# 2017/2018 Monitoring Program

Come By Chance Secure Landfill

Come By Chance, Newfoundland and Labrador

Department of Municipal Affairs and Environment

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084308 | Report No 9 | June 2018

# Executive Summary

GHD Limited (GHD) was retained by the Newfoundland and Labrador Department of Municipal Affairs and Environment (DMAE) to complete the 2017/18 Monitoring Program at the Come By Chance Secure Landfill (Site) located on Refinery Road, approximately 2.5 km west of the Trans Canada Highway and approximately 4 km south of the Town of Come By Chance (Town), Newfoundland and Labrador (NL).

The scope of work generally involved sampling of the primary and secondary leachate collection valve chambers in advance of pumping down the chambers by discharging to a nearby ditch, groundwater and surface water sampling, landfill cover inspection, groundwater drainage system inspection, and clean out inspection with cleaning (if required). The Site visit with leachate, groundwater, and surface water sampling was conducted in October 2017; the leachate pumping event and Site inspections were completed in November 2017.

The Site covers an area of approximately 19,778 square metres ($m^2$) and is fenced (chain link) along the perimeter with an access gate on the west side. The landfill was constructed between 1994 and 1996 to facilitate the clean-up of hazardous waste associated with the original operators of the Come By Chance Oil Refinery, and is filled with industrial waste and contaminated soil. The landfill was capped by the end of 1996.

Four monitor wells were installed around the Site (MW93-2, MW93-2A, MW10-1 and MW10-1A) to monitor potential leachate impacts on groundwater and two monitor wells (MW93-1 and MW93-1A) were installed upgradient of the Site to monitor background analyte concentrations. Leachate containment is achieved through the use of a redundant liner system consisting of independent primary and secondary liners (PLCS and SLCS, respectively) as well as a groundwater drainage system (GWDS) to manage excess fluid and provide a means for leachate discharge. Monitoring events conducted between 2004 and 2007 indicated that the landfill cap and primary liner appeared to be minimizing the infiltration of precipitation into the landfill. However, large volumes of leachate identified in the SLCS indicated that groundwater may be entering the SLCS via perforations in the liner, likely from areas to the north of the landfill where it was determined that, periodically, groundwater levels were higher than the base of the SLCS. As a result, in 2009, a GWDS, consisting of a French drain was installed along the north and east sides of the landfill and was connected to a storm drain located along the east side of the landfill. The collected groundwater is directed from the storm drain towards Arnolds Cove, west of the landfill. Surface water sampling was intended to characterize leachate from the Site's leachate containment system and assess potential leachate infiltration into the nearby surface water by sampling a stream directly downgradient. Background analyte concentrations of the surface water was established by sampling at an upgradient location, which is located southeast of the landfill fenced area.

Annual monitoring of leachate, groundwater and surface water quality has been ongoing since 2008. An Operations and Maintenance Manual (OMM) providing details on maintenance and monitoring requirements for the Site was issued by DMAE in 2012. The previous monitoring and maintenance program was completed in 2015-2016.

## E.1 2017-2018 Monitoring Program Summary

### E.1.1 Groundwater

Groundwater samples were submitted for analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), modified total petroleum hydrocarbons (mTPH), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), general chemistry, and dissolved metals.

In general, BTEX/mTPH, PAHs, PCBs, VOCs, general chemistry, and metals analytical data show groundwater conditions to be of better quality compared to leachate analytical data, with the exception of one VOC exceedance (Trichloroethylene) at one monitor well that was not previously detected; however, it does not appear that groundwater is being influenced by leachate from the secure landfill. Based on static groundwater levels measured during the 2017 Site visit, it also appears that groundwater infiltration may still be occurring at the northeastern area of the Site.

### E.1.2 Surface Water

Surface water samples were submitted for analysis of BTEX/mTPH, PAHs, PCBs, VOCs, general chemistry, and total metals that included trivalent and hexavalent Chromium ($Cr^{3+}$ and $Cr^{6+}$).

A review of the downgradient surface water analytical data from the October 2017 sampling event was compared to leachate analytical data to determine if leachate may be impacting the surface water. In general, the BTEX/mTPH, PAH, PCB, VOC, and general chemistry analytical data show surface water conditions to be similar or better in quality compared to the leachate analytical data. Concentrations of BTEX/TPH were non-detectable in the downgradient surface water sample, whereas leachate analytical data reported TPH concentrations of 0.24 mg/kg from the PLCS. In addition, PAH concentrations were non-detectable in the downgradient surface water sample, whereas several PAHs (Anthracene, Fluoranthene, Fluorene, Phenanthrene and Pyrene) were detected in the leachate analytical data. Furthermore, two metals (iron and zinc) reported exceedances in the downgradient surface water samples whereas the leachate analytical data did not report any metals exceedances. Based on this information, it does not appear that leachate is seeping from the landfill liners into the downgradient surface water; therefore, the secure landfill liners appear to be performing in accordance with their original intent of acting as a barrier between leachate accumulations within the landfill and surface water in the surrounding area.

### E.1.3 Leachate

Since construction of the landfill, water held in the primary and secondary liner containment systems (PLCS and SLCS, respectively) has been sampled and analyzed in an accredited laboratory and, if considered not to be affected by the waste in the landfill, pumped into a ditch adjacent to the access road to the landfill. Therefore, leachate samples collected from the PLCS and SLCS chambers were submitted for analysis of BTEX/mTPH, PAHs, PCBs, VOCs, general chemistry, dissolved and total metals, and toxicity.

Once it was determined that the leachate was below all regulated parameters and non-toxic, all water held in the containment systems was pumped and discharged to the environment in accordance with the OMM Manual. The pumping events consisted of two Site visits so that a desired flow rate of 15 L/min could be achieved on two successive days. During the Site visits for

leachate pumping in November 2017, it was observed that the PLCS and SLCS valves were permanently in the open position with the discharge hoses no longer connected to the valves. This condition has been reported in previous pumping events. GHD determined in-flow rates by pumping down each valve chamber, measuring the change in head over a fixed period of time, then calculated in-flow rates. It was also noted that leachate elevations in the PLCS and SLCS for two consecutive Site visits were less than 0.6 metres below the top of the valve chambers. Maintaining these valves in the open position does not create any integrity issues for containment as the hydraulic head in the two leachate valve chambers has not historically risen above the ground surface.

A comparison of the average of the current and historical pumped leachate volumes from the PLCS valve chambers prior to and following installation of the GWDS shows the PLCS leachate volumes as relatively unchanged. Whereas, a review of the current and historical leachate pumping volumes from the SLCS valve chamber demonstrates that pumped leachate volumes have generally decreased by approximately 41 percent since the installation of the GWDS. Consequently, the GWDS appears to contribute to reduce volumes of pumped leachate from the SLCS; however, significant volumes of leachate are still present within the two liners that require pumping on a regular basis.

### E.1.4 Landfill Cover

The landfill cover inspection was conducted in November 2017 and indicated maintenance is not required. A vegetation management program was conducted during the previous monitoring event in 2015-2016. Vegetation height, generally alders, does not exceed the OMM recommended height restriction of 0.3 metres. Two monitor well locations were surrounded with very high vegetative growth in the area; alders were noted to reach a height of approximately 1.5 metres. Therefore, GHD staff trimmed the alders prior to conducting groundwater sampling at those locations.

Meadow vole activity from tunneling and nesting was previously noted in numerous locations on the landfill cover during previous inspections, and was again noted during the 2017 inspection; however, meadow voles typically limit their habitat to less than 300 mm from surface.

There was no visible evidence of landfill subsidence and results of the elevation control survey continue to indicate that limited settlement of the landfill is occurring; however, it appears the elevation control survey points were affected by the clear cutting and mulching activities in 2015. The survey control points were observed to be in good condition, but were difficult to locate as the survey flags have been damaged and/or are missing.

### E.1.5 Groundwater Drainage System

Four GWDS clean-outs were previously installed as part of the original system construction; visual inspections confirmed that water was not present during the November 2017 Site visit. Debris or blockages were not present in any of the clean-outs; however, the inner 100 mm drain cap of CO2 and CO4 were damaged.

The outflow drainage pipe, located on the asphalt plant property, was in good condition with the rodent screen intact. Some small branches and leaves were observed to slightly impede flow; therefore, the screen was removed and the pipe cleaned out. The screen was reinstated and flow

from the outflow drainage pipe was approximately 1.0 L/min to 2.0 L/min and contained some Iron floc. Overall, it was determined the GWDS was functioning properly.

### E.2 Recommendations

Based on the findings of the 2017/18 monitoring program, along with data from previous monitoring programs, the following recommendations are offered for consideration by DMAE:

**Monitoring and Maintenance Schedule:** The leachate quality is continually reporting BTEX/TPH, PAH, PCB, general chemistry, and metals concentrations at levels that would not affect the surrounding environment, most notably groundwater and surface water. In addition, the landfill was constructed approximately 20 years ago and based on the historical analytical data reviewed in this report, it appears that leachate has reached a steady-state condition. Furthermore, groundwater infiltration has been evident for many years and has acted as a flushing mechanism for any contaminants that may have been present, although elevated levels of contaminants have not historically been identified. Therefore, GHD recommends that further monitoring of the landfill and pumping out of the PLCS and SLCS are not required on an annual basis; however, annual inspections should be continued to ensure the landfill cover system is not compromised by erosion. GHD understands that DMAE would prefer to continue monitoring activities at the landfill as a matter of due diligence; therefore, GHD recommends that monitoring and leachate pumping schedule should be amended to every 2 years.

**Maintenance:** The cracked plastic drain cap at two clean-outs (CO2 and CO4) should be replaced to prevent potential infiltration of surface water. The elevational control point flags should be replaced to facilitate easier identification of the control points.

**OMM Manual:** Several sections of the OMM Manual are out of date. For example, MW93-3/93-3A has been decommissioned and replaced by MW10-1/10-1A. The OMM Manual does not state that leachate samples should be analyzed for both total and dissolved metals. The site plan with sampling locations is not reflective of current site conditions, etc. Therefore, consideration should be given by DMAE to incorporate these changes and issue a revised OMM Manual.

# Table of Contents

# Figure Index



# Table Index

# Appendix Index

# 1. Introduction

GHD Limited (GHD) was retained by the Newfoundland and Labrador Department of Municipal Affairs and Environment (DMAE) to complete the 2017/18 Monitoring Program at the Come By Chance Secure Landfill (Site) located on Refinery Road in Come By Chance, Newfoundland and Labrador (NL) as shown on Figure 1. Site visits and field activities were completed in accordance with the DMAE Tier I schedule as outlined in the June 2012 Operations, Maintenance, and Monitoring (OMM) Manual.

The scope of work generally involved sampling of the primary and secondary leachate collection valve chambers in advance of pumping down the chambers by discharging to a nearby ditch, groundwater and surface water sampling, landfill cover inspection, groundwater drainage system inspection, and clean out inspection with cleaning (if required).

The 2017/18 Site sampling event was conducted in October 2017 with the leachate pumping event and Site inspections completed in November 2017.

# 2. Site Description

The Come By Chance Secure Landfill covers an area of approximately 19,778 square metres ($m^2$) located approximately 2.5 km west of the Trans-Canada Highway and approximately 4 km south of the Town of Come By Chance (Town), NL. The Site is fenced (chain link) along the perimeter with an access gate on the west side. The landfill was constructed between 1994 and 1996 to facilitate the clean-up of hazardous waste associated with the original operators of the Come By Chance Oil Refinery, and is filled with industrial waste and contaminated soil. The landfill was capped by the end of 1996.

Four monitor wells were installed around the Site (MW93-2, MW93-2A, MW10-1 and MW10-1A) to monitor potential leachate impacts on groundwater and two monitor wells (MW93-1 and MW93-1A) were installed upgradient of the Site to monitor background analyte concentrations. Leachate containment is achieved through the use of a redundant liner system consisting of independent primary and secondary liners (PLCS and SLCS, respectively) as well as a groundwater drainage system (GWDS) to manage excess fluid and provide a means for leachate discharge. Monitoring events conducted between 2004 and 2007 indicated that the landfill cap and primary liner appeared to be minimizing the infiltration of precipitation into the landfill. However, large volumes of leachate identified in the SLCS indicated that groundwater may be entering the SLCS via perforations in the liner, likely from areas to the north of the landfill where it was determined that, periodically, groundwater levels were higher than the base of the SLCS. As a result, in 2009, a GWDS, consisting of a French drain was installed along the north and east sides of the landfill and was connected to a storm drain located along the east side of the landfill. The collected groundwater is directed from the storm drain towards Arnolds Cove, west of the landfill. Surface water sampling was intended to characterize leachate from the Site's leachate containment system and assess potential leachate infiltration into the nearby surface water by sampling a stream directly downgradient. Background analyte concentrations of the surface water was established by sampling at an upgradient location, which is located southeast of the landfill fenced area.

Annual monitoring of leachate, groundwater and surface water quality has been ongoing since 2008. The previous monitoring and maintenance program was completed in 2015-2016.

# 3. Methodology

## 3.1 Groundwater Sampling

On October 12, 2017, static water levels were measured using an electronic product/water interface probe at the on-Site and up-gradient monitor wells (Table 1). The monitor wells were then developed, allowed to recover, and sampled using dedicated, disposable bailers. Six groundwater samples were collected from the existing monitor wells (MW93-1, MW93-1A, MW93-2, MW93-2A, MW10-1, and MW10-1A), plus one field duplicate (MW-DUP) from MW93-2A. Groundwater sample locations are presented on Figure 2 and GPS co-ordinates for the monitor wells are included in Table 2.

Note that two monitor well locations (MW93-1 and MW93-2) were surrounded with very high vegetative growth in the area; alders were noted to reach a height of approximately 1.5 metres. Therefore, GHD staff trimmed the alders prior to conducting groundwater sampling at those locations. Photographs of the monitor wells from the Site visit (Photos 1 to 3) are presented in Appendix A.

All groundwater samples collected from the existing monitor wells were submitted for analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), modified total petroleum hydrocarbons (mTPH), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), general chemistry, and dissolved metals. Groundwater samples were submitted to Maxxam Analytics Inc. (Maxxam) in Bedford, Nova Scotia (NS) for analysis except BTEX/mTPH samples that were submitted to Maxxam in St. John's, NL.

## 3.2 Surface Water Sampling

Surface water sampling was intended to demonstrate background analyte concentrations from the upgradient sample location (SURFACE-UP) and assess potential leachate infiltration into surface water by sampling downgradient (SURFACE-DOWN). The original SURFACE-DOWN location was destroyed as a result of an industrial development with an asphalt plant; therefore, a new SURFACE-DOWN location was selected and sampled since November 2012.

The surface water locations are located southeast of the fenced area and upstream (SURFACE-UP) along with one southwest of the Site beyond the gravel road and downstream (SURFACE DOWN), both of which are shown on Figure 2. GPS co-ordinates for each surface water station are presented in Table 2. Photographs of the surface water sample locations from the Site visit (Photos 4 and 5) are presented in Appendix A.

Surface water samples were collected by GHD staff on October 12, 2017 and were submitted for analysis of BTEX/mTPH, PAHs, PCBs, VOCs, general chemistry, and total metals that included trivalent and hexavalent Chromium ($Cr^{3+}$ and $Cr^{6+}$). All surface water samples were submitted to Maxxam in Bedford, NS for analysis except BTEX/mTPH samples that were submitted to Maxxam in St. John's, NL.

## 3.3 Leachate Sampling and Pumping

Since construction of the landfill, water held in the primary and secondary liner containment systems (PLCS and SLCS, respectively) has been sampled, analyzed in an accredited laboratory and, if considered not to be affected by the waste in the landfill, pumped into a ditch adjacent to the access road to the landfill. Once it was determined that the leachate was below all regulated parameters and non-toxic, all water held in the containment systems was discharged to the environment in accordance with the OMM Manual.

On October 12, 2017, GHD collected leachate samples from the PLCS and SLCS chambers for analysis of BTEX/mTPH, PAHs, PCBs, VOCs, general chemistry, dissolved and total metals, and toxicity. All leachate samples were submitted to Maxxam in Bedford, NS for analysis except BTEX/mTPH samples that were submitted to Maxxam in St. John's, NL; toxicity samples were submitted to Petroforma Laboratories (Petroforma) in Paradise, NL. Note that all laboratories are certified by the Canadian Association for Laboratory Accreditation Inc. (CALA) for the respective analyses that were completed. GPS co-ordinates were confirmed for both leachate collection system valve chamber sample locations (Table 2), which are shown on Figure 2. A photograph of the PLCS and SLCS chambers from the Site visit (Photo 6) is presented in Appendix A.

Leachate analytical data was required to determine if pumping down the PLCS and SLCS valve chambers and discharging into a nearby ditch was permitted under Newfoundland and Labrador Regulation 65/03, *Environmental Control Water and Sewage Regulations (ECWSR), 2003, Schedule "A", under the Water Resources Act* (Filed May 23, 2003) (herein referred to as ECWSR Schedule "A" for the respective comparison criteria, where available. The tabulated analytical results from the sampling event were presented to DMAE for review and approval. Since the drainage ditch location planned for leachate discharge is within the Town boundaries, approval was also requested from the Town prior to discharging leachate from both collection systems into the nearby ditch. Field data recorded prior to and during the PLCS and SLCS leachate discharge events are presented in Tables 3 and 4, respectively.

## 3.4 Landfill Cover Inspection and Elevation Control

A landfill cover visual inspection was completed during the Site visit in November 2017 along with a detailed inspection documented in Table 5 in accordance with the OMM Manual. The comprehensive landfill cover inspection conducted in November 2017 assessed the following:

- Height of vegetation
- Condition of landfill vents
- Evidence or erosion/animal burrows
- Condition of slopes
- Condition of lateral drains

Concrete elevation control points were installed at four locations on the landfill cover in 2010 to accurately measure potential settlement of the landfill cover. Therefore, an elevation control survey was conducted as part of the November 2017 Site visit. GPS co-ordinates using NAD27

(UTM Zone 21) geo reference were available for the four elevation control points and landfill vent locations (Table 2), which are shown on Figure 2.

Results of the elevational control point survey are presented in Table 6 along with a comparison of the results from the previous survey completed in 2015. Select photographs from the landfill cover inspection (Photos 7 to 10) are presented in Appendix A.

### 3.5 Groundwater Drainage System

Historically, large volumes of leachate from the SLCS were required to be pumped during each Site visit, which was previously suspected to be a result of groundwater infiltration into the secondary liner (AMEC, 2009). Based on the information gathered, it was determined that groundwater levels to the northeast of the landfill were above the level of the SLCS at various time each year. As a result, in 2009, a GWDS was designed and installed to control water levels at the Site and maintain the integrity of the liner system.

The GWDS was constructed outside the fenced area of the secure landfill along the eastern and northern boundaries at an elevation that was anticipated to intercept groundwater and divert it through the drainage system. The GWDS consists of approximately 140 m of perforated pipe (French drain), 150 mm in diameter, and 110 m of storm pipe, 200 mm in diameter. The perforated pipe is installed in a trench of washed crushed stone measuring approximately 600 mm x 600 mm wrapped in filter fabric and 110 m of corrugated steel pipe, 200 mm in diameter. Four clean out locations (CO1 to CO4) were also installed and a rip-rap storm drain placed at the end of the system. The collected groundwater is directed from the storm drain towards Arnolds Cove, west of the landfill.

A visual inspection of the GWDS was conducted during the November 2017 Site visit to determine if cleaning was required and/or if groundwater was present in the clean out locations (CO1 to CO4). GPS co-ordinates were available for the four clean out locations (Table 2), which are shown on Figure 2. The discharge location for the GWDS was also checked for blockages and to ensure the rodent screen was intact. Select photographs from the GWDS inspection (Photos 11 to 13) are presented in Appendix A.

## 4. Guideline Framework

### 4.1 Groundwater

As specified in the OMM Manual, petroleum hydrocarbon compound concentrations (BTEX/TPH) in groundwater were assessed in relation to the Atlantic Risk Based Corrective Action (RBCA) Version 3.0 (updated January 2015) Tier I Risk Based Screening Levels (RBSLs) for a commercial property with non-potable groundwater and coarse-grained soil.

PAHs, PCBs, VOCs, dissolved metals, and general chemistry concentrations in groundwater were assessed in relation 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" dated April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.

## 4.2 Surface Water

As specified in the OMM Manual, PAHs, VOCs, total metals (including trivalent and hexavalent Chromium), and general chemistry concentrations in surface water were evaluated in relation to the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Aquatic Life (Freshwater or FAL). The FAL were from the Canadian Environmental Quality Guidelines (Update 7.0, September 2007).

BTEX/TPH in surface water were assessed in relation to RBCA version 3.0 Tier I Ecological Screening Levels (ESLs) for the Protection of Freshwater and Marine Aquatic Life.

There is no known guideline for PCBs in surface water.

## 4.3 Leachate

As specified in the OMM Manual, leachate was assessed in relation to ECWSR Schedule "A." As the pumped leachate eventually discharges into a stream downgradient of the Site, parameters not specified in ECWSR Schedule "A" were assessed in relation to the CCME CWQGs for the Protection of FAL, updated 2007. Leachate samples were filtered and analyzed for dissolved metals to permit a direct comparison with dissolved metals in groundwater samples, as required by the OMM. Total metals in leachate were also analyzed to permit a direct comparison with the discharge limits set out in ECWSR Schedule "A".

# 5. Analytical Results

## 5.1 Groundwater

Groundwater analytical results for BTEX/mTPH, PAHs, PCBs, VOCs, general chemistry, and dissolved metals are presented in Tables 7 to 12, respectively. Sample locations are shown on Figure 2 and Laboratory Certificates of Analyses are included as Appendix B. Additional discussion is presented in Section 6.1 regarding the groundwater analytical results.

### 5.1.1 BTEX/mTPH in Groundwater

Laboratory analytical results for BTEX/mTPH from the six groundwater samples (MW93-1, MW93-1A, MW93-2, MW93-2A, MW10-1, and MW10-1A) are presented in Table 7, all of which reported BTEX/mTPH concentrations as non-detectable and below the applicable guidelines.

One field duplicate (MW-DUP) was also collected from MW93-2A during the October 2017 sampling event, which reported BTEX/mTPH concentrations consistent with the original sample results.

### 5.1.2 PAHs in Groundwater

Laboratory analytical results for PAHs from the six groundwater samples (MW93-1, MW93-1A, MW93-2, MW93-2A, MW10-1, and MW10-1A) are presented in Table 8, all of which reported PAH concentrations as non-detectable or below the applicable guidelines.

In addition, one field duplicate (MW-DUP) was also collected from MW93-2A and reported PAH concentrations as non-detectable.

### 5.1.3 PCBs in Groundwater

Laboratory analytical results for PCBs from the six groundwater samples (MW93-1, MW93-1A, MW93-2, MW93-2A, MW10-1, and MW10-1A) are presented in Table 9, all of which reported PCB concentrations as non-detectable and below the applicable guidelines.

In addition, one field duplicate (MW-DUP) was collected from MW93-2A that also reported PCB concentrations consistent with the original sample results.

### 5.1.4 VOCs in Groundwater

Laboratory analytical results for VOCs from the six groundwater samples (MW93-1, MW93-1A, MW93-2, MW93-2A, MW10-1, and MW10-1A) are presented in Table 10, all of which reported VOC concentrations as non-detectable or below the applicable guidelines except trichloroethylene in groundwater sample MW10-1, which exceeded the applicable guideline.

In addition, one field duplicate (MW-DUP) was collected from MW93-2A that also reported VOC concentrations consistent with the original sample results.

### 5.1.5 General Chemistry in Groundwater

Laboratory analytical results for general chemistry from the six groundwater samples (MW93-1, MW93-1A, MW93-2, MW93-2A, MW10-1, and MW10-1A) are presented in Table 11, all of which reported general chemistry concentrations as non-detectable or within the applicable guidelines.

In addition, one field duplicate (MW-DUP) was collected from MW93-2A that also reported general chemistry concentrations consistent with the original sample results.

### 5.1.6 Metals in Groundwater

Laboratory analytical results for dissolved metals from the six groundwater samples (MW93-1, MW93-1A, MW93-2, MW93-2A, MW10-1, and MW10-1A) are presented in Table 12, all of which reported dissolved metals concentrations as non-detectable or within the applicable guidelines.

In addition, one field duplicate (MW-DUP) was collected from MW93-2A that also reported dissolved metals concentrations consistent with the original sample results.

## 5.2 Surface Water

Laboratory analytical results for BTEX/mTPH, PAHs, PCBs, VOCs, general chemistry, and total metals that included trivalent and hexavalent Chromium from the two surface water sample locations collected in October 2017 are presented in Tables 13 to 18, respectively. Sample locations are shown on Figure 2 and Laboratory Certificates of Analyses are included as Appendix B. Additional discussion is presented in Section 6.2 regarding the surface water analytical results.

### 5.2.1 BTEX/mTPH in Surface Water

Laboratory analytical results for BTEX/mTPH from the two surface water samples (SURFACE-UP and SURFACE-DOWN) are presented in Table 13, both of which reported BTEX/mTPH concentrations as non-detectable and below the applicable guidelines.

In addition, one field duplicate (SURFACE-DUP) was collected from SURFACE-DOWN that also reported BTEX/mTPH concentrations consistent with the original sample results.

### 5.2.2 PAHs in Surface Water

Laboratory analytical results for PAHs from the two surface water samples (SURFACE-UP and SURFACE-DOWN) are presented in Table 14, both of which reported PAH concentrations as non-detectable and below the applicable guidelines.

In addition, one field duplicate (SURFACE-DUP) was collected from SURFACE-DOWN that also reported PAH concentrations consistent with the original sample results.

### 5.2.3 PCBs in Surface Water

Laboratory analytical results for PCBs from the two surface water samples (SURFACE-UP and SURFACE-DOWN) are presented in Table 15, both of which reported PCB concentrations as non-detectable and below the applicable guidelines. Note that CCME CWQGs (FAL) does not specify a criterion for PCBs in surface water.

In addition, one field duplicate (SURFACE-DUP) was collected from SURFACE-DOWN that also reported PCB concentrations consistent with the original sample results.

### 5.2.4 VOCs in Surface Water

Laboratory analytical results for VOCs from the two surface water samples (SURFACE-UP and SURFACE-DOWN) are presented in Table 16, both of which reported VOC concentrations as non-detectable and below the applicable guidelines.

In addition, one field duplicate (SURFACE-DUP) was collected from SURFACE-DOWN that also reported VOC concentrations consistent with the original sample results.

### 5.2.5 General Chemistry in Surface Water

Laboratory analytical results for general chemistry from the two surface water samples (SURFACE-UP and SURFACE-DOWN) are presented in Table 17, both of which reported general chemistry concentrations as non-detectable or within the applicable guidelines.

In addition, one field duplicate (SURFACE-DUP) was collected from SURFACE-DOWN that also reported general chemistry concentrations consistent with the original sample results.

### 5.2.6 Metals in Surface Water

Laboratory analytical results for total metals from two surface water samples (SURFACE-UP and SURFACE-DOWN) are presented in Table 18, both of which reported metals concentrations as

non-detectable or below the applicable guidelines except exceedances at both locations for Iron, and an exceedance for Zinc at the downgradient sample location.

The above-noted exceedances of Iron were identified in all previous monitoring events except November 2014 and December 2015 in the downgradient sample location, and all previous monitoring events except July 2010 in the upgradient sample location. The above-noted exceedance of Zinc was identified in the downstream surface water location in 2008 and December 2010.

## 5.3 Leachate Sampling

Leachate analytical results for BTEX/mTPH, PAHs, PCBs, VOCs, general chemistry, dissolved and total metals and toxicity from the two leachate samples (PLCS and SLCS) collected in October 2017 are presented in Tables 19 to 26, respectively. Sample locations are shown on Figure 2 and Laboratory Certificates of Analyses are included as Appendix B. In addition, PLCS and SLCS toxicity analytical results as reported by Petroforma are included as Appendix C. Leachate collection system pumping logs from the November 2017 program are provided in Appendix D. Further discussion is presented in Section 6.3 regarding the leachate analytical results.

### 5.3.1 BTEX/mTPH in Leachate

Laboratory analytical results for BTEX/mTPH from the two leachate samples (PLCS and SLCS) are presented in Table 19, both of which reported BTEX/mTPH concentrations as non-detectable or within the applicable guidelines. BTEX concentrations were non-detect and below the CCME CWQGs FAL criteria and TPH concentrations were below the ECWSR Schedule A criterion.

### 5.3.2 PAHs in Leachate

Laboratory analytical results for PAHs from the two leachate samples (PLCS and SLCS) are presented in Table 20, both of which reported PAH concentrations as very low or non-detectable and below CCME CWQGs (FAL), where applicable. Provincial regulations or guidelines for PAHs do not exist in consideration of discharging an effluent into a drainage ditch.

### 5.3.3 PCBs in Leachate

Laboratory analytical results for PCBs from the two leachate samples (PLCS and SLCS) are presented in Table 21, both of which reported PCB concentrations as non-detectable. Provincial regulations or guidelines for PCBs do not exist in consideration of discharging an effluent into a drainage ditch and the CCME CWQGs (FAL) do not specify criteria for PCBs.

### 5.3.4 VOCs in Leachate

Laboratory analytical results for VOCs from the two leachate samples (PLCS and SLCS) are presented in Table 22, both of which reported VOC concentrations as non-detectable. Provincial regulations or guidelines for VOCs do not exist in consideration of discharging an effluent into a drainage ditch.

### 5.3.5 General Chemistry in Leachate

Laboratory analytical results for general chemistry from the two leachate samples (PLCS and SLCS) are presented in Table 23, both of which reported general chemistry concentrations as non-detectable or within the applicable guidelines.

### 5.3.6 Metals in Leachate

Laboratory analytical results for total and dissolved metals from the two leachate samples (PLCS and SLCS) are presented in Tables 24 and 25, respectively, both of which reported total and dissolved metals concentrations as non-detectable or below the Provincial regulations.

### 5.3.7 Toxicity in Leachate

Leachate samples from the PLCS and SLCS were also submitted for toxicity analysis, which concluded the effluent from the PLCS and SLCS were non-toxic to rainbow trout with zero mortality for both samples after 96 hours. Toxicology results are presented in Table 26.

# 6. Discussion

Groundwater, surface water, and leachate analytical data from the October 2017 sampling event were compared with historical analytical data to determine if leachate may be affecting groundwater or surface water and identify the potential for trends. Annual monitoring of groundwater, surface water, and leachate quality has been ongoing since 2008. Historical data from previous environmental assessment and/or monitoring is presented in Appendix E.

## 6.1 Groundwater

A review of groundwater analytical data from the October 2017 sampling event was compared to leachate analytical data collected from the PLCS and SLCS to determine if leachate appeared to be impacting groundwater. In general, BTEX/mTPH, PAHs, PCBs, VOCs, general chemistry, and metals analytical data show groundwater conditions to be of better quality compared to leachate analytical data, with the exception of one VOC exceedance (Trichloroethylene) at one monitor well (MW10-1); however, Trichloroethylene was not previously detected in past monitoring events since 2010. It does not appear that groundwater is being influenced by leachate from the secure landfill.

Based on static groundwater levels measured during the 2017 Site visit, groundwater was confirmed to flow in a southwesterly direction toward Come By Chance Cove. In addition, static groundwater elevations in 2017 from the three sets of monitor wells were compared to the PLCS and SLCS leachate elevations in the valve chambers. The groundwater elevations at MW93-1 and MW93-1A were measured at approximately 0.14 and 0.18 metres above the leachate elevation at the SLCS valve chamber, respectively. In comparison, groundwater elevations at MW93-2, MW93-2A, MW10-1, and MW10-1A measured approximately 1.89 to 2.35 metres below the leachate elevation at the SLCS valve chamber.

## 6.2 Surface Water

A review of the downgradient surface water analytical data from the October 2017 sampling event was compared to leachate analytical data to determine if leachate may be impacting the surface water. In general, the BTEX/mTPH, PAH, PCB, VOC, and general chemistry analytical data show surface water conditions to be similar or better in quality compared to the leachate analytical data. Concentrations of BTEX/TPH were non-detectable in the downgradient surface water sample, whereas leachate analytical data reported TPH concentrations of 0.24 mg/kg from the PLCS. In addition, PAH concentrations were non-detectable in the downgradient surface water sample, whereas several PAHs (Anthracene, Fluoranthene, Fluorene, Phenanthrene and Pyrene) were detected in the leachate analytical data. Furthermore, two metals (iron and zinc) reported exceedances in the downgradient surface water samples whereas the leachate analytical data did not report any metals exceedances. Based on this information, it does not appear that leachate is seeping from the landfill liners into the downgradient surface water; therefore, the secure landfill liners appear to be performing in accordance with their original intent of acting as a barrier between leachate accumulations within the landfill and surface water in the surrounding area.

