND	2.0	4368036
Total Zinc (Zn)	ug/L	ND	6.8	5.0	4368036

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B619099
Report Date: 2016/02/10

Fracflow Consultants Inc
Client Project #: 3073
Site Location: COME BY CHANCE
Sampler Initials: IL

GENERAL COMMENTS

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

Package 1	2.0°C

Revised Report: Split report to report metals separately from ferrous iron as per Ingrid Lawlor. Feb. 10, 2016 LMU

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B619099
Report Date: 2016/02/10

Fracflow Consultants Inc
Client Project #: 3073
Site Location: COME BY CHANCE
Sampler Initials: IL

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4368036	BAN	Matrix Spike	Total Aluminum (Al)	2016/02/03		NC	%	80 - 120
			Total Antimony (Sb)	2016/02/03		100	%	80 - 120
			Total Arsenic (As)	2016/02/03		95	%	80 - 120
			Total Barium (Ba)	2016/02/03		97	%	80 - 120
			Total Beryllium (Be)	2016/02/03		101	%	80 - 120
			Total Bismuth (Bi)	2016/02/03		97	%	80 - 120
			Total Boron (B)	2016/02/03		NC	%	80 - 120
			Total Cadmium (Cd)	2016/02/03		100	%	80 - 120
			Total Calcium (Ca)	2016/02/03		NC	%	80 - 120
			Total Chromium (Cr)	2016/02/03		95	%	80 - 120
			Total Cobalt (Co)	2016/02/03		96	%	80 - 120
			Total Copper (Cu)	2016/02/03		93	%	80 - 120
			Total Iron (Fe)	2016/02/03		99	%	80 - 120
			Total Lead (Pb)	2016/02/03		96	%	80 - 120
			Total Magnesium (Mg)	2016/02/03		100	%	80 - 120
			Total Manganese (Mn)	2016/02/03		98	%	80 - 120
			Total Molybdenum (Mo)	2016/02/03		NC	%	80 - 120
			Total Nickel (Ni)	2016/02/03		95	%	80 - 120
			Total Phosphorus (P)	2016/02/03		103	%	80 - 120
			Total Potassium (K)	2016/02/03		NC	%	80 - 120
			Total Selenium (Se)	2016/02/03		98	%	80 - 120
			Total Silver (Ag)	2016/02/03		96	%	80 - 120
			Total Sodium (Na)	2016/02/03		NC	%	80 - 120
			Total Strontium (Sr)	2016/02/03		NC	%	80 - 120
			Total Thallium (Tl)	2016/02/03		97	%	80 - 120
			Total Tin (Sn)	2016/02/03		102	%	80 - 120
			Total Titanium (Ti)	2016/02/03		99	%	80 - 120
			Total Uranium (U)	2016/02/03		102	%	80 - 120
			Total Vanadium (V)	2016/02/03		99	%	80 - 120
			Total Zinc (Zn)	2016/02/03		94	%	80 - 120
4368036	BAN	Spiked Blank	Total Aluminum (Al)	2016/02/03		98	%	80 - 120
			Total Antimony (Sb)	2016/02/03		97	%	80 - 120
			Total Arsenic (As)	2016/02/03		93	%	80 - 120
			Total Barium (Ba)	2016/02/03		96	%	80 - 120
			Total Beryllium (Be)	2016/02/03		97	%	80 - 120
			Total Bismuth (Bi)	2016/02/03		99	%	80 - 120
			Total Boron (B)	2016/02/03		101	%	80 - 120
			Total Cadmium (Cd)	2016/02/03		97	%	80 - 120
			Total Calcium (Ca)	2016/02/03		99	%	80 - 120
			Total Chromium (Cr)	2016/02/03		95	%	80 - 120
			Total Cobalt (Co)	2016/02/03		97	%	80 - 120
			Total Copper (Cu)	2016/02/03		95	%	80 - 120
			Total Iron (Fe)	2016/02/03		100	%	80 - 120
			Total Lead (Pb)	2016/02/03		97	%	80 - 120
			Total Magnesium (Mg)	2016/02/03		101	%	80 - 120
			Total Manganese (Mn)	2016/02/03		97	%	80 - 120
			Total Molybdenum (Mo)	2016/02/03		98	%	80 - 120
			Total Nickel (Ni)	2016/02/03		98	%	80 - 120
			Total Phosphorus (P)	2016/02/03		102	%	80 - 120
			Total Potassium (K)	2016/02/03		98	%	80 - 120
			Total Selenium (Se)	2016/02/03		95	%	80 - 120
			Total Silver (Ag)	2016/02/03		94	%	80 - 120

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Maxxam Job #: B619099
Report Date: 2016/02/10

Fracflow Consultants Inc
Client Project #: 3073
Site Location: COME BY CHANCE
Sampler Initials: IL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Sodium (Na)	2016/02/03		102	%	80 - 120
			Total Strontium (Sr)	2016/02/03		98	%	80 - 120
			Total Thallium (Tl)	2016/02/03		97	%	80 - 120
			Total Tin (Sn)	2016/02/03		98	%	80 - 120
			Total Titanium (Ti)	2016/02/03		102	%	80 - 120
			Total Uranium (U)	2016/02/03		100	%	80 - 120
			Total Vanadium (V)	2016/02/03		97	%	80 - 120
			Total Zinc (Zn)	2016/02/03		94	%	80 - 120
4368036	BAN	Method Blank	Total Aluminum (Al)	2016/02/03	ND, RDL=5.0		ug/L	
			Total Antimony (Sb)	2016/02/03	ND, RDL=1.0		ug/L	
			Total Arsenic (As)	2016/02/03	ND, RDL=1.0		ug/L	
			Total Barium (Ba)	2016/02/03	ND, RDL=1.0		ug/L	
			Total Beryllium (Be)	2016/02/03	ND, RDL=1.0		ug/L	
			Total Bismuth (Bi)	2016/02/03	ND, RDL=2.0		ug/L	
			Total Boron (B)	2016/02/03	ND, RDL=50		ug/L	
			Total Cadmium (Cd)	2016/02/03	ND, RDL=0.010		ug/L	
			Total Calcium (Ca)	2016/02/03	ND, RDL=100		ug/L	
			Total Chromium (Cr)	2016/02/03	ND, RDL=1.0		ug/L	
			Total Cobalt (Co)	2016/02/03	ND, RDL=0.40		ug/L	
			Total Copper (Cu)	2016/02/03	ND, RDL=2.0		ug/L	
			Total Iron (Fe)	2016/02/03	ND, RDL=50		ug/L	
			Total Lead (Pb)	2016/02/03	ND, RDL=0.50		ug/L	
			Total Magnesium (Mg)	2016/02/03	ND, RDL=100		ug/L	
			Total Manganese (Mn)	2016/02/03	ND, RDL=2.0		ug/L	
			Total Molybdenum (Mo)	2016/02/03	ND, RDL=2.0		ug/L	
			Total Nickel (Ni)	2016/02/03	ND, RDL=2.0		ug/L	
			Total Phosphorus (P)	2016/02/03	ND, RDL=100		ug/L	
			Total Potassium (K)	2016/02/03	ND, RDL=100		ug/L	
			Total Selenium (Se)	2016/02/03	ND, RDL=1.0		ug/L	

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Maxxam Job #: B619099
Report Date: 2016/02/10

Fracflow Consultants Inc
Client Project #: 3073
Site Location: COME BY CHANCE
Sampler Initials: IL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Silver (Ag)	2016/02/03	ND, RDL=0.10		ug/L	
			Total Sodium (Na)	2016/02/03	ND, RDL=100		ug/L	
			Total Strontium (Sr)	2016/02/03	ND, RDL=2.0		ug/L	
			Total Thallium (Tl)	2016/02/03	ND, RDL=0.10		ug/L	
			Total Tin (Sn)	2016/02/03	ND, RDL=2.0		ug/L	
			Total Titanium (Ti)	2016/02/03	ND, RDL=2.0		ug/L	
			Total Uranium (U)	2016/02/03	ND, RDL=0.10		ug/L	
			Total Vanadium (V)	2016/02/03	ND, RDL=2.0		ug/L	
			Total Zinc (Zn)	2016/02/03	ND, RDL=5.0		ug/L	
4368036	BAN	RPD	Total Aluminum (Al)	2016/02/04	1.3		%	20
			Total Boron (B)	2016/02/04	1.2		%	20
			Total Copper (Cu)	2016/02/04	NC		%	20
			Total Iron (Fe)	2016/02/04	NC		%	20
			Total Phosphorus (P)	2016/02/04	NC		%	20
			Total Zinc (Zn)	2016/02/04	2.2		%	20

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.

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.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

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FUNDAMENTAL LABORATORY ACCEPTANCE GUIDELINE

Invoice To:
Fracflow Consultants Inc
ATTN: KAREN ANDREWS
154 Major's Path
St. John's, NL
A1A 5A1
Client Contact:
Ingrid Lawlor

Maxxam Job #:	B619099
Date Received:	2016/01/29
Your C.O.C. #:	D 06086
Your Project #:	3073
Maxxam Project Manager:	Leonard Muise
Quote #:	B57514

No discrepancies noted.

Report Comments

Received Date:	**2016/01/29**	**Time:**	**10:13**	**By:**	
Inspected Date:		**Time:**		**By:**	
FLAG Created Date:		**Time:**		**By:**	

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Maxxam Job #: B619099
Report Date: 2016/02/10

Fracflow Consultants Inc
Client Project #: 3073
Site Location: COME BY CHANCE
Sampler Initials: IL

VALIDATION SIGNATURE PAGE

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

Eric Dearman, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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www.maxxam.ca E-mail: Customerservicebedford@maxxam.ca

ATL FCD 00149 / 19

CHAIN OF CUSTODY RECORD

COC #: D 06086 Page ____ of ____

Invoice Information
Company Name: Fracflow Consultants Inc.
Contact Name: Karen Andrews
Address: 154 Majors Path
St. John's Postal Code: A1A 5A1
Phone: 709-739-7270 Fax: 709-753-5101
Email: Karen_ffc@nfld.net

Report Information (if differs from invoice)
Company Name: ingrid_ffc@nfld.net
Contact Name: john_ffc@nfld.net
Address: glenn_ffc@ns.aliantinc.ca
Postal Code: B4A
Phone: Fax:
Email:

Project Information (where applicable)
Quotation #: B57514LM
P.O. #/ AFE#:
Project ID: 3073
Site Location: COME By CHANCE
Site #:
Sampled By: I. LAWLOR

Turnaround Time (TAT) Required
☒ Regular TAT (5 business days) Most analyses
PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
IF RUSH please specify date (Surcharges will be applied)
Date Required:
Rush Confirmation #

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES			AVERAGE TEMP	INTEGRITY YES / NO
		6.1	7.4	6.1		

Integrity Checklist By: CHN

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	Lab Filtration Required	RCAP-30 (CIRCLE) TOTAL / DISSOLVED	RCAP-MS (CIRCLE) TOTAL / DISSOLVED	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel/Oil Spill Policy Low Level BTEX, C6-C32	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs	FWAL PAHs in water (with Acridine, Quinoline)	PCBs	VOCs	TOTAL METALS	FERROUS IRON			HOLD- DO NOT ANALYZE
1	3073-CBC-PLCS-1	2016/01/28	9:40	LEACHATE																			X					
2	3073-CBC-SLCS-1	2016/01/28	10:40	LEACHATE																			X	X				
3																												
4																												
5																												
6																												
7																												
8																												
9																												
10																												

Regulatory Requirements
☐ PIRI ☒ CCME
☐ Tier 1
☐ Tier 2
☒ OTHER (Please Specify)
NL REGULATION 65/03 SCHEDULE "A"

COMMENTS
1 - Sent to Sydney
2016 JAN 29 10:13

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
WILLIAM LAWLOR / Ingrid Jaffe	2016/01/28	13:15	Claire Whelan	2016/01/28	1:15	B619099
			CAIL MACKENZIE			

White: Maxxam Pink: Client

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CHAIN OF CUSTODY RECORD

COC #: D 06086 Page ____ of ____

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Freeflow Consultants Inc	Company Name: ingrid_ffc@nfld.net	Quotation #: B57514 LM	☒ Regular TAT (5 business days) Most analyses
Contact Name: Karen Andrews	Contact Name: john_ffc@nfld.net	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 154 Majors Path	Address: glenn_ffc@ns.aliantzinc.ca	Project ID: 3073	F RUSH please specify date (Surcharges will be applied)
St. John's Postal Code: A1A 5A1	Postal Code:	Site Location: COME BY CHANCE	Date Required:
Phone: 709-739-7270 Fax: 709-753-5101	Phone: Fax:	Site #:	Rush Confirmation #
Email: Karen_ffc@nfld.net	Email:	Sampled By: I. LAWLOR	

Laboratory Use Only

CUSTODY SEAL Y / N		COOLER TEMPERATURES			AVERAGE TEMP	INTEGRITY YES / NO
Present	Intact					
		6.1	7.4	6.1		Integrity Checklist By:

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	Lab Filtration Required	RCAP-30 (CIRCLE) TOTAL / DISSOLVED	RCAP-MS (CIRCLE) TOTAL / DISSOLVED	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs	FWAL PAHs in water (with Acridine, Quinoline)	PCBs	VOCs	TOTAL METALS	FERROUS IRON			HOLD- DO NOT ANALYZE
1	3073-CBC-PLCS-1	2016/01/28	9:40	LEACHATE																				X				
2	3073-CBC-SLCS-1	2016/01/26	10:40	LEACHATE																				X	X			
3																												
4																												
5																												
6																												
7																												
8																												
9																												
10																												

Regulatory Requirements

☐ PIRI ☒ CCME
☐ Tier 1
☐ Tier 2
☒ OTHER (Please Specify)
NL REGULATION 65/03 SCHEDULE "A"

COMMENTS

To be logged in in Bedford.

SHIPPED FROM

MAXXAM NL

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
World Lawlor/Ingrid Zahn	2016/01/28	13:15	Marie Whelan	2016/01/28	1:15	B619099
				2016/02/01	10:11	

White: Maxxam Pink: Client

APPENDIX D

Historical Data

(from CRA Report 2014/2015 Monitoring and Maintenance Program, Come by Chance Secure Landfill, Come by Chance, Newfoundland and Labrador, Appendix D)

TABLE D1

HISTORICAL STATIC GROUNDWATER LEVELS
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Location	Ground Surface Elevation	Length of Stick-up	TOC Elevation	Groundwater Depth (mbToC)																
				Mar	Jul	Sep	Oct	Jun	Jul	Oct	Dec	Oct	Sep	Mar	Jul	Dec	Sep	Dec	Aug	Nov
	(masl)	(m)	(masl)	2004				2006				2007	2008	2009	2010		2011	2012	2013	2014
PLCS	15.960	--	15.960	--	--	--	--	--	--	--	--	--	--		0.55	0.73	0.59	0.89	0.55	0.403
SLCS	15.955	--	15.955	--	--	--	--	--	--	--	--	--	--	--	0.52	0.713	0.55	0.892	0.549	0.404
MW 93-1	16.300	1.100	17.400	--	--	--	--	--	--	--	--	--	--	1.975	1.703	1.915	1.921	1.780	1.756	1.616
MW 93-1A	16.310	1.400	17.710	0.39	1.88	0.41	0.16	2.06	1.68	2.11	1.84	1.67	2.17	2.50	1.638	1.636	2.204	1.669	1.815	1.688
MW 93-2	14.290	1.100	15.390	0.67	0.56	0.58	0.28	1.85	2.16	2.13	--	1.72	2.18	2.20	2.084	2.147	--	2.111	2.323	2.035
MW 93-2A	14.310	1.100	15.410	--	--	--	--	--	--	--	--	--	--	1.84	1.456	1.375	--	1.234	1.663	1.181
MW 93-3*	--	--	--	--	--	--	--	--	--	--	--	--	--	1.335	--	--	--	--	--	--
MW 93-3A*	--	--	--	2.37	Dry	--	1.20	Dry	3.21	3.37	--	3.32	Dry	3.52	--	--	--	--	--	--
MW 10-1	15.790	0.846	16.636	--	--	--	--	--	--	--	--	--	--	--	3.015	3.254	3.551	3.188	3.427	2.999
MW 10-1A	15.890	0.854	16.744	--	--	--	--	--	--	--	--	--	--	--	3.084	3.279	3.662	3.234	3.513	3.047