## 6.3 Leachate

Prior to pumping and discharging leachate from the PLCS and SLCS, all analytical parameters were reviewed for compliance with ECWSR Schedule “A” and/or CCME CWGGs for FAL. In addition, copies of the results were submitted to DMAE and the Town for approval prior to the pumping event. On November 7 and 15, 2017, approvals for discharge were received from DMAE and the Town, respectively. In accordance with the OMM Manual, the pumping event consisted of two Site visits so that a desired flow rate of less than 15 L/min was achieved on two successive days.

### 6.3.1 November 2017 Leachate Pumping Event

GHD returned to the Site on November 22, 2017 to initiate the leachate collection system pumping program (Photo 14, Appendix A). As noted during previous events, it was observed that the PLCS and SLCS valves were in the open position with the discharge hose no longer connected to the valves. GHD determined in-flow rates by pumping down each valve chamber, measuring the change in head over a fixed period of time, then calculated in-flow rates. Maintaining these valves in the open position does not create any integrity issues for containment as the hydraulic head in the two leachate valve chambers has not historically risen above the ground surface.

GHD completed the initial leachate collection system pumping program on November 22, 2017. Approximately 21,300 L was pumped from the PLCS valve chamber with a final measured in-flow rate of 12 L/min while approximately 19,200 L was pumped from the SLCS valve chamber with a final measured in-flow rate of 8 L/min. The desired in-flow rate of 15 L/min was achieved for the PLCS and SLCS during the initial pumping event.

GHD completed the subsequent leachate collection system pumping program on November 23, 2017. Approximately 1,800 L was pumped from the PLCS valve chamber with a final measured in-flow rate of 7 L/min while approximately 300 L was pumped from the SLCS valve chamber with a final measured in-flow rate of 5 L/min.

### 6.3.2 Leachate Pumping Evaluation

Volumes of leachate pumped and discharged from the PLCS and SLCS were compared to previous pumped volumes. A summary of leachate pumping from November 2000 to November 2017 is presented in the table below.

Summary of Leachate Pumping Volumes (Litres)

| Year | Month | PLCS | SLCS |
|---|---|---|---|
| 2000 | November | 13,000 | 70,000 |
| 2003 | November | 15,000 | 56,000 |
| 2004 | August | NA | 45,000 |
| 2004 | September | 15,500 | 83,000 |
| 2004 | October | NA | 32,000 |
| 2006 | October | NA | 68,000 |
| 2007 | February | 6,000 | 63,000 |
| 2007 | July | NA | 103,000 |
| 2008 | November | NA | 74,000 |
| Average Pre GWDS | | ≈12,500 | ≈66,000 |

NA: No leachate present

| Year | Month | PLCS | SLCS |
|---|---|---|---|
| 2009 | August | 3,400 | 19,500 |
| 2009 | December | 4,500 | 30,700 |
| 2010 | February | 3,400 | 21,350 |
| 2010 | August | 12,100 | 35,200 |
| 2011 | January | 8,600 | 30,200 |
| 2012 | November | 12,200 | 24,900 |
| 2013 | October | 22,700 | 42,500 |
| 2014 | December | 23,000 | 18,500 |
| 2017 | November | 23,100 | 19,500 |
| Average Post GWDS | | ≈12,500 | ≈27,000 |

GWDS: Groundwater drainage system installed in March 2009

A comparison of the average of the current and historical pumped leachate volumes from the PLCS valve chambers prior to and following installation of the GWDS shows the PLCS leachate volumes as relatively unchanged. Whereas, a review of the current and historical leachate pumping volumes from the SLCS valve chamber demonstrates that pumped leachate volumes have generally decreased by approximately 41 percent since the installation of the GWDS. Consequently, the GWDS appears to contribute to reduce volumes of pumped leachate from the SLCS; however, significant volumes of leachate are still present within the two liners that require pumping on a regular basis.

## 6.4 Landfill Cover Inspection

A landfill cover inspection was conducted on November 22, 2017. Notable items resulting from the landfill cover inspection are outlined below:

- A vegetation management program was conducted during the previous monitoring event in 2015-2016. Vegetation height, generally alders, do not exceed the OMM requirement of maximum vegetation height of 0.3 metres;
- The landfill vents (V1 and V2) were in good condition and not obstructed
- There was no evidence of erosion or large animal burrows on the landfill cover
- Meadow vole activity from tunneling and nesting was noted in two locations (VOLE1 and VOLE2, Figure 2) during the 2017 inspection
- The slopes were in good condition and covered with vegetation with no signs of erosion
- The lateral drains were dry and not obstructed

Upon reviewing the results of the elevation control survey, it was noted the elevation control point decreased slightly in elevation at ECP2 (22 mm) when compared to the original 2010 elevation while the elevation control points at ECP1, ECP3, and ECP4 increased in elevation (48 mm, 345 mm, and 96 mm, respectively) when compared to the original 2010 elevations. Based on this information, the difference in elevation of the control points indicate that very limited and insignificant settlement or frost heave is occurring at the landfill cover in three locations (ECP1, ECP2, and ECP4), which in turn indicates the contents of the landfill are not settling. The elevation at one control point (ECP3) indicated a raise in elevation of 345 mm, which was likely attributed to the clear cutting and mulching activities in 2015 since there was no visual evidence of significant frost heave at this location.

The survey control points were observed to be in good condition, but were difficult to locate as the survey flags have been damaged and/or are missing.

Results of the inspection and survey of the landfill cap are summarized in Tables 5 and 6.

### 6.5 Groundwater Drainage System

Four GWDS clean-outs (CO1 to CO4) were previously installed as part of the original system construction; visual inspections confirmed that water was not present during the November 2017 Site visit. Debris or blockages were not present in any of the clean-outs; however, the inner 100 mm drain cap of CO2 and CO4 were damaged (refer to Photos 11 and 12, respectively, of Appendix A).

The outflow drainage pipe, located on the asphalt plant property, was in good condition with the rodent screen intact. Some small branches and leaves were observed behind the screen that slightly impeding flow (Photo 13, Appendix A). Therefore, the screen was removed from the pipe discharge, cleaned out, and the screen reinstated. Flow from the outflow drainage pipe was approximately 1.0 L/min to 2.0 L/min and contained some Iron floc. Overall, it was determined the GWDS was functioning properly.

## 7. Summary and Recommendations

The Come By Chance Secure Landfill covers an area of approximately 4.88 acres located approximately 2.5 km west of the Trans-Canada Highway and approximately 4 km south of the Town of Come By Chance, NL. The Site is fenced (chain link) along the perimeter with an access

gate on the west side. The landfill was constructed between 1994 and 1996 to facilitate the clean-up of hazardous waste associated with the original operators of the Come By Chance Oil Refinery, and is filled with industrial waste and contaminated soil. The landfill was capped by the end of 1996.

Four monitor wells were installed around the Site to monitor potential leachate impacts on groundwater and two monitor wells were installed upgradient of the Site to monitor background analyte concentrations. Leachate containment is achieved through the use of a redundant liner system consisting of independent primary and secondary liners (PLCS and SLCS, respectively) as well as a GWDS to manage excess fluid and provide a means for leachate discharge. Monitoring events conducted between 2004 and 2007 indicated that the landfill cap and primary liner appeared to be minimizing the infiltration of precipitation into the landfill. However, large volumes of leachate identified in the SLCS indicated that groundwater may be entering the SLCS via perforations in the liner, likely from areas to the north of the landfill where it was determined that, periodically, groundwater levels were higher than the base of the SLCS. As a result, in 2009, a GWDS, consisting of a French drain was installed along the north and east sides of the landfill and was connected to a storm drain located along the east side of the landfill. The collected groundwater is directed from the storm drain towards Arnolds Cove, west of the landfill. Surface water sampling was intended to characterize leachate from the Site's leachate containment system and assess potential leachate infiltration into the nearby surface water by sampling a stream directly downgradient. Background analyte concentrations of the surface water was established by sampling at an upgradient location, which is located southeast of the landfill fenced area.

Annual monitoring of leachate, groundwater and surface water quality has been ongoing since 2008. An Operations and Maintenance Manual (OMM) providing details on maintenance and monitoring requirements for the Site was issued by DMAE in 2012.

GHD was retained by DMAE to complete the 2017/18 Monitoring Program at the Site. The scope of work generally involved sampling of the primary and secondary leachate collection valve chambers in advance of pumping down the chambers by discharging to a nearby ditch, groundwater and surface water sampling, landfill cover inspection, groundwater drainage system inspection, and clean out inspection with cleaning (if required).

The Site visit with leachate, groundwater, and surface water sampling was conducted in October 2017; the leachate pumping event and Site inspections were completed in November 2017. Information regarding the 2017/18 monitoring program is summarized below in Section 7.1 with recommendations provided in Section 7.2.

## 7.1 2017/18 Monitoring Summary

### 7.1.1 Groundwater

In general, BTEX/mTPH, PAHs, PCBs, VOCs, general chemistry, and metals analytical data show groundwater conditions to be of better quality compared to leachate analytical data, with the exception of one VOC exceedance (Trichloroethylene) at one monitor well that was not previously detected; however, it does not appear that groundwater is being influenced by leachate from the secure landfill. Based on static groundwater levels measured during the 2017 Site visit, it also appears that groundwater infiltration may still be occurring at the northeastern area of the Site.

### 7.1.2 Surface Water

A review of the downgradient surface water analytical data from the October 2017 sampling event was compared to leachate analytical data to determine if leachate may be impacting the surface water. In general, the BTEX/mTPH, PAH, PCB, VOC, and general chemistry analytical data show surface water conditions to be similar or better in quality compared to the leachate analytical data. Concentrations of BTEX/TPH were non-detectable in the downgradient surface water sample, whereas leachate analytical data reported TPH concentrations of 0.24 mg/kg from the PLCS. In addition, PAH concentrations were non-detectable in the downgradient surface water sample, whereas several PAHs (Anthracene, Fluoranthene, Fluorene, Phenanthrene and Pyrene) were detected in the leachate analytical data. Furthermore, two metals (iron and zinc) reported exceedances in the downgradient surface water samples whereas the leachate analytical data did not report any metals exceedances. Based on this information, it does not appear that leachate is seeping from the landfill liners into the downgradient surface water; therefore, the secure landfill liners appear to be performing in accordance with their original intent of acting as a barrier between leachate accumulations within the landfill and surface water in the surrounding area.

### 7.1.3 Leachate

Since construction of the landfill, water held in the primary and secondary liner containment systems (PLCS and SLCS, respectively) has been sampled and analyzed in an accredited laboratory and, if considered not to be affected by the waste in the landfill, pumped into a ditch adjacent to the access road to the landfill. Therefore, leachate samples collected from the PLCS and SLCS chambers were submitted for analysis of BTEX/mTPH, PAHs, PCBs, VOCs, general chemistry, dissolved and total metals, and toxicity.

Once it was determined that the leachate was below all regulated parameters and non-toxic, all water held in the containment systems was pumped and discharged to the environment in accordance with the OMM Manual. The pumping events consisted of two Site visits so that a desired flow rate of 15 L/min could be achieved on two successive days. During the Site visits for leachate pumping in November 2017, it was observed that the PLCS and SLCS valves were permanently in the open position with the discharge hoses no longer connected to the valves. This condition has been reported in previous pumping events. GHD determined in-flow rates by pumping down each valve chamber, measuring the change in head over a fixed period of time, then calculated in-flow rates. It was also noted that leachate elevations in the PLCS and SLCS for two consecutive Site visits were less than 0.6 metres below the top of the valve chambers. Maintaining these valves in the open position does not create any integrity issues for containment as the hydraulic head in the two leachate valve chambers has not historically risen above the ground surface.

A comparison of the average of the current and historical pumped leachate volumes from the PLCS valve chambers prior to and following installation of the GWDS shows the PLCS leachate volumes as relatively unchanged. Whereas, a review of the current and historical leachate pumping volumes from the SLCS valve chamber demonstrates that pumped leachate volumes have generally decreased by approximately 41 percent since the installation of the GWDS. Consequently, the GWDS appears to contribute to reduce volumes of pumped leachate from the SLCS; however,

significant volumes of leachate are still present within the two liners that require pumping on a regular basis.

### 7.1.4 Landfill Cover

The landfill cover inspection was conducted in November 2017 and indicated maintenance is not required. A vegetation management program was conducted during the previous monitoring event in 2015-2016. Vegetation height, generally alders, does not exceed the OMM recommended height restriction of 0.3 metres. Two monitor well locations were surrounded with very high vegetative growth in the area; alders were noted to reach a height of approximately 1.5 metres. Therefore, GHD staff trimmed the alders prior to conducting groundwater sampling at those locations.

Meadow vole activity from tunneling and nesting was previously noted in numerous locations on the landfill cover during previous inspections, and was again noted during the 2017 inspection; however, meadow voles typically limit their habitat to less than 300 mm from surface.

There was no visible evidence of landfill subsidence and results of the elevation control survey continue to indicate that limited settlement of the landfill is occurring; however, it appears the elevation control survey points were affected by the clear cutting and mulching activities in 2015. The survey control points were observed to be in good condition, but were difficult to locate as the survey flags have been damaged and/or are missing.

### 7.1.5 Groundwater Drainage System

Four GWDS clean-outs were previously installed as part of the original system construction; visual inspections confirmed that water was not present during the November 2017 Site visit. Debris or blockages were not present in any of the clean-outs; however, the inner 100 mm drain cap of CO2 and CO4 were damaged.

The outflow drainage pipe, located on the asphalt plant property, was in good condition with the rodent screen intact. Some small branches and leaves were observed to slightly impede flow; therefore, the screen was removed and the pipe cleaned out. The screen was reinstated and flow from the outflow drainage pipe was approximately 1.0 L/min to 2.0 L/min and contained some Iron floc. Overall, it was determined the GWDS was functioning properly.

## 7.2 Recommendations

Based on the findings of the 2017/18 monitoring program, along with data from previous monitoring programs, the following recommendations are offered for consideration by DMAE:

**Monitoring and Maintenance Schedule:** The leachate quality is continually reporting BTEX/TPH, PAH, PCB, general chemistry, and metals concentrations at levels that would not affect the surrounding environment, most notably groundwater and surface water. In addition, the landfill was constructed approximately 20 years ago and based on the historical analytical data reviewed in this report, it appears that leachate has reached a steady-state condition. Furthermore, groundwater infiltration has been evident for many years and has acted as a flushing mechanism for any contaminants that may have been present, although elevated levels of contaminants have not historically been identified. Therefore, GHD recommend that further monitoring of the landfill and pumping out of the PLCS and SLCS are not required on an annual basis; however, annual

inspections should be continued to ensure the landfill cover system is not compromised by erosion. GHD understands that DMAE would prefer to continue monitoring activities at the landfill as a matter of due diligence; therefore, GHD recommend that monitoring and leachate pumping schedule should be amended to every 2 years.

**Maintenance:** The cracked plastic drain cap at two clean-outs (CO2 and CO4) should be replaced to prevent potential infiltration of surface water. The elevational control point flags should be replaced to facilitate easier identification of the control points.

**OMM Manual:** Several sections of the OMM Manual are out of date. For example, MW93-3/93-3A has been decommissioned and replaced by MW10-1/10-1A. The OMM Manual does not state that leachate samples should be analyzed for both total and dissolved metals. The site plan with sampling locations is not reflective of current site conditions, etc. Therefore, consideration should be given by DMAE to incorporate these changes and issue a revised OMM Manual.

# 8. References


Report entitled "*Come By Chance Secure Landfill Groundwater Drainage System*" prepared by AMEC Earth and Environmental for Newfoundland and Labrador Department of Environment and Conservation, dated March 2009.

Report entitled "*Annual Summary Report, 2009/2010 Environmental Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, Newfoundland*" prepared by Pinchin Leblanc Environmental Limited for Newfoundland and Labrador Department of Environment and Conservation, dated May 2010.

Report entitled "*Annual Summary Report 2010/2011 Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, NL*" prepared by CRA Limited for Newfoundland and Labrador Department of Environment and Conservation, dated March 2011.

Report entitled "*2011/2012 Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, NL*" prepared by CBCL Limited for Newfoundland and Labrador Department of Environment and Conservation, dated May 24, 2012.

Report entitled "*Come By Chance Secure Landfill – Operations, Maintenance and Monitoring (OMM) Manual*" prepared by Newfoundland and Labrador Department of Environment and Conservation, Pollution Prevention Division, dated June 2012.

Report entitled "*2012/2013 Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, NL*" prepared by CRA Limited for Newfoundland and Labrador Department of Environment and Conservation, dated May 2013.

Report entitled "*2013/2014 Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, NL*" prepared by CRA Limited for Newfoundland and Labrador Department of Environment and Conservation, dated November 2013.

Report entitled "*2014/2015 Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, NL*" prepared by CRA Limited for Newfoundland and Labrador Department of Environment and Conservation, dated February 2015.

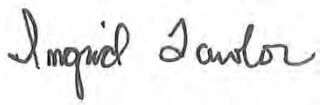
Report entitled "*2015-16 Monitoring and Maintenance Program, Come By Chance Secure Landfill, Come By Chance, NL*" prepared by Fracflow Consultants Inc. for Newfoundland and Labrador Department of Environment and Conservation, dated May 2016.

# 9. Closure

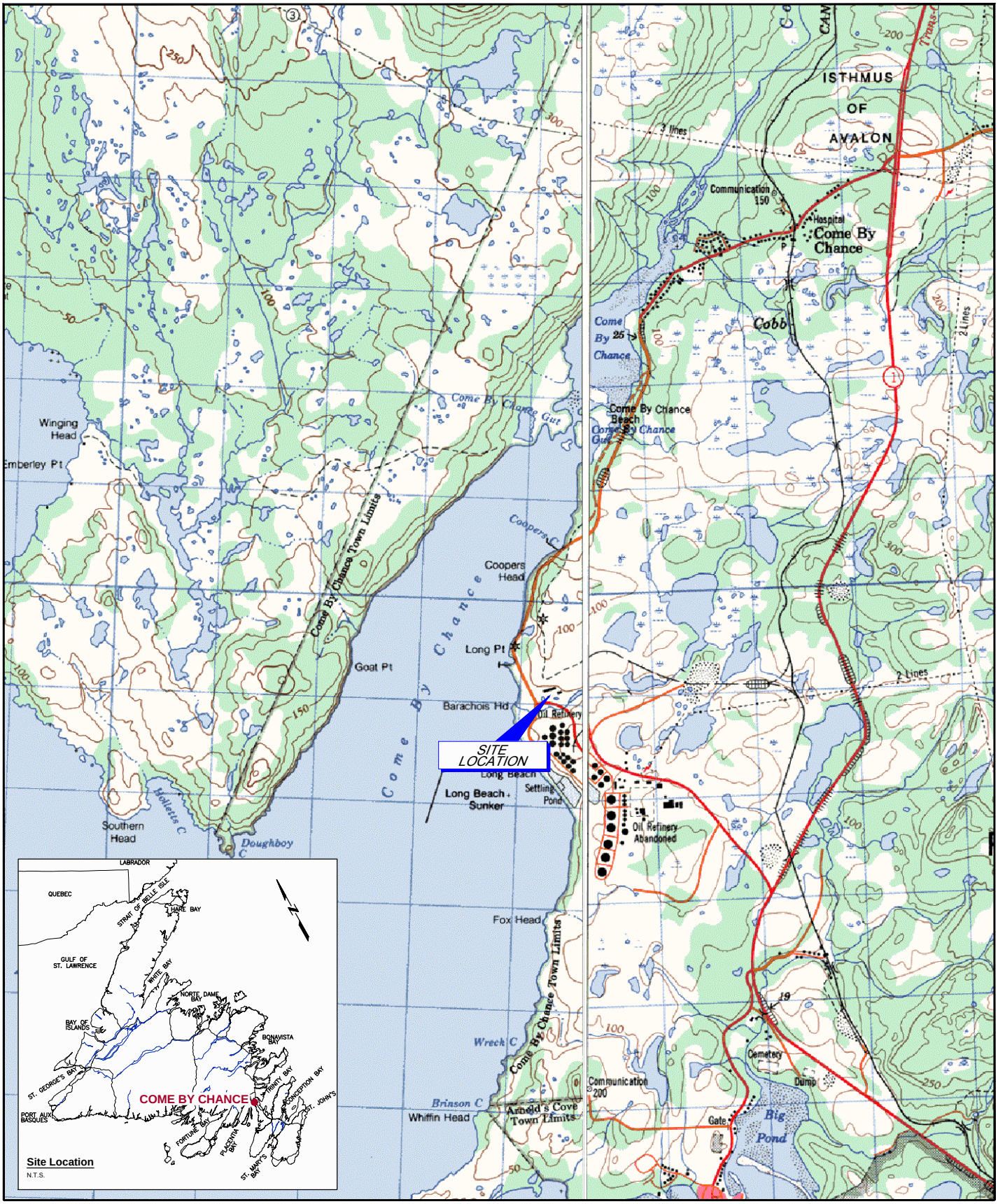
All of Which is Respectfully Submitted,

GHD

Brian Luffman, P. Eng.
Associate/Senior Project Manager



Ingrid Lawlor, C.Tech.
Environmental Technologist




0 500 1000 1500m

SCALE: 1:50,000

DEPT. OF MUNICIPAL AFFAIRS & ENVIRONMENT
COME BY CHANCE SECURE LANDFILL
COME BY CHANCE, NL
2017/2018 MONITORING PROGRAM

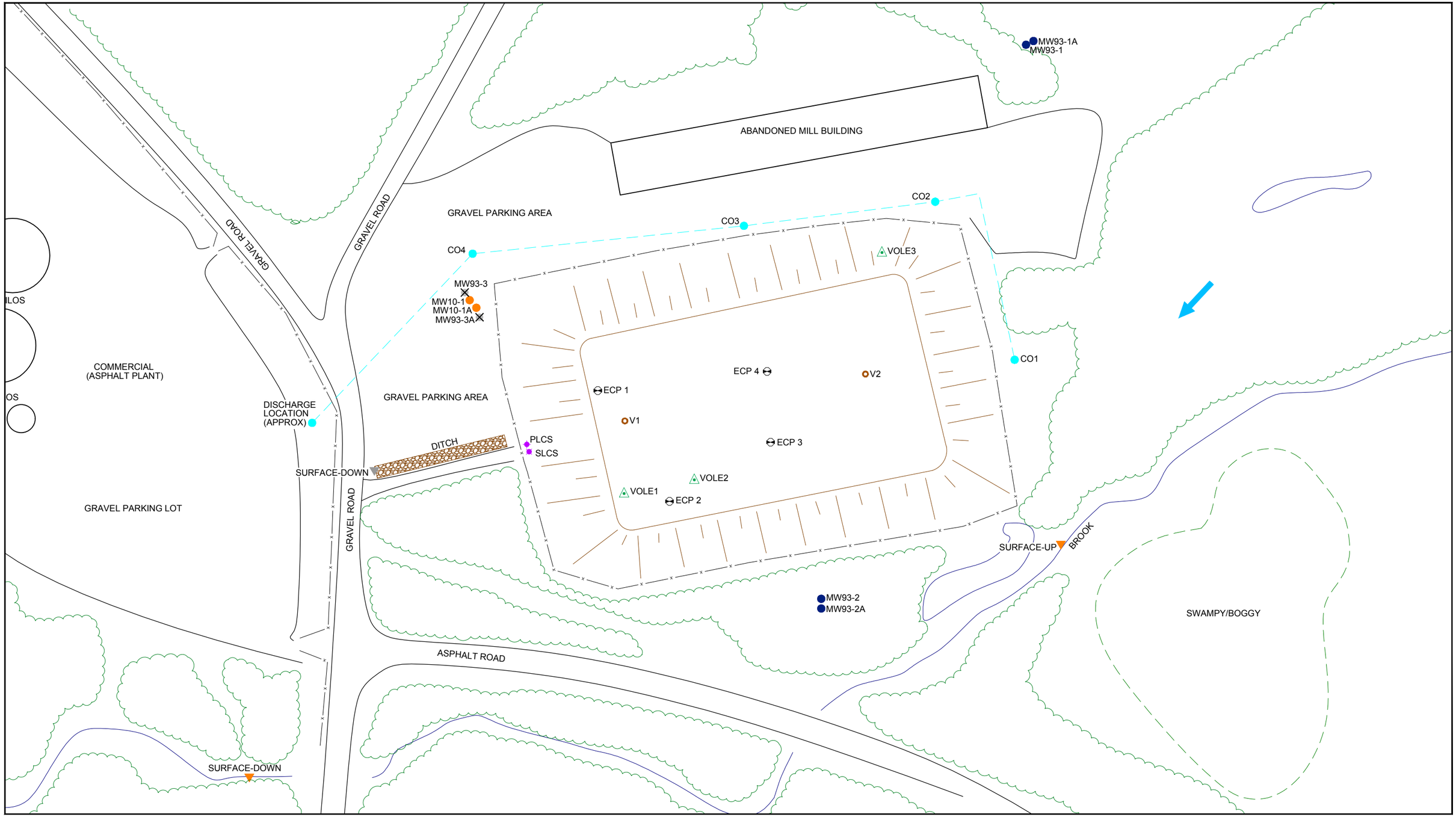
084308(009)

Jan 4, 2018

# SITE LOCATION MAP

FIGURE 1

CAD File: I:\CAD\6-chars\08----\0843--\084308\-009\084308(009) GN-NL001.dwg




0 12.5 25 37.5m

SCALE: 1:1,250

LEGEND:

- SURFACE WATER SAMPLE LOCATION (PRE 2010)
- SURFACE WATER SAMPLE LOCATION (POST 2010)
- MONITOR WELL LOCATION (CRA 2010)
- MONITOR WELL LOCATION (OTHERS)
- MONITOR WELL-DECOMMISSIONED (CRA 2010)
- ELEVATION CONTROL POINT LOCATION
- LEACHATE VALVE CHAMBER LOCATION
- CLEAN OUT LOCATION
- VENT LOCATION
- GROUNDWATER DRAINAGE SYSTEM
- FENCELINE
- VEGETATION (BUSHES, GRASSES AND SHRUBS
- GROUNDWATER FLOW DIRECTION (APPROX.)
- MEADOW VOLE ACTIVITY (2017)

DEPT. OF MUNICIPAL AFFAIRS & ENVIRONMENT
COME BY CHANCE SECURE LANDFILL, COME BY CHANCE, NL
2017/2018 MONITORING PROGRAM

084308-009

Mar 22, 2018

# SITE PLAN WITH SAMPLE LOCATIONS

FIGURE 2

CAD File: I:\CAD\6-chars\08----\0843--\084308\-009\084308(009) GN-NL002.dwg

**TABLE 1**

**STATIC WATER LEVELS**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| ID | Ground Surface Elevation | Length of Stick-up | TOC Elevation | Groundwater Depth | Water Elevation |
|---|---|---|---|---|---|
| | | | | Oct 12, 2017 | Oct 12, 2017 |
| | (masl) | (m) | (masl) | (mbTOC) | (masl) |
| **PLCS** | 15.960 | - | 15.960 | 0.450 | 15.510 |
| **SLCS** | 15.955 | - | 15.955 | 0.451 | 15.504 |
| **MW93-1** | 16.300 | 1.100 | 17.400 | 1.760 | 15.640 |
| **MW93-1A** | 16.310 | 1.400 | 17.710 | 2.030 | 15.680 |
| **MW93-2** | 14.290 | 1.100 | 15.390 | 2.235 | 13.155 |
| **MW93-2A** | 14.310 | 1.100 | 15.410 | 1.792 | 13.618 |
| **MW10-1** | 15.790 | 0.846 | 16.636 | 3.464 | 13.172 |
| **MW10-1A** | 15.890 | 0.854 | 16.744 | 3.503 | 13.241 |

**Notes:**
masl = Metres Above Sea Level
m = Metres
TOC = Top of Casing
mbTOC = Metres Below Top of Casing

**GPS CO-ORDINATES OF KEY SITE FEATURES**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| ID | NORTHING | EASTING |
|---|---|---|
| | (m) | (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 |

**Notes:**
All points recorded using NAD27, Universal Transverse Mercator (UTM) Zone 21 as coordinate system.

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
MW = Monitoring Well
ECP = Elevation Control Point

**TABLE 3**

**PRIMARY LEACHATE SAMPLING AND PUMPING INFORMATION**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| PLCS LEACHATE SAMPLING | | | | | PLCS PUMPING EVENT | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Date** | **Weather** | **Valve Condition** | **Initial head (mbTOVC)** | **Analysis Conducted** | **Date** | **Weather** | **Valve Condition** | **Final Flow Rate (L/min)** | **Pumping Time (hours)** |
| Oct 12, 2017 | Overcast, +6 °C | Unknown* | 0.450 | General chemistry, dissolved and total metals, BTEX, TPH, VOCs, PAHs, PCBs, and Toxicity | Nov 22, 2017 | Sunny, -2 °C | Open, flowing freely, hose disconnected | 11.9 | 9 |
| | | | | | Nov 23, 2017 | Rain, +5 °C | Open, flowing freely, hose disconnected | 6.6 | 2 |

**Notes:**
mbTOVC = Metres from water level to top of valve chamber.
Elevation of Top of PLCS Valve Chamber = 15.960 m.
* PLCS valve chamber completely filled with leachate; therefore, unable to inspect valve.

**TABLE 4**

**SECONDARY LEACHATE SAMPLING AND PUMPING INFORMATION**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| SLCS LEACHATE SAMPLING | | | | | SLCS PUMPING EVENT | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Date** | **Weather** | **Valve Condition** | **Initial head (mbTOVC)** | **Analysis Conducted** | **Date** | **Weather** | **Valve Condition** | **Final Flow Rate (L/min)** | **Pumping Time (hours)** |
| Oct 12, 2017 | Overcast, +6 °C | Unknown* | 0.451 | General chemistry, dissolved and total metals, BTEX, TPH, VOCs, PAHs, PCBs, and Toxicity | Nov 22, 2017 | Sunny, -2 °C | Open, flowing freely, hose disconnected | 7.7 | 8 |
| | | | | | Nov 23, 2017 | Rain, +5 °C | Open, flowing freely, hose disconnected | 5.2 | 1.5 |

**Notes:**
mbTOVC = Metres from water level to top of valve chamber.
Elevation of Top of SLCS Valve Chamber = 15.960 m.
* SLCS valve chamber completely filled with leachate; therefore, unable to inspect valve.

**TABLE 5**

**LANDFILL CAP INSPECTION FORM**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Date | Weather | Landfill Cap Inspection | | | | | | Elevational Survey Control Points | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Vegetative 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 | | | | | | | |
| Nov 22, 2017 | Sunny, -2 °C | > 0.3 m | Good, no damage or obstructions. | Good, no damage or obstructions. | Meadow vole activity evident. | No erosion, subsidence or damage noted. | Dry, no blockages. CO2 & CO4 have damaged end caps. | Good | Good | Good | Good |
| | | | | | | | | Survey flags should be repaired/replaced. | | | |

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

**TABLE 6**

**ELEVATIONAL CONTROL POINT SURVEY DATA**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Original Survey Date: | | | | Jul 16, 2010 | |
|---|---|---|---|---|---|
| Recent Survey Date: | | | | Nov 22, 2017 | |
| **Location** | **Original Elevation** | **2015** | | **2017** | |
| | | **Survey** | **DIFF** | **Survey** | **DIFF** |
| | **m** | **m** | **m** | **m** | **m** |
| PLCS | 15.960 | - | - | - | - |
| ECP1 | 20.439 | 20.421 | 0.018 | 20.487 | -0.048 |
| ECP2 | 20.442 | 20.416 | 0.026 | 20.420 | 0.022 |
| ECP3 | 20.935 | 20.928 | 0.007 | 21.280 | -0.345 |
| ECP4 | 21.212 | 21.171 | 0.041 | 21.308 | -0.096 |

**Notes:**
All elevations surveyed to benchmark PLCS.
ECP = Elevational Control Point
DIFF = Differences calculated in relation to original elevation (positive indicates amount of settlement)

**TABLE 7**

**GROUNDWATER ANALYTICAL DATA - BTEX/mTPH (mg/L)**
**2017/18 MONITORING 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 | |
| **MW93-1** | Oct 12, 2017 | < | < | < | < | < | < | < | | < | - |
| **MW93-1A** | Oct 12, 2017 | < | < | < | < | < | < | < | | < | - |
| **MW93-2** | Oct 12, 2017 | < | < | < | < | < | < | < | | < | - |
| **MW93-2A** | Oct 12, 2017 | < | < | < | < | < | < | < | | < | - |
| **MW-DUP** | Oct 12, 2017 | < | < | < | < | < | < | < | | < | - |
| **MW10-1** | Oct 12, 2017 | < | < | < | < | < | < | < | | < | - |
| **MW10-1A** | Oct 12, 2017 | < | < | < | < | < | < | < | | < | - |
| **RDL** | | 0.001 | 0.001 | 0.001 | 0.002 | 0.01 | 0.05 | 0.05 | 0.1 | 0.1 | - |
| **Atlantic RBCA Tier I RBSLs * (Commercial, Non-Potable)** | | **20** | **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.

* Atlantic Risk-Based Corrective Action (RBCA) 2015 Tier I Risk-Based Screening Level (RBSL) Table values {coarse-grained soil}.

RDL = Reportable Detection Limit
MW = Monitor Well
MW-DUP = Field Duplicate of MW93-2A

< = Parameter below detection limit
- = Not analysed
**0.0** = Above criteria

**TABLE 8**

**GROUNDWATER ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | MW93-1A | MW93-2 | MW93-2A | MW-DUP | MW10-1 | MW10-1A | Criteria* |
|---|---|---|---|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | |
| **1-Methylnaphthalene** | 0.05 | < | < | < | < | < | < | 1,800 |
| **2-Methylnaphthalene** | 0.05 | < | < | < | < | < | < | 1,800 |
| **Acenaphthene** | 0.01 | < | < | < | < | < | < | 600 |
| **Acenaphthylene** | 0.01 | < | < | < | < | < | < | 1.8 |
| **Anthracene** | 0.01 | < | < | < | < | < | < | 2.4 |
| **Benzo(a)anthracene** | 0.01 | < | < | < | < | < | < | 4.7 |
| **Benzo(a)pyrene** | 0.01 | < | < | < | < | < | < | 0.81 |
| **Benzo(b)fluoranthene** | 0.01 | < | < | < | < | < | < | 0.75 |
| **Benzo(b/j)fluoranthene** | 0.02 | < | < | < | < | < | < | - |
| **Benzo(g,h,i)perylene** | 0.01 | < | < | < | < | < | < | 0.2 |
| **Benzo(j)fluoranthene** | 0.01 | < | < | < | < | < | < | - |
| **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 | < | < | < | < | < | < | 0.2 |
| **Naphthalene** | 0.20 | < | < | < | < | < | < | 1,400 |
| **Perylene** | 0.01 | < | < | < | < | < | < | - |
| **Phenanthrene** | 0.01 | < | < | 0.011 | < | < | < | 580 |
| **Pyrene** | 0.01 | < | < | < | < | < | < | 68 |

**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
MW = Monitor Well
MW-DUP = Field Duplicate of MW93-2A

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

**TABLE 9**

**GROUNDWATER ANALYTICAL DATA - PCBs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | MW93-1 | MW93-1A | MW93-2 | MW93-2A | MW-DUP | MW10-1 | MW10-1A | Criteria* |
|---|---|---|---|---|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | |
| **Total PCBs** | 0.05 | < | < | < | < | < | < | < | 7.8 |

**Notes:**
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
Protection Act",
April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.

RDL = Reportable Detection Limit
MW = Monitor Well
MW-DUP = Field Duplicate of MW93-2A

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

**TABLE 10**

**GROUNDWATER ANALYTICAL DATA - VOCs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | MW93-1 | MW93-1A | MW93-2 | MW93-2A | MW-DUP | MW10-1 | MW10-1A | Criteria* |
|---|---|---|---|---|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | |
| **Benzene** | 1.00 | < | < | < | < | < | < | < | 44 |
| **Bromodichloromethane** | 1.00 | < | < | < | < | < | < | < | 85,000 |
| **Bromoform** | 1.00 | < | < | < | < | < | < | < | 380 |
| **Bromomethane** | 0.50 | < | < | < | < | < | < | < | 5.6 |
| **Carbon Tetrachloride** | 0.50 | < | < | < | < | < | < | < | 0.79 |
| **Chlorobenzene** | 1.00 | < | < | < | < | < | < | < | 630 |
| **Chloroethane** | 8.00 | < | < | < | < | < | < | < | - |
| **Chloroform** | 1.00 | < | < | < | < | < | < | < | 2.4 |
| **Chloromethane** | 8.00 | < | < | < | < | < | < | < | - |
| **Dibromochloromethane** | 1.00 | < | < | < | < | < | < | < | 82,000 |
| **1,2-Dichlorobenzene** | 0.50 | < | < | < | < | < | < | < | 4,600 |
| **1,3-Dichlorobenzene** | 1.00 | < | < | < | < | < | < | < | 9,600 |
| **1,4-Dichlorobenzene** | 1.00 | < | < | < | < | < | < | < | 8 |
| **1,1-Dichloroethane** | 2.00 | < | < | < | < | < | < | < | 320 |
| **1,2-Dichloroethane** | 1.00 | < | < | < | < | < | < | < | 1.6 |
| **1,1-Dichloroethylene** | 0.50 | < | < | < | < | < | < | < | 1.6 |
| **cis-1,2-Dichloroethylene** | 0.50 | < | < | < | < | < | < | < | 1.6 |
| **trans-1,2-Dichloroethylene** | 0.50 | < | < | < | < | < | < | < | 1.6 |
| **1,2-Dichloropropane** | 0.50 | < | < | < | < | < | 10 | 5.6 | 16 |
| **cis-1,3-Dichloropropene** | 0.50 | < | < | < | < | < | < | < | 5.2 |
| **trans-1,3-Dichloropropene** | 0.50 | < | < | < | < | < | < | < | 5.2 |
| **Ethylbenzene** | 1.00 | < | < | < | < | < | < | < | 2,300 |
| **Ethylene Dibromide** | 0.20 | < | < | < | < | < | < | < | 0.25 |
| **Methylene Chloride(Dichloromethane)** | 3.00 | < | < | < | < | < | < | < | 610 |
| **o-Xylene** | 1.00 | < | < | < | < | < | < | < | - |
| **p+m-Xylene** | 2.00 | < | < | < | < | < | < | < | - |
| **Styrene** | 1.00 | < | < | < | < | < | < | < | 1,300 |
| **Tetrachloroethylene** | 1.00 | < | < | < | < | < | < | < | 1.6 |
| **1,1,2,2-Tetrachloroethane** | 0.50 | < | < | < | < | < | < | < | 3.2 |
| **Toluene** | 1.00 | < | < | < | < | < | < | < | 18,000 |
| **Trichloroethylene** | 1.00 | < | < | < | < | < | **2.4** | < | 1.6 |
| **1,1,1-Trichloroethane** | 1.00 | < | < | < | < | < | < | < | 640 |
| **1,1,2-Trichloroethane** | 1.00 | < | < | < | < | < | < | < | 4.7 |
| **Trichlorofluoromethane (FREON 11)** | 8.00 | < | < | < | < | < | < | < | 2,500 |
| **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
MW = Monitor Well
MW-DUP = Field Duplicate of MW93-2A

< = Parameter below detection limit
- = Not analysed/No criteria
**1** = Above criteria

**TABLE 11**

**GROUNDWATER ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Units | MW93-1 | MW93-1A | MW93-2 | MW93-2A | MW-DUP | MW10-1 | MW10-1A | Criteria* |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | |
| **Anion Sum** | N/A | me/L | 6.38 | 7.19 | 5.79 | 1.88 | 2.05 | 2.3 | 1.79 | - |
| **Bicarb. Alkalinity (calc. as CaCO3)** | 1.00 | mg/L | 250 | 310 | 220 | 17 | 25 | 92 | 67 | - |
| **Calculated TDS** | 1.00 | mg/L | 330 | 380 | 320 | 130 | 140 | 130 | 110 | - |
| **Carb. Alkalinity (calc. as CaCO3)** | 1.00 | mg/L | 2.9 | 3.4 | < | < | < | < | < | - |
| **Cation Sum** | N/A | me/L | 5.62 | 7.09 | 5.61 | 1.88 | 2.08 | 2.13 | 1.68 | - |
| **Hardness (CaCO3)** | 1.00 | mg/L | 130 | 190 | 230 | 43 | 52 | 90 | 65 | - |
| **Ion Balance (% Difference)** | N/A | % | 6.33 | 0.7 | 1.58 | 0 | 0.73 | 3.84 | 3.17 | - |
| **Langelier Index (@ 20C)** | N/A | N/A | 0.537 | 0.792 | 0.368 | -3.09 | -2.46 | -0.424 | -0.898 | - |
| **Langelier Index (@ 4C)** | N/A | N/A | 0.288 | 0.544 | 0.119 | -3.34 | -2.71 | -0.675 | -1.15 | - |
| **Nitrate (N)** | 0.05 | mg/L | < | < | < | < | < | < | 0.064 | - |
| **Saturation pH (@ 20C)** | N/A | N/A | 7.54 | 7.28 | 7.24 | 9.08 | 8.82 | 7.91 | 8.19 | - |
| **Saturation pH (@ 4C)** | N/A | N/A | 7.79 | 7.53 | 7.49 | 9.33 | 9.07 | 8.16 | 8.44 | - |
| **Total Alkalinity (Total as CaCO3)** | 30 | mg/L | 260 | 310 | 220 | 17 | 25 | 93 | 67 | - |
| **Dissolved Chloride (Cl)** | 1 | mg/L | 30 | 11 | 16 | 28 | 26 | 5.3 | 4.9 | 2,300 |
| **Colour** | 5.00 | TCU | < | < | < | > | 110 (2) | 7.2 | 10 | - |
| **Nitrate + Nitrite (N)** | 0.05 | mg/L | < | < | < | < | < | < | 0.064 | - |
| **Nitrite (N)** | 0.01 | mg/L | < | < | < | < | < | < | < | - |
| **Nitrogen (Ammonia Nitrogen)** | 0.05 | mg/L | < | < | < | 0.35 | 0.34 | <0.050 | 0.16 | - |
| **Total Organic Carbon (C)** | 0.50 | mg/L | 5.3 (1) | <5.0 (1) | 1.3 | 11 | 10 | 4.2 | <50 (1) | - |
| **Orthophosphate (P)** | 0.01 | mg/L | < | < | < | < | < | < | < | - |
| **pH** | N/A | pH | 8.08 | 8.07 | 7.61 | 5.99 | 6.37 | 7.48 | 7.29 | - |
| **Reactive Silica (SiO2)** | 0.50 | mg/L | 9.1 | 5.9 | 18 | 7.3 | 8.2 | 11 | 11 | - |
| **Dissolved Sulphate (SO4)** | 2 | mg/L | 19 | 30 | 46 | 36 | 39 | 14 | 14 | - |
| **Turbidity** | 0.1 | NTU | 47 | 690 | 1.7 | 40 | 35 | 38 | 800 | - |
| **Conductivity** | 1 | uS/cm | 570 | 640 | 530 | 220 | 230 | 230 | 160 | - |

**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.

(1) = Reporting limit was increased due to turbidity.

(2) = Elevated reporting limit due to sample matrix.

RDL = Reportable Detection Limit
MW = Monitor Well
MW-DUP = Field Duplicate of MW93-2A

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

**TABLE 12**

**GROUNDWATER ANALYTICAL DATA - DISSOLVED METALS (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | MW93-1 | MW93-1A | MW93-2 | MW93-2A | MW-DUP | MW10-1 | MW10-1A | Criteria* |
|---|---|---|---|---|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | |
| **Aluminum (Al)** | 5.0 | 9.5 | 9.8 | 7.8 | 220 | 180 | 8.5 | 17 | - |
| **Antimony (Sb)** | 1.0 | < | < | < | < | < | < | < | 20,000 |
| **Arsenic (As)** | 1.0 | < | < | 2.3 | 1.2 | 1.1 | < | < | 1,900 |
| **Barium (Ba)** | 1.0 | 100 | 71 | 150 | 49 | 51 | 37 | 40 | 29,000 |
| **Beryllium (Be)** | 1.0 | < | < | < | < | < | < | < | 67 |
| **Bismuth (Bi)** | 2.0 | < | < | < | < | < | < | < | - |
| **Boron (B)** | 50 | 120 | 79 | 1,000 | 95 | 150 | < | < | 45,000 |
| **Cadmium (Cd)** | 0.010 | < | 0.013 | < | 0.31 | 0.32 | 0.027 | 0.015 | 2.7 |
| **Calcium (Ca)** | 100 | 30,000 | 47,000 | 70,000 | 11,000 | 14,000 | 30,000 | 21,000 | - |
| **Chromium (Cr)** | 1.0 | < | < | < | < | < | < | < | 810 |
| **Cobalt (Co)** | 0.4 | < | 1 | 0.4 | 2.2 | 2.3 | 3.3 | 5 | 66 |
| **Copper (Cu)** | 2.0 | < | 3 | < | < | < | 4.3 | 5.3 | 87 |
| **Iron (Fe)** | 50 | < | 110 | 120 | 8,600 | 8,900 | 1,000 | 3,600 | - |
| **Lead (Pb)** | 0.5 | < | < | < | < | < | < | < | 25 |
| **Magnesium (Mg)** | 100 | 14,000 | 17,000 | 14,000 | 3,600 | 4,200 | 3,500 | 2,700 | - |
| **Manganese (Mn)** | 2.0 | 87 | 140 | 1,000 | 5,100 | 5,300 | 310 | 530 | - |
| **Molybdenum (Mo)** | 2.0 | 15 | 15 | < | < | < | < | < | 9,200 |
| **Nickel (Ni)** | 2.0 | < | 2 | < | 2.3 | 2.4 | 4 | 5.5 | 490 |
| **Phosphorus (P)** | 100 | < | < | < | < | < | < | < | - |
| **Potassium (K)** | 100 | 1,600 | 2,500 | 1,300 | 1,300 | 1,300 | 810 | 620 | - |
| **Selenium (Se)** | 1.0 | < | < | < | < | < | < | < | 63 |
| **Silver (Ag)** | 0.1 | < | < | < | < | < | < | < | 1.5 |
| **Sodium (Na)** | 100 | 68,000 | 75,000 | 22,000 | 15,000 | 15,000 | 6,100 | 5,300 | 2,300,000 |
| **Strontium (Sr)** | 2.0 | 230 | 290 | 200 | 55 | 61 | 68 | 53 | - |
| **Thallium (Tl)** | 0.1 | < | < | < | < | < | < | < | 510 |
| **Tin (Sn)** | 2.0 | < | < | < | < | < | < | < | - |
| **Titanium (Ti)** | 2.0 | < | < | < | < | < | < | < | - |
| **Uranium (U)** | 0.1 | 0.28 | 2.4 | 0.2 | < | < | 0.1 | < | 420 |
| **Vanadium (V)** | 2.0 | < | < | < | < | < | < | < | 250 |
| **Zinc (Zn)** | 5.0 | < | 10 | 5.6 | 130 | 140 | 13 | 7.3 | 1,100 |

**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
MW = Monitor Well
MW-DUP = Field Duplicate of MW93-2A

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

**TABLE 13**

**SURFACE WATER ANALYTICAL DATA - BTEX/mTPH (mg/L)**
**2017/18 MONITORING 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** | Oct 12, 2017 | < | < | < | < | < | < | < | < | < | - |
| **SURFACE-DOWN** | Oct 12, 2017 | < | < | < | < | < | < | < | < | < | - |
| **SURFACE-DUP** | Oct 12, 2017 | < | < | < | < | < | < | < | < | < | - |
| **RDL** | | 0.001 | 0.001 | 0.001 | 0.002 | 0.01 | 0.05 | 0.05 | 0.1 | 0.1 | - |
| **2012 RBCA Tier I Ecological Screening Levels for the Protection of Aquatic Life [2]** | | **2.1** | **0.77** | **0.32** | **0.33** | **-** | **-** | **-** | **-** | **1.5** | **Gasoline** |
| | | | | | | | | | | **0.10** | **Diesel/#2** |
| | | | | | | | | | | **0.10** | **#6 oil/lube** |

**Notes:**

Analysis completed by Maxxam Analytics Inc. laboratory in St. John's, NL.

1. Atlantic RBCA (Risk-Based Corrective Action) Version 3.0 (July 2012) Tier I Surface Water Screening Levels for the Protection of Freshwater and Marine Aquatic Life.

RDL = Reportable Detection Limit
SURFACE-DUP = Field Duplicate of SURFACE-DOWN

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

**TABLE 14**

**SURFACE WATER ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | SURFACE-UP | SURFACE-DOWN | SURFACE-DUP | Criteria* |
|---|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | |
| **1-Methylnaphthalene** | 0.05 | < | < | < | - |
| **2-Methylnaphthalene** | 0.05 | < | < | < | - |
| **Acenaphthene** | 0.01 | < | < | < | 5.8 |
| **Acenaphthylene** | 0.01 | < | < | < | - |
| **Anthracene** | 0.01 | < | < | < | 0.012 |
| **Benzo(a)anthracene** | 0.01 | < | < | < | 0.018 |
| **Benzo(a)pyrene** | 0.01 | < | < | < | 0.015 |
| **Benzo(b)fluoranthene** | 0.01 | < | < | < | - |
| **Benzo(b/j)fluoranthene** | 0.02 | < | < | < | - |
| **Benzo(g,h,i)perylene** | 0.01 | < | < | < | - |
| **Benzo(j)fluoranthene** | 0.01 | < | < | < | - |
| **Benzo(k)fluoranthene** | 0.01 | < | < | < | - |
| **Chrysene** | 0.01 | < | < | < | - |
| **Dibenz(a,h)anthracene** | 0.01 | < | < | < | - |
| **Fluoranthene** | 0.01 | < | < | < | 0.04 |
| **Fluorene** | 0.01 | < | < | < | 3.0 |
| **Indeno(1,2,3-cd)pyrene** | 0.01 | < | < | < | - |
| **Naphthalene** | 0.2 | < | < | < | 1.1 |
| **Perylene** | 0.01 | < | < | < | - |
| **Phenanthrene** | 0.01 | < | < | < | 0.4 |
| **Pyrene** | 0.01 | < | < | < | 0.025 |

**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
SURFACE-DUP = Field Duplicate of SURFACE-DOWN

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

**TABLE 15**

**SURFACE WATER ANALYTICAL DATA - TOTAL PCBs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | SURFACE-UP | SURFACE-DOWN | SURFACE-DUP | Criteria* |
|---|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | |
| **Total PCBs** | 0.05 | < | < | < | - |

**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
SURFACE-DUP = Field Duplicate of SURFACE-DOWN

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

**TABLE 16**

**SURFACE WATER ANALYTICAL DATA - VOCs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | SURFACE-UP | SURFACE-DOWN | SURFACE-DUP | Criteria* |
|---|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | |
| **Benzene** | 1 | < | < | < | 370 |
| **Bromodichloromethane** | 1 | < | < | < | - |
| **Bromoform** | 1 | < | < | < | - |
| **Bromomethane** | 0.5 | < | < | < | - |
| **Carbon Tetrachloride** | 0.5 | < | < | < | 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** | 1 | < | < | < | - |
| **1,2-Dichloroethane** | 1 | < | < | < | 100 |
| **1,1-Dichloroethylene** | 0.5 | < | < | < | - |
| **cis-1,2-Dichloroethylene** | 0.5 | < | < | < | - |
| **trans-1,2-Dichloroethylene** | 0.5 | < | < | < | - |
| **1,2-Dichloropropane** | 0.5 | < | < | < | - |
| **cis-1,3-Dichloropropene** | 0.5 | < | < | < | - |
| **trans-1,3-Dichloropropene** | 0.5 | < | < | < | - |
| **Ethylbenzene** | 1 | < | < | < | 90 |
| **Ethylene Dibromide** | 0.2 | < | < | < | - |
| **Methylene Chloride(Dichloromethane)** | 3 | < | < | < | 98.1 |
| **o-Xylene** | 1 | < | < | < | - |
| **p+m-Xylene** | 2 | < | < | < | - |
| **Styrene** | 1 | < | < | < | 72 |
| **Tetrachloroethylene** | 1 | < | < | < | - |
| **1,1,2,2-Tetrachloroethane** | 0.5 | < | < | < | - |
| **Toluene** | 1 | < | < | < | 2 |
| **Trichloroethylene** | 1 | < | < | < | - |
| **1,1,1-Trichloroethane** | 1 | < | < | < | - |
| **1,1,2-Trichloroethane** | 1 | < | < | < | - |
| **Trichlorofluoromethane (FREON 11)** | 8 | < | < | < | - |
| **Vinyl Chloride** | 0.5 | < | < | < | - |

**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

SURFACE-DUP = Field Duplicate of SURFACE-DOWN

< = Parameter below detection limit

- = Not analysed/No criteria

**0.0** = Above criteria

**SURFACE WATER ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Units | SURFACE-UP | SURFACE-DOWN | SURFACE-DUP | Criteria* |
|---|---|---|---|---|---|---|
| | | | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | |
| **Anion Sum** | N/A | me/L | 0.94 | 1.07 | 1.09 | - |
| **Bicarb. Alkalinity (calc. as CaCO3)** | 1 | mg/L | 18 | 21 | 22 | - |
| **Calculated TDS** | 1 | mg/L | 53 | 61 | 61 | - |
| **Carb. Alkalinity (calc. as CaCO3)** | 1 | mg/L | < | < | < | - |
| **Cation Sum** | N/A | me/L | 0.9 | 1.02 | 1.03 | - |
| **Hardness (CaCO3)** | 1 | mg/L | 18 | 21 | 21 | - |
| **Ion Balance (% Difference)** | N/A | % | 2.17 | 2.39 | 2.83 | - |
| **Langelier Index (@ 20C)** | N/A | N/A | -1.96 | -1.92 | -1.42 | - |
| **Langelier Index (@ 4C)** | N/A | N/A | -2.21 | -2.17 | -1.67 | - |
| **Nitrate (N)** | 0.05 | mg/L | < | < | < | - |
| **Saturation pH (@ 20C)** | N/A | N/A | 9.32 | 9.2 | 9.18 | - |
| **Saturation pH (@ 4C)** | N/A | N/A | 9.57 | 9.45 | 9.43 | - |
| **Total Alkalinity (Total as CaCO3)** | 30 | mg/L | 18 | 21 | 22 | - |
| **Dissolved Chloride (Cl)** | 1 | mg/L | 18 | 20 | 22 | 120 |
| **Colour** | 5 | TCU | 41 | 38 | 37 | - |
| **Nitrate + Nitrite (N)** | 0.05 | mg/L | < | < | < | - |
| **Nitrite (N)** | 0.01 | mg/L | < | < | < | 0.06 |
| **Nitrogen (Ammonia Nitrogen)** | 0.05 | mg/L | < | 0.23 | 0.13 | - |
| **Total Organic Carbon (C)** | 0.5 | mg/L | 7.5 | 7.3 | 7.3 | - |
| **Orthophosphate (P)** | 0.01 | mg/L | < | < | < | - |
| **pH** | N/A | pH | 7.36 | 7.28 | 7.76 | 6.5 - 9.0 |
| **Reactive Silica (SiO2)** | 0.5 | mg/L | 1.8 | 2.1 | 2.1 | - |
| **Dissolved Sulphate (SO4)** | 2 | mg/L | 2.8 | 4.8 | 4.9 | - |
| **Turbidity** | 0.1 | NTU | 0.72 | 0.55 | 0.73 | - |
| **Conductivity** | 1 | uS/cm | 120 | 110 | 140 | - |

**Notes:**

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

SURFACE-DUP = Field Duplicate of SURFACE-DOWN

< = Parameter below detection limit

- = Not analysed/No criteria

**0.0** = Above criteria

**TABLE 18**

**SURFACE WATER ANALYTICAL DATA - TOTAL METALS (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | SURFACE-UP | SURFACE-DOWN | SURFACE-DUP | Criteria* |
|---|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | Oct 12, 2017 | |
| **Aluminum (Al)** | 5.0 | 43 | 61 | 62 | 100(1) |
| **Antimony (Sb)** | 1.0 | < | < | < | - |
| **Arsenic (As)** | 1.0 | < | < | < | 5 |
| **Barium (Ba)** | 1.0 | 6.9 | 7.4 | 7.6 | - |
| **Beryllium (Be)** | 1.0 | < | < | < | - |
| **Bismuth (Bi)** | 2.0 | < | < | < | - |
| **Boron (B)** | 50 | < | < | < | 1,500 |
| **Cadmium (Cd)** | 0.010 | < | < | < | 0.04(2) |
| **Calcium (Ca)** | 100 | 5,300 | 6,200 | 6,300 | - |
| **Chromium (Cr)** | 1.0 | < | < | < | 8.9(3) |
| **Hexavalent Chromium ($Cr^{6+}$)** | 0.5 | < | < | < | 1.0 |
| **Cobalt (Co)** | 0.4 | < | < | < | - |
| **Copper (Cu)** | 2.0 | < | < | < | 2(4) |
| **Iron (Fe)** | 50 | **420** | 300 | **310** | 300 |
| **Lead (Pb)** | 0.50 | < | < | < | 1, 2(5) |
| **Magnesium (Mg)** | 100 | 1,100 | 1,300 | 1,300 | - |
| **Manganese (Mn)** | 2.0 | 85 | 55 | 60 | - |
| **Molybdenum (Mo)** | 2.0 | < | < | < | 73 |
| **Nickel (Ni)** | 2.0 | < | < | < | 25, 65(6) |
| **Phosphorus (P)** | 100 | < | < | < | - |
| **Potassium (K)** | 100 | 340 | 370 | 400 | - |
| **Selenium (Se)** | 1.0 | < | < | < | 1 |
| **Silver (Ag)** | 0.1 | < | < | < | 0.1 |
| **Sodium (Na)** | 100 | 12,000 | 13,000 | 13,000 | - |
| **Strontium (Sr)** | 2.0 | 17 | 20 | 19 | - |
| **Thallium (Tl)** | 0.1 | < | < | < | 0.8 |
| **Tin (Sn)** | 2.0 | < | < | < | - |
| **Titanium (Ti)** | 2.0 | < | < | < | - |
| **Uranium (U)** | 0.10 | < | < | < | 15 |
| **Vanadium (V)** | 2.0 | < | < | < | - |
| **Zinc (Zn)** | 5.0 | < | **37** | < | 30 |

**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
SURFACE-DUP = Field Dup of SURFACE-DOWN

< = Parameter below detection limit
- = Not analysed/No criteria
**3** = Above criteria

(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 [CaCO3] = 120-180 mg/L; 4 ug/L at [CaCO3] >180 mg/L.
(5) Lead guideline = 1 ug/L at [$CaCO_3$] = 0-60 mg/L; 2 ug/L at [CaCO3] = 60-120 mg/L; 4 ug/L at [CaCO3] = 120-180 mg/L; 7 ug/L at [CaCO3] >180 mg/L.
(6) Nickel guideline = 25 ug/L at [$CaCO_3$] = 0-60 mg/L; 65 ug/L at [CaCO3] = 60-120 mg/L; 110 ug/L at [CaCO3] = 120-180 mg/L; 150 ug/L at [CaCO3] >180 mg/L.

**TABLE 19**

**LEACHATE ANALYTICAL DATA - BTEX/mTPH (mg/L)**
**2017/18 MONITORING 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 | |
| **PLCS** | Oct 12, 2017 | < | < | < | < | < | < | 0.067 | 0.17 | 0.24 | One product in fuel/lube range |
| **SLCS** | Oct 12, 2017 | < | < | < | < | < | < | < | < | < | - |
| **RDL** | | 0.001 | 0.001 | 0.001 | 0.002 | 0.01 | 0.05 | 0.05 | 0.1 | 0.1 | - |
| **Schedule A Water & Sewer Regulations [1]** | | - | - | - | - | - | - | | - | 15 | - |
| **2007 CCME Freshwater Aquatic Life Guidelines [2]** | | **0.37** | **0.00** | **0.09** | **-** | **-** | **-** | **-** | **-** | **-** | **Gasoline** |
| | | | | | | | | | | **-** | **Diesel /#2 Fuel Oil** |
| | | | | | | | | | | **-** | **#6 Oil** |

**Notes:**

Analysis completed by Maxxam Analytics Inc. laboratory in St. John's, NL.

1. Schedule A of NL Environmental Control Water and Sewer Regulations, 2003.
2. 2007 CCME Freshwater Aquatic Life Guidelines.

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
**0.0** = Above CCME Criteria

**LEACHATE ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | PLCS | SLCS | Criteria | |
|---|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | NL [1] | CCME [2] |
| 1-Methylnaphthalene | 0.05 | < | < | - | - |
| 2-Methylnaphthalene | 0.05 | < | < | - | - |
| Acenaphthene | 0.01 | < | < | - | 580 |
| Acenaphthylene | 0.01 | < | < | - | - |
| Anthracene | 0.01 | < | 0.018 | - | 1.2 |
| Benzo(a)anthracene | 0.01 | < | < | - | 1.8 |
| Benzo(a)pyrene | 0.01 | < | < | - | 1.5 |
| Benzo(b)fluoranthene | 0.01 | < | < | - | - |
| Benzo(b/j)fluoranthene | 0.02 | < | < | - | - |
| Benzo(g,h,i)perylene | 0.01 | < | < | - | - |
| Benzo(j)fluoranthene | 0.01 | < | < | - | - |
| Benzo(k)fluoranthene | 0.01 | < | < | - | - |
| Chrysene | 0.01 | < | < | - | - |
| Dibenz(a,h)anthracene | 0.01 | < | < | - | - |
| Fluoranthene | 0.01 | < | 0.037 | - | 4 |
| Fluorene | 0.01 | < | 0.012 | - | 300 |
| Indeno(1,2,3-cd)pyrene | 0.01 | < | < | - | - |
| Naphthalene | 0.2 | < | < | - | 110 |
| Perylene | 0.01 | < | < | - | - |
| Phenanthrene | 0.01 | < | 0.012 | - | 40 |
| Pyrene | 0.01 | 0.012 | 0.14 | - | 2.5 |

**Notes:**

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

1. Schedule A of NL Environmental Control Water and Sewer Regulations, 2003.

2. CCME Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life (2007 - Update 7.1) with a dilution factor of 100 based on distance between ditch and receiving waters and percolation through soil.

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System

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

**LEACHATE ANALYTICAL DATA - TOTAL PCBs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | PLCS | SLCS | Criteria* |
|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | |
| **Total PCBs** | 0.05 | < | < | - |

**Notes:**
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Schedule A of NL Environmental Control Water and Sewer Regulations, 2003.

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System

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

**LEACHATE ANALYTICAL DATA - VOCs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | PLCS | SLCS | Criteria* |
|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | |
| **Benzene** | 1 | < | < | - |
| **Bromodichloromethane** | 1 | < | < | - |
| **Bromoform** | 1 | < | < | - |
| **Bromomethane** | 0.5 | < | < | - |
| **Carbon Tetrachloride** | 0.5 | < | < | - |
| **Chlorobenzene** | 1 | < | < | - |
| **Chloroethane** | 8 | < | < | - |
| **Chloroform** | 1 | < | < | - |
| **Chloromethane** | 8 | < | < | - |
| **Dibromochloromethane** | 1 | < | < | - |
| **1,2-Dichlorobenzene** | 0.5 | < | < | - |
| **1,3-Dichlorobenzene** | 1 | < | < | - |
| **1,4-Dichlorobenzene** | 1 | < | < | - |
| **1,1-Dichloroethane** | 2 | < | < | - |
| **1,2-Dichloroethane** | 1 | < | < | - |
| **1,1-Dichloroethylene** | 0.5 | < | < | - |
| **cis-1,2-Dichloroethylene** | 0.5 | < | < | - |
| **trans-1,2-Dichloroethylene** | 0.5 | < | < | - |
| **1,2-Dichloropropane** | 0.5 | < | < | - |
| **cis-1,3-Dichloropropene** | 0.5 | < | < | - |
| **trans-1,3-Dichloropropene** | 0.5 | < | < | - |
| **Ethylbenzene** | 1 | < | < | - |
| **Methylene Chloride(Dichloromethane)** | 3 | < | < | - |
| **o-Xylene** | 1 | < | < | - |
| **p+m-Xylene** | 2 | < | < | - |
| **Styrene** | 1 | < | < | - |
| **Tetrachloroethylene** | 1 | < | < | - |
| **1,1,2,2-Tetrachloroethane** | 0.5 | < | < | - |
| **Toluene** | 1 | < | < | - |
| **Trichloroethylene** | 1 | < | < | - |
| **1,1,1-Trichloroethane** | 1 | < | < | - |
| **1,1,2-Trichloroethane** | 1 | < | < | - |
| **Trichlorofluoromethane (FREON 11)** | 8 | < | < | - |
| **Vinyl Chloride** | 0.5 | < | < | - |

**Notes:**
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Schedule A of NL Environmental Control Water and Sewer Regulations, 2003.