Location	Ground Surface Elevation	Length of Stick-up	TOC Elevation	Groundwater Elevation (masl)																
				Mar	Jul	Sep	Oct	Jun	Jul	Oct	Dec	Oct	Sep	Mar	Jul	Dec	Sep	Dec	Aug	Nov
	(masl)	(m)	(masl)	2004				2006				2007	2008	2009	2010		2011	2012	2013	2014
PLCS	15.960	--	15.960	--	--	--	--	--	--	--	--	--	--		15.410	15.230	15.370	15.070	15.410	15.557
SLCS	15.955	--	15.955	--	--	--	--	--	--	--	--	--	--	--	15.435	15.242	15.405	15.063	15.406	15.551
MW 93-1	16.300	1.100	17.400	--	--	--	--	--	--	--	--	--	--	15.425	15.697	15.485	15.479	15.620	15.644	15.784
MW 93-1A	16.310	1.400	17.710	17.320	15.830	17.300	17.550	15.650	16.030	15.600	15.870	16.040	15.540	15.210	16.072	16.074	15.506	16.041	15.895	16.022
MW 93-2	14.290	1.100	15.390	14.720	14.830	14.810	15.110	13.540	13.230	13.260	--	13.670	13.210	13.190	13.306	13.243	--	13.279	13.067	13.355
MW 93-2A	14.310	1.100	15.410	--	--	--	--	--	--	--	--	--	--	13.570	13.954	14.035	--	14.176	13.747	14.229
MW 93-3*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW 93-3A*	--	--	15.900	13.530	Dry	--	14.700	Dry	12.690	12.530	--	12.580	Dry	12.380	--	--	--	--	--	--
MW 10-1	15.790	0.846	16.636	--	--	--	--	--	--	--	--	--	--	--	13.621	13.382	13.085	13.448	13.209	13.637
MW 10-1A	15.890	0.854	16.744	--	--	--	--	--	--	--	--	--	--	--	13.660	13.465	13.082	13.510	13.231	13.697

Notes:

PLCS = Primary Leachate Collection System Valve Chamber
SLCS = Secondary Leachate Collection System Valve Chamber
MW = Monitor Well

m = Metres
TOC = Top of Casing

masl = Metres Above Sea Level
mbTOC = Metres Below Top of Casing

* = Monitor Well Decommissioned in July 2010

TABLE D2

HISTORICAL GROUNDWATER ANALYTICAL DATA - BTEX/mTPH
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Sample Location	Date Sampled	Benzene	Toluene	Ethyl-benzene	Xylenes	Total Petroleum Hydrocarbons (TPH)					Comments
						F1 C_6-C_{10}	F2 C_{10}-C_{16}	F3 C_{16}-C_{21}	F3 C_{21}-C_{32}	Modified TPH	
MW 93-1	Aug 19, 2009	<	<	<	<	<	<	<		<	-
	Aug 19, 2009[1]	<	<	<	<	<	<	<		<	-
	Jul 16, 2010	<	<	<	<	<	<	<		<	-
	Dec 13, 2010	<	<	<	<	<	<	<		<	-
	Sep 02, 2011	<	<	<	<	<	<	<		<	-
	Aug 30, 2012	<(0.0013)	<(0.0013)	<(0.0013)	<(0.0026)	<(0.013)	<	<		<	-
	Aug 28, 2013	<	<	<	<	<	<	<		<	-
	Nov 25, 2014	<	<	<	<	<	<	<		<	-
MW 93-1A	2008 (AMEC)	<(0.2)	<(0.2)	<(0.2)	<(0.6)	<(0.05)[2]	<(0.05)[2]	<(0.05)[2]		<(0.15)[2]	-
	Aug 19, 2009	<	<	<	<	<	<	<		<	-
	Jul 16, 2010	<	<	<	<	<	<	<		<	-
	Dec 13, 2010	<	<	<	<	<	<	<		<	-
	Sep 02, 2011	<	<	<	<	<	<	<		<	-
	Aug 30, 2012	<(0.0013)	<(0.0013)	<(0.0013)	<(0.0026)	<(0.013)	<	<		<	-
DUP-03	Aug 30, 2012	<	<	<	<	<	<	<		<	-
	Aug 28, 2013	<	<	<	<	<	<	<		<	-
	Nov 25, 2014	<	<	<	<	<	<	<		<	-
MW 93-2	2008 (AMEC)	<(0.2)	<(0.2)	<(0.2)	<(0.6)	<(0.05)[2]	<(0.05)[2]	<(0.05)[2]		<(0.15)[2]	-
	Aug 19, 2009	<	<	<	<	<	<	<		<	-
	Jul 16, 2010	<	<	<	<	<	<	<		<	-
	Jul 16, 2010[3]	-	-	-	-	-	<	<		-	-
	Dec 13, 2010	<	<	<	<	<	<	<		<	-
	Dec 13, 2010[3]	-	-	-	-	-	<	<		-	-
	Sep 02, 2011	<	<	<	<	<	<	<		<	-
	Aug 30, 2012	<(0.0013)	<(0.0013)	<(0.0013)	<(0.0026)	<(0.013)	<	<		<	-
	Aug 28, 2013	<	<	<	<	<	<	<		<	-
	Nov 25, 2014	<	<	<	<	<	<	<		<	-
MW 93-2A	Aug 19, 2009	<	<	<	<	<	<	<		<	-
	Jul 16, 2010	<	<	<	<	<	<	<		<	-
	Dec 13, 2010	<	<	<	<	<	<	<		<	-
	Sep 02, 2011	<	<	<	<	<	<	<		<	-
	Aug 30, 2012	<	<	<	<	<	<	<		<	-
	Aug 28, 2013	<	<	<	<	<	<	<		<	-
	Nov 25, 2014	<	<	<	<	<	<	<		<	-
MW 10-1	Jul 16, 2010	<	<	<	<	<	<	<		<	-
	Jul 16, 2010[1]	<	<	<	<	<	<	<		<	-
	Dec 13, 2010	<	<	<	<	<	<	<		<	-
	Sep 02, 2011	<	<	<	<	<	<	0.4		0.4	Possible LO fraction
	Aug 30, 2012	<	<	<	<	<	<	<		<	-
	Aug 28, 2013										
DUP-05	Aug 28, 2013	<	<	<	<	<	<	<		<	-
	Nov 25, 2014	<	<	<	<	<	<	<	0.1	0.1	No resemblance to petroleum products in lube oil range
DUP-07	Nov 25, 2014	<	<	<	<	<	<	<	<	<	
MW 10-1A	Jul 16, 2010	<	<	<	<	<	<	<		<	-
	Dec 13, 2010	<	<	<	<	<	<	<		<	-
	Dec 13, 2010[1]	<	<	<	<	<	<	<		<	-
	Sep 02, 2011	<	<	<	<	<	<	<		<	-
	Aug 30, 2012	<	<	<	<	<	<	<		<	-
DUP- A	Sep 02, 2011	<	<	<	<	<	<	<		<	-
	Aug 28, 2013	<	<	<	<	<	<	<		<	-
	Nov 25, 2014	<	<	<	<	<	<	<		<	-
RDL		0.001	0.001	0.001	0.002	0.01	0.05	0.1	0.1	0.1	-
Atlantic RBCA Tier I RBSLs*		6.9	20	20	20	na	na	na	na	20	Gasoline
										20	Diesel / #2 Fuel Oil
										20	# 6 Oil

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in St. John's, NL.
1. Field Duplicate
2. Assumed transcript error by factor of 1,000 from Pinchin LeBlanc Environmental Table 2 from March 2010 OMM Report
3. Lab Duplicate
DUP-A= Field Dup of MW 10-1A
DUP-03= Field Dup of MW 93-1A
DUP-05= Field Dup of MW 10-1
DUP-07 = Field Dup of MW 10-01
* 2012 Atlantic Risk-Based Corrective Action (RBCA) Tier I Risk-Based Screening Level (RBSL) Table values {commercial/non-potable/coarse grained soil}.

G = Gasoline
FO = Fuel Oil
LO = Lube Oil
W = Weathered

RDL = Reportable Detection Limit
< = Parameter below detection limit
- = Not analysed
0.0 = above criteria

TABLE D3

HISTORICAL GROUNDWATER ANALYTICAL DATA - PAHs (ug/L)
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	MW 93-1								MW 93-1A								
			Aug 19, 2009	Aug 19, 2009 Field Dup	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Nov 25, 2014	AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 30, 2012 DUP-03	Aug 28, 2013	Nov 25, 2014
1-Methylnaphthalene	0.05	1,800	<	<	<	<	<	<	<	<	<0.03	<	<	<	<	<	<	<	<
2-Methylnaphthalene	0.05	1,800	<	<	<	<	<	<	<	<	<0.03	<	<	<	<	<	<	<	<
Acenaphthene	0.01	600	<	<	<	<	0.01	<	<	<	<0.04	<	<	<	<	<	<	<	<
Acenaphthylene	0.01	2	<	<	<	<	<	<	<	<	<0.03	<	<	<	<	<	<	<	<
Acridine	0.05	-	-	-	<	<	-	-	<	<	-	-	<	<	-	-	-	<	<
Anthracene	0.01	2	<	<	<	<	<	<	<	<	<0.01	<	<	<	<	<	<	<	<
Benzo(a)anthracene	0.01	5	<	<	<	<	<	<	<	<	<0.01	<	<	<	<	<	<	<	<
Benzo(a)pyrene	0.01	0.8	<	0.01	<	<	<	<	<	<	<0.01	<	<	<	<	<	<	<	<
Benzo(b)fluoranthene	0.01	1	<	0.02	<	<	<	<	<	<	<0.05	<	<	<	<	<	<	<	<
Benzo(g,h,i)perylene	0.01	0.2	<	0.02	<	<	<	<	<	<	<0.03	<	<	<	<	<	<	<	<
Benzo(k)fluoranthene	0.01	0.4	<	0.02	<	<	<	<	<	<	<0.05	<	<	<	<	<	<	<	<
Chrysene	0.01	1	<	<	<	<	<	<	<	<	<0.04	<	<	<	<	<	<	<	<
Dibenz(a,h)anthracene	0.01	0.52	<	0.03	<	<	<	<	<	<	-	<	<	<	<	<	<	<	<
Fluoranthene	0.01	130	<	<	<	<	<	<	<	<	<0.03	<	<	<	<	<	<	<	<
Fluorene	0.01	400	<	<	<	<	<	<	<	<	<0.03	<	<	<	<	<	<	<	<
Indeno(1,2,3-cd)pyrene	0.01	0.20	<	0.02	<	<	<	<	<	<	<0.05	<	<	<	<	<	<	<	<
Naphthalene	0.20	1,400	<	<	<	<	<	<	<	<	-	<	<	<	<	<	<	<	<
Perylene	0.01	-	<	<	<	<	<	<	<	<	-	<	<	<	<	<	<	<	<
Phenanthrene	0.01	580	0.01	<	<	<	<	<	<	<	<0.04	0.01	<	<	<	<	<	<	<
Pyrene	0.01	68	<	<	<	<	<	<	<	<	<0.01	<	<	<	<	<	<	<	<
Quinoline	0.05	-	-	-	<	<	-	-	-	-	-	-	<	<	-	-	-	-	-

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Ontario Ministry of the Environment (MOE) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
0.0 = above criteria
DUP-01 = Field Duplicate of MW 10-1, First Sampling Event
DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-A= Field Duplicate of MW-101A
DUP-03= Field Duplicate of MW 93-1A
DUP-05= Field Duplicate of MW 10-1
DUP-07 = Field Duplicate of MW 10-1
(1)= Elevated PAH RDL(s) due to matrix/co-extractive interference

TABLE D3

HISTORICAL GROUNDWATER ANALYTICAL DATA - PAHs (ug/L)
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	MW 93-2								MW 93-2A						
			AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Nov 25, 2014	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Nov 25, 2014
1-Methylnaphthalene	0.05	1,800	<0.03	<	<	<	<	<	<	<	<	<	<	<	<	<	<
2-Methylnaphthalene	0.05	1,800	<0.03	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Acenaphthene	0.01	600	<0.04	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Acenaphthylene	0.01	2	<0.03	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Acridine	0.05	-	-	-	<	<	-	-	<	<	-	<	<	-	-	<	<
Anthracene	0.01	2	<0.01	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(a)anthracene	0.01	5	<0.01	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(a)pyrene	0.01	0.8	<0.01	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(b)fluoranthene	0.01	1	<0.05	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(g,h,i)perylene	0.01	0.2	<0.03	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(k)fluoranthene	0.01	0.4	<0.05	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chrysene	0.01	1	<0.04	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Dibenz(a,h)anthracene	0.01	0.52	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Fluoranthene	0.01	130	<0.03	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Fluorene	0.01	400	<0.03	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Indeno(1,2,3-cd)pyrene	0.01	0.20	<0.05	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Naphthalene	0.20	1,400	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Perylene	0.01	-	-	<	<	<	<	<	<	<	<	<	<	0.02	<	<	<
Phenanthrene	0.01	580	<0.04	0.01	<	<	<	<	<	<	0.01	<	<	<	0.012	<	<
Pyrene	0.01	68	<0.01	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Quinoline	0.05	-	-	-	<	<	-	-	-	-	-	<	<	-	-	-	-

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Ontario Ministry of the Environment (MOE) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
0.0 = above criteria
DUP-01 = Field Duplicate of MW 10-1, First Sampling Event
DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-A= Field Duplicate of MW-101A
DUP-03= Field Duplicate of MW 93-1A
DUP-05= Field Duplicate of MW 10-1
DUP-07 = Field Duplicate of MW 10-1
(1)= Elevated PAH RDL(s) due to matrix/co-extractive interference

TABLE D3

HISTORICAL GROUNDWATER ANALYTICAL DATA - PAHs (ug/L)
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	MW 10-1										MW 10-1A					
			Jul 16, 2010	Jul 16, 2010 DUP-01	Dec 13, 2010	Dec 13, 2010 DUP-02	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Aug 28, 2013 DUP-05	Nov 25, 2014	Nov 25, 2014 Dup-07	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Sep 02, 2011 DUP-A	Aug 28, 2013	Nov 25, 2014
1-Methylnaphthalene	0.05	1,800	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
2-Methylnaphthalene	0.05	1,800	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Acenaphthene	0.01	600	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Acenaphthylene	0.01	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Acridine	0.05	-	<	<	<	<	-	-	<	<	<	<	<	<	-	-	<	<
Anthracene	0.01	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(a)anthracene	0.01	5	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(a)pyrene	0.01	0.8	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(b)fluoranthene	0.01	1	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(g,h,i)perylene	0.01	0.2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(k)fluoranthene	0.01	0.4	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chrysene	0.01	1	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Dibenz(a,h)anthracene	0.01	0.52	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Fluoranthene	0.01	130	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Fluorene	0.01	400	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Indeno(1,2,3-cd)pyrene	0.01	0.20	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Naphthalene	0.20	1,400	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Perylene	0.01	-	<	<	<	0.04	<	<	<	<	<	<	<	<	<	<	0.019	<
Phenanthrene	0.01	580	<	<	<	<	<	<	<	<	<	<	<	<	<	<	0.013	<
Pyrene	0.01	68	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Quinoline	0.05	-	<	<	<	<	-	-	-	<	-	-	<	<	<	<	-	-

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Ontario Ministry of the Environment (MOE) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
0.0 = above criteria
DUP-01 = Field Duplicate of MW 10-1, First Sampling Event
DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-A= Field Duplicate of MW-101A
DUP-03= Field Duplicate of MW 93-1A
DUP-05= Field Duplicate of MW 10-1
DUP-07 = Field Duplicate of MW 10-1
(1)= Elevated PAH RDL(s) due to matrix/co-extractive interference

TABLE D4

GROUNDWATER ANALYTICAL DATA - PCBs
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Sample Location	Date Sampled	Total PCBs
MW 93-1	Aug 19, 2009	<
	Aug 19, 2009	<[1]
	Aug 19, 2009	<[2]
	Jul 16, 2010	<
	Dec 13, 2010	<
	Sep 02,2011	<
	Aug 30, 2012	<
	Aug 28, 2013	<
	Nov 25, 2014	<
MW 93-1A	AMEC 2008	<0.04
	Aug 19, 2009	0.1
	Jul 16, 2010	<
	Dec 13, 2010	<
	Sep 02, 2011	<
	Aug 30, 2012	<
DUP-03	Aug 30, 2012	<
	Aug 28, 2013	<
	Nov 25, 2014	<
MW 93-2	AMEC 2008	<0.04
	Aug 19, 2009	<
	Jul 16, 2010	<
	Dec 13, 2010	<
	Sep 02, 2011	<
	Aug 30, 2012	<
	Aug 28, 2013	<
	Nov 25, 2014	<
MW 93-2A	Aug 19, 2009	0.11
	Jul 16, 2010	<
	Dec 13, 2010	<
	Sep 02, 2011	<
	Aug 30, 2012	<
	Aug 28, 2013	<
	Nov 25, 2014	<
MW 10-1	Jul 16, 2010	<
	Jul 16, 2010	<[2]
	Dec 13, 2010	<
	Sep 02, 2011	<
	Aug 30, 2012	<
	Aug 28, 2013	<
DUP-05	Aug 28, 2013	<
	Nov 25, 2014	<
DUP-07	Nov 25, 2014	<
MW 10-1A	Jul 16, 2010	<
	Dec 13, 2010	<
	Dec 13, 2010	<[2]
	Sep 02, 2011	<
	Aug 30, 2012	<
DUP-A	Sep 02, 2011	<
	Aug 28, 2013	<
	Nov 25, 2014	<
RDL		0.05
Criteria* - Ontario MOE		7.8

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
1. Lab Duplicate
2. Field Duplicate
* Ontario Ministry of the Environment (MOE) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

MW = Monitor Well
DUP-01 = Field Duplicate of MW 10-1, First Sampling Event
DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-A = Field Duplicate of MW 10-1A
DUP-03= Field Duplicate of MW 93-1A
DUP-04= Field Duplicate of PLCS
DUP-05 = Field Duplicate of MW 10-1
DUP-07 = Field Duplicate of MW 10-1
RDL = Reportable Detection Limit
< = Parameter below detection limit
0.0 = above criteria

TABLE D5

HISTORICAL GROUNDWATER ANALYTICAL DATA - VOCs (ug/L)
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	MW 93-1								MW 93-1A								
			Aug 19, 2009	Aug 19, 2009 Field Dup	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Nov 25, 2014	AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 30, 2012 DUP-03	Aug 28, 2013	Nov 25, 2014
Benzene	1.00	44	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromodichloromethane	1.00	85,000	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromoform	1.00	380	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromomethane	3.00	5.6	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Carbon Tetrachloride	1.00	1	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chlorobenzene	1.00	630	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chloroethane	8.00	-	<	<	<	<	<10 (1)	<	<	<	<	<	<	<	<10 (1)	<	<	<	<
Chloroform	1.00	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chloromethane	8.00	-	<	<	<	<	<10 (1)	<	<	<	<	<	<	<	<10 (1)	<	<	<	<
Dibromochloromethane	1.00	82,000	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichlorobenzene	0.50	4,600	<	<	<	<	<0.7 (1)	<	<	<	<	<	<	<	<0.7 (1)	<	<	<	<
1,3-Dichlorobenzene	1.00	9,600	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,4-Dichlorobenzene	1.00	8	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1-Dichloroethane	2.00	320	<	<	<	<	<3 (1)	<	<	<	<	<	<	<	<3 (1)	<	<	<	<
1,2-Dichloroethane	1.00	1.6	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1-Dichloroethylene	0.50	1.6	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
cis-1,2-Dichloroethylene	2.00	1.6	<	<	<	<	<3 (1)	<	<	<	<	<	<	<	<3 (1)	<	<	<	<
trans-1,2-Dichloroethylene	2.00	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichloropropane	1.00	16.0	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
cis-1,3-Dichloropropene	2.00	5.2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
trans-1,3-Dichloropropene	1.00	5.2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Ethylbenzene	1.00	2,300	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Methylene Chloride(Dichloromethane)	3.00	610	<	<	<	<	<4 (1)	<	<	<	<	<	<	<	<4 (1)	<	<	<	<
o-Xylene	1.00	4,200	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
p+m-Xylene	2.00	4,200	<	<	<	<	<3 (1)	<	<	<	<	<	<	<	<3 (1)	<	<	<	<
Styrene	1.00	1,300	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Tetrachloroethylene	1.00	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,2,2-Tetrachloroethane	1.00	3	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Toluene	1.00	18,000	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Trichloroethylene	1.00	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,1-Trichloroethane	1.00	640	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,2-Trichloroethane	1.00	5	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Trichlorofluoromethane (FREON 11)	8.00	2,500	<	<	<	<	<10 (1)	<	<	<	<	<	<	<	<10 (1)	<	<	<	<
Vinyl Chloride	0.50	0.5	<	<	<	<	<	<	<	<	0.2	<	<	<	<	<	<	<	<

Notes:
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Ontario Ministry of the Environment (MOE) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
RDL = Reportable Detection Limit
SW = Surface Water Sample
-= Not analysed/No criteria
< = Parameter below detection limit
0.0 = above criteria
DUP-01 = Field Duplicate of MW 10-1, First Sampling Event
DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-A= Field Duplicate of MW 10-1A
DUP-03= Field Duplicate of MW 93-1A
DUP-05 = Field Duplicate of MW 10-1
DUP-07 = Field Duplicate of MW 10-1
(1)=Elevated RDL for analyzed VOC(s)

TABLE D5

HISTORICAL GROUNDWATER ANALYTICAL DATA - VOCs (ug/L)
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	MW 93-2								MW 93-2A						
			AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Nov 25, 2014	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Nov 25, 2014
Benzene	1.00	44	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromodichloromethane	1.00	85,000	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromoform	1.00	380	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromomethane	3.00	5.6	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Carbon Tetrachloride	1.00	1	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chlorobenzene	1.00	630	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chloroethane	8.00	-	<	<	<	<	<10 (1)	<	<	<	<	<	<	<10 (1)	<	<	<
Chloroform	1.00	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chloromethane	8.00	-	<	<	<	<	<10 (1)	<	<	<	<	<	<	<10 (1)	<	<	<
Dibromochloromethane	1.00	82,000	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichlorobenzene	0.50	4,600	<	<	<	<	<0.7 (1)	<	<	<	<	<	<	<0.7 (1)	<	<	<
1,3-Dichlorobenzene	1.00	9,600	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,4-Dichlorobenzene	1.00	8	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1-Dichloroethane	2.00	320	<	<	<	<	<3 (1)	<	<	<	<	<	<	<3 (1)	<	<	<
1,2-Dichloroethane	1.00	1.6	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1-Dichloroethylene	0.50	1.6	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
cis-1,2-Dichloroethylene	2.00	1.6	<	<	<	<	<3 (1)	<	<	<	<	<	<	<3 (1)	<	<	<
trans-1,2-Dichloroethylene	2.00	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichloropropane	1.00	16.0	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
cis-1,3-Dichloropropene	2.00	5.2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
trans-1,3-Dichloropropene	1.00	5.2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Ethylbenzene	1.00	2,300	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Methylene Chloride(Dichloromethane)	3.00	610	<	<	<	<	<4 (1)	<	<	<	<	<	<	<4 (1)	<	<	<
o-Xylene	1.00	4,200	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
p+m-Xylene	2.00	4,200	<	<	<	<	<3 (1)	<	<	<	<	<	<	<3 (1)	<	<	<
Styrene	1.00	1,300	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Tetrachloroethylene	1.00	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,2,2-Tetrachloroethane	1.00	3	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Toluene	1.00	18,000	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Trichloroethylene	1.00	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,1-Trichloroethane	1.00	640	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,2-Trichloroethane	1.00	5	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Trichlorofluoromethane (FREON 11)	8.00	2,500	<	<	<	<	<10 (1)	<	<	<	<	<	<	<10 (1)	<	<	<
Vinyl Chloride	0.50	0.5	0.2	<	<	<	<	<	<	<	<	<	<	<	<	<	<

Notes:
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Ontario Ministry of the Environment (MOE) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
RDL = Reportable Detection Limit
SW = Surface Water Sample
-= Not analysed/No criteria
< = Parameter below detection limit
0.0 = above criteria
DUP-01 = Field Duplicate of MW 10-1, First Sampling Event
DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-A= Field Duplicate of MW 10-1A
DUP-03= Field Duplicate of MW 93-1A
DUP-05 = Field Duplicate of MW 10-1
DUP-07 = Field Duplicate of MW 10-1
(1)=Elevated RDL for analyzed VOC(s)

TABLE D5

HISTORICAL GROUNDWATER ANALYTICAL DATA - VOCs (ug/L)
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	MW 10-1									MW 10-1A						
			Jul 16, 2010	Dec 13, 2010	Jul 16, 2010 DUP-01	Dec 13, 2010 DUP-02	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Aug 28, 2013 DUP-05	Nov 25, 2014	Nov 25, 2014 DUP-07	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Sep 02, 2011 DUP- A	Aug 28, 2013	Nov 25, 2014
Benzene	1.00	44	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromodichloromethane	1.00	85,000	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromoform	1.00	380	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromomethane	3.00	5.6	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Carbon Tetrachloride	1.00	1	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chlorobenzene	1.00	630	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chloroethane	8.00	-	<	<	<	<	<10 (1)	<	<	<	<	<	<	<	<10 (1)	<	<10 (1)	<	<
Chloroform	1.00	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chloromethane	8.00	-	<	<	<	<	<10 (1)	<	<	<	<	<	<	<	<10 (1)	<	<10 (1)	<	<
Dibromochloromethane	1.00	82,000	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichlorobenzene	0.50	4,600	<	<	<	<	<0.7 (1)	<	<	<	<	<	<	<	<0.7 (1)	<	<0.7 (1)	<	<
1,3-Dichlorobenzene	1.00	9,600	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,4-Dichlorobenzene	1.00	8	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1-Dichloroethane	2.00	320	<	<	<	<	<3 (1)	<	<	<	<	<	<	<	<3 (1)	<	<3 (1)	<	<
1,2-Dichloroethane	1.00	1.6	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1-Dichloroethylene	0.50	1.6	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
cis-1,2-Dichloroethylene	2.00	1.6	<	<	<	<	<3 (1)	<	<	<	<	<	<	<	<3 (1)	<	<3 (1)	<	<
trans-1,2-Dichloroethylene	2.00	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichloropropane	1.00	16.0	<	<	<	4.00	2.00	<	<	<	1.00	1.00	<	2.00	7.00	3.00	7.00	7.1	<
cis-1,3-Dichloropropene	2.00	5.2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
trans-1,3-Dichloropropene	1.00	5.2	<	<	<	1.00	<	<	<	<	<	<	<	1.00	<	<	<	<	<
Ethylbenzene	1.00	2,300	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Methylene Chloride(Dichloromethane)	3.00	610	<	<	<	<	<4 (1)	<	<	<	<	<	<	<	<4 (1)	<	<4 (1)	<	<
o-Xylene	1.00	4,200	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
p+m-Xylene	2.00	4,200	<	<	<	<	<3 (1)	<	<	<	<	<	<	<	<3 (1)	<	<3 (1)	<	<
Styrene	1.00	1,300	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Tetrachloroethylene	1.00	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,2,2-Tetrachloroethane	1.00	3	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Toluene	1.00	18,000	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Trichloroethylene	1.00	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,1-Trichloroethane	1.00	640	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,2-Trichloroethane	1.00	5	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Trichlorofluoromethane (FREON 11)	8.00	2,500	<	<	<	<	<10 (1)	<	<	<	<	<	<	<	<10 (1)	<	<10 (1)	<	<
Vinyl Chloride	0.50	0.5	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<

Notes:
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Ontario Ministry of the Environment (MOE) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
RDL = Reportable Detection Limit
SW = Surface Water Sample
-= Not analysed/No criteria
< = Parameter below detection limit
0.0 = above criteria
DUP-01 = Field Duplicate of MW 10-1, First Sampling Event
DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-A= Field Duplicate of MW 10-1A
DUP-03= Field Duplicate of MW 93-1A
DUP-05 = Field Duplicate of MW 10-1
DUP-07 = Field Duplicate of MW 10-1
(1)=Elevated RDL for analyzed VOC(s)

TABLE D6

HISTORICAL GROUNDWATER ANALYTICAL DATA - GENERAL CHEMISTRY
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	Units	RDL	Criteria*	MW 93-1								MW 93-1A								
				Aug 19, 2009	Aug 19, 2009 Field Dup	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Nov 25, 2014	AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 30, 2012 DUP-03	Aug 28, 2013	Nov 25, 2014
Anion Sum	me/L	N/A	-	6.10	7.22	5.87	5.52	7.47	6.51	6.2	6.2	-	7.22	7.33	7.46	5.61	6.5	6.47	7.23	7.66
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1.00	-	236.0	292.0	229.0	210.0	304.0	270	240	250	-	285.0	293.0	297.0	216.0	260	250	300	320
Calculated TDS	mg/L	1.00	-	338.0	375.0	313.0	313.0	389.0	338	330	330	265.0	447.0	390.0	401.0	302.0	334	334	380	400
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.00	-	2.00	3.00	3.00	2.00	4.00	4.7	2.6	3.7	-	3.00	3.00	2.00	3.00	5.2	5.4	2.8	3.3
Cation Sum	me/L	N/A	-	6.60	6.77	5.62	5.90	6.90	6.14	5.82	5.72	-	9.57	7.02	7.19	5.35	5.89	5.94	7.05	7.38
Hardness (CaCO3)	mg/L	1.00	-	160	160	120	120	180	150	140	130	205	210	170	170	120	140	150	170	180
Ion Balance (% Difference)	%	N/A	-	4.00	3.22	2.18	3.33	3.97	2.92	3.16	4.11	-	14.00	2.16	1.84	2.37	4.92	4.27	1.26	1.86
Langelier Index (@ 20C)	N/A	N/A	-	0.50	0.62	0.47	0.38	0.80	0.815	0.51	0.64	-	0.70	0.62	0.61	0.55	0.826	0.846	0.65	0.74
Langelier Index (@ 4C)	N/A	N/A	-	0.30	0.37	0.22	0.13	0.55	0.566	0.261	0.395	-	0.45	0.37	0.36	0.31	0.577	0.597	0.401	0.495
Nitrate (N)	mg/L	0.05	-	<	<	<	<	<	<	<	<	-	<	<	<	<	<	<	<	<
Saturation pH (@ 20C)	N/A	N/A	-	7.50	7.41	7.64	7.64	7.32	7.45	7.54	7.56	-	7.31	7.37	7.32	7.67	7.5	7.5	7.34	7.29
Saturation pH (@ 4C)	N/A	N/A	-	7.80	7.66	7.89	7.89	7.57	7.69	7.79	7.81	-	7.55	7.62	7.57	7.92	7.75	7.75	7.59	7.54
Total Alkalinity (Total as CaCO3)	mg/L	30	-	240	300	230	210	310	280	250	250	290	290	300	300	220	260	260	310	320
Carbonaceous BOD	mg/L	5.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Chloride (Cl)	mg/L	1	-	36	35	19	15	11	11	24	17	11	12	11	11	16	30	30	11	10
Colour	TCU	5.00	-	<	<	<	<	<	<	<	<	-	<	<	<5	<5	<	<	<	<
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate + Nitrite	mg/L	0.05	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Nitrite (N)	mg/L	0.01	-	<	<	<	<	<	<	<	<	0.015	<	<	<	<	<	<	<	<
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	-	0.10	<	<	<	<	<	<	<	0.02	<	<	<0.05	<0.05	<	<	<	<
Total Organic Carbon (C)	mg/L	0.50	-	1.20	1.00	2.10	0.90	930.00	<	1.1	0.86	2.00	<	<(5) (1)	<(5) (1)	<(0.5)	1.4	1.5	2.6 (1)	<
Orthophosphate (P)	mg/L	0.01	-	<	<	<	<	<	<	0.013	<	-	<	<	0.04	<	<	<	<	<
pH	pH	N/A	-	8.00	8.03	8.11	8.02	8.12	8.26	8.05	8.2	8.02	8.00	7.99	7.93	8.22	8.33	8.35	7.99	8.03
Phenols-4AAP	mg/L	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reactive Silica (SiO2)	mg/L	0.50	-	9.90	10.00	7.60	7.60	6.90	5.3	8.1	7.9	-	5.00	7.10	6.80	7.70	9.1	9.1	6.3	7.7
Total Suspended Solids (TSS)	mg/L	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Sulphate (SO4)	mg/L	2	-	2	16	33	42	48	33	27	37	-	55	53	56	38	19	20	38	43
Sulphide	mg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	0.1	-	0.5	1.3	61.0	34.0	<1000	590	2.1	5.1	-	350.0	300.0	470.0	1.1	5.9	5.7	160	490
Conductivity	uS/cm	1	-	580	580	520	500	630	580	540	520	511	610	630	640	500	580	590	620	680
Total Oil & Grease	mg/L	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
Analysis completed by Maxxam Analytics Inc. laboratory in St. John's, NL.
* Ontario Ministry of the Environment (MOE) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
RDL = Reportable Detection Limit **0.0** = above criteria
- = Not analysed/No criteria (2)= Reporting limit was increased due to turbidity
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
DUP-01 = Field Duplicate of MW 10-1, First Sampling Event
DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-03= Field Duplicate of MW 93-1A
DUP-05= Field Duplicate of MW 10-1
Dup-07 = Field Duplicate of MW 10-1
(1) = Elevated detection limit due to matrix interference