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System

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

**LEACHATE ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Units | PLCS | SLCS | Criteria* |
|---|---|---|---|---|---|
| | | | Oct 12, 2017 | Oct 12, 2017 | |
| **Anion Sum** | N/A | me/L | 3.98 | 7.85 | - |
| **Bicarb. Alkalinity (calc. as CaCO3)** | 1 | mg/L | 170 | 340 | - |
| **Calculated TDS** | 1 | mg/L | 220 | 410 | 1,000 |
| **Carb. Alkalinity (calc. as CaCO3)** | 1 | mg/L | 1.4 | 2.7 | - |
| **Cation Sum** | N/A | me/L | 3.92 | 7.24 | - |
| **Hardness (CaCO3)** | 1 | mg/L | 150 | 280 | - |
| **Ion Balance (% Difference)** | N/A | % | 0.76 | 4.04 | - |
| **Langelier Index (@ 20C)** | N/A | N/A | 0.488 | 0.938 | - |
| **Langelier Index (@ 4C)** | N/A | N/A | 0.238 | 0.69 | - |
| **Nitrate (N)** | 0.05 | mg/L | 0.29 | 0.4 | 10 |
| **Saturation pH (@ 20C)** | N/A | N/A | 7.46 | 6.98 | - |
| **Saturation pH (@ 4C)** | N/A | N/A | 7.71 | 7.22 | - |
| **Total Alkalinity (Total as CaCO3)** | 30.00 | mg/L | 170 | 350 | - |
| **Carbonaceous BOD** | 15.00 | mg/L | < | < | 20 |
| **Dissolved Chloride (Cl)** | 1 | mg/L | 11 | 27 | 1,000 |
| **Colour** | 5 | TCU | 22 | 12 | - |
| **Strong Acid Dissoc. Cyanide (CN)** | 0.001 | mg/L | < | < | 25 |
| **Nitrate + Nitrite** | 0.05 | mg/L | 0.29 | 0.4 | - |
| **Nitrite (N)** | 0.01 | mg/L | < | < | - |
| **Nitrogen (Ammonia Nitrogen)** | 0.05 | mg/L | 0.32 | 0.3 | 2 |
| **Total Organic Carbon (C)** | 0.5 | mg/L | 5.9 | 10 | - |
| **Orthophosphate (P)** | 0.01 | mg/L | < | < | - |
| **pH** | N/A | pH | 7.95 | 7.91 | 5.5 - 9.0 |
| **Phenols-4AAP** | 0.001 | mg/L | < | 0.0012 | 0.10 |
| **Reactive Silica (SiO2)** | 0.5 | mg/L | 9.5 | 13 | - |
| **Total Suspended Solids (TSS)** | 2.0 | mg/L | 6.4 | 12 | 30 |
| **Dissolved Sulphate (SO4)** | 2.0 | mg/L | 13 | 6.4 | - |
| **Sulphide** | 0.02 | mg/L | < | < | 0.50 |
| **Turbidity** | 0.1 | NTU | 2.5 | 10 | - |
| **Conductivity** | 1 | uS/cm | 380 | 680 | - |

**Notes:**
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Schedule A of NL Environmental Control Water and Sewer Regulations, 2003.

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System

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

**LEACHATE ANALYTICAL DATA - TOTAL METALS (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | PLCS | SLCS | Criteria* |
|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | |
| **Aluminum (Al)** | 5 | 42 | 17 | - |
| **Antimony (Sb)** | 1 | < | < | - |
| **Arsenic (As)** | 1 | < | < | 500 |
| **Barium (Ba)** | 1 | 17 | 31 | 5,000 |
| **Beryllium (Be)** | 1 | < | < | - |
| **Bismuth (Bi)** | 2 | < | < | - |
| **Boron (B)** | 5 | 370 | 1,300 | 5,000 |
| **Cadmium (Cd)** | 0.010 | 0.015 | < | 50 |
| **Calcium (Ca)** | 100 | 50,000 | 87,000 | - |
| **Chromium (Cr)** | 1 | < | < | 1,000 |
| **Hexavalent Chromium ($Cr^{6+}$)** | 0.5 | < | < | 50 |
| **Cobalt (Co)** | 0.4 | < | 0.72 | - |
| **Copper (Cu)** | 2 | 4 | < | 300 |
| **Iron (Fe)** | 50 | 350 | 2,700 | 10,000 |
| **Lead (Pb)** | 0.5 | < | < | 200 |
| **Magnesium (Mg)** | 100 | 4,100 | 16,000 | - |
| **Manganese (Mn)** | 2 | 61 | 5,200 | - |
| **Mercury (Hg)** | 0.013 | < | < | 5 |
| **Molybdenum (Mo)** | 2 | < | < | - |
| **Nickel (Ni)** | 2 | < | 2.2 | 500 |
| **Phosphorus (P)** | 100 | < | < | - |
| **Potassium (K)** | 100 | 17,000 | 24,000 | - |
| **Selenium (Se)** | 1 | < | < | 10 |
| **Silver (Ag)** | 0.1 | < | < | 50 |
| **Sodium (Na)** | 100 | 12,000 | 20,000 | - |
| **Strontium (Sr)** | 2 | 110 | 230 | - |
| **Thallium (Tl)** | 0.1 | < | < | - |
| **Tin (Sn)** | 2 | < | < | - |
| **Titanium (Ti)** | 2 | 2.1 | < | - |
| **Uranium (U)** | 1 | 0.23 | 1.1 | - |
| **Vanadium (V)** | 2 | < | < | - |
| **Zinc (Zn)** | 5 | 8.2 | < | 500 |

**Notes:**
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Schedule A of NL Environmental Control Water and Sewer Regulations, 2003.

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System

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

**LEACHATE ANALYTICAL DATA - DISSOLVED METALS (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | PLCS | SLCS | Criteria* |
|---|---|---|---|---|
| | | Oct 12, 2017 | Oct 12, 2017 | |
| **Aluminum (Al)** | 5 | 17 | 5.5 | - |
| **Antimony (Sb)** | 1 | < | < | 20,000 |
| **Arsenic (As)** | 1 | < | < | 1,900 |
| **Barium (Ba)** | 1 | 15 | 30 | 29,000 |
| **Beryllium (Be)** | 1 | < | < | 67 |
| **Bismuth (Bi)** | 2 | < | < | - |
| **Boron (B)** | 5 | 380 | 1,300 | 45,000 |
| **Cadmium (Cd)** | 0.010 | < | < | 2.7 |
| **Calcium (Ca)** | 100 | 51,000 | 86,000 | - |
| **Chromium (Cr)** | 1 | < | < | 810/140(1) |
| **Cobalt (Co)** | 0.4 | < | 0.78 | 66 |
| **Copper (Cu)** | 2 | 2.2 | < | 87 |
| **Iron (Fe)** | 50 | < | 2,300 | - |
| **Lead (Pb)** | 0.5 | < | < | 25 |
| **Magnesium (Mg)** | 100 | 4,300 | 16,000 | - |
| **Manganese (Mn)** | 2 | 54 | 5,200 | - |
| **Molybdenum (Mo)** | 2 | < | < | 9,200 |
| **Nickel (Ni)** | 2 | < | 2.2 | 490 |
| **Phosphorus (P)** | 100 | < | < | - |
| **Potassium (K)** | 100 | 17,000 | 23,000 | - |
| **Selenium (Se)** | 1 | < | < | 63 |
| **Silver (Ag)** | 0.1 | < | < | 1.5 |
| **Sodium (Na)** | 100 | 13,000 | 20,000 | 2,300,000 |
| **Strontium (Sr)** | 2 | 120 | 230 | - |
| **Thallium (Tl)** | 0.1 | < | < | 510 |
| **Tin (Sn)** | 2 | < | < | - |
| **Titanium (Ti)** | 2 | < | < | - |
| **Uranium (U)** | 1 | 0.23 | 1 | 420 |
| **Vanadium (V)** | 2 | < | < | 250 |
| **Zinc (Zn)** | 5 | 12 | 6.3 | 1,100 |

**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

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System

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

**TABLE 26**

**LEACHATE ANALYTICAL DATA - TOXICOLOGY**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Sample Location | Date Sampled | Effluent Conc. (%) | Toxicology Test Results* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Temp (°C) | | D.O. (mg/L) | | pH (units) | | Cond. (µs/cm) | | Mortality |
| | | | Init. | Final | Init. | Final | Init. | Final | Init. | Final | % |
| PLCS | Oct 12, 2017 | 100 | 14.3 | 15.9 | 9.3 | 9.6 | 7.0 | 8.0 | 293 | 300 | 0 |
| | | 0 | 15.0 | 16.0 | 9.3 | 9.2 | 7.0 | 6.6 | 88 | 94 | 0 |
| SLCS | Oct 12, 2017 | 100 | 14.3 | 16.0 | 9.5 | 9.4 | 6.8 | 8.0 | 593 | 487 | 0 |
| | | 0 | 15.0 | 16.0 | 9.8 | 9.2 | 7.0 | 6.6 | 88 | 94 | 0 |

**Notes:**

Analysis completed by Petroforma Laboratory in Paradise, NL.

* 96-hour LT50 bioassay. Reference Method: For Determining Acute Lethality of Effluents to Rainbow Trout (Report EPS 1/RM/13 Second Edition-December 2000, May 2007 and February 2016 amendments).

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System

# Appendices

# Appendix A
# Site Photographs


Photo 1 - View, looking west, showing MW93-1 and MW93-1A during the October 2017 monitoring event.


Photo 2 - View, looking north, showing MW93-2 and MW93-2A during the October 2017 monitoring event.

# Site Photographs


Photo 3 - View, looking northeast, showing MW10-1 and MW10-1A during the October 2017 monitoring event.

Photo 4 - View, looking northeast, showing the upgradient surface water sample location (SURFACE-UP).

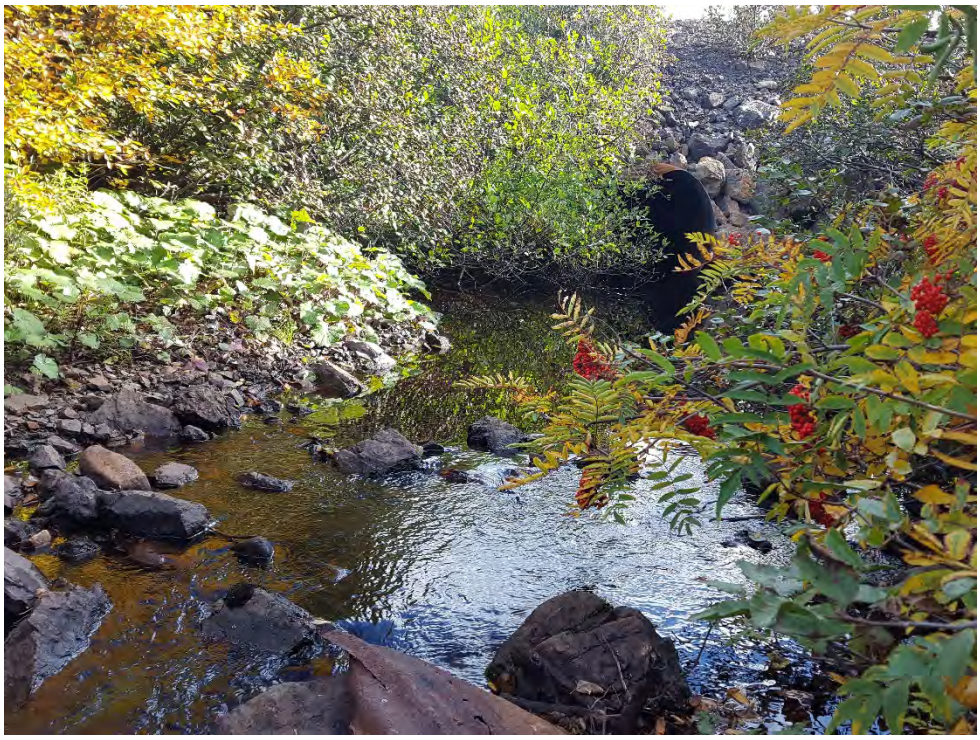


Photo 5 - View, looking east, showing the downgradient surface water sample location (SURFACE-DOWN).


Photo 6 - View, looking east, showing the PLCS and SLCS chambers during the October 2017 monitoring event.

## Site Photographs

Photo 7 - View, looking north, from the top of the landfill during the inspection and survey of the cap in November 2017.

Photo 8 - View, looking east, from the top of the landfill during the inspection and survey of the cap in November 2017.

Photo 9 - View, looking south, from the top of the landfill during the inspection and survey of the cap in November 2017.

Photo 10 - View, looking west, from the top of the landfill during the inspection and survey of the cap in November 2017.

Photo 11 - View of groundwater drainage system clean out CO2. Note the 4” drain cap is damaged.

Photo 12 - View of groundwater drainage system clean out CO4. Note the 4” drain cap is damaged.

Photo 13 - View, looking east, showing the groundwater drainage system outflow with rodent screen attached.


Photo 14 - View, looking west, while pumping leachate from the PLCS and SLCS chambers in November 2017.

# Appendix B
# Laboratory Certificates of Analyses

Maxxam
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Your P.O. #: 73509542
Your Project #: 084308-02
Site Location: Come By Chance, NL
Your C.O.C. #: 14886

**Attention:Brian Luffman**

GHD Limited
St.John's
1118 Topsail Road
St. John's, NL, NL
CANADA A1B 3N7

**Report Date: 2017/10/26**
Report #: R4804105
Version: 2 - Revision

# CERTIFICATE OF ANALYSIS – REVISED REPORT

**MAXXAM JOB #: B7M7761**
**Received: 2017/10/16, 09:18**

Sample Matrix: Water
# Samples Received: 12

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Carbonate, Bicarbonate and Hydroxide | 2 | N/A | 2017/10/18 | N/A | SM 22 4500-CO2 D |
| Carbonate, Bicarbonate and Hydroxide | 10 | N/A | 2017/10/20 | N/A | SM 22 4500-CO2 D |
| Alkalinity | 6 | N/A | 2017/10/19 | ATL SOP 00013 | EPA 310.2 R1974 m |
| Alkalinity | 6 | N/A | 2017/10/20 | ATL SOP 00013 | EPA 310.2 R1974 m |
| Benzo(b/j)fluoranthene Sum (water) | 8 | N/A | 2017/10/20 | N/A | Auto Calc. |
| Benzo(b/j)fluoranthene Sum (water) | 4 | N/A | 2017/10/23 | N/A | Auto Calc. |
| Carbonaceous BOD | 2 | 2017/10/18 | 2017/10/23 | ATL SOP 00041 | SM 22 5210B m |
| Chloride | 6 | N/A | 2017/10/20 | ATL SOP 00014 | SM 22 4500-Cl- E m |
| Chloride | 6 | N/A | 2017/10/23 | ATL SOP 00014 | SM 22 4500-Cl- E m |
| Str. Acid Diss. Cyanide water (2) | 2 | N/A | 2017/10/18 | ATL SOP 00040 | EPA 335.3 m |
| Colour | 6 | N/A | 2017/10/19 | ATL SOP 00020 | SM 22 2120C m |
| Colour | 6 | N/A | 2017/10/23 | ATL SOP 00020 | SM 22 2120C m |
| Chromium 3+ by calculation | 5 | 2017/10/16 | 2017/10/24 | N/A | Auto Calc. |
| Chromium (VI) in Water (1) | 5 | N/A | 2017/10/23 | CAM SOP-00436 | EPA 7199 m |
| Conductance - water | 2 | N/A | 2017/10/18 | ATL SOP 00004 | SM 22 2510B m |
| Conductance - water | 10 | N/A | 2017/10/19 | ATL SOP 00004 | SM 22 2510B m |
| TEH in Water (PIRI) | 1 | 2017/10/18 | 2017/10/18 | ATL SOP 00113 | Atl. RBCA v3.1 m |
| TEH in Water (PIRI) | 3 | 2017/10/18 | 2017/10/19 | ATL SOP 00113 | Atl. RBCA v3.1 m |
| TEH in Water (PIRI) | 8 | 2017/10/19 | 2017/10/20 | ATL SOP 00113 | Atl. RBCA v3.1 m |
| Hardness (calculated as CaCO3) | 12 | N/A | 2017/10/18 | ATL SOP 00048 | SM 22 2340 B |
| Mercury - Total (CVAA,LL) | 2 | 2017/10/18 | 2017/10/20 | ATL SOP 00026 | EPA 245.1 R3 m |
| Metals Water Diss. MS (as rec'd) | 9 | N/A | 2017/10/17 | ATL SOP 00058 | EPA 6020A R1 m |
| Metals Water Total MS | 5 | 2017/10/17 | 2017/10/18 | ATL SOP 00058 | EPA 6020A R1 m |
| Ion Balance (% Difference) | 6 | N/A | 2017/10/20 | N/A | Auto Calc. |
| Ion Balance (% Difference) | 6 | N/A | 2017/10/23 | N/A | Auto Calc. |
| Anion and Cation Sum | 12 | N/A | 2017/10/20 | N/A | Auto Calc. |
| Nitrogen Ammonia - water | 12 | N/A | 2017/10/19 | ATL SOP 00015 | EPA 350.1 R2 m |
| Nitrogen - Nitrate + Nitrite | 6 | N/A | 2017/10/19 | ATL SOP 00016 | USGS SOPINCF0452.2 m |
| Nitrogen - Nitrate + Nitrite | 6 | N/A | 2017/10/20 | ATL SOP 00016 | USGS SOPINCF0452.2 m |



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Your P.O. #: 73509542
Your Project #: 084308-02
Site Location: Come By Chance, NL
Your C.O.C. #: 14886

**Attention:Brian Luffman**

GHD Limited
St.John's
1118 Topsail Road
St. John's, NL, NL
CANADA A1B 3N7

**Report Date: 2017/10/26**
Report #: R4804105
Version: 2 - Revision

# CERTIFICATE OF ANALYSIS – REVISED REPORT

**MAXXAM JOB #: B7M7761**
**Received: 2017/10/16, 09:18**

Sample Matrix: Water
# Samples Received: 12

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| Nitrogen - Nitrite | 6 | N/A | 2017/10/20 | ATL SOP 00017 | SM 22 4500-NO2- B m |
| Nitrogen - Nitrite | 6 | N/A | 2017/10/23 | ATL SOP 00017 | SM 22 4500-NO2- B m |
| Nitrogen - Nitrate (as N) | 6 | N/A | 2017/10/20 | ATL SOP 00018 | ASTM D3867-16 |
| Nitrogen - Nitrate (as N) | 6 | N/A | 2017/10/23 | ATL SOP 00018 | ASTM D3867-16 |
| PAH in Water by GC/MS (SIM) | 8 | 2017/10/17 | 2017/10/20 | ATL SOP 00103 | EPA 8270D 2007 m |
| PAH in Water by GC/MS (SIM) | 4 | 2017/10/18 | 2017/10/21 | ATL SOP 00103 | EPA 8270D 2007 m |
| PCBs in water by GC/ECD | 4 | 2017/10/19 | 2017/10/20 | ATL SOP 00107 | EPA 8082A m |
| PCBs in water by GC/ECD | 8 | 2017/10/20 | 2017/10/24 | ATL SOP 00107 | EPA 8082A m |
| PCB Aroclor sum (water) | 4 | N/A | 2017/10/20 | N/A | Auto Calc. |
| PCB Aroclor sum (water) | 8 | N/A | 2017/10/24 | N/A | Auto Calc. |
| Phenols (4-AAP) | 2 | N/A | 2017/10/19 | ATL SOP 00039 | EPA 420.2 m |
| pH (3) | 2 | N/A | 2017/10/18 | ATL SOP 00003 | SM 22 4500-H+ B m |
| pH (3) | 10 | N/A | 2017/10/19 | ATL SOP 00003 | SM 22 4500-H+ B m |
| Phosphorus - ortho | 6 | N/A | 2017/10/19 | ATL SOP 00021 | SM 22 4500-P E m |
| Phosphorus - ortho | 6 | N/A | 2017/10/23 | ATL SOP 00021 | SM 22 4500-P E m |
| VPH in Water (PIRI) | 4 | N/A | 2017/10/17 | ATL SOP 00118 | Atl. RBCA v3.1 m |
| VPH in Water (PIRI) | 8 | N/A | 2017/10/18 | ATL SOP 00118 | Atl. RBCA v3.1 m |
| Sat. pH and Langelier Index (@ 20C) | 6 | N/A | 2017/10/20 | ATL SOP 00049 | Auto Calc. |
| Sat. pH and Langelier Index (@ 20C) | 6 | N/A | 2017/10/23 | ATL SOP 00049 | Auto Calc. |
| Sat. pH and Langelier Index (@ 4C) | 6 | N/A | 2017/10/20 | ATL SOP 00049 | Auto Calc. |
| Sat. pH and Langelier Index (@ 4C) | 6 | N/A | 2017/10/23 | ATL SOP 00049 | Auto Calc. |
| Reactive Silica | 6 | N/A | 2017/10/19 | ATL SOP 00022 | EPA 366.0 m |
| Reactive Silica | 6 | N/A | 2017/10/20 | ATL SOP 00022 | EPA 366.0 m |
| Sulphate | 6 | N/A | 2017/10/19 | ATL SOP 00023 | ASTM D516-16 m |
| Sulphate | 6 | N/A | 2017/10/20 | ATL SOP 00023 | ASTM D516-16 m |
| Sulphide (1) | 2 | N/A | 2017/10/18 | CAM SOP-00455 | SM 22 4500-S G m |
| Total Dissolved Solids (TDS calc) | 6 | N/A | 2017/10/20 | N/A | Auto Calc. |
| Total Dissolved Solids (TDS calc) | 6 | N/A | 2017/10/23 | N/A | Auto Calc. |
| Organic carbon - Total (TOC) (4) | 12 | N/A | 2017/10/23 | ATL SOP 00037 | SM 22 5310C m |

Your P.O. #: 73509542
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1118 Topsail Road
St. John's, NL, NL
CANADA A1B 3N7

**Report Date: 2017/10/26**
Report #: R4804105
Version: 2 - Revision

# CERTIFICATE OF ANALYSIS – REVISED REPORT

**MAXXAM JOB #: B7M7761**
**Received: 2017/10/16, 09:18**

Sample Matrix: Water
# Samples Received: 12

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Reference |
|---|---|---|---|---|---|
| ModTPH (T1) Calc. for Water | 1 | N/A | 2017/10/19 | N/A | Atl. RBCA v3 m |
| ModTPH (T1) Calc. for Water | 11 | N/A | 2017/10/20 | N/A | Atl. RBCA v3 m |
| Total Suspended Solids | 2 | 2017/10/18 | 2017/10/24 | ATL SOP 00007 | SM 22 2540D m |
| Turbidity | 8 | N/A | 2017/10/18 | ATL SOP 00011 | EPA 180.1 R2 m |
| Turbidity | 4 | N/A | 2017/10/19 | ATL SOP 00011 | EPA 180.1 R2 m |
| Volatile Organic Compounds in Water | 12 | N/A | 2017/10/18 | ATL SOP 00133 | EPA 8260C R3 m |

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Analytics Mississauga
(2) Strong acid dissociable cyanide value may include contribution from thiocyanate.
(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.
(4) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Your P.O. #: 73509542
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**Report Date: 2017/10/26**
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# CERTIFICATE OF ANALYSIS – REVISED REPORT

**MAXXAM JOB #: B7M7761**
**Received: 2017/10/16, 09:18**

Encryption Key Sara Mason
Sara Mason
Project Manager Assistant
26 Oct 2017 09:59:12

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: HMacumber@maxxam.ca
Phone# (902)420-0203 Ext:226

==========

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 #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## RBCA HYDROCARBONS IN WATER (WATER)

| Maxxam ID | | FIE812 | FIE812 | FIE813 | | FIE814 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 11:20 | 2017/10/12 11:20 | 2017/10/12 11:18 | | 2017/10/12 14:00 | | |
| COC Number | | 14886 | 14886 | 14886 | | 14886 | | |
| | UNITS | PLCS | PLCS Lab-Dup | SLCS | QC Batch | MW93-1 | RDL | QC Batch |
| **Petroleum Hydrocarbons** | | | | | | | | |
| Benzene | mg/L | <0.0010 | | <0.0010 | 5215386 | <0.0010 | 0.0010 | 5215386 |
| Toluene | mg/L | <0.0010 | | <0.0010 | 5215386 | <0.0010 | 0.0010 | 5215386 |
| Ethylbenzene | mg/L | <0.0010 | | <0.0010 | 5215386 | <0.0010 | 0.0010 | 5215386 |
| Total Xylenes | mg/L | <0.0020 | | <0.0020 | 5215386 | <0.0020 | 0.0020 | 5215386 |
| C6 - C10 (less BTEX) | mg/L | <0.010 | | <0.010 | 5215386 | <0.010 | 0.010 | 5215386 |
| >C10-C16 Hydrocarbons | mg/L | <0.050 | <0.050 | <0.050 | 5217584 | <0.050 | 0.050 | 5217454 |
| >C16-C21 Hydrocarbons | mg/L | 0.067 | 0.056 | <0.050 | 5217584 | <0.050 | 0.050 | 5217454 |
| >C21-<C32 Hydrocarbons | mg/L | 0.17 | 0.17 | <0.10 | 5217584 | <0.10 | 0.10 | 5217454 |
| Modified TPH (Tier1) | mg/L | 0.24 | | <0.10 | 5213153 | <0.10 | 0.10 | 5213153 |
| Reached Baseline at C32 | mg/L | Yes | | NA | 5217584 | NA | N/A | 5217454 |
| Hydrocarbon Resemblance | mg/L | COMMENT (1) | | NA | 5217584 | NA | N/A | 5217454 |
| **Surrogate Recovery (%)** | | | | | | | | |
| Isobutylbenzene - Extractable | % | 107 | 89 | 95 | 5217584 | 97 | | 5217454 |
| n-Dotriacontane - Extractable | % | 103 | 93 | 100 | 5217584 | 115 | | 5217454 |
| Isobutylbenzene - Volatile | % | 82 | | 82 | 5215386 | 80 | | 5215386 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) One product in fuel / lube range.



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## RBCA HYDROCARBONS IN WATER (WATER)

| Maxxam ID | | FIE815 | | FIE816 | FIE817 | FIE818 | FIE819 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 13:27 | | 2017/10/12 16:02 | 2017/10/12 15:43 | 2017/10/12 09:40 | 2017/10/12 10:45 | | |
| COC Number | | 14886 | | 14886 | 14886 | 14886 | 14886 | | |
| | UNITS | MW93-1A | QC Batch | MW93-2 | MW93-2A | MW10-1 | MW10-1A | RDL | QC Batch |
| **Petroleum Hydrocarbons** | | | | | | | | | |
| Benzene | mg/L | <0.0010 | 5215386 | <0.0010 | <0.0010 | <0.0010 | <0.0010 | 0.0010 | 5215386 |
| Toluene | mg/L | <0.0010 | 5215386 | <0.0010 | <0.0010 | <0.0010 | <0.0010 | 0.0010 | 5215386 |
| Ethylbenzene | mg/L | <0.0010 | 5215386 | <0.0010 | <0.0010 | <0.0010 | <0.0010 | 0.0010 | 5215386 |
| Total Xylenes | mg/L | <0.0020 | 5215386 | <0.0020 | <0.0020 | <0.0020 | <0.0020 | 0.0020 | 5215386 |
| C6 - C10 (less BTEX) | mg/L | <0.010 | 5215386 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215386 |
| >C10-C16 Hydrocarbons | mg/L | <0.050 | 5217584 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5219881 |
| >C16-C21 Hydrocarbons | mg/L | <0.050 | 5217584 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5219881 |
| >C21-<C32 Hydrocarbons | mg/L | <0.10 | 5217584 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5219881 |
| Modified TPH (Tier1) | mg/L | <0.10 | 5213153 | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5213153 |
| Reached Baseline at C32 | mg/L | NA | 5217584 | NA | NA | NA | NA | N/A | 5219881 |
| Hydrocarbon Resemblance | mg/L | NA | 5217584 | NA | NA | NA | NA | N/A | 5219881 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| Isobutylbenzene - Extractable | % | 90 | 5217584 | 99 | 101 | 99 | 101 | | 5219881 |
| n-Dotriacontane - Extractable | % | 98 | 5217584 | 115 | 116 | 110 | 118 | | 5219881 |
| Isobutylbenzene - Volatile | % | 83 | 5215386 | 79 | 80 | 80 | 81 | | 5215386 |

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



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## RBCA HYDROCARBONS IN WATER (WATER)

| Maxxam ID | | FIE820 | FIE821 | FIE822 | FIE823 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 15:55 | 2017/10/12 15:41 | 2017/10/12 10:08 | 2017/10/12 10:23 | | |
| COC Number | | 14886 | 14886 | 14886 | 14886 | | |
| | UNITS | MW-DUP | SURFACE-UP | SURFACE-DOWN | SURFACE-DUP | RDL | QC Batch |
| **Petroleum Hydrocarbons** | | | | | | | |
| Benzene | mg/L | <0.0010 | <0.0010 | <0.0010 | <0.0010 | 0.0010 | 5215386 |
| Toluene | mg/L | <0.0010 | <0.0010 | <0.0010 | <0.0010 | 0.0010 | 5215386 |
| Ethylbenzene | mg/L | <0.0010 | <0.0010 | <0.0010 | <0.0010 | 0.0010 | 5215386 |
| Total Xylenes | mg/L | <0.0020 | <0.0020 | <0.0020 | <0.0020 | 0.0020 | 5215386 |
| C6 - C10 (less BTEX) | mg/L | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215386 |
| >C10-C16 Hydrocarbons | mg/L | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5219881 |
| >C16-C21 Hydrocarbons | mg/L | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5219881 |
| >C21-<C32 Hydrocarbons | mg/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5219881 |
| Modified TPH (Tier1) | mg/L | <0.10 | <0.10 | <0.10 | <0.10 | 0.10 | 5213153 |
| Reached Baseline at C32 | mg/L | NA | NA | NA | NA | N/A | 5219881 |
| Hydrocarbon Resemblance | mg/L | NA | NA | NA | NA | N/A | 5219881 |
| **Surrogate Recovery (%)** | | | | | | | |
| Isobutylbenzene - Extractable | % | 97 | 95 | 98 | 96 | | 5219881 |
| n-Dotriacontane - Extractable | % | 115 | 117 | 130 | 118 | | 5219881 |
| Isobutylbenzene - Volatile | % | 82 | 83 | 81 | 84 | | 5215386 |

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



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

| Maxxam ID | | FIE812 | | FIE813 | | | FIE821 | FIE821 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 11:20 | | 2017/10/12 11:18 | | | 2017/10/12 15:41 | 2017/10/12 15:41 | | |
| COC Number | | 14886 | | 14886 | | | 14886 | 14886 | | |
| | UNITS | PLCS | QC Batch | SLCS | RDL | QC Batch | SURFACE-UP | SURFACE-UP Lab-Dup | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | | | |
| Anion Sum | me/L | 3.98 | 5213207 | 7.85 | N/A | 5213207 | 0.940 | | N/A | 5213207 |
| Bicarb. Alkalinity (calc. as CaCO3) | mg/L | 170 | 5213214 | 340 | 1.0 | 5213214 | 18 | | 1.0 | 5213214 |
| Calculated TDS | mg/L | 220 | 5213212 | 410 | 1.0 | 5213212 | 53 | | 1.0 | 5213212 |
| Carb. Alkalinity (calc. as CaCO3) | mg/L | 1.4 | 5213214 | 2.7 | 1.0 | 5213214 | <1.0 | | 1.0 | 5213214 |
| Cation Sum | me/L | 3.92 | 5213207 | 7.24 | N/A | 5213207 | 0.900 | | N/A | 5213207 |
| Hardness (CaCO3) | mg/L | 150 | 5213205 | 280 | 1.0 | 5213205 | 18 | | 1.0 | 5213205 |
| Ion Balance (% Difference) | % | 0.760 | 5213206 | 4.04 | N/A | 5213206 | 2.17 | | N/A | 5213206 |
| Langelier Index (@ 20C) | N/A | 0.488 | 5213210 | 0.938 | | 5213210 | -1.96 | | | 5213210 |
| Langelier Index (@ 4C) | N/A | 0.238 | 5213211 | 0.690 | | 5213211 | -2.21 | | | 5213211 |
| Nitrate (N) | mg/L | 0.29 | 5213208 | 0.40 | 0.050 | 5213208 | <0.050 | | 0.050 | 5213208 |
| Saturation pH (@ 20C) | N/A | 7.46 | 5213210 | 6.98 | | 5213210 | 9.32 | | | 5213210 |
| Saturation pH (@ 4C) | N/A | 7.71 | 5213211 | 7.22 | | 5213211 | 9.57 | | | 5213211 |
| **Inorganics** | | | | | | | | | | |
| Total Alkalinity (Total as CaCO3) | mg/L | 170 | 5218088 | 350 | 25 | 5220710 | 18 | | 5.0 | 5220710 |
| Dissolved Chloride (Cl) | mg/L | 11 | 5218089 | 27 | 1.0 | 5220713 | 18 | | 1.0 | 5220713 |
| Colour | TCU | 22 | 5218095 | 12 | 5.0 | 5220717 | 41 | | 5.0 | 5220717 |
| Nitrate + Nitrite (N) | mg/L | 0.29 | 5218101 | 0.40 | 0.050 | 5220719 | <0.050 | | 0.050 | 5220719 |
| Nitrite (N) | mg/L | <0.010 | 5218103 | <0.010 | 0.010 | 5220721 | <0.010 | | 0.010 | 5220721 |
| Nitrogen (Ammonia Nitrogen) | mg/L | 0.32 | 5220040 | 0.30 | 0.050 | 5220040 | <0.050 | | 0.050 | 5220040 |
| Total Organic Carbon (C) | mg/L | 5.9 | 5225903 | 10 | 0.50 | 5225903 | 7.5 | 7.7 | 0.50 | 5226299 |
| Orthophosphate (P) | mg/L | <0.010 | 5218100 | <0.010 | 0.010 | 5220718 | <0.010 | | 0.010 | 5220718 |
| pH | pH | 7.95 | 5219841 | 7.91 | N/A | 5219841 | 7.36 | | N/A | 5219843 |
| Reactive Silica (SiO2) | mg/L | 9.5 | 5218093 | 13 | 0.50 | 5220715 | 1.8 | | 0.50 | 5220715 |
| Dissolved Sulphate (SO4) | mg/L | 13 | 5218091 | 6.4 | 2.0 | 5220714 | 2.8 | | 2.0 | 5220714 |
| Turbidity | NTU | 2.5 | 5217419 | 10 | 0.10 | 5217419 | 0.72 | | 0.10 | 5219880 |
| Conductivity | uS/cm | 380 | 5219842 | 680 | 1.0 | 5219842 | 120 | | 1.0 | 5219844 |
| **Metals** | | | | | | | | | | |
| Total Aluminum (Al) | ug/L | 42 | 5215272 | 17 | 5.0 | 5215272 | 43 | | 5.0 | 5215272 |
| Total Antimony (Sb) | ug/L | <1.0 | 5215272 | <1.0 | 1.0 | 5215272 | <1.0 | | 1.0 | 5215272 |
| Total Arsenic (As) | ug/L | <1.0 | 5215272 | <1.0 | 1.0 | 5215272 | <1.0 | | 1.0 | 5215272 |
| Total Barium (Ba) | ug/L | 17 | 5215272 | 31 | 1.0 | 5215272 | 6.9 | | 1.0 | 5215272 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

| Maxxam ID | | FIE812 | | FIE813 | | | FIE821 | FIE821 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 11:20 | | 2017/10/12 11:18 | | | 2017/10/12 15:41 | 2017/10/12 15:41 | | |
| COC Number | | 14886 | | 14886 | | | 14886 | 14886 | | |
| | UNITS | PLCS | QC Batch | SLCS | RDL | QC Batch | SURFACE-UP | SURFACE-UP Lab-Dup | RDL | QC Batch |
| Total Beryllium (Be) | ug/L | <1.0 | 5215272 | <1.0 | 1.0 | 5215272 | <1.0 | | 1.0 | 5215272 |
| Total Bismuth (Bi) | ug/L | <2.0 | 5215272 | <2.0 | 2.0 | 5215272 | <2.0 | | 2.0 | 5215272 |
| Total Boron (B) | ug/L | 370 | 5215272 | 1300 | 50 | 5215272 | <50 | | 50 | 5215272 |
| Total Cadmium (Cd) | ug/L | 0.015 | 5215272 | <0.010 | 0.010 | 5215272 | <0.010 | | 0.010 | 5215272 |
| Total Calcium (Ca) | ug/L | 50000 | 5215272 | 87000 | 100 | 5215272 | 5300 | | 100 | 5215272 |
| Total Chromium (Cr) | ug/L | <1.0 | 5215272 | <1.0 | 1.0 | 5215272 | <1.0 | | 1.0 | 5215272 |
| Total Cobalt (Co) | ug/L | <0.40 | 5215272 | 0.72 | 0.40 | 5215272 | <0.40 | | 0.40 | 5215272 |
| Total Copper (Cu) | ug/L | 4.0 | 5215272 | <2.0 | 2.0 | 5215272 | <2.0 | | 2.0 | 5215272 |
| Total Iron (Fe) | ug/L | 350 | 5215272 | 2700 | 50 | 5215272 | 420 | | 50 | 5215272 |
| Total Lead (Pb) | ug/L | <0.50 | 5215272 | <0.50 | 0.50 | 5215272 | <0.50 | | 0.50 | 5215272 |
| Total Magnesium (Mg) | ug/L | 4100 | 5215272 | 16000 | 100 | 5215272 | 1100 | | 100 | 5215272 |
| Total Manganese (Mn) | ug/L | 61 | 5215272 | 5200 | 2.0 | 5215272 | 85 | | 2.0 | 5215272 |
| Total Molybdenum (Mo) | ug/L | <2.0 | 5215272 | <2.0 | 2.0 | 5215272 | <2.0 | | 2.0 | 5215272 |
| Total Nickel (Ni) | ug/L | <2.0 | 5215272 | 2.2 | 2.0 | 5215272 | <2.0 | | 2.0 | 5215272 |
| Total Phosphorus (P) | ug/L | <100 | 5215272 | <100 | 100 | 5215272 | <100 | | 100 | 5215272 |
| Total Potassium (K) | ug/L | 17000 | 5215272 | 24000 | 100 | 5215272 | 340 | | 100 | 5215272 |
| Total Selenium (Se) | ug/L | <1.0 | 5215272 | <1.0 | 1.0 | 5215272 | <1.0 | | 1.0 | 5215272 |
| Total Silver (Ag) | ug/L | <0.10 | 5215272 | <0.10 | 0.10 | 5215272 | <0.10 | | 0.10 | 5215272 |
| Total Sodium (Na) | ug/L | 12000 | 5215272 | 20000 | 100 | 5215272 | 12000 | | 100 | 5215272 |
| Total Strontium (Sr) | ug/L | 110 | 5215272 | 230 | 2.0 | 5215272 | 17 | | 2.0 | 5215272 |
| Total Thallium (Tl) | ug/L | <0.10 | 5215272 | <0.10 | 0.10 | 5215272 | <0.10 | | 0.10 | 5215272 |
| Total Tin (Sn) | ug/L | <2.0 | 5215272 | <2.0 | 2.0 | 5215272 | <2.0 | | 2.0 | 5215272 |
| Total Titanium (Ti) | ug/L | 2.1 | 5215272 | <2.0 | 2.0 | 5215272 | <2.0 | | 2.0 | 5215272 |
| Total Uranium (U) | ug/L | 0.23 | 5215272 | 1.1 | 0.10 | 5215272 | <0.10 | | 0.10 | 5215272 |
| Total Vanadium (V) | ug/L | <2.0 | 5215272 | <2.0 | 2.0 | 5215272 | <2.0 | | 2.0 | 5215272 |
| Total Zinc (Zn) | ug/L | 8.2 | 5215272 | <5.0 | 5.0 | 5215272 | <5.0 | | 5.0 | 5215272 |

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



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

| Maxxam ID | | FIE822 | | FIE823 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 10:08 | | 2017/10/12 10:23 | | |
| COC Number | | 14886 | | 14886 | | |
| | UNITS | SURFACE-DOWN | QC Batch | SURFACE-DUP | RDL | QC Batch |
| **Calculated Parameters** | | | | | | |
| Anion Sum | me/L | 1.07 | 5213207 | 1.09 | N/A | 5213207 |
| Bicarb. Alkalinity (calc. as CaCO3) | mg/L | 21 | 5213214 | 22 | 1.0 | 5213214 |
| Calculated TDS | mg/L | 61 | 5213212 | 61 | 1.0 | 5213212 |
| Carb. Alkalinity (calc. as CaCO3) | mg/L | <1.0 | 5213214 | <1.0 | 1.0 | 5213214 |
| Cation Sum | me/L | 1.02 | 5213207 | 1.03 | N/A | 5213207 |
| Hardness (CaCO3) | mg/L | 21 | 5213205 | 21 | 1.0 | 5213205 |
| Ion Balance (% Difference) | % | 2.39 | 5213206 | 2.83 | N/A | 5213206 |
| Langelier Index (@ 20C) | N/A | -1.92 | 5213210 | -1.42 | | 5213210 |
| Langelier Index (@ 4C) | N/A | -2.17 | 5213211 | -1.67 | | 5213211 |
| Nitrate (N) | mg/L | <0.050 | 5213208 | <0.050 | 0.050 | 5213208 |
| Saturation pH (@ 20C) | N/A | 9.20 | 5213210 | 9.18 | | 5213210 |
| Saturation pH (@ 4C) | N/A | 9.45 | 5213211 | 9.43 | | 5213211 |
| **Inorganics** | | | | | | |
| Total Alkalinity (Total as CaCO3) | mg/L | 21 | 5220710 | 22 | 5.0 | 5220710 |
| Dissolved Chloride (Cl) | mg/L | 20 | 5220713 | 19 | 1.0 | 5220713 |
| Colour | TCU | 38 | 5220717 | 37 | 5.0 | 5220717 |
| Nitrate + Nitrite (N) | mg/L | <0.050 | 5220719 | <0.050 | 0.050 | 5220719 |
| Nitrite (N) | mg/L | <0.010 | 5220721 | <0.010 | 0.010 | 5220721 |
| Nitrogen (Ammonia Nitrogen) | mg/L | 0.23 | 5220040 | 0.13 | 0.050 | 5220045 |
| Total Organic Carbon (C) | mg/L | 7.3 | 5226299 | 7.3 | 0.50 | 5226299 |
| Orthophosphate (P) | mg/L | <0.010 | 5220718 | <0.010 | 0.010 | 5220718 |
| pH | pH | 7.28 | 5217403 | 7.76 | N/A | 5219843 |
| Reactive Silica (SiO2) | mg/L | 2.1 | 5220715 | 2.1 | 0.50 | 5220715 |
| Dissolved Sulphate (SO4) | mg/L | 4.8 | 5220714 | 4.9 | 2.0 | 5220714 |
| Turbidity | NTU | 0.55 | 5219880 | 0.73 | 0.10 | 5219880 |
| Conductivity | uS/cm | 110 | 5217404 | 140 | 1.0 | 5219844 |
| **Metals** | | | | | | |
| Total Aluminum (Al) | ug/L | 61 | 5215272 | 62 | 5.0 | 5215272 |
| Total Antimony (Sb) | ug/L | <1.0 | 5215272 | <1.0 | 1.0 | 5215272 |
| Total Arsenic (As) | ug/L | <1.0 | 5215272 | <1.0 | 1.0 | 5215272 |
| Total Barium (Ba) | ug/L | 7.4 | 5215272 | 7.6 | 1.0 | 5215272 |
| Total Beryllium (Be) | ug/L | <1.0 | 5215272 | <1.0 | 1.0 | 5215272 |

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



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

| Maxxam ID | | FIE822 | | FIE823 | | |
|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 10:08 | | 2017/10/12 10:23 | | |
| COC Number | | 14886 | | 14886 | | |
| | UNITS | SURFACE-DOWN | QC Batch | SURFACE-DUP | RDL | QC Batch |
| Total Bismuth (Bi) | ug/L | <2.0 | 5215272 | <2.0 | 2.0 | 5215272 |
| Total Boron (B) | ug/L | <50 | 5215272 | <50 | 50 | 5215272 |
| Total Cadmium (Cd) | ug/L | <0.010 | 5215272 | <0.010 | 0.010 | 5215272 |
| Total Calcium (Ca) | ug/L | 6200 | 5215272 | 6300 | 100 | 5215272 |
| Total Chromium (Cr) | ug/L | <1.0 | 5215272 | <1.0 | 1.0 | 5215272 |
| Total Cobalt (Co) | ug/L | <0.40 | 5215272 | <0.40 | 0.40 | 5215272 |
| Total Copper (Cu) | ug/L | <2.0 | 5215272 | <2.0 | 2.0 | 5215272 |
| Total Iron (Fe) | ug/L | 300 | 5215272 | 310 | 50 | 5215272 |
| Total Lead (Pb) | ug/L | <0.50 | 5215272 | <0.50 | 0.50 | 5215272 |
| Total Magnesium (Mg) | ug/L | 1300 | 5215272 | 1300 | 100 | 5215272 |
| Total Manganese (Mn) | ug/L | 55 | 5215272 | 60 | 2.0 | 5215272 |
| Total Molybdenum (Mo) | ug/L | <2.0 | 5215272 | <2.0 | 2.0 | 5215272 |
| Total Nickel (Ni) | ug/L | <2.0 | 5215272 | <2.0 | 2.0 | 5215272 |
| Total Phosphorus (P) | ug/L | <100 | 5215272 | <100 | 100 | 5215272 |
| Total Potassium (K) | ug/L | 370 | 5215272 | 400 | 100 | 5215272 |
| Total Selenium (Se) | ug/L | <1.0 | 5215272 | <1.0 | 1.0 | 5215272 |
| Total Silver (Ag) | ug/L | <0.10 | 5215272 | <0.10 | 0.10 | 5215272 |
| Total Sodium (Na) | ug/L | 13000 | 5215272 | 13000 | 100 | 5215272 |
| Total Strontium (Sr) | ug/L | 20 | 5215272 | 19 | 2.0 | 5215272 |
| Total Thallium (Tl) | ug/L | <0.10 | 5215272 | <0.10 | 0.10 | 5215272 |
| Total Tin (Sn) | ug/L | <2.0 | 5215272 | <2.0 | 2.0 | 5215272 |
| Total Titanium (Ti) | ug/L | <2.0 | 5215272 | <2.0 | 2.0 | 5215272 |
| Total Uranium (U) | ug/L | <0.10 | 5215272 | <0.10 | 0.10 | 5215272 |
| Total Vanadium (V) | ug/L | <2.0 | 5215272 | <2.0 | 2.0 | 5215272 |
| Total Zinc (Zn) | ug/L | 37 | 5215272 | <5.0 | 5.0 | 5215272 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

| Maxxam ID | | FIE814 | | FIE815 | | FIE816 | | FIE817 | FIE817 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 14:00 | | 2017/10/12 13:27 | | 2017/10/12 16:02 | | 2017/10/12 15:43 | 2017/10/12 15:43 | | |
| COC Number | | 14886 | | 14886 | | 14886 | | 14886 | 14886 | | |
| | UNITS | MW93-1 | RDL | MW93-1A | RDL | MW93-2 | RDL | MW93-2A | MW93-2A Lab-Dup | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | | | | |
| Anion Sum | me/L | 6.38 | N/A | 7.19 | N/A | 5.79 | N/A | 1.88 | | N/A | 5213207 |
| Bicarb. Alkalinity (calc. as CaCO3) | mg/L | 250 | 1.0 | 310 | 1.0 | 220 | 1.0 | 17 | | 1.0 | 5213214 |
| Calculated TDS | mg/L | 330 | 1.0 | 380 | 1.0 | 320 | 1.0 | 130 | | 1.0 | 5213212 |
| Carb. Alkalinity (calc. as CaCO3) | mg/L | 2.9 | 1.0 | 3.4 | 1.0 | <1.0 | 1.0 | <1.0 | | 1.0 | 5213214 |
| Cation Sum | me/L | 5.62 | N/A | 7.09 | N/A | 5.61 | N/A | 1.88 | | N/A | 5213207 |
| Hardness (CaCO3) | mg/L | 130 | 1.0 | 190 | 1.0 | 230 | 1.0 | 43 | | 1.0 | 5213205 |
| Ion Balance (% Difference) | % | 6.33 | N/A | 0.700 | N/A | 1.58 | N/A | 0.00 | | N/A | 5213206 |
| Langelier Index (@ 20C) | N/A | 0.537 | | 0.792 | | 0.368 | | -3.09 | | | 5213210 |
| Langelier Index (@ 4C) | N/A | 0.288 | | 0.544 | | 0.119 | | -3.34 | | | 5213211 |
| Nitrate (N) | mg/L | <0.050 | 0.050 | <0.050 | 0.050 | <0.050 | 0.050 | <0.050 | | 0.050 | 5213208 |
| Saturation pH (@ 20C) | N/A | 7.54 | | 7.28 | | 7.24 | | 9.08 | | | 5213210 |
| Saturation pH (@ 4C) | N/A | 7.79 | | 7.53 | | 7.49 | | 9.33 | | | 5213211 |
| **Inorganics** | | | | | | | | | | | |
| Total Alkalinity (Total as CaCO3) | mg/L | 260 | 25 | 310 | 25 | 220 | 25 | 17 | | 5.0 | 5218088 |
| Dissolved Chloride (Cl) | mg/L | 30 | 1.0 | 11 | 1.0 | 16 | 1.0 | 28 | | 1.0 | 5218089 |
| Colour | TCU | <5.0 | 5.0 | <5.0 | 5.0 | <5.0 | 5.0 | 51 | | 25 | 5218095 |
| Nitrate + Nitrite (N) | mg/L | <0.050 | 0.050 | <0.050 | 0.050 | <0.050 | 0.050 | <0.050 | | 0.050 | 5218101 |
| Nitrite (N) | mg/L | <0.010 | 0.010 | <0.010 | 0.010 | <0.010 | 0.010 | <0.010 | | 0.010 | 5218103 |
| Nitrogen (Ammonia Nitrogen) | mg/L | <0.050 | 0.050 | <0.050 | 0.050 | <0.050 | 0.050 | 0.35 | 0.35 | 0.050 | 5220040 |
| Total Organic Carbon (C) | mg/L | 5.3 (1) | 5.0 | <5.0 (1) | 5.0 | 1.3 | 0.50 | 11 | | 0.50 | 5225903 |
| Orthophosphate (P) | mg/L | <0.010 | 0.010 | <0.010 | 0.010 | <0.010 | 0.010 | <0.010 | | 0.010 | 5218100 |
| pH | pH | 8.08 | N/A | 8.07 | N/A | 7.61 | N/A | 5.99 | | N/A | 5219841 |
| Reactive Silica (SiO2) | mg/L | 9.1 | 0.50 | 5.9 | 0.50 | 18 | 0.50 | 7.3 | | 0.50 | 5218093 |
| Dissolved Sulphate (SO4) | mg/L | 19 | 2.0 | 30 | 2.0 | 46 | 4.0 | 36 | | 2.0 | 5218091 |
| Turbidity | NTU | 47 | 0.10 | 690 | 1.0 | 1.7 | 0.10 | 40 | | 0.10 | 5217419 |
| Conductivity | uS/cm | 570 | 1.0 | 640 | 1.0 | 530 | 1.0 | 220 | | 1.0 | 5219842 |
| **Metals** | | | | | | | | | | | |
| Dissolved Aluminum (Al) | ug/L | 9.5 | 5.0 | 9.8 | 5.0 | 7.8 | 5.0 | 220 | | 5.0 | 5215126 |
| Dissolved Antimony (Sb) | ug/L | <1.0 | 1.0 | <1.0 | 1.0 | <1.0 | 1.0 | <1.0 | | 1.0 | 5215126 |
| Dissolved Arsenic (As) | ug/L | <1.0 | 1.0 | <1.0 | 1.0 | 2.3 | 1.0 | 1.2 | | 1.0 | 5215126 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Reporting limit was increased due to turbidity.



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

| Maxxam ID | | FIE814 | | FIE815 | | FIE816 | | FIE817 | FIE817 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 14:00 | | 2017/10/12 13:27 | | 2017/10/12 16:02 | | 2017/10/12 15:43 | 2017/10/12 15:43 | | |
| COC Number | | 14886 | | 14886 | | 14886 | | 14886 | 14886 | | |
| | UNITS | MW93-1 | RDL | MW93-1A | RDL | MW93-2 | RDL | MW93-2A | MW93-2A Lab-Dup | RDL | QC Batch |
| Dissolved Barium (Ba) | ug/L | 100 | 1.0 | 71 | 1.0 | 150 | 1.0 | 49 | | 1.0 | 5215126 |
| Dissolved Beryllium (Be) | ug/L | <1.0 | 1.0 | <1.0 | 1.0 | <1.0 | 1.0 | <1.0 | | 1.0 | 5215126 |
| Dissolved Bismuth (Bi) | ug/L | <2.0 | 2.0 | <2.0 | 2.0 | <2.0 | 2.0 | <2.0 | | 2.0 | 5215126 |
| Dissolved Boron (B) | ug/L | 120 | 50 | 79 | 50 | 1000 | 50 | 95 | | 50 | 5215126 |
| Dissolved Cadmium (Cd) | ug/L | <0.010 | 0.010 | 0.013 | 0.010 | <0.010 | 0.010 | 0.31 | | 0.010 | 5215126 |
| Dissolved Calcium (Ca) | ug/L | 30000 | 100 | 47000 | 100 | 70000 | 100 | 11000 | | 100 | 5215126 |
| Dissolved Chromium (Cr) | ug/L | <1.0 | 1.0 | <1.0 | 1.0 | <1.0 | 1.0 | <1.0 | | 1.0 | 5215126 |
| Dissolved Cobalt (Co) | ug/L | <0.40 | 0.40 | 1.0 | 0.40 | 0.40 | 0.40 | 2.2 | | 0.40 | 5215126 |
| Dissolved Copper (Cu) | ug/L | <2.0 | 2.0 | 3.0 | 2.0 | <2.0 | 2.0 | <2.0 | | 2.0 | 5215126 |
| Dissolved Iron (Fe) | ug/L | <50 | 50 | 110 | 50 | 120 | 50 | 8600 | | 50 | 5215126 |
| Dissolved Lead (Pb) | ug/L | <0.50 | 0.50 | <0.50 | 0.50 | <0.50 | 0.50 | <0.50 | | 0.50 | 5215126 |
| Dissolved Magnesium (Mg) | ug/L | 14000 | 100 | 17000 | 100 | 14000 | 100 | 3600 | | 100 | 5215126 |
| Dissolved Manganese (Mn) | ug/L | 87 | 2.0 | 140 | 2.0 | 1000 | 2.0 | 5100 | | 2.0 | 5215126 |
| Dissolved Molybdenum (Mo) | ug/L | 15 | 2.0 | 15 | 2.0 | <2.0 | 2.0 | <2.0 | | 2.0 | 5215126 |
| Dissolved Nickel (Ni) | ug/L | <2.0 | 2.0 | 2.0 | 2.0 | <2.0 | 2.0 | 2.3 | | 2.0 | 5215126 |
| Dissolved Phosphorus (P) | ug/L | <100 | 100 | <100 | 100 | <100 | 100 | <100 | | 100 | 5215126 |
| Dissolved Potassium (K) | ug/L | 1600 | 100 | 2500 | 100 | 1300 | 100 | 1300 | | 100 | 5215126 |
| Dissolved Selenium (Se) | ug/L | <1.0 | 1.0 | <1.0 | 1.0 | <1.0 | 1.0 | <1.0 | | 1.0 | 5215126 |
| Dissolved Silver (Ag) | ug/L | <0.10 | 0.10 | <0.10 | 0.10 | <0.10 | 0.10 | <0.10 | | 0.10 | 5215126 |
| Dissolved Sodium (Na) | ug/L | 68000 | 100 | 75000 | 100 | 22000 | 100 | 15000 | | 100 | 5215126 |
| Dissolved Strontium (Sr) | ug/L | 230 | 2.0 | 290 | 2.0 | 200 | 2.0 | 55 | | 2.0 | 5215126 |
| Dissolved Thallium (Tl) | ug/L | <0.10 | 0.10 | <0.10 | 0.10 | <0.10 | 0.10 | <0.10 | | 0.10 | 5215126 |
| Dissolved Tin (Sn) | ug/L | <2.0 | 2.0 | <2.0 | 2.0 | <2.0 | 2.0 | <2.0 | | 2.0 | 5215126 |
| Dissolved Titanium (Ti) | ug/L | <2.0 | 2.0 | <2.0 | 2.0 | <2.0 | 2.0 | <2.0 | | 2.0 | 5215126 |
| Dissolved Uranium (U) | ug/L | 0.28 | 0.10 | 2.4 | 0.10 | 0.20 | 0.10 | <0.10 | | 0.10 | 5215126 |
| Dissolved Vanadium (V) | ug/L | <2.0 | 2.0 | <2.0 | 2.0 | <2.0 | 2.0 | <2.0 | | 2.0 | 5215126 |
| Dissolved Zinc (Zn) | ug/L | <5.0 | 5.0 | 10 | 5.0 | 5.6 | 5.0 | 130 | | 5.0 | 5215126 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

| Maxxam ID | | FIE818 | | | FIE819 | | | FIE820 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 09:40 | | | 2017/10/12 10:45 | | | 2017/10/12 15:55 | | |
| COC Number | | 14886 | | | 14886 | | | 14886 | | |
| | UNITS | MW10-1 | RDL | QC Batch | MW10-1A | RDL | QC Batch | MW-DUP | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | | | |
| Anion Sum | me/L | 2.30 | N/A | 5213207 | 1.79 | N/A | 5213207 | 2.05 | N/A | 5213207 |
| Bicarb. Alkalinity (calc. as CaCO3) | mg/L | 92 | 1.0 | 5213214 | 67 | 1.0 | 5213214 | 25 | 1.0 | 5213214 |
| Calculated TDS | mg/L | 130 | 1.0 | 5213212 | 110 | 1.0 | 5213212 | 140 | 1.0 | 5213212 |
| Carb. Alkalinity (calc. as CaCO3) | mg/L | <1.0 | 1.0 | 5213214 | <1.0 | 1.0 | 5213214 | <1.0 | 1.0 | 5213214 |
| Cation Sum | me/L | 2.13 | N/A | 5213207 | 1.68 | N/A | 5213207 | 2.08 | N/A | 5213207 |
| Hardness (CaCO3) | mg/L | 90 | 1.0 | 5213205 | 65 | 1.0 | 5213205 | 52 | 1.0 | 5213205 |
| Ion Balance (% Difference) | % | 3.84 | N/A | 5213206 | 3.17 | N/A | 5213206 | 0.730 | N/A | 5213206 |
| Langelier Index (@ 20C) | N/A | -0.424 | | 5213210 | -0.898 | | 5213210 | -2.46 | | 5213210 |
| Langelier Index (@ 4C) | N/A | -0.675 | | 5213211 | -1.15 | | 5213211 | -2.71 | | 5213211 |
| Nitrate (N) | mg/L | <0.050 | 0.050 | 5213208 | 0.064 | 0.050 | 5213208 | <0.050 | 0.050 | 5213208 |
| Saturation pH (@ 20C) | N/A | 7.91 | | 5213210 | 8.19 | | 5213210 | 8.82 | | 5213210 |
| Saturation pH (@ 4C) | N/A | 8.16 | | 5213211 | 8.44 | | 5213211 | 9.07 | | 5213211 |
| **Inorganics** | | | | | | | | | | |
| Total Alkalinity (Total as CaCO3) | mg/L | 93 | 5.0 | 5218088 | 67 | 5.0 | 5220710 | 25 | 5.0 | 5220710 |
| Dissolved Chloride (Cl) | mg/L | 5.3 | 1.0 | 5218089 | 4.9 | 1.0 | 5220713 | 26 | 1.0 | 5220713 |
| Colour | TCU | 7.2 | 5.0 | 5218095 | 10 | 5.0 | 5220717 | 110 (1) | 25 | 5220717 |
| Nitrate + Nitrite (N) | mg/L | <0.050 | 0.050 | 5218101 | 0.064 | 0.050 | 5220719 | <0.050 | 0.050 | 5220719 |
| Nitrite (N) | mg/L | <0.010 | 0.010 | 5218103 | <0.010 | 0.010 | 5220721 | <0.010 | 0.010 | 5220721 |
| Nitrogen (Ammonia Nitrogen) | mg/L | <0.050 | 0.050 | 5220040 | 0.16 | 0.050 | 5220040 | 0.34 | 0.050 | 5220040 |
| Total Organic Carbon (C) | mg/L | 4.2 | 0.50 | 5225903 | <50 (2) | 50 | 5225903 | 10 | 0.50 | 5225903 |
| Orthophosphate (P) | mg/L | <0.010 | 0.010 | 5218100 | <0.010 | 0.010 | 5220718 | <0.010 | 0.010 | 5220718 |
| pH | pH | 7.48 | N/A | 5219843 | 7.29 | N/A | 5219841 | 6.37 | N/A | 5217403 |
| Reactive Silica (SiO2) | mg/L | 11 | 0.50 | 5218093 | 11 | 0.50 | 5220715 | 8.2 | 0.50 | 5220715 |
| Dissolved Sulphate (SO4) | mg/L | 14 | 2.0 | 5218091 | 14 | 2.0 | 5220714 | 39 | 2.0 | 5220714 |
| Turbidity | NTU | 38 | 0.10 | 5217419 | 800 | 1.0 | 5217419 | 35 | 0.10 | 5219880 |
| Conductivity | uS/cm | 230 | 1.0 | 5219844 | 160 | 1.0 | 5219842 | 230 | 1.0 | 5217404 |
| **Metals** | | | | | | | | | | |
| Dissolved Aluminum (Al) | ug/L | 8.5 | 5.0 | 5215126 | 17 | 5.0 | 5215126 | 180 | 5.0 | 5215126 |
| Dissolved Antimony (Sb) | ug/L | <1.0 | 1.0 | 5215126 | <1.0 | 1.0 | 5215126 | <1.0 | 1.0 | 5215126 |
| Dissolved Arsenic (As) | ug/L | <1.0 | 1.0 | 5215126 | <1.0 | 1.0 | 5215126 | 1.1 | 1.0 | 5215126 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to sample matrix.
(2) Reporting limit was increased due to turbidity.