TABLE D6

HISTORICAL GROUNDWATER ANALYTICAL DATA - GENERAL CHEMISTRY
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	Units	RDL	Criteria*	MW 93-2								MW 93-2A						
				AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Nov 25, 2014	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Nov 25, 2014
Anion Sum	me/L	N/A	-	-	6.90	6.30	6.58	6.42	6.36	6.33	6.18	2.69	6.43	1.31	2.42	1.37	1.72	2.27
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1.00	-	-	232.0	205.0	219.0	210.0	210.0	220	220	62.0	212.0	14.0	61.0	11.0	14	7.7
Calculated TDS	mg/L	1.00	-	331.0	380.0	346.0	368.0	361.0	353.0	350	340	184.0	351.0	87.0	145.0	96.0	120	150
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.00	-	-	1.00	1.00	1.00	2.00	2.60	1.3	1.7	<	1.00	<	<	<	<	<
Cation Sum	me/L	N/A	-	-	6.50	5.66	6.19	6.10	5.99	5.97	6.01	3.43	5.70	1.15	2.09	1.44	1.87	1.96
Hardness (CaCO3)	mg/L	1.00	-	245	270	240	250	260	250	250	250	120	240	31	73	34	42	61
Ion Balance (% Difference)	%	N/A	-	-	2.60	5.35	3.05	2.56	3.00	2.93	1.39	12.10	`	6.50	7.32	2.49	4.18	7.33
Langelier Index (@ 20C)	N/A	N/A	-	-	0.50	0.53	0.54	0.68	0.90	0.591	0.711	-1.51	0.48	-3.48	-1.21	-3.03	-3.37	-3.6
Langelier Index (@ 4C)	N/A	N/A	-	-	0.30	0.28	0.29	0.43	0.65	0.342	0.462	-1.76	0.24	-3.73	-1.46	-3.28	-3.62	-3.85
Nitrate (N)	mg/L	0.05	-	-	<	<	<	<	<	<	<	<	<	0.15	<	<	<	0.43
Saturation pH (@ 20C)	N/A	N/A	-	-	7.20	7.28	7.20	7.23	7.22	7.22	7.2	8.06	7.27	9.25	8.27	9.28	9.14	9.26
Saturation pH (@ 4C)	N/A	N/A	-	-	7.40	7.53	7.45	7.47	7.47	7.47	7.45	8.31	7.52	9.50	8.52	9.53	9.39	9.51
Total Alkalinity (Total as CaCO3)	mg/L	30	-	205	2,320	210	220	210	220	220	220	62	210	14	61	12	14	7.7
Carbonaceous BOD	mg/L	5.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Chloride (Cl)	mg/L	1	-	24	24	23	21	20	20	19	18	21	23	14	16	17	22	31
Colour	TCU	5.00	-	-	<	<	<5	<5	<	<	<	6.00	<	79.00	120.00	41.00	65	14
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate + Nitrite	mg/L	0.05	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	0.43
Nitrite (N)	mg/L	0.01	-	0.02	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	-	<0.01	<	<	<	<	<	<	<	0.24	<	0.35	0.25	0.40	0.53	0.21
Total Organic Carbon (C)	mg/L	0.50	-	2.00	0.50	1.50	1.30	1.00	0.88	1	1	6.20	1.30	16.00	17.00	22.00	16	13
Orthophosphate (P)	mg/L	0.01	-	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<
pH	pH	N/A	-	7.50	7.70	7.81	7.74	7.90	8.12	7.81	7.91	6.55	7.75	5.77	7.06	6.25	5.77	5.66
Phenols-4AAP	mg/L	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reactive Silica (SiO2)	mg/L	0.50	-	-	19.00	18.00	19.00	19.00	18.00	18	17	12.00	18.00	6.40	11.00	5.70	6.4	7
Total Suspended Solids (TSS)	mg/L	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Sulphate (SO4)	mg/L	2	-	-	73	74	76	78	71	68	56	41	74	31	36	32	40	58
Sulphide	mg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	0.1	-	-	13.0	5.4	13.0	3.9	4.0	1.1	6.1	84.0	3.2	100.0	190.0	120.0	44	70
Conductivity	uS/cm	1	-	549	560	570	580	570	580	560	550	260	570	140	230	150	190	260
Total Oil & Grease	mg/L	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
Analysis completed by Maxxam Analytics Inc. laboratory in St. John's, NL.
* Ontario Ministry of the Environment (MOE) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
RDL = Reportable Detection Limit **0.0** = above criteria
- = Not analysed/No criteria (2)= Reporting limit was increased due to turbidity
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
DUP-01 = Field Duplicate of MW 10-1, First Sampling Event
DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-03= Field Duplicate of MW 93-1A
DUP-05= Field Duplicate of MW 10-1
Dup-07 = Field Duplicate of MW 10-1
(1) = Elevated detection limit due to matrix interference

TABLE D6

HISTORICAL GROUNDWATER ANALYTICAL DATA - GENERAL CHEMISTRY
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	Units	RDL	Criteria*	MW 10-1										MW 10-1A						
				Jul 16, 2010	Dec 13, 2010	Jul 16, 2010 DUP-01	Dec 13, 2010 DUP-02	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Aug 28, 2013 DUP-05	Nov 25, 2014	Nov 25, 2014 Dup-07	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Sep 02, 2011 DUP-A	Aug 28, 2013	Nov 25, 2014
Anion Sum	me/L	N/A	-	3.87	2.63	3.89	2.70	3.48	3.24	2.92	2.96	3.11	3.16	3.86	3.08	1.43	2.11	1.44	1.66	2.92
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1.00	-	94.0	92.0	96.0	95.0	144.0	140	120	120	96	98	94.0	114.0	50.0	77.0	51.0	49	90
Calculated TDS	mg/L	1.00	-	215.0	147.0	217.0	149.0	185.0	174	160	160	170	170	215.0	171.0	95.0	122.0	95.0	100	160
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.00	-	<	<	<	<	<	1.1	<	<	<	<	<	<	<	<	<	<	<
Cation Sum	me/L	N/A	-	3.60	2.55	3.66	2.57	3.27	3.11	2.89	2.91	2.99	3.01	3.61	3.08	1.57	1.98	1.59	1.61	2.76
Hardness (CaCO3)	mg/L	1.00	-	100	110	100	110	150	140	130	130	130	130	100	140	61	84	61	68	120
Ion Balance (% Difference)	%	N/A	-	3.61	1.54	3.05	2.47	3.11	2.05	0.52	0.85	1.97	2.43	3.35	0.00	4.67	3.18	4.95	1.53	2.82
Langelier Index (@ 20C)	N/A	N/A	-	-0.23	-0.79	-0.31	-0.68	0.34	0.365	-0.202	-0.192	-0.006	0.007	-0.36	-0.18	-1.18	-0.60	-1.11	-1.51	-0.083
Langelier Index (@ 4C)	N/A	N/A	-	-0.48	-1.05	-0.56	-0.93	0.09	0.115	-0.452	-0.442	-0.256	-0.243	-0.61	-0.43	-1.43	-0.85	-1.36	-1.76	-0.333
Nitrate (N)	mg/L	0.05	-	<	0.24	<	0.25	<	0.16	<	<	0.13	0.14	<	0.26	0.10	0.08	0.08	0.068	0.069
Saturation pH (@ 20C)	N/A	N/A	-	7.93	7.79	7.91	7.77	7.51	7.55	7.64	7.63	7.73	7.72	7.92	7.64	8.32	8.00	8.31	8.29	7.76
Saturation pH (@ 4C)	N/A	N/A	-	8.18	8.05	8.16	8.02	7.76	7.8	7.89	7.88	7.98	7.97	8.17	7.89	8.57	8.25	8.56	8.54	8.01
Total Alkalinity (Total as CaCO3)	mg/L	30	-	95	92	96	96	140	140	120	120	96	98	95	110	51	77	51	49	90
Carbonaceous BOD	mg/L	5.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Chloride (Cl)	mg/L	1	-	56	12	56	12	6	3.8	5.4	5.8	26	26	56	14	3	4	3	5.7	27
Colour	TCU	5.00	-	10.00	9.00	6.00	13.00	9.00	5.6	<	<	<	<	7.00	5.00	22.00	7.70	18.00	8.2	16
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate + Nitrite	mg/L	0.05	-	<	<	<	<	0.90	0.16	<	<	0.13	0.14	<	<	0.11	0.08	0.08	0.068	0.069
Nitrite (N)	mg/L	0.01	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	-	0.14	<0.05	0.14	<0.05	0.28	<	<	<	<	<	0.15	0.09	<	0.11	<	<	<
Total Organic Carbon (C)	mg/L	0.50	-	8 (1)	33.00	8 (1)	18.00	18.00	2.7	3	3.1	2.2	2.3	8 (1)	2.30	15.00	8.70	18.00	34 (1)	7.1 (2)
Orthophosphate (P)	mg/L	0.01	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
pH	pH	N/A	-	7.70	7.00	7.60	7.09	7.85	7.91	7.44	7.44	7.73	7.72	7.56	7.46	7.14	7.40	7.20	6.78	7.68
Phenols-4AAP	mg/L	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reactive Silica (SiO2)	mg/L	0.50	-	7.00	6.20	7.00	6.00	8.00	7.4	6.9	7	4.5	4.5	7.10	7.60	10.00	10.00	10.00	11	2.9
Total Suspended Solids (TSS)	mg/L	2	-	-	-	-	-	-	-	-	-	-	-	-	-	7,000	-	9,400	-	-
Dissolved Sulphate (SO4)	mg/L	2	-	18	21	19	21	20	17	17	18	21	21	19	19	22	21	22	24	16
Sulphide	mg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	0.1	-	640.0	>1000	570.0	540.0	320.0	26	110	110	37	38	520.0	110.0	>1000	240.0	>1000	>1000	310
Conductivity	uS/cm	1	-	380	250	380	260	320	300	270	280	300	300	380	300	150	200	150	160	280
Total Oil & Grease	mg/L	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
Analysis completed by Maxxam Analytics Inc. laboratory in St. John's, NL.
* Ontario Ministry of the Environment (MOE) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
RDL = Reportable Detection Limit **0.0** = above criteria
- = Not analysed/No criteria (2)= Reporting limit was increased due to turbidity
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
DUP-01 = Field Duplicate of MW 10-1, First Sampling Event
DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-03= Field Duplicate of MW 93-1A
DUP-05= Field Duplicate of MW 10-1
Dup-07 = Field Duplicate of MW 10-1
(1) = Elevated detection limit due to matrix interference

TABLE D7

HISTORICAL GROUNDWATER ANALYTICAL DATA - METALS
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	MW 93-1								MW 93-1A								
			Aug 19, 2009	Aug 19, 2009 Field Dup	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Nov 25, 2014	AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 30, 2012 DUP-03	Aug 28, 2013	Nov 25, 2014
Aluminum (Al)	5.0	-	100	120	37	17	73.7	73.7	8.3	14	42000	13,000	15	31	5.9	5.9	13.0	10	18
Antimony (Sb)	1.0	20,000	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Arsenic (As)	1.0	1,900	<	<	<	<	<	<	<	1.2	36	7	<	<	<	<	<	<	<
Barium (Ba)	1.0	29,000	130	150	88	70	77.9	77.9	100	85	426	240	79	73	68.6	68.6	107	83	71
Beryllium (Be)	1.0	67	<	<	<	<	<1	<1	<	<	2	<	<	<	<	<	<	<	<
Bismuth (Bi)	2.0	-	<	<	<	<	<2	<2	<	<	-	<	<	<	<	<	<	<	<
Boron (B)	5.0	45,000	120	120	100	99	63	63	110	98	-	58	56	57	96	96	118	69	64
Cadmium (Cd)	0.0	2.7	0.4	<	0.02	0.05	<	<	0.044	0.022	3	<	0.03	0.07	<	<	<	<	0.012
Calcium (Ca)	100	-	-	-	26,000	29,000	43,500	43,500	31,000	30,000	-	-	40,000	45,000	26,300	26,300	33,000	42,000	45,000
Chromium (Cr)	1.0	810/140[(1)]	<	<	<	<	<	<	<	<	54	39	<	<	<	<	<	<	<
Cobalt (Co)	0.4	66	<	<	<	<	0.44	0.44	<	<	**110**	**170**	0.7	0.4	<	<	<	1	<
Copper (Cu)	2.0	87	6	3	<	<	<2	<2	<	<	**370**	**170**	2	<	<	<	6.8	<	<
Iron (Fe)	50	-	670	550	<	<	65	65	570	330	370	37000	<	<	<	<	55	530	<
Lead (Pb)	1	25	4.6	1	<	<	<	<	<	<	**45**	17	<	<	<	<	<	<	<
Magnesium (Mg)	100	-	-	-	14,000	12,000	16,400	16,400	15,000	14,000	-	-	17,000	14,000	12,200	12,200	15,400	17,000	17,000
Manganese (Mn)	2.0	-	110	120	120	81	60	60	110	120	2,620	1200	160	57	259	259	103	160	71
Molybdenum (Mo)	2.0	9,200	6	6	20	18	16.3	16.3	15	15	20	11	15	14	19.2	19.2	10.7	16	15
Nickel (Ni)	2.0	490	6	<	<	<	<	<	<	<	154	87	<	<	<	<	<	<	<
Phosphorus (P)	100	-	-	-	<	<	-	-	<	<	-	-	<	130	-	-	<	<	<
Potassium (K)	100	-	-	-	1,900	2,000	2,680	2,680	1,800	1,700	-	-	2,500	2,700	1,830	1,830	1,730	2,700	2,500
Selenium (Se)	1.0	63	<	<	<	<	<	<	<	<	<1	<	<	<	<	<	<	<	<
Silver (Ag)	0.1	1.5	<	<	<	<	<	<	<	<	1	<	<	<	<	<	<	<	<
Sodium	100	2,300,000	-	-	-	-	76,100	70,400	69,000	69,000	-	-	-	-	68,600	68,200	68,600	80,000	85,000
Strontium (Sr)	2.0	-	250	260	230	220	263	263	240	220	-	300	300	280	192	192	249	280	280
Thallium (Tl)	0.1	510	<	<	<	<	<	<	<	<	-	-	<	<	<	<	<	<	<
Tin (Sn)	2.0	-	<	<	<	<	<2	<2	<	<	-	<	<	<	<	<	<	<	<
Titanium (Ti)	2.0	-	3	3	<	<	2.6	2.6	<	<	-	720	<	2	<	<	<	<	<
Uranium (U)	0.1	-	0.2	0.2	0.3	0.2	3.06	3.06	0.16	0.34	-	6	2.9	2.8	0.4	0.4	0.21	2.3	3.1
Vanadium (V)	2.0	250	<	<	<	<	<	<	<	<	155	28	<	<	<	<	<	<	<
Zinc (Zn)	5.0	1,100	360	32	10	10	<	<	12	10	443	250	<	<	<	<	<	<	<

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
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DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-03= Field Duplicate of MW 93-1A
DUP-05 = Field Duplicate of MW 10-1
DUP-07 = Field Duplicate fo MW 10-1
(1) Criteria for Total Chromium = 2000 ug/L, Criteria for Chromium (VI) = 110 ug/L