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

| Maxxam ID | | FIE818 | | | FIE819 | | | FIE820 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 09:40 | | | 2017/10/12 10:45 | | | 2017/10/12 15:55 | | |
| COC Number | | 14886 | | | 14886 | | | 14886 | | |
| | UNITS | MW10-1 | RDL | QC Batch | MW10-1A | RDL | QC Batch | MW-DUP | RDL | QC Batch |
| Dissolved Barium (Ba) | ug/L | 37 | 1.0 | 5215126 | 40 | 1.0 | 5215126 | 51 | 1.0 | 5215126 |
| Dissolved Beryllium (Be) | ug/L | <1.0 | 1.0 | 5215126 | <1.0 | 1.0 | 5215126 | <1.0 | 1.0 | 5215126 |
| Dissolved Bismuth (Bi) | ug/L | <2.0 | 2.0 | 5215126 | <2.0 | 2.0 | 5215126 | <2.0 | 2.0 | 5215126 |
| Dissolved Boron (B) | ug/L | <50 | 50 | 5215126 | <50 | 50 | 5215126 | 150 | 50 | 5215126 |
| Dissolved Cadmium (Cd) | ug/L | 0.027 | 0.010 | 5215126 | 0.015 | 0.010 | 5215126 | 0.32 | 0.010 | 5215126 |
| Dissolved Calcium (Ca) | ug/L | 30000 | 100 | 5215126 | 21000 | 100 | 5215126 | 14000 | 100 | 5215126 |
| Dissolved Chromium (Cr) | ug/L | <1.0 | 1.0 | 5215126 | <1.0 | 1.0 | 5215126 | <1.0 | 1.0 | 5215126 |
| Dissolved Cobalt (Co) | ug/L | 3.3 | 0.40 | 5215126 | 5.0 | 0.40 | 5215126 | 2.3 | 0.40 | 5215126 |
| Dissolved Copper (Cu) | ug/L | 4.3 | 2.0 | 5215126 | 5.3 | 2.0 | 5215126 | <2.0 | 2.0 | 5215126 |
| Dissolved Iron (Fe) | ug/L | 1000 | 50 | 5215126 | 3600 | 50 | 5215126 | 8900 | 50 | 5215126 |
| Dissolved Lead (Pb) | ug/L | <0.50 | 0.50 | 5215126 | <0.50 | 0.50 | 5215126 | <0.50 | 0.50 | 5215126 |
| Dissolved Magnesium (Mg) | ug/L | 3500 | 100 | 5215126 | 2700 | 100 | 5215126 | 4200 | 100 | 5215126 |
| Dissolved Manganese (Mn) | ug/L | 310 | 2.0 | 5215126 | 530 | 2.0 | 5215126 | 5300 | 2.0 | 5215126 |
| Dissolved Molybdenum (Mo) | ug/L | <2.0 | 2.0 | 5215126 | <2.0 | 2.0 | 5215126 | <2.0 | 2.0 | 5215126 |
| Dissolved Nickel (Ni) | ug/L | 4.0 | 2.0 | 5215126 | 5.5 | 2.0 | 5215126 | 2.4 | 2.0 | 5215126 |
| Dissolved Phosphorus (P) | ug/L | <100 | 100 | 5215126 | <100 | 100 | 5215126 | <100 | 100 | 5215126 |
| Dissolved Potassium (K) | ug/L | 810 | 100 | 5215126 | 620 | 100 | 5215126 | 1300 | 100 | 5215126 |
| Dissolved Selenium (Se) | ug/L | <1.0 | 1.0 | 5215126 | <1.0 | 1.0 | 5215126 | <1.0 | 1.0 | 5215126 |
| Dissolved Silver (Ag) | ug/L | <0.10 | 0.10 | 5215126 | <0.10 | 0.10 | 5215126 | <0.10 | 0.10 | 5215126 |
| Dissolved Sodium (Na) | ug/L | 6100 | 100 | 5215126 | 5300 | 100 | 5215126 | 15000 | 100 | 5215126 |
| Dissolved Strontium (Sr) | ug/L | 68 | 2.0 | 5215126 | 53 | 2.0 | 5215126 | 61 | 2.0 | 5215126 |
| Dissolved Thallium (Tl) | ug/L | <0.10 | 0.10 | 5215126 | <0.10 | 0.10 | 5215126 | <0.10 | 0.10 | 5215126 |
| Dissolved Tin (Sn) | ug/L | <2.0 | 2.0 | 5215126 | <2.0 | 2.0 | 5215126 | <2.0 | 2.0 | 5215126 |
| Dissolved Titanium (Ti) | ug/L | <2.0 | 2.0 | 5215126 | <2.0 | 2.0 | 5215126 | <2.0 | 2.0 | 5215126 |
| Dissolved Uranium (U) | ug/L | 0.10 | 0.10 | 5215126 | <0.10 | 0.10 | 5215126 | <0.10 | 0.10 | 5215126 |
| Dissolved Vanadium (V) | ug/L | <2.0 | 2.0 | 5215126 | <2.0 | 2.0 | 5215126 | <2.0 | 2.0 | 5215126 |
| Dissolved Zinc (Zn) | ug/L | 13 | 5.0 | 5215126 | 7.3 | 5.0 | 5215126 | 140 | 5.0 | 5215126 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## ATLANTIC VOC IN WATER (WATER)

| Maxxam ID | | FIE812 | FIE812 | FIE813 | FIE814 | FIE815 | FIE816 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 11:20 | 2017/10/12 11:20 | 2017/10/12 11:18 | 2017/10/12 14:00 | 2017/10/12 13:27 | 2017/10/12 16:02 | | |
| COC Number | | 14886 | 14886 | 14886 | 14886 | 14886 | 14886 | | |
| | UNITS | PLCS | PLCS Lab-Dup | SLCS | MW93-1 | MW93-1A | MW93-2 | RDL | QC Batch |
| **Chlorobenzenes** | | | | | | | | | |
| 1,2-Dichlorobenzene | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| 1,3-Dichlorobenzene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| 1,4-Dichlorobenzene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Chlorobenzene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| **Volatile Organics** | | | | | | | | | |
| 1,1,1-Trichloroethane | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| 1,1,2,2-Tetrachloroethane | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| 1,1,2-Trichloroethane | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| 1,1-Dichloroethane | ug/L | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | 2.0 | 5215463 |
| 1,1-Dichloroethylene | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| 1,2-Dichloroethane | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| 1,2-Dichloropropane | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| Benzene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Bromodichloromethane | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Bromoform | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Bromomethane | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| Carbon Tetrachloride | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| Chloroethane | ug/L | <8.0 | <8.0 | <8.0 | <8.0 | <8.0 | <8.0 | 8.0 | 5215463 |
| Chloroform | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Chloromethane | ug/L | <8.0 | <8.0 | <8.0 | <8.0 | <8.0 | <8.0 | 8.0 | 5215463 |
| cis-1,2-Dichloroethylene | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| cis-1,3-Dichloropropene | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| Dibromochloromethane | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Ethylbenzene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Ethylene Dibromide | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5215463 |
| Methylene Chloride(Dichloromethane) | ug/L | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 | 3.0 | 5215463 |
| o-Xylene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| p+m-Xylene | ug/L | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | 2.0 | 5215463 |
| Styrene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Tetrachloroethylene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Toluene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| trans-1,2-Dichloroethylene | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## ATLANTIC VOC IN WATER (WATER)

| Maxxam ID | | FIE812 | FIE812 | FIE813 | FIE814 | FIE815 | FIE816 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 11:20 | 2017/10/12 11:20 | 2017/10/12 11:18 | 2017/10/12 14:00 | 2017/10/12 13:27 | 2017/10/12 16:02 | | |
| COC Number | | 14886 | 14886 | 14886 | 14886 | 14886 | 14886 | | |
| | UNITS | PLCS | PLCS Lab-Dup | SLCS | MW93-1 | MW93-1A | MW93-2 | RDL | QC Batch |
| trans-1,3-Dichloropropene | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| Trichloroethylene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Trichlorofluoromethane (FREON 11) | ug/L | <8.0 | <8.0 | <8.0 | <8.0 | <8.0 | <8.0 | 8.0 | 5215463 |
| Vinyl Chloride | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| 4-Bromofluorobenzene | % | 98 | 97 | 98 | 99 | 97 | 97 | | 5215463 |
| D4-1,2-Dichloroethane | % | 98 | 108 | 99 | 100 | 103 | 106 | | 5215463 |
| D8-Toluene | % | 98 | 96 | 97 | 98 | 97 | 97 | | 5215463 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## ATLANTIC VOC IN WATER (WATER)

| Maxxam ID | | FIE817 | FIE818 | FIE819 | FIE820 | FIE821 | FIE822 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 15:43 | 2017/10/12 09:40 | 2017/10/12 10:45 | 2017/10/12 15:55 | 2017/10/12 15:41 | 2017/10/12 10:08 | | |
| COC Number | | 14886 | 14886 | 14886 | 14886 | 14886 | 14886 | | |
| | UNITS | MW93-2A | MW10-1 | MW10-1A | MW-DUP | SURFACE-UP | SURFACE-DOWN | RDL | QC Batch |
| **Chlorobenzenes** | | | | | | | | | |
| 1,2-Dichlorobenzene | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| 1,3-Dichlorobenzene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| 1,4-Dichlorobenzene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Chlorobenzene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| **Volatile Organics** | | | | | | | | | |
| 1,1,1-Trichloroethane | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| 1,1,2,2-Tetrachloroethane | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| 1,1,2-Trichloroethane | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| 1,1-Dichloroethane | ug/L | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | 2.0 | 5215463 |
| 1,1-Dichloroethylene | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| 1,2-Dichloroethane | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| 1,2-Dichloropropane | ug/L | <0.50 | 10 | 5.6 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| Benzene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Bromodichloromethane | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Bromoform | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Bromomethane | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| Carbon Tetrachloride | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| Chloroethane | ug/L | <8.0 | <8.0 | <8.0 | <8.0 | <8.0 | <8.0 | 8.0 | 5215463 |
| Chloroform | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Chloromethane | ug/L | <8.0 | <8.0 | <8.0 | <8.0 | <8.0 | <8.0 | 8.0 | 5215463 |
| cis-1,2-Dichloroethylene | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| cis-1,3-Dichloropropene | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| Dibromochloromethane | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Ethylbenzene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Ethylene Dibromide | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5215463 |
| Methylene Chloride(Dichloromethane) | ug/L | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 | 3.0 | 5215463 |
| o-Xylene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| p+m-Xylene | ug/L | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | 2.0 | 5215463 |
| Styrene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Tetrachloroethylene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Toluene | ug/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| trans-1,2-Dichloroethylene | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| trans-1,3-Dichloropropene | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## ATLANTIC VOC IN WATER (WATER)

| Maxxam ID | | FIE817 | FIE818 | FIE819 | FIE820 | FIE821 | FIE822 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 15:43 | 2017/10/12 09:40 | 2017/10/12 10:45 | 2017/10/12 15:55 | 2017/10/12 15:41 | 2017/10/12 10:08 | | |
| COC Number | | 14886 | 14886 | 14886 | 14886 | 14886 | 14886 | | |
| | UNITS | MW93-2A | MW10-1 | MW10-1A | MW-DUP | SURFACE-UP | SURFACE-DOWN | RDL | QC Batch |
| Trichloroethylene | ug/L | <1.0 | 2.4 | <1.0 | <1.0 | <1.0 | <1.0 | 1.0 | 5215463 |
| Trichlorofluoromethane (FREON 11) | ug/L | <8.0 | <8.0 | <8.0 | <8.0 | <8.0 | <8.0 | 8.0 | 5215463 |
| Vinyl Chloride | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5215463 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| 4-Bromofluorobenzene | % | 96 | 97 | 97 | 97 | 96 | 97 | | 5215463 |
| D4-1,2-Dichloroethane | % | 112 | 102 | 103 | 102 | 106 | 103 | | 5215463 |
| D8-Toluene | % | 95 | 97 | 97 | 97 | 96 | 96 | | 5215463 |

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Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## ATLANTIC VOC IN WATER (WATER)

| Maxxam ID | | FIE823 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/10/12 10:23 | | |
| COC Number | | 14886 | | |
| | UNITS | SURFACE-DUP | RDL | QC Batch |
| **Chlorobenzenes** | | | | |
| 1,2-Dichlorobenzene | ug/L | <0.50 | 0.50 | 5215463 |
| 1,3-Dichlorobenzene | ug/L | <1.0 | 1.0 | 5215463 |
| 1,4-Dichlorobenzene | ug/L | <1.0 | 1.0 | 5215463 |
| Chlorobenzene | ug/L | <1.0 | 1.0 | 5215463 |
| **Volatile Organics** | | | | |
| 1,1,1-Trichloroethane | ug/L | <1.0 | 1.0 | 5215463 |
| 1,1,2,2-Tetrachloroethane | ug/L | <0.50 | 0.50 | 5215463 |
| 1,1,2-Trichloroethane | ug/L | <1.0 | 1.0 | 5215463 |
| 1,1-Dichloroethane | ug/L | <2.0 | 2.0 | 5215463 |
| 1,1-Dichloroethylene | ug/L | <0.50 | 0.50 | 5215463 |
| 1,2-Dichloroethane | ug/L | <1.0 | 1.0 | 5215463 |
| 1,2-Dichloropropane | ug/L | <0.50 | 0.50 | 5215463 |
| Benzene | ug/L | <1.0 | 1.0 | 5215463 |
| Bromodichloromethane | ug/L | <1.0 | 1.0 | 5215463 |
| Bromoform | ug/L | <1.0 | 1.0 | 5215463 |
| Bromomethane | ug/L | <0.50 | 0.50 | 5215463 |
| Carbon Tetrachloride | ug/L | <0.50 | 0.50 | 5215463 |
| Chloroethane | ug/L | <8.0 | 8.0 | 5215463 |
| Chloroform | ug/L | <1.0 | 1.0 | 5215463 |
| Chloromethane | ug/L | <8.0 | 8.0 | 5215463 |
| cis-1,2-Dichloroethylene | ug/L | <0.50 | 0.50 | 5215463 |
| cis-1,3-Dichloropropene | ug/L | <0.50 | 0.50 | 5215463 |
| Dibromochloromethane | ug/L | <1.0 | 1.0 | 5215463 |
| Ethylbenzene | ug/L | <1.0 | 1.0 | 5215463 |
| Ethylene Dibromide | ug/L | <0.20 | 0.20 | 5215463 |
| Methylene Chloride(Dichloromethane) | ug/L | <3.0 | 3.0 | 5215463 |
| o-Xylene | ug/L | <1.0 | 1.0 | 5215463 |
| p+m-Xylene | ug/L | <2.0 | 2.0 | 5215463 |
| Styrene | ug/L | <1.0 | 1.0 | 5215463 |
| Tetrachloroethylene | ug/L | <1.0 | 1.0 | 5215463 |
| Toluene | ug/L | <1.0 | 1.0 | 5215463 |
| trans-1,2-Dichloroethylene | ug/L | <0.50 | 0.50 | 5215463 |
| trans-1,3-Dichloropropene | ug/L | <0.50 | 0.50 | 5215463 |

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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## ATLANTIC VOC IN WATER (WATER)

| **Maxxam ID** | | FIE823 | | |
|---|---|---|---|---|
| **Sampling Date** | | 2017/10/12 10:23 | | |
| **COC Number** | | 14886 | | |
| | **UNITS** | **SURFACE-DUP** | **RDL** | **QC Batch** |
| Trichloroethylene | ug/L | <1.0 | 1.0 | 5215463 |
| Trichlorofluoromethane (FREON 11) | ug/L | <8.0 | 8.0 | 5215463 |
| Vinyl Chloride | ug/L | <0.50 | 0.50 | 5215463 |
| **Surrogate Recovery (%)** | | | | |
| 4-Bromofluorobenzene | % | 96 | | 5215463 |
| D4-1,2-Dichloroethane | % | 104 | | 5215463 |
| D8-Toluene | % | 97 | | 5215463 |

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Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## RESULTS OF ANALYSES OF WATER

| Maxxam ID | | FIE812 | | FIE813 | FIE821 | FIE822 | FIE823 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 11:20 | | 2017/10/12 11:18 | 2017/10/12 15:41 | 2017/10/12 10:08 | 2017/10/12 10:23 | | |
| COC Number | | 14886 | | 14886 | 14886 | 14886 | 14886 | | |
| | UNITS | PLCS | RDL | SLCS | SURFACE-UP | SURFACE-DOWN | SURFACE-DUP | RDL | QC Batch |
| **Calculated Parameters** | | | | | | | | | |
| Chromium (+3) | mg/L | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | 5213367 |
| **Inorganics** | | | | | | | | | |
| Carbonaceous BOD | mg/L | <5.0 | 5.0 | <5.0 | | | | 5.0 | 5215161 |
| Strong Acid Dissoc. Cyanide (CN) | mg/L | <0.0010 | 0.0010 | <0.0010 | | | | 0.0010 | 5218107 |
| Phenols-4AAP | mg/L | <0.0010 | 0.0010 | 0.0012 | | | | 0.0010 | 5220972 |
| Total Suspended Solids | mg/L | 6.4 | 1.0 | 12 | | | | 2.0 | 5217705 |
| Sulphide | mg/L | <0.020 | 0.020 | <0.020 | | | | 0.020 | 5218882 |

RDL = Reportable Detection Limit
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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## MERCURY BY COLD VAPOUR AA (WATER)

| Maxxam ID | | FIE812 | FIE813 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 11:20 | 2017/10/12 11:18 | | |
| COC Number | | 14886 | 14886 | | |
| | UNITS | PLCS | SLCS | RDL | QC Batch |
| **Metals** | | | | | |
| Total Mercury (Hg) | ug/L | <0.013 | <0.013 | 0.013 | 5217874 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## ELEMENTS BY ICP/MS (WATER)

| Maxxam ID | | FIE812 | FIE813 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 11:20 | 2017/10/12 11:18 | | |
| COC Number | | 14886 | 14886 | | |
| | UNITS | PLCS | SLCS | RDL | QC Batch |
| **Metals** | | | | | |
| Dissolved Aluminum (Al) | ug/L | 17 | 5.5 | 5.0 | 5215126 |
| Dissolved Antimony (Sb) | ug/L | <1.0 | <1.0 | 1.0 | 5215126 |
| Dissolved Arsenic (As) | ug/L | <1.0 | <1.0 | 1.0 | 5215126 |
| Dissolved Barium (Ba) | ug/L | 15 | 30 | 1.0 | 5215126 |
| Dissolved Beryllium (Be) | ug/L | <1.0 | <1.0 | 1.0 | 5215126 |
| Dissolved Bismuth (Bi) | ug/L | <2.0 | <2.0 | 2.0 | 5215126 |
| Dissolved Boron (B) | ug/L | 380 | 1300 | 50 | 5215126 |
| Dissolved Cadmium (Cd) | ug/L | <0.010 | <0.010 | 0.010 | 5215126 |
| Dissolved Calcium (Ca) | ug/L | 51000 | 86000 | 100 | 5215126 |
| Dissolved Chromium (Cr) | ug/L | <1.0 | <1.0 | 1.0 | 5215126 |
| Dissolved Cobalt (Co) | ug/L | <0.40 | 0.78 | 0.40 | 5215126 |
| Dissolved Copper (Cu) | ug/L | 2.2 | <2.0 | 2.0 | 5215126 |
| Dissolved Iron (Fe) | ug/L | <50 | 2300 | 50 | 5215126 |
| Dissolved Lead (Pb) | ug/L | <0.50 | <0.50 | 0.50 | 5215126 |
| Dissolved Magnesium (Mg) | ug/L | 4300 | 16000 | 100 | 5215126 |
| Dissolved Manganese (Mn) | ug/L | 54 | 5200 | 2.0 | 5215126 |
| Dissolved Molybdenum (Mo) | ug/L | <2.0 | <2.0 | 2.0 | 5215126 |
| Dissolved Nickel (Ni) | ug/L | <2.0 | 2.2 | 2.0 | 5215126 |
| Dissolved Phosphorus (P) | ug/L | <100 | <100 | 100 | 5215126 |
| Dissolved Potassium (K) | ug/L | 17000 | 23000 | 100 | 5215126 |
| Dissolved Selenium (Se) | ug/L | <1.0 | <1.0 | 1.0 | 5215126 |
| Dissolved Silver (Ag) | ug/L | <0.10 | <0.10 | 0.10 | 5215126 |
| Dissolved Sodium (Na) | ug/L | 13000 | 20000 | 100 | 5215126 |
| Dissolved Strontium (Sr) | ug/L | 120 | 230 | 2.0 | 5215126 |
| Dissolved Thallium (Tl) | ug/L | <0.10 | <0.10 | 0.10 | 5215126 |
| Dissolved Tin (Sn) | ug/L | <2.0 | <2.0 | 2.0 | 5215126 |
| Dissolved Titanium (Ti) | ug/L | <2.0 | <2.0 | 2.0 | 5215126 |
| Dissolved Uranium (U) | ug/L | 0.23 | 1.0 | 0.10 | 5215126 |
| Dissolved Vanadium (V) | ug/L | <2.0 | <2.0 | 2.0 | 5215126 |
| Dissolved Zinc (Zn) | ug/L | 12 | 6.3 | 5.0 | 5215126 |

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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Maxxam ID | | FIE812 | FIE813 | FIE821 | FIE822 | FIE823 | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 11:20 | 2017/10/12 11:18 | 2017/10/12 15:41 | 2017/10/12 10:08 | 2017/10/12 10:23 | | |
| COC Number | | 14886 | 14886 | 14886 | 14886 | 14886 | | |
| | UNITS | PLCS | SLCS | SURFACE-UP | SURFACE-DOWN | SURFACE-DUP | RDL | QC Batch |
| **Metals** | | | | | | | | |
| Chromium (VI) | ug/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 0.50 | 5218868 |

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Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

| Maxxam ID | | FIE812 | FIE813 | FIE814 | FIE815 | FIE816 | FIE817 | FIE818 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 11:20 | 2017/10/12 11:18 | 2017/10/12 14:00 | 2017/10/12 13:27 | 2017/10/12 16:02 | 2017/10/12 15:43 | 2017/10/12 09:40 | | |
| COC Number | | 14886 | 14886 | 14886 | 14886 | 14886 | 14886 | 14886 | | |
| | UNITS | PLCS | SLCS | MW93-1 | MW93-1A | MW93-2 | MW93-2A | MW10-1 | RDL | QC Batch |
| **Polyaromatic Hydrocarbons** | | | | | | | | | | |
| 1-Methylnaphthalene | ug/L | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5215197 |
| 2-Methylnaphthalene | ug/L | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5215197 |
| Acenaphthene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Acenaphthylene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Anthracene | ug/L | <0.010 | 0.018 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Benzo(a)anthracene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Benzo(a)pyrene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Benzo(b)fluoranthene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Benzo(b/j)fluoranthene | ug/L | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | <0.020 | 0.020 | 5213503 |
| Benzo(g,h,i)perylene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Benzo(j)fluoranthene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Benzo(k)fluoranthene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Chrysene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Dibenz(a,h)anthracene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Fluoranthene | ug/L | <0.010 | 0.037 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Fluorene | ug/L | <0.010 | 0.012 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Indeno(1,2,3-cd)pyrene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Naphthalene | ug/L | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5215197 |
| Perylene | ug/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| Phenanthrene | ug/L | <0.010 | 0.012 | <0.010 | <0.010 | <0.010 | 0.011 | <0.010 | 0.010 | 5215197 |
| Pyrene | ug/L | 0.012 | 0.14 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5215197 |
| **Surrogate Recovery (%)** | | | | | | | | | | |
| D10-Anthracene | % | 92 | 73 | 53 | 50 | 96 | 58 | 91 | | 5215197 |
| D14-Terphenyl | % | 101 | 82 | 76 | 60 | 103 | 62 | 93 | | 5215197 |
| D8-Acenaphthylene | % | 95 | 75 | 71 | 71 | 100 | 68 | 91 | | 5215197 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

| Maxxam ID | | FIE819 | | FIE820 | FIE820 | FIE821 | FIE822 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 10:45 | | 2017/10/12 15:55 | 2017/10/12 15:55 | 2017/10/12 15:41 | 2017/10/12 10:08 | | |
| COC Number | | 14886 | | 14886 | 14886 | 14886 | 14886 | | |
| | UNITS | MW10-1A | QC Batch | MW-DUP | MW-DUP Lab-Dup | SURFACE-UP | SURFACE-DOWN | RDL | QC Batch |
| **Polyaromatic Hydrocarbons** | | | | | | | | | |
| 1-Methylnaphthalene | ug/L | <0.050 | 5215197 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5217532 |
| 2-Methylnaphthalene | ug/L | <0.050 | 5215197 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5217532 |
| Acenaphthene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Acenaphthylene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Anthracene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Benzo(a)anthracene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Benzo(a)pyrene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Benzo(b)fluoranthene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Benzo(b/j)fluoranthene | ug/L | <0.020 | 5213503 | <0.020 | | <0.020 | <0.020 | 0.020 | 5213503 |
| Benzo(g,h,i)perylene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Benzo(j)fluoranthene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Benzo(k)fluoranthene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Chrysene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Dibenz(a,h)anthracene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Fluoranthene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Fluorene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Indeno(1,2,3-cd)pyrene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Naphthalene | ug/L | <0.20 | 5215197 | <0.20 | <0.20 | <0.20 | <0.20 | 0.20 | 5217532 |
| Perylene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Phenanthrene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| Pyrene | ug/L | <0.010 | 5215197 | <0.010 | <0.010 | <0.010 | <0.010 | 0.010 | 5217532 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| D10-Anthracene | % | 52 | 5215197 | 56 | 57 | 56 | 67 | | 5217532 |
| D14-Terphenyl | % | 62 | 5215197 | 52 | 56 | 64 | 62 | | 5217532 |
| D8-Acenaphthylene | % | 66 | 5215197 | 55 | 64 | 73 | 70 | | 5217532 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

| Maxxam ID | | FIE823 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/10/12 10:23 | | |
| COC Number | | 14886 | | |
| | UNITS | SURFACE-DUP | RDL | QC Batch |
| **Polyaromatic Hydrocarbons** | | | | |
| 1-Methylnaphthalene | ug/L | <0.050 | 0.050 | 5217532 |
| 2-Methylnaphthalene | ug/L | <0.050 | 0.050 | 5217532 |
| Acenaphthene | ug/L | <0.010 | 0.010 | 5217532 |
| Acenaphthylene | ug/L | <0.010 | 0.010 | 5217532 |
| Anthracene | ug/L | <0.010 | 0.010 | 5217532 |
| Benzo(a)anthracene | ug/L | <0.010 | 0.010 | 5217532 |
| Benzo(a)pyrene | ug/L | <0.010 | 0.010 | 5217532 |
| Benzo(b)fluoranthene | ug/L | <0.010 | 0.010 | 5217532 |
| Benzo(b/j)fluoranthene | ug/L | <0.020 | 0.020 | 5213503 |
| Benzo(g,h,i)perylene | ug/L | <0.010 | 0.010 | 5217532 |
| Benzo(j)fluoranthene | ug/L | <0.010 | 0.010 | 5217532 |
| Benzo(k)fluoranthene | ug/L | <0.010 | 0.010 | 5217532 |
| Chrysene | ug/L | <0.010 | 0.010 | 5217532 |
| Dibenz(a,h)anthracene | ug/L | <0.010 | 0.010 | 5217532 |
| Fluoranthene | ug/L | <0.010 | 0.010 | 5217532 |
| Fluorene | ug/L | <0.010 | 0.010 | 5217532 |
| Indeno(1,2,3-cd)pyrene | ug/L | <0.010 | 0.010 | 5217532 |
| Naphthalene | ug/L | <0.20 | 0.20 | 5217532 |
| Perylene | ug/L | <0.010 | 0.010 | 5217532 |
| Phenanthrene | ug/L | <0.010 | 0.010 | 5217532 |
| Pyrene | ug/L | <0.010 | 0.010 | 5217532 |
| **Surrogate Recovery (%)** | | | | |
| D10-Anthracene | % | 71 | | 5217532 |
| D14-Terphenyl | % | 64 | | 5217532 |
| D8-Acenaphthylene | % | 72 | | 5217532 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

| Maxxam ID | | FIE812 | FIE813 | FIE814 | FIE815 | FIE816 | FIE817 | FIE818 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 11:20 | 2017/10/12 11:18 | 2017/10/12 14:00 | 2017/10/12 13:27 | 2017/10/12 16:02 | 2017/10/12 15:43 | 2017/10/12 09:40 | | |
| COC Number | | 14886 | 14886 | 14886 | 14886 | 14886 | 14886 | 14886 | | |
| | UNITS | PLCS | SLCS | MW93-1 | MW93-1A | MW93-2 | MW93-2A | MW10-1 | RDL | QC Batch |
| **PCBs** | | | | | | | | | | |
| Aroclor 1016 | ug/L | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5222421 |
| Aroclor 1221 | ug/L | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5222421 |
| Aroclor 1232 | ug/L | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5222421 |
| Aroclor 1248 | ug/L | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5222421 |
| Aroclor 1242 | ug/L | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5222421 |
| Aroclor 1254 | ug/L | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5222421 |
| Aroclor 1260 | ug/L | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5222421 |
| Calculated Total PCB | ug/L | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5213504 |
| **Surrogate Recovery (%)** | | | | | | | | | | |
| Decachlorobiphenyl | % | 67 (1) | 70 (1) | 66 (2) | 58 (2) | 89 (3) | 72 (3) | 75 (2) | | 5222421 |

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

(1) PCB sample analysed past recommended hold time due to lab error.

(2) PCB sample analysed past recommended hold time due to lab error. PCB:Unidentified (possibly halogenated) compounds detected. PCB sample contained sediment.

(3) PCB sample analysed past recommended hold time due to lab error. PCB:Unidentified (possibly halogenated) compounds detected.



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

| Maxxam ID | | FIE819 | | FIE820 | FIE820 | FIE821 | FIE822 | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2017/10/12 10:45 | | 2017/10/12 15:55 | 2017/10/12 15:55 | 2017/10/12 15:41 | 2017/10/12 10:08 | | |
| COC Number | | 14886 | | 14886 | 14886 | 14886 | 14886 | | |
| | UNITS | MW10-1A | QC Batch | MW-DUP | MW-DUP Lab-Dup | SURFACE-UP | SURFACE-DOWN | RDL | QC Batch |
| **PCBs** | | | | | | | | | |
| Aroclor 1016 | ug/L | <0.050 | 5222421 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5219965 |
| Aroclor 1221 | ug/L | <0.050 | 5222421 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5219965 |
| Aroclor 1232 | ug/L | <0.050 | 5222421 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5219965 |
| Aroclor 1248 | ug/L | <0.050 | 5222421 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5219965 |
| Aroclor 1242 | ug/L | <0.050 | 5222421 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5219965 |
| Aroclor 1254 | ug/L | <0.050 | 5222421 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5219965 |
| Aroclor 1260 | ug/L | <0.050 | 5222421 | <0.050 | <0.050 | <0.050 | <0.050 | 0.050 | 5219965 |
| Calculated Total PCB | ug/L | <0.050 | 5213504 | <0.050 | | <0.050 | <0.050 | 0.050 | 5213504 |
| **Surrogate Recovery (%)** | | | | | | | | | |
| Decachlorobiphenyl | % | 52 (1) | 5222421 | 56 (2) | 61 (2) | 76 | 80 | | 5219965 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) PCB sample analysed past recommended hold time due to lab error. PCB:Unidentified (possibly halogenated) compounds detected. PCB sample contained sediment.
(2) PCB:Unidentified (possibly halogenated) compounds detected.

| Maxxam ID | | FIE823 | | |
|---|---|---|---|---|
| Sampling Date | | 2017/10/12 10:23 | | |
| COC Number | | 14886 | | |
| | UNITS | SURFACE-DUP | RDL | QC Batch |
| **PCBs** | | | | |
| Aroclor 1016 | ug/L | <0.050 | 0.050 | 5219965 |
| Aroclor 1221 | ug/L | <0.050 | 0.050 | 5219965 |
| Aroclor 1232 | ug/L | <0.050 | 0.050 | 5219965 |
| Aroclor 1248 | ug/L | <0.050 | 0.050 | 5219965 |
| Aroclor 1242 | ug/L | <0.050 | 0.050 | 5219965 |
| Aroclor 1254 | ug/L | <0.050 | 0.050 | 5219965 |
| Aroclor 1260 | ug/L | <0.050 | 0.050 | 5219965 |
| Calculated Total PCB | ug/L | <0.050 | 0.050 | 5213504 |
| **Surrogate Recovery (%)** | | | | |
| Decachlorobiphenyl | % | 82 | | 5219965 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## GENERAL COMMENTS

Samples PLCS and SLCS were received past the recommended hold tiome for BOD.

Poor RCAp Ion Balance due to sample matrix.

Revised report - the below samples were analyzed past the recommended hold time for PCBs due to lab error. HWS Oct 26/17

**Results relate only to the items tested.**



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

## QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | | QC Standard | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits | % Recovery | QC Limits |
| 5215197 | D10-Anthracene | 2017/10/18 | 59 | 50 - 130 | 96 | 50 - 130 | 104 | % | | | | |
| 5215197 | D14-Terphenyl | 2017/10/18 | 71 | 50 - 130 | 95 | 50 - 130 | 106 | % | | | | |
| 5215197 | D8-Acenaphthylene | 2017/10/18 | 64 | 50 - 130 | 98 | 50 - 130 | 95 | % | | | | |
| 5215386 | Isobutylbenzene - Volatile | 2017/10/17 | 83 | 70 - 130 | 82 | 70 - 130 | 83 | % | | | | |
| 5215463 | 4-Bromofluorobenzene | 2017/10/18 | 100 (2) | 70 - 130 | 100 | 70 - 130 | 98 | % | | | | |
| 5215463 | D4-1,2-Dichloroethane | 2017/10/18 | 103 (2) | 70 - 130 | 100 | 70 - 130 | 99 | % | | | | |
| 5215463 | D8-Toluene | 2017/10/18 | 98 (2) | 70 - 130 | 99 | 70 - 130 | 98 | % | | | | |
| 5217454 | Isobutylbenzene - Extractable | 2017/10/18 | 95 | 30 - 130 | 90 | 30 - 130 | 90 | % | | | | |
| 5217454 | n-Dotriacontane - Extractable | 2017/10/18 | 116 | 30 - 130 | 129 | 30 - 130 | 94 | % | | | | |
| 5217532 | D10-Anthracene | 2017/10/21 | 61 (4) | 50 - 130 | 79 | 50 - 130 | 92 | % | | | | |
| 5217532 | D14-Terphenyl | 2017/10/21 | 70 (4) | 50 - 130 | 79 | 50 - 130 | 93 | % | | | | |
| 5217532 | D8-Acenaphthylene | 2017/10/21 | 79 (4) | 50 - 130 | 91 | 50 - 130 | 88 | % | | | | |
| 5217584 | Isobutylbenzene - Extractable | 2017/10/19 | 93 (6) | 30 - 130 | 90 | 30 - 130 | 90 | % | | | | |
| 5217584 | n-Dotriacontane - Extractable | 2017/10/19 | 105 (6) | 30 - 130 | 98 | 30 - 130 | 93 | % | | | | |
| 5219881 | Isobutylbenzene - Extractable | 2017/10/20 | 96 | 30 - 130 | 92 | 30 - 130 | 97 | % | | | | |
| 5219881 | n-Dotriacontane - Extractable | 2017/10/20 | 123 | 30 - 130 | 118 | 30 - 130 | 112 | % | | | | |
| 5219965 | Decachlorobiphenyl | 2017/10/20 | 83 (9) | 30 - 130 | 89 | 30 - 130 | 87 | % | | | | |
| 5222421 | Decachlorobiphenyl | 2017/10/24 | 57 | 30 - 130 | 77 | 30 - 130 | 73 | % | | | | |
| 5215126 | Dissolved Aluminum (Al) | 2017/10/17 | 106 | 80 - 120 | 106 | 80 - 120 | <5.0 | ug/L | 0.23 (1) | 20 | | |
| 5215126 | Dissolved Antimony (Sb) | 2017/10/17 | 101 | 80 - 120 | 94 | 80 - 120 | <1.0 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Arsenic (As) | 2017/10/17 | 97 | 80 - 120 | 98 | 80 - 120 | <1.0 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Barium (Ba) | 2017/10/17 | NC | 80 - 120 | 95 | 80 - 120 | <1.0 | ug/L | 0.10 (1) | 20 | | |
| 5215126 | Dissolved Beryllium (Be) | 2017/10/17 | 96 | 80 - 120 | 98 | 80 - 120 | <1.0 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Bismuth (Bi) | 2017/10/17 | 102 | 80 - 120 | 103 | 80 - 120 | <2.0 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Boron (B) | 2017/10/17 | 99 | 80 - 120 | 101 | 80 - 120 | <50 | ug/L | 1.5 (1) | 20 | | |
| 5215126 | Dissolved Cadmium (Cd) | 2017/10/17 | 100 | 80 - 120 | 101 | 80 - 120 | <0.010 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Calcium (Ca) | 2017/10/17 | 101 | 80 - 120 | 102 | 80 - 120 | <100 | ug/L | 0.76 (1) | 20 | | |
| 5215126 | Dissolved Chromium (Cr) | 2017/10/17 | 97 | 80 - 120 | 99 | 80 - 120 | <1.0 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Cobalt (Co) | 2017/10/17 | 99 | 80 - 120 | 101 | 80 - 120 | <0.40 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Copper (Cu) | 2017/10/17 | 96 | 80 - 120 | 100 | 80 - 120 | <2.0 | ug/L | 1.4 (1) | 20 | | |



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

## QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | | QC Standard | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits | % Recovery | QC Limits |
| 5215126 | Dissolved Iron (Fe) | 2017/10/17 | NC | 80 - 120 | 107 | 80 - 120 | <50 | ug/L | 0.63 (1) | 20 | | |
| 5215126 | Dissolved Lead (Pb) | 2017/10/17 | 96 | 80 - 120 | 97 | 80 - 120 | <0.50 | ug/L | 3.0 (1) | 20 | | |
| 5215126 | Dissolved Magnesium (Mg) | 2017/10/17 | 103 | 80 - 120 | 107 | 80 - 120 | <100 | ug/L | 1.4 (1) | 20 | | |
| 5215126 | Dissolved Manganese (Mn) | 2017/10/17 | NC | 80 - 120 | 100 | 80 - 120 | <2.0 | ug/L | 1.3 (1) | 20 | | |
| 5215126 | Dissolved Molybdenum (Mo) | 2017/10/17 | 106 | 80 - 120 | 101 | 80 - 120 | <2.0 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Nickel (Ni) | 2017/10/17 | 98 | 80 - 120 | 100 | 80 - 120 | <2.0 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Phosphorus (P) | 2017/10/17 | 111 | 80 - 120 | 108 | 80 - 120 | <100 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Potassium (K) | 2017/10/17 | 110 | 80 - 120 | 108 | 80 - 120 | <100 | ug/L | 0.79 (1) | 20 | | |
| 5215126 | Dissolved Selenium (Se) | 2017/10/17 | 102 | 80 - 120 | 102 | 80 - 120 | <1.0 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Silver (Ag) | 2017/10/17 | 98 | 80 - 120 | 98 | 80 - 120 | <0.10 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Sodium (Na) | 2017/10/17 | 101 | 80 - 120 | 106 | 80 - 120 | <100 | ug/L | 0.77 (1) | 20 | | |
| 5215126 | Dissolved Strontium (Sr) | 2017/10/17 | NC | 80 - 120 | 101 | 80 - 120 | <2.0 | ug/L | 0.98 (1) | 20 | | |
| 5215126 | Dissolved Thallium (Tl) | 2017/10/17 | 103 | 80 - 120 | 104 | 80 - 120 | <0.10 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Tin (Sn) | 2017/10/17 | 105 | 80 - 120 | 102 | 80 - 120 | <2.0 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Titanium (Ti) | 2017/10/17 | 99 | 80 - 120 | 105 | 80 - 120 | <2.0 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Uranium (U) | 2017/10/17 | 103 | 80 - 120 | 105 | 80 - 120 | <0.10 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Vanadium (V) | 2017/10/17 | 98 | 80 - 120 | 99 | 80 - 120 | <2.0 | ug/L | NC (1) | 20 | | |
| 5215126 | Dissolved Zinc (Zn) | 2017/10/17 | 99 | 80 - 120 | 104 | 80 - 120 | <5.0 | ug/L | 5.4 (1) | 20 | | |
| 5215161 | Carbonaceous BOD | 2017/10/23 | | | 96 | 80 - 120 | <2.0 | mg/L | NC (1) | 25 | 112 | 80 - 120 |
| 5215197 | 1-Methylnaphthalene | 2017/10/18 | 64 | 30 - 130 | 91 | 30 - 130 | <0.050 | ug/L | NC (1) | 40 | | |
| 5215197 | 2-Methylnaphthalene | 2017/10/18 | 68 | 30 - 130 | 98 | 30 - 130 | <0.050 | ug/L | NC (1) | 40 | | |
| 5215197 | Acenaphthene | 2017/10/18 | 63 | 30 - 130 | 104 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Acenaphthylene | 2017/10/18 | 77 | 30 - 130 | 117 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Anthracene | 2017/10/18 | 58 | 30 - 130 | 113 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Benzo(a)anthracene | 2017/10/18 | 70 | 30 - 130 | 95 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Benzo(a)pyrene | 2017/10/18 | 67 | 30 - 130 | 96 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Benzo(b)fluoranthene | 2017/10/18 | 74 | 30 - 130 | 107 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Benzo(g,h,i)perylene | 2017/10/18 | 71 | 30 - 130 | 104 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Benzo(j)fluoranthene | 2017/10/18 | 71 | 30 - 130 | 100 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Benzo(k)fluoranthene | 2017/10/18 | 67 | 30 - 130 | 99 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

## QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | | QC Standard | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits | % Recovery | QC Limits |
| 5215197 | Chrysene | 2017/10/18 | 69 | 30 - 130 | 98 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Dibenz(a,h)anthracene | 2017/10/18 | 68 | 30 - 130 | 91 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Fluoranthene | 2017/10/18 | 73 | 30 - 130 | 93 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Fluorene | 2017/10/18 | 70 | 30 - 130 | 112 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Indeno(1,2,3-cd)pyrene | 2017/10/18 | 70 | 30 - 130 | 98 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Naphthalene | 2017/10/18 | 64 | 30 - 130 | 100 | 30 - 130 | <0.20 | ug/L | NC (1) | 40 | | |
| 5215197 | Perylene | 2017/10/18 | 69 | 30 - 130 | 100 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Phenanthrene | 2017/10/18 | 65 | 30 - 130 | 94 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215197 | Pyrene | 2017/10/18 | 70 | 30 - 130 | 97 | 30 - 130 | <0.010 | ug/L | NC (1) | 40 | | |
| 5215272 | Total Aluminum (Al) | 2017/10/18 | 99 | 80 - 120 | 101 | 80 - 120 | <5.0 | ug/L | | | | |
| 5215272 | Total Antimony (Sb) | 2017/10/18 | 101 | 80 - 120 | 99 | 80 - 120 | <1.0 | ug/L | | | | |
| 5215272 | Total Arsenic (As) | 2017/10/18 | 98 | 80 - 120 | 99 | 80 - 120 | <1.0 | ug/L | 9.5 (1) | 20 | | |
| 5215272 | Total Barium (Ba) | 2017/10/18 | 97 | 80 - 120 | 100 | 80 - 120 | <1.0 | ug/L | | | | |
| 5215272 | Total Beryllium (Be) | 2017/10/18 | 97 | 80 - 120 | 98 | 80 - 120 | <1.0 | ug/L | | | | |
| 5215272 | Total Bismuth (Bi) | 2017/10/18 | 103 | 80 - 120 | 105 | 80 - 120 | <2.0 | ug/L | | | | |
| 5215272 | Total Boron (B) | 2017/10/18 | 101 | 80 - 120 | 101 | 80 - 120 | <50 | ug/L | | | | |
| 5215272 | Total Cadmium (Cd) | 2017/10/18 | 102 | 80 - 120 | 102 | 80 - 120 | <0.010 | ug/L | | | | |
| 5215272 | Total Calcium (Ca) | 2017/10/18 | 106 | 80 - 120 | 107 | 80 - 120 | <100 | ug/L | | | | |
| 5215272 | Total Chromium (Cr) | 2017/10/18 | 99 | 80 - 120 | 102 | 80 - 120 | <1.0 | ug/L | | | | |
| 5215272 | Total Cobalt (Co) | 2017/10/18 | 101 | 80 - 120 | 103 | 80 - 120 | <0.40 | ug/L | | | | |
| 5215272 | Total Copper (Cu) | 2017/10/18 | 98 | 80 - 120 | 102 | 80 - 120 | <2.0 | ug/L | | | | |
| 5215272 | Total Iron (Fe) | 2017/10/18 | 103 | 80 - 120 | 106 | 80 - 120 | <50 | ug/L | | | | |
| 5215272 | Total Lead (Pb) | 2017/10/18 | 98 | 80 - 120 | 100 | 80 - 120 | <0.50 | ug/L | NC (1) | 20 | | |
| 5215272 | Total Magnesium (Mg) | 2017/10/18 | 100 | 80 - 120 | 101 | 80 - 120 | <100 | ug/L | | | | |
| 5215272 | Total Manganese (Mn) | 2017/10/18 | 100 | 80 - 120 | 103 | 80 - 120 | <2.0 | ug/L | | | | |
| 5215272 | Total Molybdenum (Mo) | 2017/10/18 | 104 | 80 - 120 | 105 | 80 - 120 | <2.0 | ug/L | | | | |
| 5215272 | Total Nickel (Ni) | 2017/10/18 | 101 | 80 - 120 | 104 | 80 - 120 | <2.0 | ug/L | | | | |
| 5215272 | Total Phosphorus (P) | 2017/10/18 | 104 | 80 - 120 | 104 | 80 - 120 | <100 | ug/L | | | | |
| 5215272 | Total Potassium (K) | 2017/10/18 | 105 | 80 - 120 | 106 | 80 - 120 | <100 | ug/L | | | | |
| 5215272 | Total Selenium (Se) | 2017/10/18 | 102 | 80 - 120 | 102 | 80 - 120 | <1.0 | ug/L | | | | |



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

## QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | | QC Standard | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits | % Recovery | QC Limits |
| 5215272 | Total Silver (Ag) | 2017/10/18 | 101 | 80 - 120 | 102 | 80 - 120 | <0.10 | ug/L | | | | |
| 5215272 | Total Sodium (Na) | 2017/10/18 | 99 | 80 - 120 | 101 | 80 - 120 | <100 | ug/L | | | | |
| 5215272 | Total Strontium (Sr) | 2017/10/18 | 100 | 80 - 120 | 104 | 80 - 120 | <2.0 | ug/L | | | | |
| 5215272 | Total Thallium (Tl) | 2017/10/18 | 104 | 80 - 120 | 106 | 80 - 120 | <0.10 | ug/L | | | | |
| 5215272 | Total Tin (Sn) | 2017/10/18 | 105 | 80 - 120 | 104 | 80 - 120 | <2.0 | ug/L | | | | |
| 5215272 | Total Titanium (Ti) | 2017/10/18 | 101 | 80 - 120 | 103 | 80 - 120 | <2.0 | ug/L | | | | |
| 5215272 | Total Uranium (U) | 2017/10/18 | 106 | 80 - 120 | 108 | 80 - 120 | <0.10 | ug/L | 3.1 (1) | 20 | | |
| 5215272 | Total Vanadium (V) | 2017/10/18 | 98 | 80 - 120 | 100 | 80 - 120 | <2.0 | ug/L | | | | |
| 5215272 | Total Zinc (Zn) | 2017/10/18 | 101 | 80 - 120 | 107 | 80 - 120 | <5.0 | ug/L | | | | |
| 5215386 | Benzene | 2017/10/17 | 112 | 70 - 130 | 113 | 70 - 130 | <0.0010 | mg/L | NC (1) | 40 | | |
| 5215386 | C6 - C10 (less BTEX) | 2017/10/17 | | | | | <0.010 | mg/L | NC (1) | 40 | | |
| 5215386 | Ethylbenzene | 2017/10/17 | 108 | 70 - 130 | 109 | 70 - 130 | <0.0010 | mg/L | NC (1) | 40 | | |
| 5215386 | Toluene | 2017/10/17 | 112 | 70 - 130 | 112 | 70 - 130 | <0.0010 | mg/L | NC (1) | 40 | | |
| 5215386 | Total Xylenes | 2017/10/17 | 107 | 70 - 130 | 108 | 70 - 130 | <0.0020 | mg/L | NC (1) | 40 | | |
| 5215463 | 1,1,1-Trichloroethane | 2017/10/18 | 102 (2) | 70 - 130 | 106 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | 1,1,2,2-Tetrachloroethane | 2017/10/18 | 102 (2) | 70 - 130 | 101 | 70 - 130 | <0.50 | ug/L | NC (3) | 40 | | |
| 5215463 | 1,1,2-Trichloroethane | 2017/10/18 | 103 (2) | 70 - 130 | 102 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | 1,1-Dichloroethane | 2017/10/18 | 102 (2) | 70 - 130 | 105 | 70 - 130 | <2.0 | ug/L | NC (3) | 40 | | |
| 5215463 | 1,1-Dichloroethylene | 2017/10/18 | 103 (2) | 70 - 130 | 107 | 70 - 130 | <0.50 | ug/L | NC (3) | 40 | | |
| 5215463 | 1,2-Dichlorobenzene | 2017/10/18 | 92 (2) | 70 - 130 | 95 | 70 - 130 | <0.50 | ug/L | NC (3) | 40 | | |
| 5215463 | 1,2-Dichloroethane | 2017/10/18 | 100 (2) | 70 - 130 | 101 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | 1,2-Dichloropropane | 2017/10/18 | 95 (2) | 70 - 130 | 98 | 70 - 130 | <0.50 | ug/L | NC (3) | 40 | | |
| 5215463 | 1,3-Dichlorobenzene | 2017/10/18 | 91 (2) | 70 - 130 | 96 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | 1,4-Dichlorobenzene | 2017/10/18 | 91 (2) | 70 - 130 | 96 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Benzene | 2017/10/18 | 96 (2) | 70 - 130 | 99 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Bromodichloromethane | 2017/10/18 | 100 (2) | 70 - 130 | 102 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Bromoform | 2017/10/18 | 106 (2) | 70 - 130 | 106 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Bromomethane | 2017/10/18 | 102 (2) | 60 - 140 | 101 | 60 - 140 | <0.50 | ug/L | NC (3) | 40 | | |
| 5215463 | Carbon Tetrachloride | 2017/10/18 | 101 (2) | 70 - 130 | 105 | 70 - 130 | <0.50 | ug/L | NC (3) | 40 | | |
| 5215463 | Chlorobenzene | 2017/10/18 | 93 (2) | 70 - 130 | 98 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |



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## QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | | QC Standard | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits | % Recovery | QC Limits |
| 5215463 | Chloroethane | 2017/10/18 | 91 (2) | 60 - 140 | 93 | 60 - 140 | <8.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Chloroform | 2017/10/18 | 91 (2) | 70 - 130 | 94 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Chloromethane | 2017/10/18 | 114 (2) | 60 - 140 | 72 | 60 - 140 | <8.0 | ug/L | NC (3) | 40 | | |
| 5215463 | cis-1,2-Dichloroethylene | 2017/10/18 | 106 (2) | 70 - 130 | 109 | 70 - 130 | <0.50 | ug/L | NC (3) | 40 | | |
| 5215463 | cis-1,3-Dichloropropene | 2017/10/18 | 105 (2) | 70 - 130 | 107 | 70 - 130 | <0.50 | ug/L | NC (3) | 40 | | |
| 5215463 | Dibromochloromethane | 2017/10/18 | 106 (2) | 70 - 130 | 107 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Ethylbenzene | 2017/10/18 | 99 (2) | 70 - 130 | 105 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Ethylene Dibromide | 2017/10/18 | 106 (2) | 70 - 130 | 106 | 70 - 130 | <0.20 | ug/L | NC (3) | 40 | | |
| 5215463 | Methylene Chloride(Dichloromethane) | 2017/10/18 | 105 (2) | 70 - 130 | 106 | 70 - 130 | <3.0 | ug/L | NC (3) | 40 | | |
| 5215463 | o-Xylene | 2017/10/18 | 101 (2) | 70 - 130 | 106 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | p+m-Xylene | 2017/10/18 | 102 (2) | 70 - 130 | 109 | 70 - 130 | <2.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Styrene | 2017/10/18 | 104 (2) | 70 - 130 | 110 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Tetrachloroethylene | 2017/10/18 | 101 (2) | 70 - 130 | 106 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Toluene | 2017/10/18 | 101 (2) | 70 - 130 | 106 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | trans-1,2-Dichloroethylene | 2017/10/18 | 102 (2) | 70 - 130 | 106 | 70 - 130 | <0.50 | ug/L | NC (3) | 40 | | |
| 5215463 | trans-1,3-Dichloropropene | 2017/10/18 | 96 (2) | 70 - 130 | 96 | 70 - 130 | <0.50 | ug/L | NC (3) | 40 | | |
| 5215463 | Trichloroethylene | 2017/10/18 | 102 (2) | 70 - 130 | 106 | 70 - 130 | <1.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Trichlorofluoromethane (FREON 11) | 2017/10/18 | 97 (2) | 60 - 140 | 99 | 60 - 140 | <8.0 | ug/L | NC (3) | 40 | | |
| 5215463 | Vinyl Chloride | 2017/10/18 | 102 (2) | 60 - 140 | 105 | 60 - 140 | <0.50 | ug/L | NC (3) | 40 | | |
| 5217403 | pH | 2017/10/18 | | | | | | | 4.2 (1) | N/A | 100 | 97 - 103 |
| 5217404 | Conductivity | 2017/10/18 | | | 106 | 80 - 120 | 1.3, RDL=1.0 | uS/cm | 0.11 (1) | 25 | | |
| 5217419 | Turbidity | 2017/10/18 | | | 92 | 80 - 120 | <0.10 | NTU | 9.1 (1) | 20 | 91 | 80 - 120 |
| 5217454 | >C10-C16 Hydrocarbons | 2017/10/18 | 93 | 70 - 130 | 87 | 70 - 130 | <0.050 | mg/L | NC (1) | 40 | | |
| 5217454 | >C16-C21 Hydrocarbons | 2017/10/18 | 91 | 70 - 130 | 83 | 70 - 130 | <0.050 | mg/L | NC (1) | 40 | | |
| 5217454 | >C21-<C32 Hydrocarbons | 2017/10/18 | 107 | 70 - 130 | 98 | 70 - 130 | <0.10 | mg/L | NC (1) | 40 | | |
| 5217532 | 1-Methylnaphthalene | 2017/10/21 | 85 (4) | 30 - 130 | 95 | 30 - 130 | <0.050 | ug/L | NC (5) | 40 | | |
| 5217532 | 2-Methylnaphthalene | 2017/10/21 | 93 (4) | 30 - 130 | 102 | 30 - 130 | <0.050 | ug/L | NC (5) | 40 | | |
| 5217532 | Acenaphthene | 2017/10/21 | 80 (4) | 30 - 130 | 91 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Acenaphthylene | 2017/10/21 | 95 (4) | 30 - 130 | 113 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Anthracene | 2017/10/21 | 82 (4) | 30 - 130 | 87 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |



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## QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | | QC Standard | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits | % Recovery | QC Limits |
| 5217532 | Benzo(a)anthracene | 2017/10/21 | 69 (4) | 30 - 130 | 80 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Benzo(a)pyrene | 2017/10/21 | 68 (4) | 30 - 130 | 95 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Benzo(b)fluoranthene | 2017/10/21 | 74 (4) | 30 - 130 | 97 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Benzo(g,h,i)perylene | 2017/10/21 | 72 (4) | 30 - 130 | 105 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Benzo(j)fluoranthene | 2017/10/21 | 76 (4) | 30 - 130 | 104 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Benzo(k)fluoranthene | 2017/10/21 | 72 (4) | 30 - 130 | 99 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Chrysene | 2017/10/21 | 68 (4) | 30 - 130 | 77 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Dibenz(a,h)anthracene | 2017/10/21 | 65 (4) | 30 - 130 | 96 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Fluoranthene | 2017/10/21 | 81 (4) | 30 - 130 | 90 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Fluorene | 2017/10/21 | 87 (4) | 30 - 130 | 102 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Indeno(1,2,3-cd)pyrene | 2017/10/21 | 69 (4) | 30 - 130 | 99 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Naphthalene | 2017/10/21 | 108 (4) | 30 - 130 | 99 | 30 - 130 | <0.20 | ug/L | NC (5) | 40 | | |
| 5217532 | Perylene | 2017/10/21 | 71 (4) | 30 - 130 | 99 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Phenanthrene | 2017/10/21 | 74 (4) | 30 - 130 | 92 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217532 | Pyrene | 2017/10/21 | 76 (4) | 30 - 130 | 84 | 30 - 130 | <0.010 | ug/L | NC (5) | 40 | | |
| 5217584 | >C10-C16 Hydrocarbons | 2017/10/19 | 88 (6) | 70 - 130 | 88 | 70 - 130 | <0.050 | mg/L | NC (7) | 40 | | |
| 5217584 | >C16-C21 Hydrocarbons | 2017/10/19 | 89 (6) | 70 - 130 | 91 | 70 - 130 | <0.050 | mg/L | 17 (7) | 40 | | |
| 5217584 | >C21-<C32 Hydrocarbons | 2017/10/19 | 101 (6) | 70 - 130 | 107 | 70 - 130 | <0.10 | mg/L | 3.8 (7) | 40 | | |
| 5217705 | Total Suspended Solids | 2017/10/24 | | | | | <1.0 | mg/L | 6.1 (1) | 25 | 97 | 80 - 120 |
| 5217874 | Total Mercury (Hg) | 2017/10/20 | 103 | 80 - 120 | 104 | 80 - 120 | <0.013 | ug/L | NC (1) | 20 | | |
| 5218088 | Total Alkalinity (Total as CaCO3) | 2017/10/19 | NC | 80 - 120 | 108 | 80 - 120 | <5.0 | mg/L | 1.9 (1) | 25 | | |
| 5218089 | Dissolved Chloride (Cl) | 2017/10/20 | 101 | 80 - 120 | 103 | 80 - 120 | <1.0 | mg/L | 3.3 (1) | 25 | 104 | 80 - 120 |
| 5218091 | Dissolved Sulphate (SO4) | 2017/10/19 | NC | 80 - 120 | 95 | 80 - 120 | <2.0 | mg/L | 3.5 (8,1) | 25 | | |
| 5218093 | Reactive Silica (SiO2) | 2017/10/19 | 90 | 80 - 120 | 96 | 80 - 120 | <0.50 | mg/L | 0.43 (1) | 25 | | |
| 5218095 | Colour | 2017/10/19 | | | 92 | 80 - 120 | <5.0 | TCU | 3.0 (1) | 20 | | |
| 5218100 | Orthophosphate (P) | 2017/10/19 | 89 | 80 - 120 | 100 | 80 - 120 | <0.010 | mg/L | NC (1) | 25 | | |
| 5218101 | Nitrate + Nitrite (N) | 2017/10/19 | NC | 80 - 120 | 99 | 80 - 120 | <0.050 | mg/L | 1.2 (1) | 25 | | |
| 5218103 | Nitrite (N) | 2017/10/20 | 96 | 80 - 120 | 93 | 80 - 120 | <0.010 | mg/L | 15 (1) | 25 | | |
| 5218107 | Strong Acid Dissoc. Cyanide (CN) | 2017/10/18 | 103 | 80 - 120 | 102 | 80 - 120 | <0.0010 | mg/L | NC (1) | 25 | | |
| 5218868 | Chromium (VI) | 2017/10/23 | 99 | 80 - 120 | 99 | 80 - 120 | <0.50 | ug/L | NC (1) | 20 | | |



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## QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | | QC Standard | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits | % Recovery | QC Limits |
| 5218882 | Sulphide | 2017/10/18 | 89 | 80 - 120 | 99 | 80 - 120 | <0.020 | mg/L | 3.8 (1) | 20 | | |
| 5219841 | pH | 2017/10/19 | | | | | | | 1.9 (1) | N/A | 100 | 97 - 103 |
| 5219842 | Conductivity | 2017/10/19 | | | 101 | 80 - 120 | 1.7, RDL=1.0 | uS/cm | 1.1 (1) | 25 | | |
| 5219843 | pH | 2017/10/19 | | | | | | | 1.5 (1) | N/A | 100 | 97 - 103 |
| 5219844 | Conductivity | 2017/10/19 | | | 102 | 80 - 120 | 1.7, RDL=1.0 | uS/cm | 0.000021 (1) | 25 | | |
| 5219880 | Turbidity | 2017/10/19 | | | 92 | 80 - 120 | <0.10 | NTU | 1.0 (1) | 20 | 95 | 80 - 120 |
| 5219881 | >C10-C16 Hydrocarbons | 2017/10/20 | 88 | 70 - 130 | 90 | 70 - 130 | <0.050 | mg/L | NC (1) | 40 | | |
| 5219881 | >C16-C21 Hydrocarbons | 2017/10/20 | 86 | 70 - 130 | 86 | 70 - 130 | <0.050 | mg/L | NC (1) | 40 | | |
| 5219881 | >C21-<C32 Hydrocarbons | 2017/10/20 | 106 | 70 - 130 | 104 | 70 - 130 | <0.10 | mg/L | NC (1) | 40 | | |
| 5219965 | Aroclor 1016 | 2017/10/20 | | | | | <0.050 | ug/L | NC (10) | 40 | | |
| 5219965 | Aroclor 1221 | 2017/10/20 | | | | | <0.050 | ug/L | NC (10) | 40 | | |
| 5219965 | Aroclor 1232 | 2017/10/20 | | | | | <0.050 | ug/L | NC (10) | 40 | | |
| 5219965 | Aroclor 1242 | 2017/10/20 | | | | | <0.050 | ug/L | NC (10) | 40 | | |
| 5219965 | Aroclor 1248 | 2017/10/20 | | | | | <0.050 | ug/L | NC (10) | 40 | | |
| 5219965 | Aroclor 1254 | 2017/10/20 | 112 (9) | 30 - 130 | 106 | 30 - 130 | <0.050 | ug/L | NC (10) | 40 | | |
| 5219965 | Aroclor 1260 | 2017/10/20 | | | | | <0.050 | ug/L | NC (10) | 40 | | |
| 5220040 | Nitrogen (Ammonia Nitrogen) | 2017/10/19 | 97 (11) | 80 - 120 | 105 | 80 - 120 | <0.050 | mg/L | 1.6 (12) | 20 | | |
| 5220045 | Nitrogen (Ammonia Nitrogen) | 2017/10/19 | 104 | 80 - 120 | 104 | 80 - 120 | <0.050 | mg/L | NC (1) | 20 | | |
| 5220710 | Total Alkalinity (Total as CaCO3) | 2017/10/20 | 80 | 80 - 120 | 107 | 80 - 120 | <5.0 | mg/L | NC (1) | 25 | | |
| 5220713 | Dissolved Chloride (Cl) | 2017/10/23 | 98 | 80 - 120 | 101 | 80 - 120 | <1.0 | mg/L | 1.7 (1) | 25 | 104 | 80 - 120 |
| 5220714 | Dissolved Sulphate (SO4) | 2017/10/20 | NC | 80 - 120 | 103 | 80 - 120 | <2.0 | mg/L | 0.68 (1) | 25 | | |
| 5220715 | Reactive Silica (SiO2) | 2017/10/20 | NC | 80 - 120 | 94 | 80 - 120 | <0.50 | mg/L | 0.097 (1) | 25 | | |
| 5220717 | Colour | 2017/10/23 | | | 96 | 80 - 120 | <5.0 | TCU | NC (1) | 20 | | |
| 5220718 | Orthophosphate (P) | 2017/10/23 | 99 | 80 - 120 | 97 | 80 - 120 | <0.010 | mg/L | NC (1) | 25 | | |
| 5220719 | Nitrate + Nitrite (N) | 2017/10/20 | 99 | 80 - 120 | 98 | 80 - 120 | <0.050 | mg/L | 2.9 (1) | 25 | | |
| 5220721 | Nitrite (N) | 2017/10/23 | 100 | 80 - 120 | 98 | 80 - 120 | <0.010 | mg/L | NC (1) | 25 | | |
| 5220972 | Phenols-4AAP | 2017/10/19 | 94 | 80 - 120 | 96 | 80 - 120 | <0.0010 | mg/L | NC (1) | 25 | | |
| 5222421 | Aroclor 1016 | 2017/10/24 | | | | | <0.050 | ug/L | NC (1) | 40 | | |
| 5222421 | Aroclor 1221 | 2017/10/24 | | | | | <0.050 | ug/L | NC (1) | 40 | | |



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

## QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | | QC Standard | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits | % Recovery | QC Limits |
| 5222421 | Aroclor 1232 | 2017/10/24 | | | | | <0.050 | ug/L | NC (1) | 40 | | |
| 5222421 | Aroclor 1242 | 2017/10/24 | | | | | <0.050 | ug/L | NC (1) | 40 | | |
| 5222421 | Aroclor 1248 | 2017/10/24 | | | | | <0.050 | ug/L | NC (1) | 40 | | |
| 5222421 | Aroclor 1254 | 2017/10/24 | 78 | 30 - 130 | 89 | 30 - 130 | <0.050 | ug/L | NC (1) | 40 | | |
| 5222421 | Aroclor 1260 | 2017/10/24 | | | | | <0.050 | ug/L | NC (1) | 40 | | |
| 5225903 | Total Organic Carbon (C) | 2017/10/23 | 98 | 80 - 120 | 103 | 80 - 120 | <0.50 | mg/L | 4.3 (1) | 20 | | |



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

## QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

| | | | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | | QC Standard | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QC Batch | Parameter | Date | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits | % Recovery | QC Limits |
| 5226299 | Total Organic Carbon (C) | 2017/10/23 | 99 (13) | 80 - 120 | 99 | 80 - 120 | <0.50 | mg/L | 2.4 (14) | 20 | | |

N/A = Not Applicable

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

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

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

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

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

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

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

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

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [FIE813-16]

(3) Duplicate Parent ID [FIE812-16]

(4) Matrix Spike Parent ID [FIE821-05]

(5) Duplicate Parent ID [FIE820-04]

(6) Matrix Spike Parent ID [FIE813-11]

(7) Duplicate Parent ID [FIE812-11]

(8) Elevated reporting limit due to sample matrix.