TABLE D7

HISTORICAL GROUNDWATER ANALYTICAL DATA - METALS
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	MW 93-2								MW 93-2A						
			AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Nov 25, 2104	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Nov 25, 2014
Aluminum (Al)	5.0	-	484	460	9	<	<	<	5.4	6.2	630	<	150	86.6		290	270
Antimony (Sb)	1.0	20,000	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Arsenic (As)	1.0	1,900	3	2	2	2	1.2	1.2	1.9	3.0	<	2	<	<	<	<	<
Barium (Ba)	1.0	29,000	131	180	170	160	171	171	170	190	69	180	39	54.1	54.1	48	90
Beryllium (Be)	1.0	67	<0.1	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bismuth (Bi)	2.0	-	<0.5	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Boron (B)	5.0	45,000	-	1100	980	1100	<	<	1,100	980	440.0	1000	24	317	317	<	<
Cadmium (Cd)	0.0	2.7	-	<	0.15	0.1	**1160**	**1160**	<0.010	<	**11**	0.15	**3.5**	0.304	0.304	0.32	**11**
Calcium (Ca)	100	-	-	-	69,000	80,000	77,300	77,400	75,000	76000	-	69,000	9,000	20,600	20,600	11,000	16,000
Chromium (Cr)	1.0	810/140[(1)]	1	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Cobalt (Co)	0.4	66	1	<	<	0.4	<	<	<	<	1	<	1.4	1.19	1.19	0.93	5.2
Copper (Cu)	2.0	87	8	5	<	<	0.56	0.56	<	<	6	<	<	<	<	<	<
Iron (Fe)	50	-	1300	980	<	<	<	<	57	130	9900	<	1900	3000	3000	12,000	730
Lead (Pb)	1	25	5	2	<	<	<	<	<	<	6.9	<	0.8	1.17	1.17	1	1
Magnesium (Mg)	100	-	-	-	16,000	13,000	15,600	15,600	15,000	15000		16,000	2,200	5,220	5,220	3,300	4,900
Manganese (Mn)	2.0	-	15,300	1200	880	950	1,120	1,120	980	720	4300	890	4,000	4,190	4,190	5,000	6,700
Molybdenum (Mo)	2.0	9,200	2	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Nickel (Ni)	2.0	490	1	<	<	<	<	<	<	<	<	<	<	<	<	<	4.8
Phosphorus (P)	100	-	-	-	<	150	-	-	<	<	-	<	<	-	-	<	110
Potassium (K)	100	-	-	-	1,200	1,400	1,560	1,560	1,300	1300	-	1,200	980	1,040	1,040	1,300	1,600
Selenium (Se)	1.0	63	1	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Silver (Ag)	0.1	1.5	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Sodium	100	2,300,000	-	-	-	-	21,000	20,300	22,000	22000	-	-	-	11,000	9,100	12,000	15,000
Strontium (Sr)	2.0	-	-	230	240	230	210	210	220	230	100	240	41	70.6	70.6	52	77
Thallium (Tl)	0.1	510	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Tin (Sn)	2.0	-	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Titanium (Ti)	2.0	-	-	21	<	<	<	<	<	<	20	<	2	<	<	2.2	<
Uranium (U)	0.1	-	-	0	0.3	0.2	0.24	0.24	0.26	0.23	0.3	0.3	<	<	<	<	<
Vanadium (V)	2.0	250	2	<	<	<	<	<	<	<	4	<	<	<	<	<	<
Zinc (Zn)	5.0	1,100	33	41	19	18	5	5	<	<	**1,700**	17	**1,300**	568	568	190	**2,900**

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Ontario Ministry of the Environment (MOE) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
0.0 = above criteria
DUP-01 = Field Duplicate of MW 10-1, First Sampling Event
DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-03= Field Duplicate of MW 93-1A
DUP-05 = Field Duplicate of MW 10-1
DUP-07 = Field Duplicate fo MW 10-1
(1) Criteria for Total Chromium = 2000 ug/L, Criteria for Chromium (VI) = 110 ug/L

TABLE D7

HISTORICAL GROUNDWATER ANALYTICAL DATA - METALS
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	MW 10-1										MW 10-1A						
			Jul 16, 2010	Dec 13, 2010	Jul 16, 2010 DUP-01	Dec 13, 2010 DUP-02	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Aug 28, 2013 DUP-05	Nov 25, 2014	Nov 25, 2014 DUP-07	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Sep 02, 2011 DUP-A	Aug 28, 2013	Nov 25, 2014
Aluminum (Al)	5.0	-	200	38	160	36	41.8	41.8	30	26	12	17	100	11	74.5	74.5	68.3	58	75
Antimony (Sb)	1.0	20,000	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Arsenic (As)	1.0	1,900	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Barium (Ba)	1.0	29,000	100	36	110	38	50.2	50.2	38	38	41	41	110	62	28.8	28.8	29.4	35	22
Beryllium (Be)	1.0	67	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bismuth (Bi)	2.0	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Boron (B)	5.0	45,000	45	9	38	9	<	<	<	<	<	<	42	13	<	<	<	<	<
Cadmium (Cd)	0.0	2.7	0.03	<	0.03	<	0.032	0.032	0.037	0.053	<	<	0.02	0.03	0.039	0.039	0.036	0.033	<
Calcium (Ca)	100	-	31,000	41,000	32,000	42,000	51,100	51,100	45,000	45,000	46,000	47,000	31,000	48,000	20,600	20,600	20,800	23,000	45,000
Chromium (Cr)	1.0	810/140[(1)]	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Cobalt (Co)	0.4	66	2.3	1.4	2.4	1.4	4.91	4.91	0.41	<	<	<	2.5	3.3	1.54	1.54	2.07	12	<
Copper (Cu)	2.0	87	5	9	5	9	7.3	7.3	5.8	6	3.8	4	4	<	9.4	9.4	9.1	11	6.8
Iron (Fe)	50	-	120	50	140	59	50	50	84	<	<	<	82	<	96	96	92	560	86
Lead (Pb)	1	25	<	<	<	<	<	<	<	<	<	<	<	<	<	<	2.66	<	<
Magnesium (Mg)	100	-	5,800	2,300	5,900	2,300	4,540	4,540	4,100	4,000	3,900	3,900	5,900	3,900	2,190	2,190	2,150	2,500	1,800
Manganese (Mn)	2.0	-	390	190	390	170	239	239	27	26	12	13	400	380	106	106	139	860	3.3
Molybdenum (Mo)	2.0	9,200	16	3	16	3	2.5	2.5	<	<	<	<	14	5	8.5	8.5	6.1	3.2	<
Nickel (Ni)	2.0	490	6	6	6	6	6.5	6.5	2	2.1	<	<	5	6	8.9	8.9	8.3	11	<
Phosphorus (P)	100	-	<	150	<	<	-	-	<	<	<	<	<	<	-	-	-	<	<
Potassium (K)	100	-	6,400	1,100	6,400	980	1,360	1,360	1,200	1,300	1,100	1,100	6,400	1,400	714	714	693	720	850
Selenium (Se)	1.0	63	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Silver (Ag)	0.1	1.5	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	0.15	<
Sodium	100	2,300,000	-	-	-	-	6,570	7,020	6,600	6,600	8,000	7,800	-	-	4,670	5,750	4,600	5,100	8,100
Strontium (Sr)	2.0	-	98	85	99	87	106	106	98	98	98	98	99	100	46.9	46.9	45.4	56	85
Thallium (Tl)	0.1	510	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Tin (Sn)	2.0	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Titanium (Ti)	2.0	-	3	<	3	<	<	<	<	<	<	<	2	<	2.1	2.1	<	<	3.9
Uranium (U)	0.1	-	0.4	<	0.4	<	0.43	0.43	0.29	0.29	0.2	0.21	0.4	0.3	<	<	<	<	0.14
Vanadium (V)	2.0	250	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Zinc (Zn)	5.0	1,100	5	11	6	11	9	9	8.2	11	<	<	5	10	8.9	8.9	10.1	6.9	<

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Ontario Ministry of the Environment (MOE) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
0.0 = above criteria
DUP-01 = Field Duplicate of MW 10-1, First Sampling Event
DUP-02 = Field Duplicate of MW 10-1, Second Sampling Event
DUP-03= Field Duplicate of MW 93-1A
DUP-05 = Field Duplicate of MW 10-1
DUP-07 = Field Duplicate fo MW 10-1
(1) Criteria for Total Chromium = 2000 ug/L, Criteria for Chromium (VI) = 110 ug/L

TABLE D8

HISTORICAL SURFACE WATER ANALYTICAL DATA - BTEX/MTPH
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Sample Location	Date Sampled	Benzene	Toluene	Ethyl-benzene	Xylenes	Total Petroleum Hydrocarbons (TPH)					Comments
						F1	F2	F3		Modified TPH	
						C_6-C_{10}	C_{10}-C_{16}	C_{16}-C_{21}	C_{21}-C_{32}		
SURFACE UP	2008 (AMEC)	<(0.2)	<(0.2)	<(0.2)	<(0.6)	<(0.05)[1]	<(0.05)[1]		<(0.05)[1]	<(0.15)[1]	-
	Aug 19, 2009	<	<	<	<	<	<		<	<	-
	Jul 16, 2010	<	<	<	<	<	<		<	<	-
	Dec 13, 2010	<	<	<	<	<	<		<	<	-
	Sep 02, 2011	<	<	<	<	<	<		<	<	-
	Nov 07, 2012	<	<	<	<	<	<		<	<	-
	Aug 28, 2013	<	<	<	<	<	<	<	<	<	-
	Nov 25, 2014	<	<	<	<	<	<	<	<	<	-
SURACE DOWN	2008 (AMEC)	<(0.2)	<(0.2)	<(0.2)	<(0.6)	<(0.05)[1]	<(0.05)[1]		<(0.05)[1]	<(0.15)[1]	-
	Aug 19, 2009	<	<	<	<	<	<		<	<	-
	Jul 16, 2010	<		<	<	<	<		<	<	-
	Dec 13, 2010	<	<	<	<	<	<		<	<	-
	Sep 02, 2011	<	0.02	<	<	<	<		<	<	-
	Nov 07, 2012	<	<	<	<	<	<		<	<	-
	Aug 28, 2013	<	<	<	<	<	<	<	<	<	-
	Nov 25, 2014	<	<	<	<	<	<	<	<	<	-
RDL		0.001	0.001	0.001	0.002	0.01	0.05	0.1	0.1	0.1	-
2007 CCME Freshwater Aquatic Life Guidelines[2]		**4.00**	**2.00**	**0.39**	**-**	**-**	**-**	**-**	**-**	**-**	**Gasoline**
										-	**Diesel /#2 Fuel Oil**
										-	**#6 Oil**
1997 BC Guidelines for Protection of Aquatic Life[3]		**-**	**-**	**-**	**-**	**1.5**	**0.5**	**-**	**-**	**-**	**-**
										-	**-**
										-	**-**

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in St. John's, NL.
1. Assumed transcript error by factor of 1,000 from Pinchin LeBlanc Environmental Table 2 from March 2010 OMM Report
2. 2007 CCME Freshwater Aquatic Life Guidelines
3. BC Ministry of Water, Land and Air Protection Guidelines for Protection of Aquatic Life

RDL = Reportable Detection Limit
< = Parameter below detection limit
- = Not analysed

DUP = Laboratory duplicate
0.0 = above criteria
<(#) = Parameter below AMEC laboratory detection limit

TABLE D9

HISTORICAL SURFACE WATER ANALYTICAL DATA - PAHs (ug/L)
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	SURFACE UP								SURFACE DOWN							
			AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Nov 07, 2012	Aug 28, 2013	Nov 25. 2014	AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Nov 07, 2012	Aug 28, 2013	Nov 25, 2014
1-Methylnaphthalene	0.05	-	<0.03	<	<	<	<	<	<	<	<0.03	<	<	<	<	<	<	<
2-Methylnaphthalene	0.05	-	<0.03	<	<	<	<	<	<	<	<0.03	<	<	<	<	<	<	<
Acenaphthene	0.01	5.8	<0.04	<	<	<	<	<	<	<	<0.04	<	<	<	<	<	<	<
Acenaphthylene	0.01	-	<0.03	<	<	<	<	<	<	<	<0.03	<	<	<	<	<	<	<
Acridine	0.05	4.4	-	-	<	<	-	-	<	<	-	-	<	<	-	-	<	<
Anthracene	0.01	0.012	<0.01	<	<	<	<	<	<	<	<0.01	<	<	<	<	<	<	<
Benzo(a)anthracene	0.01	0.018	<0.01	<	<	<	<	<	<	<	<0.01	<	<	<	<	<	<	<
Benzo(a)pyrene	0.01	0.015	<0.01	<	<	<	<	<	<	<	<0.01	<	<	<	<	<	<	<
Benzo(b)fluoranthene	0.01	-	<0.05	<	<	<	<	<	<	<	<0.05	<	<	<	<	<	<	<
Benzo(g,h,i)perylene	0.01	-	<0.03	<	<	<	<	<	<	<	<0.03	<	<	<	<	<	<	<
Benzo(j)fluoranthene	0.01		-	-	-	-	<	<	<	<	-	-	-	-	<	<	<	<
Benzo(k)fluoranthene	0.01	-	<0.05	<	<	<	<	<	<	<	<0.05	<	<	<	<	<	<	<
Chrysene	0.01	-	<0.04	<	<	<	<	<	<	<	<0.04	<	<	<	<	<	<	<
Dibenz(a,h)anthracene	0.01	-	-	<	<	<	<	<	<	<	NA	<	<	<	<	<	<	<
Fluoranthene	0.01	0.04	<0.03	<	<	<	<	<	<	<	<0.03	<	<	<	<	<	<	<
Fluorene	0.01	3.0	<0.03	<	<	<	<	<	<	<	<0.03	<	<	<	<	<	<	<
Indeno(1,2,3-cd)pyrene	0.01	-	<0.05	<	<	<	<	<	<	<	<0.05	<	<	<	<	<	<	<
Naphthalene	0.2	1.1	-	<	<	<	<	<	<	<	NA	<	<	<	<	<	<	<
Perylene	0.01	-	-	<	0.01	<	<	<	<	<	NA	<	<	<	<	<	<	<
Phenanthrene	0.01	0.4	<0.04	<	<	<	<	0.011	<	<	<0.04	0.01	<	<	<	0.012	<	<
Pyrene	0.01	0.025	<	<	<	<	<	<	<	<	<0.01	<	<	<	<	<	<	<
Quinoline	0.05	3.4	-	-	<	<	-	-	<	<	-	-	<	<	-	-	<	<

Analysis completed by Maxxam Analytics Inc. laboratory in St. John's, NL.
* Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1).

RDL = Reportable Detection Limit
0.0 = above criteria
- = Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit

TABLE D10

HISTORICAL SURFACE WATER ANALYTICAL DATA - PCBs (ug/L)
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	SURFACE UP							
			AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Nov 07, 2012	Aug 28, 2013	Nov 25, 2014
Total PCBs	0.05	-	<0.04	0.11	<	<	<	<	<	<

Parameter	RDL	Criteria*	SURFACE DOWN							
			AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Nov 07, 2012	Aug 28, 2013	Nov 25, 2014
Total PCBs	0.05	-	<0.04	0.13	<	<	<	<	<	<

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1).
RDL = Reportable Detection Limit
< = Parameter below detection limit
< (#) = Parameter below AMEC laboratory detection limit
0.0 = above criteria

TABLE D11

HISTORICAL SURFACE WATER ANALYTICAL DATA - VOCs (ug/L)
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	SURFACE UP								SURFACE DOWN							
			AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Nov 07, 2012	Aug 28, 2013	Nov 25, 2014	AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Nov 07, 2012	Aug 28, 2013	Nov 25, 2014
Benzene	1	370	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromodichloromethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromoform	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromomethane	3	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Carbon Tetrachloride	1	13.3	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chlorobenzene	1	1.3	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chloroethane	8	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chloroform	1	1.8	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chloromethane	8	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Dibromochloromethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichlorobenzene	0.5	0.7	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,3-Dichlorobenzene	1	150	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,4-Dichlorobenzene	1	26	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1-Dichloroethane	2	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichloroethane	1	100	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1-Dichloroethylene	0.5	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
cis-1,2-Dichloroethylene	2	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
trans-1,2-Dichloroethylene	2	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichloropropane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
cis-1,3-Dichloropropene	2	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
trans-1,3-Dichloropropene	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Ethylbenzene	1	90	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Methylene Chloride(Dichloromethane)	3	98.1	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
o-Xylene	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
p+m-Xylene	2	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Styrene	1	300	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Tetrachloroethylene	1	72	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,2,2-Tetrachloroethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Toluene	1	111	<	<	<	<	2	<	<	<	<	<	<	<	<	<	<	<
Trichloroethylene	1	2.0	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,1-Trichloroethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,2-Trichloroethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Trichlorofluoromethane (FREON 11)	8	21	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Vinyl Chloride	0.5	-	0.2	<	<	<	<	<	<	<	0.2	<	<	<	<	<	<	<

Notes:
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1).

RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
0.0 = above criteria

TABLE D12

HISTORICAL SURFACE WATER ANALYTICAL DATA - GENERAL CHEMISTRY
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	Units	RDL	Criteria*	SURFACE UP								SURFACE DOWN							
				AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Nov 07, 2012	Aug 28, 2013	Nov 25, 2014	AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Nov 07, 2012	Aug 28, 2013	Nov 25, 2014
Anion Sum	me/L	N/A	-	-	4.8	1.14	0.34	0.68	0.610	0.64	0.82	-	3.78	2.69	1.53	3.8	0.630	0.69	0.84
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1	-	-	118	38	6	17	7.6	11	10	-	150	117	12	159	8.2	12	10
Calculated TDS	mg/L	1	-	53	267	62	23	63	38.0	39	51	145	205	140	122	204	39.0	41	51
Carb. Alkalinity (calc. as CaCO3)	mg/L	1	-	-	<	<	<	<	<	<	<	-	3	<	<	<	<	<	<
Cation Sum	me/L	N/A	-	-	4.8	1.05	0.43	1.45	0.650	0.74	0.85	-	3.8	2.54	2.4	3.85	0.650	0.74	0.84
Hardness (CaCO3)	mg/L	1	-	21.5	100	41	10	29	14	15	17	138	170	110	70	170	14	16	18
Ion Balance (% Difference)	%	N/A	-	-	0.6	4.11	11.7	36.2	3.17	7.25	1.8	-	0.26	2.87	22.1	0.65	1.56	3.5	0.0
Langelier Index (@ 20C)	N/A	N/A	-	-	-0.4	-1.36	-3.49	-3.19	-2.97	-2.82	-2.69	-	0.996	-0.099	-2.64	0.248	-2.95	-2.57	-2.73
Langelier Index (@ 4C)	N/A	N/A	-	-	-0.7	-1.61	-3.74	3.44	-3.22	-3.07	-2.94	-	0.746	-0.35	-2.89	-0.002	-3.20	-2.82	-2.98
Nitrate (N)	mg/L	0.05	13	<	<	0.17	<	<	0.054	<	0.068	<	<	<	2	1.6	0.058	<	0.076
Saturation pH (@ 20C)	N/A	N/A	-	-	7.8	8.62	10.1	9.18	9.83	9.61	9.61	-	7.39	7.69	9.01	7.39	9.80	9.56	9.59
Saturation pH (@ 4C)	N/A	N/A	-	-	8.1	8.87	10.3	9.43	10.1	9.86	9.86	-	7.64	7.94	9.26	7.64	10.0	9.81	9.85
Total Alkalinity (Total as CaCO3)	mg/L	30	-	24	120	39	39	17	7.6	11	10	136	150	120	120	160	8.2	12	10
Carbonaceous BOD	mg/L	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Chloride (Cl)	mg/L	1	-	8.9	79	5	6	7	12	12	17	3.6	4	1	23	8	12	13	16
Colour	TCU	5	-	-	44	38	49	140	67	65	52	-	23	39	120	32	78	71	57
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate + Nitrite	mg/L	0.05	-	-	<	0.17	<	<	0.054	<	0.068	-	<	<	2	1.6	0.058	<	0.076
Nitrite (N)	mg/L	0.01	0.06	<0.015	<	<	<	<	<	<	<	<0.015	<	<	<	<	<	<	<
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	-	-	0.1	<	<	<	<	<	<	-	<	0.19	0.06	<	<	<	<
Total Organic Carbon (C)	mg/L	0.5	-	9.5	5.7	6	6.4	41	7.9	8.2	6.4	9.2	4.3	5.4	18	2.8	7.9	7.9	6.8
Orthophosphate (P)	mg/L	0.01	-	-	<	<	<	<	<	<	<	-	<	<	<	<	<	<	<
pH	pH	N/A	6.5 - 9	6.9	7.4	7.26	6.58	5.99	6.86	6.79	6.92	7.48	8.39	7.59	6.37	7.64	6.85	6.99	6.87
Phenols-4AAP	mg/L	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reactive Silica (SiO2)	mg/L	0.5	-	-	6.3	1.5	1.5	3.5	2.1	1.5	2.3	-	4	3.1	7.4	1.8	2.2	1.6	2.4
Total Suspended Solids (TSS)	mg/L	2	-	-	-	-	-	840	-	-	-	-	-	-	-	160	-	-	-
Dissolved Sulphate (SO4)	mg/L	2	-	-	8	11	3	-	5.7	3.2	6.7	-	29	15	24	-	5.8	3.5	7.8
Sulphide	mg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	0.1	-	-	2.9	3.8	2.2	30	0.72	1.6	3	-	5.2	39	140	5.6	0.88	0.77	4.4
Conductivity	uS/cm	1	-	87	470	110	43	72	66	72	91	275	290	240	170	340	67	76	94
Total Oil & Grease	mg/L	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1).

RDL = Reportable Detection Limit
-= Not analysed/No criteria
< = Parameter below detection limit
< (#) = Parameter below AMEC laboratory detection limit
0.0 = above criteria = above criteria

TABLE D13

HISTORICAL SURFACE WATER ANALYTICAL DATA - METALS
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	Units	RDL	Criteria*	SURFACE UP								SURFACE DOWN							
				AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Nov 07, 2012	Aug 28, 2013	Nov 25, 2014	AMEC 2008	Aug 19, 2009	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Nov 07, 2012	Aug 28, 2013	Nov 25, 2014
Aluminum (Al)	ug/L	5.0	100[1]	**484**	18	**108**	**257**	**1,140**	**113**	86	**270**	**42,000**	69	**527**	**5,210**	**941**	**117**	83	**270**
Antimony (Sb)	ug/L	1.0	-	<	<	<	<	-	<	<	<	<	<	<	<	<	<	<	<
Arsenic (As)	ug/L	1.0	5.0	3	<	<	<	2.50	<	<	<	**36**	<	1.1	3.3	2.5	<	<	<
Barium (Ba)	ug/L	1.0	-	131	26	22.3	9.4	132.0	8.9	9.1	11	426	82	102	289	179	8.6	8.6	11
Beryllium (Be)	ug/L	1.0	-	<0.1	<	<	<	<	<	<	<	1.8	<	<	<	<	<	<	<
Bismuth (Bi)	ug/L	2.0	-	<0.5	<	<	<	<	<	<	<	<0.1	<	<	<	<	<	<	<
Boron (B)	ug/L	5	-	-	14	9.4	6.9	<50	<	<	<	-	22	27.1	9	<	<	<	<
Cadmium (Cd)	ug/L	0.017	0.04[2]	**0.273**	<	**0.028**	**0.04**	**0.066**	<	<	<	**2.65**	<	**0.044**	**0.232**	**-**	<	<	<
Calcium (Ca)	ug/L	100	-	-	-	12,900	2,960	8,230	3,870	4,500	4,900	-	-	40,100	18,300	62,300	3,890	4,500	5,000
Chromium (Cr)	ug/L	1	8.9/1.0[3]	1	<	<	<	2.3	<	<	<	110	<	<	8	163	<	<	<
Hexavalent Chromium (Cr^{6+})	ug/L	1	1.00						<	0.61	0.63						<	0.68	0.74
Cobalt (Co)	ug/L	0.4	-	1	<	<	<	1.9	<	<	<	307	<	0.9	6.69	1.98	<	<	<
Copper (Cu)	ug/L	2	2[4]	8	<	<	<	5.3	<	<	5	370	<	**12.7**	**32.9**	**3**	<	<	<
Iron (Fe)	ug/L	50	300	**1,300**	**1,300**	289	**722**	**16,700**	**387**	**530**	**310**	**59,000**	**380**	**1,820**	**10,900**	**4,130**	**382**	**440**	300
Lead (Pb)	ug/L	0.5	1, 2[5]	5	<	<	<	0.5	<	<	<	45	<	1.48	**7.64**	**0.69**	<	<	<
Magnesium (Mg)	ug/L	100	-	-	-	2,140	713	100	1,040	1,000	1,200	-	-	3,320	5,840	3,830	1,050	1,100	1,300
Manganese (Mn)	ug/L	2	-	1,260	230	98	142	2	41	110	49	2,620	62	481	427	1,760	38	66	41
Molybdenum (Mo)	ug/L	2	73.00	2	3.0	<	<	2	<	<	<	0.09	<	<	<	<2	<	<	<
Nickel (Ni)	ug/L	2	25, 65[6]	1	<	<	<	2	<	<	<	2	<	3	16.7	-	<	<	<
Phosphorus (P)	ug/L	100	-	-	-	<	<	-	<	<	<	-	-	120	852	-	<	<	<
Potassium (K)	ug/L	100	-	-	-	588	295	100	363	310	860	-	-	1080	4060	1030	400	320	580
Selenium (Se)	ug/L	1	1.0	1	<	<	<	1	<	<	<	<	<	<	<	<1	<	<	<
Silver (Ag)	ug/L	0.1	0.1	<	<	<	<	0.1	<	<	<	0.5	<	<	<	<	<	<	<
Sodium (Na)	ug/L	100	-	-	-	4,720	3,680	100	7,930	9,300	11,000	-	-	4,300	11,500	5,820	7,880	9,100	11,000
Strontium (Sr)	ug/L	2	-	-	90	40.7	9.7	2	13.4	16	16	-	110	85.4	49.9	110	13.3	17	17
Thallium (Tl)	ug/L	0.1	0.8	-	<	<	<	0.1	<	<	<	-	<	<	<	<0.1	<	<	<
Tin (Sn)	ug/L	2	-	-	<	<	<	2	<	<	<	-	<	<	<	<2	<	<	<
Titanium (Ti)	ug/L	2	-	-	<	2.1	7.9	2	3.1	2	5	-	2.0	17.2	148	37.2	2.7	2.5	3.5
Uranium (U)	ug/L	0.1	-	-	0.2	<	<	0.1	<	<	<	-	0.9	0.38	0.38	0.35	<	<	<
Vanadium (V)	ug/L	2	-	<	<	<	<	2	<	<	<	155	<	<	0.34	2.8	<	<	<
Zinc (Zn)	ug/L	5	30	33	<	9.2	10.7	5	<	<	18	**443**	<	25.2	**103**	**12.4**	<	<	<
Hardness (CaCO3)	mg/L	1	-	21.5	100	41	10	29	14	15	17	138	170	110	70	170	14	16	18
pH	pH	-	6.5 - 9	6.9	7.4	7.26	6.58	5.99	6.86	6.79	6.92	7.48	8.39	7.59	6.37	7.64	6.85	6.99	6.87

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1).

(1) Aluminum guideline = 5 ug/L at pH < 6.5
= 100 ug/L at pH ≥ 6.5

(2) Cadmium guideline = $10^{\{0.86[\log(\text{hardness})]-3.2\}}$

(3) Criteria for Chromium (III) = 8.9 ug/L, Criteria for Chromium (VI) = 1.0 ug/L

(4) Copper guideline = 2 ug/L at $[CaCO_3]$ = 0-120 mg/L
= 3 ug/L at $[CaCO_3]$ = 120-180 mg/L
= 4 ug/L at $[CaCO_3]$ >180 mg/L

(5) Lead guideline = 1 ug/L at $[CaCO_3]$ = 0-60 mg/L
= 2 ug/L at $[CaCO_3]$ = 60-120 mg/L
= 4 ug/L at $[CaCO_3]$ = 120-180 mg/L
= 7 ug/L at $[CaCO_3]$ >180 mg/L

(6) Nickel guideline = 25 ug/L at $[CaCO_3]$ = 0-60 mg/L
= 65 ug/L at $[CaCO_3]$ = 60-120 mg/L
= 110 ug/L at $[CaCO_3]$ = 120-180 mg/L
= 150 ug/L at $[CaCO_3]$ >180 mg/L

RDL = Reportable Detection Limit

- = Not analysed/No criteria
< = Parameter below detection limit
0.0 = above criteria

TABLE D14

HISTORICAL LEACHATE ANALYTICAL DATA - BTEX/MTPH
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Sample Location	Date Sampled	Benzene	Toluene	Ethyl-benzene	Xylenes	Total Petroleum Hydrocarbons (TPH)					Comments
						F1	F2	F3		Modified TPH	
						C_6-C_{10}	C_{10}-C_{16}	C_{16}-C_{21}	C_{21}-C_{32}		
PLCS	Aug 19, 2009	<	<	<	<	<	0.08		0.1	0.2	NR
	Oct 13, 2009	<	<	<	<	<	0.2		0.1	0.3	WFO
	Jan 26, 2010	<	<	<	<	<	0.09		<	<	WFO
	Jul 16, 2010	<	<	<	<	<	<		<	<	-
	Dec 13, 2010	<	<	<	<	<	<		<	<	-
	Sep 02, 2011	<	<	<	<	<	0.05		<	<	-
	Feb 07, 2012	<	<	<	<	<	0.05		<	<	-
	Aug 30, 2012	<	<	<	<	<	<		<	<	-
	Aug 30, 2012 DUP-04	<	<	<	<	<	0.173		<	0.18	No resemblance to petroleum products in fuel oil range.
	Aug 28, 2013	<	<	<	<	<	<	<	<	<	-
	Nov 25, 2014	<	<	<	<	<	<	<	<	<	-
	Nov 25, 2014 (DUP-08)	<	<	<	<	<	<	<	<	<	-
SLCS	2008 (AMEC)	<(0.2)	<(0.2)	<(0.2)	<(0.6)	<(0.05)[1]	<(0.05)[1]		<(0.05)[1]	<(0.15)[1]	-
	Aug 19, 2009	<	<	<	<	<	<		<	<	-
	Oct 13, 2009	<	<	<	<	<	0.14		<	0.1	WFO
	Jan 26, 2010	<	<	<	<	<	0.11		<	0.1	WFO
	Jan 26, 2010[2]	<	<	<	<	<	0.11		<	0.1	WFO
	Jul 16, 2010	<	<	<	<	<	<		<	<	-
	Dec 13, 2010	<	<	<	<	<	0.05		<	<	-
	Sep 02, 2011	<	<	<	<	<	0.05		<	<	-
	Feb 07, 2012	<	<	<	<	<	0.11		<	0.21	One product in fuel/ lube oil range
	Feb 07, 2012 (DUP)	<	<	<	<	<	0.11		<	0.11	One product in fuel/ lube oil range
	Aug 30, 2012	<	<	<	<	<	0.159		<	0.16	No resemblance to petroleum products in fuel oil range.
	Aug 28, 2013	<	<	<	<	<	0.058	0.062	<	0.12	No resemblance to petroleum products in fuel oil range.
	Aug 28, 2013 (DUP-06)	<	<	<	<	<	0.071	0.061	<	0.13	No resemblance to petroleum products in fuel oil range.
	Nov 25, 2015	<	<	<	<	<	<	<	<	<	-
RDL		0.001	0.001	0.001	0.002	0.01	0.05	0.1	0.1	0.1	-
2007 CCME Freshwater Aquatic Life Guidelines[3]		**4.00**	**2.00**	**0.39**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
										-	**-**
										-	**-**
Schedule A Water & Sewer Regulations*		-	-	-	-	-	-	-	-	**15**	-
2012 Tier I Surface Water ESL - Freshwater[4]		**2.10**	**0.77**	**0.32**	**0.33**	**-**	**-**	**-**	**-**	**1.5**	**Gasoline**
										0.1	**Diesel /#2 Fuel Oil**
										0.1	**#6 Oil**

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in St. John's, NL.
* Schedule A of Environmental Control Water and Sewer Regulations, 2003.

1. Assumed transcript error by factor of 1,000 from Pinchin LeBlanc Environmental Table 2 from March 2010 OMM Report
2. Field Duplicate
3. 2007 CCME Freshwater Aquatic Life Guidelines
4. Atlantic Risk-Based Corrective Action (RBCA) Tier I Surface Water Ecological Screening Level (ESL)
Table values for protection of freshwater and marine aquatic life.

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
DUP-04 = Field Duplicate of PLCS
DUP-06 = Field Duplicate of SLCS

RDL = Reportable Detection Limit
< = Parameter below detection limit
- = Not analysed
0.0 = above criteria

G = Gasoline
FO = Fuel Oil
LO = Lube Oil
W = Weathered

TABLE D15

HISTORICAL LEACHATE ANALYTICAL DATA - PAHs (ug/L)
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*		PLCS												
		NL [1]	CCME [2]	Aug 19, 2009	Oct 13, 2009	Jan 25, 2010	Jul 16, 2010	Dec 13, 2010	Sep 02, 2012	Feb 07, 2012	Aug 30, 2012	Aug 30, 2012 DUP-04	Aug 28, 2013	Nov 25, 2014	Nov 25, 2014 DUP-08
1-Methylnaphthalene	0.05	-	-	<	<	<	<	<	<	<	<	<	<	<	<
2-Methylnaphthalene	0.05	-	-	<	<	<	<	<	<	<	<	<	<	<	<
Acenaphthene	0.01	-	580	<	0.01	0.01	<	<	<	0.011	0.041	0.01	<	<	<
Acenaphthylene	0.01	-	-	<	<	<	<	<	<	<	<	<	<	<	<
Acridine	0.05			-	-	-	<	<	<	<	-	<	-	<	<
Anthracene	0.01	-	1.2	<	0.05	0.06	<	0.04	<	<	<0.15 (1)	<0.040 (1)	<	<0.020 (1)	<
Benzo(a)anthracene	0.01	-	1.8	<	0.01	0.02	<	<	<	<	0.039	0.013	<	<	<
Benzo(a)pyrene	0.01	-	1.5	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(b)fluoranthene	0.01	-	-	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(g,h,i)perylene	0.01	-	-	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(j)fluoranthene	0.01	-	-										<	<	<
Benzo(k)fluoranthene	0.01	-	-	<	<	<	<	<	<	<	<	<	<	<	<
Chrysene	0.01	-	-	<	0.04	0.03	<	0.02	<	<	0.064	0.024	<	<	<
Dibenz(a,h)anthracene	0.01	-	-	<	<	<	<	<	<	<	<	<	<	<	<
Fluoranthene	0.01	-	4	<	0.05	0.07	<	0.04	<	0.011	0.18	0.046	0.011	<	<
Fluorene	0.01	-	300	<	0.02	0.02	<	<	<		0.049	0.014	<	<	<
Indeno(1,2,3-cd)pyrene	0.01	-	-	<	<	<	<	<	<	0.017	<	<	<	<	<
Naphthalene	0.2	-	110	<	<	<	<	<	<	<	<	<	<	<	<
Perylene	0.01	-	-	<	<	<	<	<	<	<	<	<	<	<	<
Phenanthrene	0.01	-	40	<	0.17	0.23	<	0.07	<	0.034	<0.020 (1)	<0.060(1)	<	0.012	<
Pyrene	0.01	-	2.5	<	0.36	0.32	<	0.17	0.2	0.046	0.85	0.01	0.052	0.013	<
Quinoline	0.05	-	-	<	-	-	<	<	-	-	-	-	-	-	-

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
NL = Environmental Control Water and Sewer Regulations, 2003, under the Water Resources Act, Newfoundland and Labrador Regulation 65/03.
CCME = Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1).
PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
DUP-04= Field Duplicate of PLCS
DUP-06 = Field Duplicate of SLCS
(1) = Elevated PAH RDL(s) due to matrix / co-extractive interference.
RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
0.0 = above NL criteria
0.0 = above CCME criteria for surface water

TABLE D15

HISTORICAL LEACHATE ANALYTICAL DATA - PAHs (ug/L)
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*		SLCS													
		NL [1]	CCME [2]	AMEC 2008	Aug 19, 2009	Oct 13, 2009	Jan 25, 2010	Jan 25, 2010 Field Dup	Jul 16, 2010	Dec 13, 2010	Sep 02, 2012	Feb 07, 2012	Aug 30, 2012	Aug 28, 2013	Aug 28, 2013 DUP-06	Nov 25, 2014
1-Methylnaphthalene	0.05	-	-	<0.03	<	<	<	<	<	<	<	<	<	<	<	<
2-Methylnaphthalene	0.05	-	-	<0.03	<	<	<	<	0.22	<	<	<	<	<	<	<
Acenaphthene	0.01	-	580	<0.04	<	<	0.01	<	<	<	<	<	0.019	0.014	0.017	<
Acenaphthylene	0.01	-	-	<0.03	<	<	<	<	<	<	<	<	0.018	<	<(0.02)	<
Acridine	0.05			-					<	<	<	<	-	-	-	<
Anthracene	0.01	-	1.2	<0.01	<	0.1	0.06	0.06	<	<	<	<	<0.20 (1)	<(0.06)	<(0.15)	<
Benzo(a)anthracene	0.01	-	1.8	<0.01	<	0.06	0.02	0.03	<	<	<	<	0.064	0.05	0.062	<
Benzo(a)pyrene	0.01	-	1.5	<0.01	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(b)fluoranthene	0.01	-	-	<0.05	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(g,h,i)perylene	0.01	-	-	<0.03	<	<	<	<	<	<	<	<	<	<	<	<
Benzo(j)fluoranthene	0.01	-	-											<	<	<
Benzo(k)fluoranthene	0.01	-	-	<0.05	<	<	<	<	<	<	<	<	<	<	<	<
Chrysene	0.01	-	-	<0.04	<	0.09	0.04	0.04	<	0.01	<	0.013	0.10	0.085	0.11	<
Dibenz(a,h)anthracene	0.01	-	-	-	<	<	<	<	<	<	<	<	<	<	<	<
Fluoranthene	0.01	-	4	<0.03	<	0.26	0.11	0.11	0.01	<	<	0.018	0.37	0.24	0.29	0.01
Fluorene	0.01	-	300	<0.03	<	0.02	<	<	<	<	<	<	0.031	<(0.02)	<(0.04)	<
Indeno(1,2,3-cd)pyrene	0.01	-	-	<0.05	<	<	<	<	<	<	<	<	<	<	<	<
Naphthalene	0.2	-	110	-	<	<	<	<	<	<	<	<	<	<	<	<
Perylene	0.01	-	-	-	<	<	<	<	<	<	<	<	<	<	<	<
Phenanthrene	0.01	-	40	<0.04	<	0.4	0.13	0.07	0.02	0.01	<	0.012	<0.30 (1)	<	<(0.04)	<
Pyrene	0.01	-	2.5	<0.01	<	1.5	0.55	0.55	0.06	<	<	0.085	1.8	1.3	1.7	0.064
Quinoline	0.05	-	-	-	-	-	-	-	<	<	-	-	-	-	-	-

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
NL = Environmental Control Water and Sewer Regulations, 2003, under the Water Resources Act, Newfoundland and Labrador Regulation 65/03.
CCME = Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1).
PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
DUP-04= Field Duplicate of PLCS
DUP-06 = Field Duplicate of SLCS
(1) = Elevated PAH RDL(s) due to matrix / co-extractive interference.
RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
0.0 = above NL criteria
0.0 = above CCME criteria for surface water

TABLE D16

HISTORICAL LEACHATE ANALYTICAL DATA - PCBs (ug/L)
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	PLCS											
			Aug 19, 2009	Oct 13, 2009	Jan 26, 2010	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Feb 07, 2012	Aug 30, 2012	Aug 30, 2012 DUP-04	Aug 28, 2013	Nov 25, 2014	Nov 25, 2014 DUP-08
Total PCBs	0.05	-	0.16	<	<	<	<	<	<	<	<	<	<	<

Parameter	RDL	Criteria*	SLCS											
			AMEC 2008	Aug 19, 2009	Oct 13, 2009	Jan 26, 2010	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Feb 07, 2012	Aug 30, 2012	Aug 28, 2013	Aug 28, 2013 DUP-06	Nov 25, 2014
Total PCBs	0.05	-	<0.04	<	<	<	<	<	<	<	<	<	<	<

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.

* Environmental Control Water and Sewer Regulations, 2003, under the Water Resources Act, Newfoundland and Labrador Regulation 65/03.

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
DUP-04= Field Duplicate of PLCS
DUP-06= Field Duplicate of SLCS
DUP-08 = Field Duplicate on PLCS
RDL = Reportable Detection Limit

< = Parameter below detection limit

0.0 = above criteria

TABLE D17

HISTORICAL LEACHATE ANALYTICAL DATA - VOCs
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	PLCS											
			Aug 19, 2009	Oct 13, 2009	Jan 26, 2010	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Feb 07, 2012	Aug 30, 2012	Aug 30, 2012 DUP-04	Aug 28, 2013	Nov 25, 2014	Nov 25, 2014 DUP-08
Benzene	1	-	<	<	<	<	<	<	<	<	<	<	<	<
Bromodichloromethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<
Bromoform	1	-	<	<	<	<	<	<	<	<	<	<	<	<
Bromomethane	3	-	<	<	<	<	<	<	<(4)	<	<	<	<	<
Carbon Tetrachloride	1	-	<	<	<	<	<	<	<	<	<	<	<	<
Chlorobenzene	1	-	<	<	<	<	<	<	<	<	<	<	<	<
Chloroethane	8	-	<	<	<	<	<	<	<(10)	<	<	<	<	<
Chloroform	1	-	<	<	<	<	<	<	<	<	<	<	<	<
Chloromethane	8	-	<	<	<	<	<	<	<(10)	<	<	<	<	<
Dibromochloromethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichlorobenzene	0.5	-	<	<	<	<	<	<	<(0.7)	<	<	<	<	<
1,3-Dichlorobenzene	1	-	<	<	<	<	<	<	<	<	<	<	<	<
1,4-Dichlorobenzene	1	-	<	<	<	<	<	<	<	<	<	<	<	<
1,1-Dichloroethane	2	-	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichloroethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<
1,1-Dichloroethylene	0.5	-	<	<	<	<	<	<	<(0.7)	<	<	<	<	<
cis-1,2-Dichloroethylene	2	-	<	<	<	<	<	<	<(3)	<	<	<	<	<
trans-1,2-Dichloroethylene	2	-	<	<	<	<	<	<	<(3)	<	<	<	<	<
1,2-Dichloropropane	1	-	<	<	<	<	<	<	<	<	<	<	<	<
cis-1,3-Dichloropropene	2	-	<	<	<	<	<	<	<(3)	<	<	<	<	<
trans-1,3-Dichloropropene	1	-	<	<	<	<	<	<	<	<	<	<	<	<
Ethylbenzene	1	-	<	<	<	<	<	<	<	<	<	<	<	<
Methylene Chloride(Dichloromethane)	3	-	<	<	<	<	<	<	<(4)	<	<	<	<	<
o-Xylene	1	-	<	<	<	<	<	<	<	<	<	<	<	<
p+m-Xylene	2	-	<	<	<	<	<	<	<(3)	<	<	<	<	<
Styrene	1	-	<	<	<	<	<	<	<	<	<	<	<	<
Tetrachloroethylene	1	-	<	<	<	<	<	<	<	<	<	<	<	<
1,1,2,2-Tetrachloroethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<
Toluene	1	-	<	<	<	<	<	<	<	<	<	<	<	<
Trichloroethylene	1	-	<	<	<	<	<	<	<	<	<	<	<	<
1,1,1-Trichloroethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<
1,1,2-Trichloroethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<
Trichlorofluoromethane (FREON 11)	8	-	<	<	<	<	<	<	<(10)	<	<	<	<	<
Vinyl Chloride	0.5	-	<	<	<	<	<	<	<(0.7)	<	<	<	<	<

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Environmental Control Water and Sewer Regulations, 2003, under the Water Resources Act, Newfoundland and Labrador Regulation 65/03.
PLCS = Primary Leachate Collection System - = Not analysed/No criteria
SLCS = Secondary Leachate Collection System < = Parameter below detection limit
DUP-04 = Field Duplicate of PLCS
DUP-06 = Field Duplicate of SLCS
RDL = Reportable Detection Limit
0.0 = above criteria

TABLE D17

HISTORICAL LEACHATE ANALYTICAL DATA - VOCs
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	SLCS												
			AMEC 2008	Aug 19, 2009	Oct 13, 2009	Jan 26, 2010	Jan 26, 2010 Field Dup	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Feb 07, 2012	Aug 30, 2012	Aug 28, 2013	Aug 28, 2013 DUP-06	Nov 25, 2014
Benzene	1	-		<	<	<	<	<	<	<	<	<	<	<	<
Bromodichloromethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromoform	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
Bromomethane	3	-	<	<	<	<	<	<	<	<(4)	<(4)	<	<	<	<
Carbon Tetrachloride	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
Chlorobenzene	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
Chloroethane	8	-	<	<	<	<	<	<	<	<(10)	<(10)	<	<	<	<
Chloroform	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
Chloromethane	8	-	<	<	<	<	<	<	<	<(10)	<(10)	<	<	<	<
Dibromochloromethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichlorobenzene	0.5	-	<	<	<	<	<	<	<	<(0.7)	<(0.7)	<	<	<	<
1,3-Dichlorobenzene	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
1,4-Dichlorobenzene	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1-Dichloroethane	2	-	<	<	<	<	<	<	<	<	<	<	<	<	<
1,2-Dichloroethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1-Dichloroethylene	0.5	-	<	<	<	<	<	<	<	<(0.7)	<(0.7)	<	<	<	<
cis-1,2-Dichloroethylene	2	-	<	<	<	<	<	<	<	<(3)	<(3)	<	<	<	<
trans-1,2-Dichloroethylene	2	-	<	<	<	<	<	<	<	<(3)	<(3)	<	<	<	<
1,2-Dichloropropane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
cis-1,3-Dichloropropene	2	-	<	<	<	<	<	<	<	<(3)	<(3)	<	<	<	<
trans-1,3-Dichloropropene	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
Ethylbenzene	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
Methylene Chloride(Dichloromethane)	3	-	<	<	<	<	<	<	<	<(4)	<(4)	<	<	<	<
o-Xylene	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
p+m-Xylene	2	-	<	<	<	<	<	<	<	<(3)	<(3)	<	<	<	<
Styrene	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
Tetrachloroethylene	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,2,2-Tetrachloroethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
Toluene	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
Trichloroethylene	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,1-Trichloroethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
1,1,2-Trichloroethane	1	-	<	<	<	<	<	<	<	<	<	<	<	<	<
Trichlorofluoromethane (FREON 11)	8	-	<	<	<	<	<	<	<	<(10)	<(10)	<	<	<	<
Vinyl Chloride	0.5	-	<	<	<	<	<	<	<	<(0.7)	<(0.7)	<	<	<	<

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Environmental Control Water and Sewer Regulations, 2003, under the Water Resources Act, Newfoundland and Labrador Regulation 65/03.
PLCS = Primary Leachate Collection System - = Not analysed/No criteria
SLCS = Secondary Leachate Collection System < = Parameter below detection limit
DUP-04 = Field Duplicate of PLCS
DUP-06 = Field Duplicate of SLCS
RDL = Reportable Detection Limit
0.0 = above criteria

TABLE D18

HISTORICAL LEACHATE ANALYTICAL DATA - GENERAL CHEMISTRY
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	Units	RDL	Criteria*	PLCS										
				Aug 19, 2009	Oct 13, 2009	Jan 26, 2010	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 30, 2012 DUP-04	Aug 28, 2013	Nov 25, 2014	Nov 25, 2014 DUP-08
Anion Sum	me/L	N/A	-	2.30	12.20	12.20	4.86	10.10	4.21	12.5	9.53	10	3.36	3.18
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1	-	90	482	453	176	400	167	520	390	420	140	120
Calculated TDS	mg/L	1	1,000	133	640	662	263	546	239	624	564	540	180	180
Carb. Alkalinity (calc. as CaCO3)	mg/L	1	-	<	<	<	1	1	1	2.6	2.3	<	<	1.2
Cation Sum	me/L	N/A	-	2.30	11.60	11.90	4.47	10.10	4.06	10.7	12.3	10	3.18	3.27
Hardness (CaCO3)	mg/L	1	-	71	510	540	190	190	140	470	530	430	120	120
Ion Balance (% Difference)	%	N/A	-	0.40	2.40	1.30	4.18	0.00	1.81	7.94	12.9	0.05	2.75	1.40
Langelier Index (@ 20C)	N/A	N/A	-	-0.10	0.60	0.60	0.42	0.86	0.366	1.10	1.11	0.449	0.19	0.339
Langelier Index (@ 4C)	N/A	N/A	-	-0.40	0.30	0.30	0.17	0.61	0.116	0.856	0.864	0.202	-0.061	0.089
Nitrate (N)	mg/L	0.05	10	0.30	<	0.10	0.35	0.28	0.32	0.061	0.41	0.11	0.25	0.32
Saturation pH (@ 20C)	N/A	N/A	-	8.00	6.60	6.60	7.40	6.74	7.51	6.63	6.69	6.73	7.64	7.67
Saturation pH (@ 4C)	N/A	N/A	-	8.30	6.90	6.90	7.65	6.98	7.76	6.87	6.94	6.98	7.89	7.92
Total Alkalinity (Total as CaCO3)	mg/L	30.00	-	91	480	450	180	400	170	530	390	420	140	120
Carbonaceous BOD	mg/L	5.00	20	-	-	-	<	<	-	-	-	<	<	<
Dissolved Chloride (Cl)	mg/L	1	-	8	40	33	11	29	11	39	31	30	12	14
Colour	TCU	5	-	31	35	20	15	17	18	10	10	8.6	14	21
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.002	25	-	-	-	<	<	-	<0.0020	-	<(2)	0.0017	<
Nitrate + Nitrite	mg/L	0.05	-	0.30	<	0.10	0.37	0.28	0.32	0.061	0.41	0.11	0.25	0.32
Nitrite (N)	mg/L	0.01	-	<	<	<	0.03	<	ND	<0.010	<	<	<	<
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	2	<	0.30	0.40	<	0.10	ND	0.53	0.45	0.35	<	<
Total Organic Carbon (C)	mg/L	0.5	-	4.7	25.0	16.0	6.4	11.0	5.1	16 (1)	20 (5)	13	3.9	3.7
Orthophosphate (P)	mg/L	0.01	-	<	<	<	<	<	ND	<0.010	<	<	<	<
pH	pH	N/A	5.5 - 9.0	7.90	7.20	7.20	7.82	7.59	7.88	7.73	7.8	7.18	7.83	8.01
Phenols-4AAP	mg/L	0.001	0.10	-	-	-	0.01	0.003	0.003	0.012	-	0.0064	0.0012	<
Reactive Silica (SiO2)	mg/L	0.5	-	4.30	16.00	16.00	8.40	13.00	12	17	14	14	7.4	7.6
Total Suspended Solids (TSS)	mg/L	2.0	30	-	2	6	11	17	5	9.8	-	1.6	<	<
Dissolved Sulphate (SO4)	mg/L	2.0	-	11	66	110	47	61	25	43	36	42	13	13
Sulphide	mg/L	0.02	0.50	-	-	-	<	<	ND	<0.020	-	<	<	<
Turbidity	NTU	0.1	-	0.4	62.0	6.8	1.6	16.0	0.7	160	12	140	0.68	0.51
Conductivity	uS/cm	1	-	220	1000	1000	440	840	400	1000	820	820	300	300
Total Oil & Grease	mg/L	5.00	-	-	-	-	<	<	-	-	-	<	<	<
Coliform-Fecal	#/100mL	-	1,000/100 mL	-	-	-	0	0	-	-	-	-	-	-
Coliform-Total	#/100mL	-	5,000/100 mL	-	-	-	>80	>80	-	-	-	-	-	-

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
Coliform analysis completed by Newfoundland and Labrador Government Services in Grand Falls-Windsor, NL
* Environmental Control Water and Sewer Regulations, 2003, under the Water Resources Act, Newfoundland and Labrador Regulation 65/03.
PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
DUP-04= Field Duplicate of PLCS
DUP-06= Field Duplicate of SLCS
RDL = Reportable Detection Limit **0.0** = above criteria
-= Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit

TABLE D18

HISTORICAL LEACHATE ANALYTICAL DATA - GENERAL CHEMISTRY
2013/14 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	Units	RDL	Criteria*	SLCS											
				AMEC 2008	Aug 19, 2009	Oct 13, 2009	Jan 26, 2010	Jan 26, 2010 Field Dup	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Aug 28, 2013 DUP-06	Nov 25, 2014
Anion Sum	me/L	N/A	-	-	10.80	13.70	13.60	13.40	8.68	10.90	6.93	12.3	11.2	12.8	7.39
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1	-	-	428	542	532	509	315	420	267	500	460	530	310
Calculated TDS	mg/L	1	1,000	780	598	737	728	716	460	574	383	647	640	710	390
Carb. Alkalinity (calc. as CaCO3)	mg/L	1	-	-	<	<	<	<	1	2	2	2.2	<	<	<
Cation Sum	me/L	N/A	-	-	10.70	13.90	12.90	13.10	7.81	10.40	6.6	12.0	13.5	14.2	7.2
Hardness (CaCO3)	mg/L	1	-	658	410	580	560	570	320	320	240	500	560	580	280
Ion Balance (% Difference)	%	N/A	-	-	0.50	0.70	3.70	1.10	5.28	2.44	2.44	1.07	9.25	5.24	1.58
Langelier Index (@ 20C)	N/A	N/A	-	-	0.60	0.40	0.50	0.60	0.67	0.99	0.749	1.04	0.511	0.487	0.441
Langelier Index (@ 4C)	N/A	N/A	-	-	0.40	0.20	0.30	0.30	0.42	0.74	0.5	0.787	0.264	0.24	0.193
Nitrate (N)	mg/L	0.05	10	<0.05	0.10	<	<	<	0.35	0.10	0.48	0.067	0.077	<	0.23
Saturation pH (@ 20C)	N/A	N/A	-	-	6.80	6.60	6.60	6.60	7.00	6.73	7.17	6.63	6.6	6.53	7.01
Saturation pH (@ 4C)	N/A	N/A	-	-	7.00	6.80	6.80	6.80	7.25	6.98	7.42	6.87	6.85	6.78	7.26
Total Alkalinity (Total as CaCO3)	mg/L	30.00	-	587	430	540	530	510	320	420	270	510	460	530	310
Carbonaceous BOD	mg/L	5.00	20	-	-	-	-	-	<	<	-	-	<	<	<
Dissolved Chloride (Cl)	mg/L	1	-	67	40	54	48	48	32	43	29	44	38	42	26
Colour	TCU	5	-	-	17	19	15	15	12	56	10	12	13	12	10
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.002	25	-	-	-	-	-	<	<	-	<0.0020	<(2)	<(2)	<
Nitrate + Nitrite	mg/L	0.05	-	-	0.10	<	<	<	0.37	0.10	0.48	0.067	0.1	<	0.23
Nitrite (N)	mg/L	0.01	-	<0.015	<	<	<	<	0.02	<	ND	<0.010	0.028	<	<
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	2	0.43	0.40	0.50	0.50	0.50	0.12	0.26	ND	0.50	0.38	0.53	0.06
Total Organic Carbon (C)	mg/L	0.5	-	25.7	16.0	24.0	19.0	19.0	12.0	13.0	ND	20 (1)	18	19(1)	7.3
Orthophosphate (P)	mg/L	0.01	-	-	<	<	<	<	<	<	ND	<0.010	<	<	<
pH	pH	N/A	5.5 - 9.0	6.80	7.40	7.00	7.10	7.10	7.67	7.72	7.92	7.66	7.11	7.02	7.45
Phenols-4AAP	mg/L	0.001	0.10	-	-	-	-	-	0.003	<0.01*	0.004	0.014	0.0088	0.0086	0.0015
Reactive Silica (SiO2)	mg/L	0.5	-	-	19.00	17.00	17.00	18.00	14.00	14.00	19	15	15	16	13
Total Suspended Solids (TSS)	mg/L	2.0	30	**69**	-	**34**	18	16	5	**33**	**5**	24	29	28	1.2
Dissolved Sulphate (SO4)	mg/L	2.0	-	-	54	64	90	88	69	60	34	44	40	43	17
Sulphide	mg/L	0.02	0.50	-	-	-	-	-	<	<	ND	0.060	<	<	<
Turbidity	NTU	0.1	-	-	140.0	200.0	77.0	65.0	6.6	17.0	0.9	280	130	220	0.64
Conductivity	uS/cm	1	-	1250	980	990	1200	1100	750	900	620	1100	950	1,100	630
Total Oil & Grease	mg/L	5.00	-	-	-	-	-	-	<	<	-	-	<	<	<
Coliform-Fecal	#/100mL	-	1,000/100 mL	-	-	-	-	-	0	- [1]	-	-	-	-	-
Coliform-Total	#/100mL	-	5,000/100 mL	-	-	-	-	-	>80	- [1]	-	-	-	-	-

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
Coliform analysis completed by Newfoundland and Labrador Government Services in Grand Falls-Windsor, NL
* Environmental Control Water and Sewer Regulations, 2003, under the Water Resources Act, Newfoundland and Labrador Regulation 65/03.
PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
DUP-04= Field Duplicate of PLCS
DUP-06= Field Duplicate of SLCS
RDL = Reportable Detection Limit **0.0** = above criteria
-= Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit

TABLE D19

HISTORICAL LEACHATE ANALYTICAL DATA - TOTAL METALS (ug/L)
2012/13 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	PLCS										
			Aug 19, 2009	Oct 13, 2009	Jan 26, 2010	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 30, 2012 DUP-04	Aug 28, 2013	Nov 25, 2014	Nov 25, 2014 DUP-08
Aluminum (Al)	5	-	35	<	<	36.8	<	41	14.2	22.2	18	-	-
Antimony (Sb)	1	-	<	<	<	<	<	-	<	<	<	-	-
Arsenic (As)	1	500	<	<	<	<	<	-	<	1.0	<	-	-
Barium (Ba)	1	5,000	7.0	73	71	13.3	51	11	72.7	85.7	85	13.0	13
Beryllium (Be)	1	-	<	<	<	<	<	-	<	<	<	<	<
Bismuth (Bi)	2	-	<	<	<	<	<	-	<	<	<	<	<
Boron (B)	5	5,000	170	7,400	3,400	1,170	2,230	650	1,500	1,890	1,700	200	210
Cadmium (Cd)	0.017	50	<	<	<	<	<	-	<	<	0.012	<	<
Calcium (Ca)	100	-	-	-	-	58,400	138,000	46,100	140,000	159,000		41,000	42,000
Total Chromium (Cr)	1	1,000	<	<	<	<	<	-	<	<	<	<	<
Chromium VI	0.001	0.05	-	-	-	<	<	-	-	<	0.58	-	<
Cobalt (Co)	0.4	-	<	<	<	<	<	-	<	<	<	<	<
Copper (Cu)	2	300	4.0	<	<	2.50	<	2	<	<	<	<	<
Iron (Fe)	50	10,000	77	4,900	4,000	1,790	3,150	342	5,470	**14,300**	**12,000**	62	150
Lead (Pb)	5	200	<	<	<	<	<	-	<	<	<	<	<
Magnesium (Mg)	100	-	-	-	-	10,700	24,300	7,070	28,800	32,900	23,000	4,100	4,200
Manganese (Mn)	2	-	7.0	9,100	8,800	1,130	6,240	369	7,270	8,770	5,700	65	67
Mercury (Hg)	0.013	5	-	-	<	<	<	-	-	<	<	<	<
Molybdenum (Mo)	2	-	<	<	<	<	<	-	<	<	<	<	<
Nickel (Ni)	2	500	<	<	<	<	<	-	<	<	<	<	<
Phosphorus (P)	100	-	-	-	-	<	<	-	<	<	<	<	110.00
Potassium (K)	100	-	-	-	-	7,270	6,530	21,000	5,840	5,800	6,100	13,000	13,000
Selenium (Se)	1	10	<	<	<	<	<	-	<	<	<	<	<
Silver (Ag)	0.1	50	-	-	-	<	<	-	<	<	<	<	<
Sodium (Na)	100	-	<	<	<	9,880	22,500	14,300	21,100	23,700	19,000	11,000	11,000
Strontium (Sr)	2	-	52	360	350	156	289	104	318	362	300	90	93
Thallium (Tl)	0.1	-	<	<	<	<	<	-	<	<	<	<	<
Tin (Sn)	2	-	<	<	<	<	<	-	<	<	<	<	<
Titanium (Ti)	2	-	<	<	<	<	<	-	<	2.00	<	2.30	4.50
Uranium (U)	1	-	0.1	<	<	0.25	<	0	0.79	0.94	0.66	0.19	0.21
Vanadium (V)	2	-	<	<	<	<	<	-	<	<	<	<	<
Zinc (Zn)	50	500	<	67.0	<	8.10	<	14	<	6.50	<	<	<

Notes:

Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Environmental Control Water and Sewer Regulations, 2003, under the Water Resources Act, Newfoundland and Labrador Regulation 65/03.
PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
DUP-04 = Field Duplicate of PLCS
DUP-06 = Field Duplicate of SLCS
RDL = Reportable Detection Limit -= Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
0.0 = above criteria

TABLE D19

HISTORICAL LEACHATE ANALYTICAL DATA - TOTAL METALS (ug/L)
2012/13 MONITORING AND MAINTENANCE PROGRAM
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL

Parameter	RDL	Criteria*	SLCS											
			AMEC 2008	Aug 19, 2009	Oct 13, 2009	Jan 26, 2010	Jan 26, 2010 Field Dup	Jul 16, 2010	Dec 13, 2010	Sep 02, 2011	Aug 30, 2012	Aug 28, 2013	Aug 28, 2013 DUP-06	Nov 25, 2014
Aluminum (Al)	5	-	42	<	100	<	<	23.1	<	23.7	16.3	22	28	-
Antimony (Sb)	1	-	<1	<	<	<	<	<	<	-	<	<	<	-
Arsenic (As)	1	500	2	<	<	<	<	<	<	-	1.1	<	1.1	-
Barium (Ba)	1	5,000	69.8	38	93	68	68	18.9	40	5.3	78.2	98	110	13
Beryllium (Be)	1	-	<0.1	<	<	<	<	<	<	-	<	<	<	<
Bismuth (Bi)	2	-	1.1	<	<	<	<	<	<	-	<	<	<	<
Boron (B)	5	5,000	-	2,800	3,100	2,300	2,400	1,970	1,870	1,350	2,500	2,300	2,400	1,200
Cadmium (Cd)	0.017	50	1.3	<	<	<	<	<	<	-	<	<	<	<
Calcium (Ca)	100	-	-	-	-	-	-	90,900	135,000	69,700	147,000	170,000	180,000	87,000
Total Chromium (Cr)	1	1,000	1	<	<	<	<	<	<	63.2	<	<	<	<
Chromium VI	0.001	0.05	-	-	-	-	-	<	<	-	-	<	<	-
Cobalt (Co)	0.4	-	<1	<	<	<	<	0.49	<	-	1.04	0.61	0.47	<
Copper (Cu)	2	300	1	<	<	<	<	<	<	-	<	<	<	<
Iron (Fe)	50	10,000	**29,900**	6,800	**19,000**	8,500	8,300	1,320	2,240	-	**15,100**	**22,000**	**27,000**	130
Lead (Pb)	5	200	6	<	<	<	<	<	<	-	<	<	<	<
Magnesium (Mg)	100	-	-	-	-	-	-	23,500	27,400	16900	33,200	34,000	35,000	16,000
Manganese (Mn)	2	-	11,000	5,400	10,000	8,900	9,000	3,270	5,120	241	8,250	9,300	9,500	850
Mercury (Hg)	0.013	5	-	-	-	<	<	<	<	-	-	<	<	<
Molybdenum (Mo)	2	-	2	<	<	<	<	<	<	-	7.20	<	<	<
Nickel (Ni)	2	500	1	<	<	<	<	<	<	-	2.40	<	<	<
Phosphorus (P)	100	-	-	-	-	-	-	<	<	-	<	<	<	<
Potassium (K)	100	-	-	-	-	-	-	<	7,750	28,400	8,870	9,100	10,000	22,000
Selenium (Se)	1	10	1	<	<	<	<	<	<	-	<	<	<	<
Silver (Ag)	0.1	50	-	-	-	-	-	<	<	-	<	<	<	<
Sodium (Na)	100	-	0.6	<	<	<	<	21,300	25,500	23,100	26,600	26,000	28,000	21,000
Strontium (Sr)	2	-	-	280	440	380	390	282	324	183	369	430	450	220
Thallium (Tl)	0.1	-	-	<	<	<	<	<	<	-	<	<	<	<
Tin (Sn)	2	-	-	<	<	<	<	<	<	-	<	<	<	<
Titanium (Ti)	2	-	-	<	<	<	<	<	<	-	<	<	2.5	<
Uranium (U)	1	-	-	0.8	1	2	2	1.11	1	0.71	5.05	1.2	1.1	0.7
Vanadium (V)	2	-	4	<	<	<	<	<	<	-	<	<	<	<
Zinc (Zn)	50	500	7	<	<	<	<	5.20	<	32.2	8.30	16	180	<

Notes:

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