(9) Matrix Spike Parent ID [FIE821-06]

(10) Duplicate Parent ID [FIE820-05]

(11) Matrix Spike Parent ID [FIE817-03]

(12) Duplicate Parent ID [FIE817-03]

(13) Matrix Spike Parent ID [FIE822-03]

(14) Duplicate Parent ID [FIE821-03]



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Maxxam Job #: B7M7761
Report Date: 2017/10/26

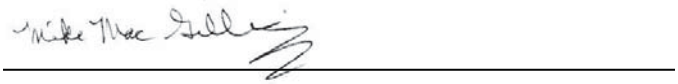
GHD Limited
Client Project #: 084308-02
Site Location: Come By Chance, NL
Your P.O. #: 73509542
Sampler Initials: ISL

## VALIDATION SIGNATURE PAGE

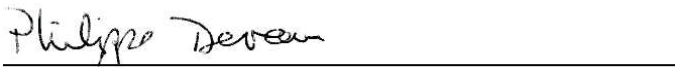
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Brad Newman, Scientific Service Specialist

Eric Dearman, Scientific Specialist



Mike MacGillivray, Scientific Specialist (Inorganics)



Phil Deveau, 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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# Custody Tracking Form

T14886

Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition).
Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

**First Sample:** PLCS
**Last Sample:** SURFACE-DUP
**Sample Count:** 12

| Relinquished By | | | | Received By | | | |
|---|---|---|---|---|---|---|---|
| Ingrid Lawlor | Ingrid Lawlor | Date | Oct 13/17 | Jasmine Redmond | Jasmine Redmond | Date | 2017/10/13 |
| | | Time (24 HR) | 10:30 | | | Time (24 HR) | 11:40 |
| | | Date | | | | Date | |
| | | Time (24 HR) | | | | Time (24 HR) | |
| | | Date | | | | Date | |
| | | Time (24 HR) | | | | Time (24 HR) | |

## Submission Triage Information

Sampled By: ISL

# of Coolers/Pkgs: 1 OF 4

Rush ☐ Immediate Test ☐ Food Residue ☐
Micro ☐ Food Chemistry ☐

## *** LAB USE ONLY ***

Received At

Labeled By

Verified By

Comments: B7M 7761

| Custody Seal | | Cooling | Temperature °C | | |
|---|---|---|---|---|---|
| Present (Y/N) | Intact (Y/N) | Media | 1 | 2 | 3 |
| | | ✓ | 3.8 | 3.6 | 3.7 |
| | | | | | |
| | | | | | |

OCT 13 2017

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# Custody Tracking Form

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Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition).
Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

**First Sample:** PLCS
**Last Sample:** SURFACE-DUP
**Sample Count:** 12

| Relinquished By | | | | Received By | | | |
|---|---|---|---|---|---|---|---|
| Ingrid Lawson | Ingrid Lawson | Date | Oct 13/17 | Jasmine Redmond | Jasmine Redmond | Date | 2017/10/13 |
| | | Time (24 HR) | 10:30 | | | Time (24 HR) | 11:40 |
| | | Date | | | | Date | |
| | | Time (24 HR) | | | | Time (24 HR) | |
| | | Date | | | | Date | |
| | | Time (24 HR) | | | | Time (24 HR) | |

## Submission Triage Information

Sampled By: IsL

# of Coolers/Pkgs: 2 OF 4

Rush ☐ Immediate Test ☐ Food Residue ☐
Micro ☐ Food Chemistry ☐

## *** LAB USE ONLY ***

Received At

Labeled By

Verified By

Comments: B7M7761

OCT 13 2017

| Custody Seal | | Cooling | Temperature °C | | |
|---|---|---|---|---|---|
| Present (Y/N) | Intact (Y/N) | Media | 1 | 2 | 3 |
| | | ✓ | 3.9 | 4.0 | 3.6 |
| | | | | | |
| | | | | | |

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**First Sample:** PLCS
**Last Sample:** SURFACE-DUP
**Sample Count:** 12

| Relinquished By | | | | Received By | | | |
|---|---|---|---|---|---|---|---|
| Ingrid Lawson | Angel Zum | Date | Oct 13/17 | Jasmine Redmond | | Date | 2017/10/13 |
| | | Time (24 HR) | 10:30 | | | Time (24 HR) | 11:40 |
| | | Date | | | | Date | |
| | | Time (24 HR) | | | | Time (24 HR) | |
| | | Date | | | | Date | |
| | | Time (24 HR) | | | | Time (24 HR) | |

## Submission Triage Information

Sampled By: ISL

# of Coolers/Pkgs: 3 of 4

Rush ☐ Immediate Test ☐ Food Residue ☐
Micro ☐ Food Chemistry ☐

## *** LAB USE ONLY ***

Received At:
Labeled By:
Verified By:

Comments: B7M7761

| Custody Seal | | Cooling | Temperature °C | | |
|---|---|---|---|---|---|
| Present (Y/N) | Intact (Y/N) | Media | 1 | 2 | 3 |
| | | ✓ | 3.4 | 5.7 | 3.3 |
| | | | | | |
| | | | | | |

OCT 13 2017

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# Custody Tracking Form

T14886

Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition). Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

**First Sample:** PLCS
**Last Sample:** SURFACE-DUP
**Sample Count:** 12

| Relinquished By | | | | Received By | | | |
|---|---|---|---|---|---|---|---|
| Print: INGRID LAWSON | Sign: Ingrid Lawson | Date | OCT 13/17 | Print: Jasmine Redmond | Sign: JRedmond | Date | 2017/10/13 |
| | | Time (24 HR) | 10:30 | | | Time (24 HR) | 11:40 |
| Print: | Sign: | Date | | Print: | Sign: | Date | |
| | | Time (24 HR) | | | | Time (24 HR) | |
| Print: | Sign: | Date | | Print: | Sign: | Date | |
| | | Time (24 HR) | | | | Time (24 HR) | |

## Submission Triage Information

Sampled By: ISL

# of Coolers/Pkgs: 4 OF 4

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

## *** LAB USE ONLY ***

Received At:

Labeled By:

Verified By:

Comments: B7M7761

| Custody Seal | | Cooling | Temperature °C | | |
|---|---|---|---|---|---|
| Present (Y/N) | Intact (Y/N) | Media | 1 | 2 | 3 |
| | | ✓ | 7.4 | 6.8 | 6.9 |
| | | | | | |
| | | | | | |

OCT 13 2017

# Appendix C
# Petroforma Lethality Laboratory Reports

petroforma LABORATORIES

October 19, 2017
Project: 11300
Lab Refer No.: B-0424-17

Report No.: 06917

GHD Ltd.
1118 Topsail Road
St. John's, NL
A1N 5B8
Tel: (709) 364-5353

**Attention: Brian Luffman**

Dear Mr. Luffman

**Reference: Toxicology Testing Results**

Please find enclosed the results of the 96-hour bioassay conducted October 13 - 17, 2017. The toxicity test was performed on the PLCS sample. The effluent was collected on October 12, 2017. The sample was received in acceptable condition.

Test conditions for a single concentration test were followed according to the Reference Method: For Determining Acute Lethality of Effluents to Rainbow Trout (Report EPS 1/RM/13 Second Edition-December 2000, May 2007 and February 2016 amendments). All test parameters were maintained within the recommended levels outlined in the above protocol.

The PLCS sample is not acutely lethal to the fish, since less than 50.00 % of the fish died in the 100.00 % effluent during the 96-hour period. The LT50 was determined to be greater than 96 hours.

Please call if you have any questions regarding these results.

Sincerely,

**petroforma Laboratories**

**Suzette Winter, B.Sc**
Manager

Attachments:

A- Bench Data Sheet(s)


85C Bremigens Blvd. Paradise, NL A1L 4A2 Canada

**Reference:** Toxicology Testing Results

**SAMPLE**

| | |
|---|---|
| Lab Refer No.: | B-0424-17 |
| Company: | GHD Ltd. |
| Sample Material: | PLCS |
| Sampling Method: | Grab |
| Sample Condition: | Received in acceptable condition. |
| Collected: | October 12, 2017; 11:57 |
| Collected By: | I. Lawlor |

**SAMPLE CHARACTERIZATION**

| | |
|---|---|
| Received (Date and Time): | October 13, 2017; 2:20 |
| Volume: | 2 x 20 L |
| Temperature: | 14.0 °C |
| Dissolved Oxygen: | 9.2 mg/L |
| pH: | 7.0 pH units |
| Conductivity: | 293 µS/cm |
| Colour: | Clear, yellow |
| Odour: | None |
| Storage: | 0 hrs @ 15 ± 1.0 °C |

**DILUTION WATER CHARACTERIZATION (MONTHLY AVERAGE)**

| | |
|---|---|
| Source: | St. John's Dechlorinated |
| Dissolved Oxygen: | 9.4 ± 0.2 mg/L |
| Conductivity: | 80 ± 2 µS/cm |
| Hardness: | 26 ± 0 mg/L |
| pH: | 7.0 ± 0.1 pH units |
| Date Revised: | October 5, 2017 |

**TEST CONDITIONS**

| | |
|---|---|
| Started (Date and Time): | October 13, 2017; 4:05 PM |
| Ended (Date and Time): | October 17, 2017; 4:05 PM |
| Type of Test: | 96-hour static $LT_{50}$ (Pass/Fail) |
| Volume of Test Solutions: | 20 Litres |
| Photoperiod: | 16h ± 1h Light/08h ± 1h Dark |
| Light Intensity: | 500 Lux |
| Aeration Rate: | 6.5 ± 1.0 mL/min.$L^{-1}$ |
| Preaeration Time: | 30 mins |
| Test Temperature: | 15 ± 1 °C |
| Duration: | 96 hours |

**TEST ORGANISM**

| | | | |
|---|---|---|---|
| Species: | Rainbow Trout (*Oncorhynchus mykiss*) | | |
| Source: | Rainbow Springs Hatchery | | |
| Batch Number: | 17-07 | | |
| Number per Tank: | 10 | | |
| % Mortality: | 0.00 % (7 days prior to testing) | | |
| Mean Fork Length (cm): | 4.4 ± 0.7 | Range (cm): | 3.3 – 5.6 |
| Mean Total Weight (g): | 1.0 ± 0.6 | Range (g): | 0.3 – 2.1 |
| Loading Density (g/L): | 0.5 | | |


85C Bremigens Blvd. Paradise, NL A1L 4A2 Canada

October 19, 2017
Attention: Brian Luffman

Project: 11300
Report No.: 06917

**Reference:** Toxicology Testing Results

**TEST RESULTS**

| | |
|---|---|
| Lab Refer No.: | B-0424-17 |
| Sample Material: | PLCS |
| Collection Date: | October 12, 2017; 11:57 |
| Protocol: | EPS 1/RM/13 |
| Test Type: | $LT_{50}$ (Pass/Fail) |
| $LT_{50}$ value (static, acute): | > 96 hours |
| 95% Confidence Intervals: | N/A |

| Effluent Conc.(%) | Temp(°C) | | D.O. (mg/L) | | pH (units) | | Cond.(µs/cm) | | Mortality |
|---|---|---|---|---|---|---|---|---|---|
| | Init. | Final | Init. | Final | Init. | Final | Init. | Final | (%) |
| 100 | 14.3 | 15.9 | 9.3 | 9.6 | 7.0 | 8.0 | 293 | 300 | 0 |
| 0 | 15.0 | 16.0 | 9.3 | 9.2 | 7.0 | 6.6 | 88 | 94 | 0 |

**COMMENTS:**

- Arrival temperature was 13.7°C.
- The sample contained a few twigs and suspended particles.
- Samples have not been pH adjusted or filtered.
- The above analysis was conducted according to protocols indicated. The above results, which refer to the sample(s) tested only, are for your information and will be held in the strictest of confidence by this firm.
- Sample controls are considered a part of a sample test and as such are subject to the same treatment. (This includes, but is not limited to, aeration and temperature testing requirements.)

**REFERENCE TOXICITY TEST DATA (LOG SCALE)**

| | |
|---|---|
| Test Organism: | *Oncorhynchus mykiss* |
| Toxicant: | Phenol |
| Fish Batch No.: | 17-07 |
| Reference Toxicant Date: | September 6 – 10, 2017 |
| $LC_{50}$ Value: | 0.85 mg/L |
| 95% Confidence Limits: | 0.74 – 0.95 mg/L |
| Historic Mean ± 2 SD (Warning Limits): | 0.94 ± 0.17 mg/L |

Performed by: Stephen Rossiter/Amanda Woodrow/Holly Doucette

Technical Reviewer: Amanda Woodrow / AWoodrow
(Print Name/Signature)

Senior Reviewer: Suzette Winter / SWinter
(Print Name/Signature)

Date: October 19/17


85C Bremigens Blvd. Paradise, NL A1L 4A2 Canada

**Reference:** Toxicology Testing Results

**ATTACHMENT A**

Bench Data Sheet (s)


85C Bremigens Blvd. Paradise, NL A1L 4A2 Canada

petroforma LABORATORIES

# petroforma Laboratories

Lab Form: B-0011
Date: February 14, 2014

## LT50 Fish Bioassay Data Sheet

**Customer:** GHD Ltd.
Brian Luffman
1118 Topsail Road
St. John's, NL
A1N 5B8
(709) 364-5353

**Sample ID #** B-0424-17

**Project #** 11300

Light Intensity: 500 lux
Ammonia (Init.): —
Ammonia (Fin.): —

Sample Material: PLCS
Start Date: 101317
Finish Date: 101717
Date Collected: 101217 Time Collected: 11:57
Date Received: 101317 Time Received: 2:20

Preaeration Time: 30 min.
Test Org - Batch #: 17-07
Source: RSH
Test Start Date: 101317
Test Start Time: 4:05

Clarity (I): Clear
Colour (I): yellow
Odour (I): none
Susp. Part. (I): few twigs etc
Other (I): Arrival temp 13.7°C

Aeration Rate: 6.5 ± mL/min. L-1

Conc:
Salinity: 0.2ppt 100%

Conc:
Salinity: 0%

Volume: 2x20 Litres Receiving
Storage: Temp to 15°C ± 1.0°C in warm WB.

| Time | Day | Monit By | HR. | Mort # | Temp (°C) | DO (mg/l) | pH | Cond (µS/cm) | Mort # | Temp (°C) | DO (mg/l) | pH | Cond (uS/cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3:35 | 101317 | AW | INT | | 14.0 | 9.2 | 7.0 | 293 | | | | | |
| 4:05 | 101317 | ↓ | 0 | — | 14.3 | 9.3 | 7.0 | 293 | — | 15.0 | 9.3 | 7.0 | 88 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 10:40 | 101417 | SC | 24 | / | 14.9 | 9.1 | 7.3 | 299 | / | 15.0 | 9.8 | 6.9 | 86 |
| 12:00 | 101517 | SC | 48 | / | 15.3 | 9.5 | 7.6 | 298 | / | 15.3 | 9.7 | 6.9 | 86 |
| 2:00 | 101617 | HB | 72 | — | 16.0 | 9.5 | 7.8 | 295 | — | 16.0 | 9.6 | 6.9 | 93 |
| 4:05 | 101717 | HB | 96 | — | 15.9 | 9.6 | 8.0 | 300 | — | 16.0 | 9.2 | 6.6 | 94 |

**Fish Behaviour Comments**

All fish are alive with normal behavior at 96 hours.

**Pretreatment:** Composite ☒ Temp ☒ Other ☐
Dissolved Oxygen ☒ Water Hardness ☐

Comments EPS1 / RM / 13 Second Edition - December 2000

Clarity (F): } same as initial
Colour (F):
Odour (F):
Susp. Part. (F):
Other (F): —

**Fish Measurements**

| Fork Length (cm) | Wet Weight (g) |
|---|---|
| 4.4 | 1.1 |
| 4.0 | 0.8 |
| 5.1 | 1.5 |
| 5.1 | 1.8 |
| 3.3 | 0.3 |
| 4.0 | 0.7 |
| 3.8 | 0.5 |
| 4.2 | 0.5 |
| 5.6 | 2.1 |
| 4.5 | 10 |

Mean +/- SD

| | | | |
|---|---|---|---|
| 4.4 | 0.70 | 1.03 | 0.60 |

Loading Density (g/l): 0.5

LT50: > 96 hours.

petroforma LABORATORIES

October 19, 2017
Project: 11300
Lab Refer No.: B-0425-17

Report No.: 06918

GHD Ltd.
1118 Topsail Road
St. John's, NL
A1N 5B8
Tel: (709) 364-5353

**Attention: Brian Luffman**

Dear Mr. Luffman

**Reference: Toxicology Testing Results**

Please find enclosed the results of the 96-hour bioassay conducted October 13 - 17, 2017. The toxicity test was performed on the SLCS sample. The effluent was collected on October 12, 2017. The sample was received in acceptable condition.

Test conditions for a single concentration test were followed according to the Reference Method: For Determining Acute Lethality of Effluents to Rainbow Trout (Report EPS 1/RM/13 Second Edition-December 2000, May 2007 and February 2016 amendments). All test parameters were maintained within the recommended levels outlined in the above protocol.

The SLCS sample is not acutely lethal to the fish, since less than 50.00 % of the fish died in the 100.00 % effluent during the 96-hour period. The LT50 was determined to be greater than 96 hours.

Please call if you have any questions regarding these results.

Sincerely,

**petroforma Laboratories**

**Suzette Winter, B.Sc**
Manager

Attachments:

A- Bench Data Sheet(s)


85C Bremigens Blvd. Paradise, NL A1L 4A2 Canada

**Reference:** Toxicology Testing Results

**SAMPLE**

| | |
|---|---|
| Lab Refer No.: | B-0425-17 |
| Company: | GHD Ltd. |
| Sample Material: | SLCS |
| Sampling Method: | Grab |
| Sample Condition: | Received in acceptable condition. |
| Collected: | October 12, 2017; 11:42 |
| Collected By: | I. Lawlor |

**SAMPLE CHARACTERIZATION**

| | |
|---|---|
| Received (Date and Time): | October 13, 2017; 2:20 |
| Volume: | 2 x 20 L |
| Temperature: | 14.0 °C |
| Dissolved Oxygen: | 9.1 mg/L |
| pH: | 6.7 pH units |
| Conductivity: | 593 µS/cm |
| Colour: | Slightly cloudy, yellow |
| Odour: | None |
| Storage: | 0 hrs @ 15 ± 1.0 °C |

**DILUTION WATER CHARACTERIZATION (MONTHLY AVERAGE)**

| | |
|---|---|
| Source: | St. John's Dechlorinated |
| Dissolved Oxygen: | 9.4 ± 0.2 mg/L |
| Conductivity: | 80 ± 2 µS/cm |
| Hardness: | 26 ± 0 mg/L |
| pH: | 7.0 ± 0.1 pH units |
| Date Revised: | October 5, 2017 |

**TEST CONDITIONS**

| | |
|---|---|
| Started (Date and Time): | October 13, 2017; 4:00 PM |
| Ended (Date and Time): | October 17, 2017; 4:00 PM |
| Type of Test: | 96-hour static $LT_{50}$ (Pass/Fail) |
| Volume of Test Solutions: | 20 Litres |
| Photoperiod: | 16h ± 1h Light/08h ± 1h Dark |
| Light Intensity: | 496 Lux |
| Aeration Rate: | 6.5 ± 1.0 mL/min.$L^{-1}$ |
| Preaeration Time: | 30 mins |
| Test Temperature: | 15 ± 1 °C |
| Duration: | 96 hours |

**TEST ORGANISM**

| | | | |
|---|---|---|---|
| Species: | Rainbow Trout (*Oncorhynchus mykiss*) | | |
| Source: | Rainbow Springs Hatchery | | |
| Batch Number: | 17-07 | | |
| Number per Tank: | 10 | | |
| % Mortality: | 0.00 % (7 days prior to testing) | | |
| Mean Fork Length (cm): | 4.4 ± 0.7 | Range (cm): | 3.3 – 5.6 |
| Mean Total Weight (g): | 1.0 ± 0.6 | Range (g): | 0.3 – 2.1 |
| Loading Density (g/L): | 0.5 | | |


85C Bremigens Blvd. Paradise, NL A1L 4A2 Canada

**Reference:** Toxicology Testing Results

**TEST RESULTS**

| | |
|---|---|
| Lab Refer No.: | B-0425-17 |
| Sample Material: | SLCS |
| Collection Date: | October 12, 2017; 11:42 |
| Protocol: | EPS 1/RM/13 |
| Test Type: | $LT_{50}$ (Pass/Fail) |
| $LT_{50}$ value (static, acute): | > 96 hours |
| 95% Confidence Intervals: | N/A |

| Effluent Conc.(%) | Temp(°C) | | D.O. (mg/L) | | pH (units) | | Cond.(µs/cm) | | Mortality |
|---|---|---|---|---|---|---|---|---|---|
| | Init. | Final | Init. | Final | Init. | Final | Init. | Final | (%) |
| 100 | 14.3 | 16.0 | 9.5 | 9.4 | 6.8 | 8.0 | 593 | 487 | 0 |
| 0 | 15.0 | 16.0 | 9.8 | 9.2 | 7.0 | 6.6 | 88 | 94 | 0 |

**COMMENTS:**

- Arrival temperature was 13.7°C.
- The sample contained a few twigs and small brown suspended particles.
- Samples have not been pH adjusted or filtered.
- The above analysis was conducted according to protocols indicated. The above results, which refer to the sample(s) tested only, are for your information and will be held in the strictest of confidence by this firm.
- Sample controls are considered a part of a sample test and as such are subject to the same treatment. (This includes, but is not limited to, aeration and temperature testing requirements.)

**REFERENCE TOXICITY TEST DATA (LOG SCALE)**

| | |
|---|---|
| Test Organism: | *Oncorhynchus mykiss* |
| Toxicant: | Phenol |
| Fish Batch No.: | 17-07 |
| Reference Toxicant Date: | September 6 – 10, 2017 |
| $LC_{50}$ Value: | 0.85 mg/L |
| 95% Confidence Limits: | 0.74 – 0.95 mg/L |
| Historic Mean ± 2 SD (Warning Limits): | 0.94 ± 0.17 mg/L |

Performed by: Stephen Rossiter/Amanda Woodrow/Holly Doucette

Technical Reviewer: Amanda Woodrow / A Woodrow
(Print Name/Signature)

Senior Reviewer: Suzette Winter
(Print Name/Signature)

Date: October 20/17


85C Bremigens Blvd. Paradise, NL A1L 4A2 Canada

**Reference:** Toxicology Testing Results

**ATTACHMENT A**

Bench Data Sheet (s)


85C Bremigens Blvd. Paradise, NL A1L 4A2 Canada

petroforma LABORATORIES

Date: February 14, 2014

**LT50 Fish Bioassay Data Sheet**

**Customer:** GHD Ltd.
Brian Luffman
1118 Topsail Road
St. John's, NL
A1N 5B8
(709) 364-5353

**Sample ID #** B-0425-17

**Project #** 11300

Light Intensity: 496 lux
Ammonia (Init.): —
Ammonia (Fin.): —

Sample Material: SLCS
Start Date: 101317
Finish Date: 101717
Date Collected: 10 1217 Time Collected: 1142
Date Received: 101317 Time Received: 2:20

Preaeration Time: 30 min.
Test Org - Batch #: 17-09
Source: RSH
Test Start Date: 101317
Test Start Time: 4:00

Clarity (I): Slightly Cloudy
Colour (I): Yellow
Odour (I): None
Susp. Part. (I): Small brown & some twigs
Other (I): Arrival temp 13.7°C

Aeration Rate: 6.5 ± mL/min. L-1

Conc: 100%
Salinity: 0.3ppt

Conc: 0%
Salinity:

Volume: 2x20 Litres received
Storage: Temp to 15°C ±1.0°C in warm water bath

| Time | Day | Monit By | HR. | Mort # | Temp (°C) | DO (mg/l) | pH | Cond (µS/cm) | Mort # | Temp (°C) | DO (mg/l) | pH | Cond (uS/cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3:30 | 101317 | AJ | INT | | 14.0 | 9.1 | 6.7 | 593 | | | | | |
| 4:00 | ↓ | ↓ | 0 | — | 14.3 | 9.5 | 6.8 | 593 | — | 15.0 | 9.8 | 7.0 | 88 |
| ~~16:40~~ | ~~101417~~ | ~~SR~~ | | | | | | | | | | | |
| 10:40 | 101417 | SR | 24 | — | 14.9 | 9.2 | 7.1 | 608 | — | 15.0 | 9.8 | 6.9 | 86 (2) 96 |
| 12:05 | 101517 | SR | 48 | — | 15.4 | 9.6 | 7.6 | 579 | — | 15.3 | 9.7 | 6.9 | ~~86~~ 96 |
| 2:00 | 101617 | HO | 72 | — | 16.0 | 9.5 | 7.9 | 532 | — | 16.0 | 9.6 | 6.9 | 93 |
| 4:00 | 101717 | HO | 96 | — | 16.0 | 9.4 | 8.0 | 487 | — | 16.0 | 9.2 | 6.6 | 94 |

**Fish Behaviour Comments**

All fish are alive with normal behavior at 96 hours.

**Pretreatment:** Composite ☒ ~~Temp~~ ☒ ~~Other~~ ☐
Dissolved Oxygen ☒ ~~Water Hardness~~ ☐

Comments EPS1 / RM / 13 Second Edition - December 2000

Clarity (F): } same as initial
Colour (F):
Odour (F):
Susp. Part. (F):
Other (F): —

**Fish Measurements**

| Fork Length (cm) | Wet Weight (g) |
|---|---|
| 4.4 | 1.1 |
| 4.0 | 0.8 |
| 5.1 | 1.5 |
| 5.1 | 1.8 |
| 3.3 | 0.3 |
| 4.0 | 0.7 |
| 3.8 | 0.5 |
| 4.2 | 0.5 |
| 5.6 | 2.1 |
| 4.5 | 1.0 |

Mean +/- SD

| | | | |
|---|---|---|---|
| 4.4 | 0.70 | 1.03 | 0.60 |

Loading Density (g/l): 0.5

LT50: > 96 hrs.

# Appendix D
# Leachate Pumping Logs

LEACHATE PUMPING LOG
COME BY CHANCE SECURE LANDFILL, COME BY CHANCE, NL

NAME: PRIMARY (PLCS)
CHAMBER DIAMETER: 1.46 m
AREA: 1.67 $m^2$

| | INTERVAL | PUMPING / FILLING | DEPTH (mbtoc) | | TIME | | CALCULATIONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | START | END | START | END | ΔD (m) | VOLUME ($m^3$) | ΔT | Q (L/min) | < 15 L/min? |
| Nov. 22, 2017 | 1 | PUMP | 0.450 | 2.450 | 8:40 | 8:52 | 2.000 | 3.348 | 12 | 279 | No |
| | 2 | FILL | 3.280 | 2.120 | 10:32 | 11:03 | 1.160 | 1.942 | 31 | 63 | No |
| | 3 | FILL | 2.350 | 1.080 | 12:12 | 12:46 | 1.270 | 2.126 | 34 | 63 | No |
| | 4 | FILL | 3.450 | 2.540 | 13:07 | 13:45 | 0.910 | 1.523 | 38 | 40 | No |
| | 5 | FILL | 2.892 | 2.500 | 14:50 | 15:15 | 0.392 | 0.656 | 25 | 26 | No |
| | 6 | FILL | 3.132 | 2.962 | 15:28 | 15:40 | 0.170 | 0.285 | 12 | 24 | No |
| | 7 | FILL | 2.150 | 1.975 | 16:05 | 16:25 | 0.175 | 0.293 | 20 | 15 | YES |
| | 8 | FILL | 3.000 | 2.823 | 17:00 | 17:20 | 0.177 | 0.296 | 20 | 15 | YES |
| | 9 | FILL | 2.100 | 1.995 | 17:20 | 17:35 | 0.105 | 0.176 | 15 | 12 | YES |
| | 10 | | | | | | | | | | |
| | 11 | | | | | | | | | | |
| Nov. 23, 2017 | 12 | PUMP | – | – | 8:30 | – | – | – | – | – | – |
| | 13 | FILL | 3.325 | 3.083 | 9:05 | 9:15 | 0.242 | 0.405 | 10 | 41 | No |
| | 14 | FILL | 3.335 | 3.222 | 9:34 | 9:54 | 0.113 | 0.189 | 20 | 9 | YES |
| | 15 | FILL | 3.160 | 3.082 | 10:07 | 10:27 | 0.078 | 0.131 | 20 | 7 | YES |
| | 16 | | | | | | | | | | |
| | 17 | | | | | | | | | | |
| | 18 | | | | | | | | | | |
| | 19 | | | | | | | | | | |
| | 20 | | | | | | | | | | |
| | 21 | | | | | | | | | | |
| | 22 | | | | | | | | | | |
| | 23 | | | | | | | | | | |
| | 24 | | | | | | | | | | |
| | 25 | | | | | | | | | | |
| | 26 | | | | | | | | | | |
| | 27 | | | | | | | | | | |
| | 28 | | | | | | | | | | |
| | 29 | | | | | | | | | | |
| | 30 | | | | | | | | | | |

LEACHATE PUMPING LOG
COME BY CHANCE SECURE LANDFILL, COME BY CHANCE, NL

NAME: SECONDARY (SLCS)
CHAMBER DIAMETER: 1.46 m
AREA: 1.67 $m^2$

| | INTERVAL | PUMPING / FILLING | DEPTH (mbtoc) | | TIME | | CALCULATIONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | START | END | START | END | ΔD (m) | VOLUME ($m^3$) | ΔT | Q (L/min) | < 15 L/min? |
| Nov 22, 2017 | 1 | PUMP | 0.451 | 2.134 | 8:52 | 9:12 | 1.683 | 2.818 | 20 | 141 | No |
| | 2 | FILL | 2.150 | 1.970 | 11:55 | 12:10 | 0.180 | 0.301 | 15 | 20 | No |
| | 3 | FILL | 2.380 | 2.023 | 12:48 | 13:08 | 0.357 | 0.598 | 20 | 30 | No |
| | 4 | FILL | 2.753 | 2.485 | 13:45 | 14:05 | 0.268 | 0.449 | 20 | 22 | No |
| | 5 | FILL | 2.320 | 2.190 | 14:30 | 14:56 | 0.130 | 0.218 | 26 | 8 | YES |
| | 6 | FILL | 3.373 | 3.305 | 16:27 | 16:42 | 0.068 | 0.114 | 15 | 8 | YES |
| | 7 | | | | | | | | | | |
| | 8 | | | | | | | | | | |
| Nov 23, 2017 | 9 | FILL | 2.773 | 2.655 | 9:24 | 9:42 | 0.118 | 0.198 | 18 | 11 | YES |
| | 10 | FILL | 2.655 | 2.600 | 9:45 | 10:03 | 0.055 | 0.092 | 18 | 5 | YES |
| | 11 | | | | | | | | | | |
| | 12 | | | | | | | | | | |
| | 13 | | | | | | | | | | |
| | 14 | | | | | | | | | | |
| | 15 | | | | | | | | | | |
| | 16 | | | | | | | | | | |
| | 17 | | | | | | | | | | |
| | 18 | | | | | | | | | | |
| | 19 | | | | | | | | | | |
| | 20 | | | | | | | | | | |
| | 21 | | | | | | | | | | |
| | 22 | | | | | | | | | | |
| | 23 | | | | | | | | | | |
| | 24 | | | | | | | | | | |
| | 25 | | | | | | | | | | |
| | 26 | | | | | | | | | | |
| | 27 | | | | | | | | | | |
| | 28 | | | | | | | | | | |
| | 29 | | | | | | | | | | |
| | 30 | | | | | | | | | | |

# Appendix E
# Historical Monitoring Data

**TABLE E1**

**HISTORICAL STATIC GROUNDWATER LEVELS**
**2017/18 MONITORING 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 | Dec | Oct |
| | (masl) | (m) | (masl) | 2004 | | | | 2006 | | | | 2007 | 2008 | 2009 | 2010 | | 2011 | 2012 | 2013 | 2014 | 2015 | 2017 |
| PLCS | 15.960 | -- | 15.960 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | 0.55 | 0.73 | 0.59 | 0.89 | 0.55 | 0.40 | 0.60 | 0.450 |
| SLCS | 15.955 | -- | 15.955 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.52 | 0.713 | 0.55 | 0.892 | 0.549 | 0.40 | 0.60 | 0.451 |
| MW 93-1 | 16.300 | 1.100 | 17.400 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1.975 | 1.703 | 1.915 | 1.921 | 1.780 | 1.756 | 1.62 | -- | 1.760 |
| 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 | 1.69 | 2.110 | 2.030 |
| 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 | 2.04 | -- | 2.235 |
| MW 93-2A | 14.310 | 1.100 | 15.410 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1.84 | 1.456 | 1.375 | -- | 1.234 | 1.663 | 1.18 | 1.785 | 1.792 |
| 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 | 3.00 | -- | 3.464 |
| MW 10-1A | 15.890 | 0.854 | 16.744 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3.084 | 3.279 | 3.662 | 3.234 | 3.513 | 3.05 | 3.439 | 3.503 |

| 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 | Dec | Oct |
| | (masl) | (m) | (masl) | 2004 | | | | 2006 | | | | 2007 | 2008 | 2009 | 2010 | | 2011 | 2012 | 2013 | 2014 | 2015 | 2017 |
| PLCS | 15.960 | -- | 15.960 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | 15.410 | 15.230 | 15.370 | 15.070 | 15.410 | 15.557 | 15.360 | 15.510 |
| SLCS | 15.955 | -- | 15.955 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 15.435 | 15.242 | 15.405 | 15.063 | 15.406 | 15.551 | 15.355 | 15.504 |
| MW 93-1 | 16.300 | 1.100 | 17.400 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 15.425 | 15.697 | 15.485 | 15.479 | 15.620 | 15.644 | 15.784 | -- | 15.640 |
| 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 | 15.600 | 15.680 |
| 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 | -- | 13.155 |
| MW 93-2A | 14.310 | 1.100 | 15.410 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 13.570 | 13.954 | 14.035 | -- | 14.176 | 13.747 | 14.229 | 13.625 | 13.618 |
| 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 | -- | 13.172 |
| MW 10-1A | 15.890 | 0.854 | 16.744 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 13.660 | 13.465 | 13.082 | 13.510 | 13.231 | 13.697 | 13.305 | 13.241 |

**Notes:**

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
MW = Monitor Well
TOC = Top of Casing
masl = Metres Above Sea Level
mbTOC = Metres Below Top of Casing
* = Monitor Well Decommissioned in July 2010

**TABLE E2**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - BTEX/mTPH**
**2017/18 MONITORING 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 $C_{16}$-$C_{21}$ \| $C_{21}$-$C_{32}$ | mTPH | |
| 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 | < | < | < | < | < | < | < | < | - |
| | Dec 08, 2015 | - | - | - | - | - | - | - | - | - |
| | Oct 12, 2017 | < | < | < | < | < | < | < | < | - |
| MW 93-1A | 2008 (AMEC) | <(0.2) | <(0.2) | <(0.2) | <(0.6) | <(0.05)[3] | <(0.05)[3] | <(0.05)[3] | <(0.15)[3] | - |
| | 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[2] | < | < | < | < | < | < | < | < | - |
| MW 93-1A | Aug 28, 2013 | < | < | < | < | < | < | < | < | - |
| | Nov 25, 2014 | < | < | < | < | < | < | < | < | - |
| | Dec 08, 2015 | < | < | < | < | < | < | < | < | - |
| | Oct 12, 2017 | < | < | < | < | < | < | < | < | - |
| MW 93-2 | 2008 (AMEC) | <(0.2) | <(0.2) | <(0.2) | <(0.6) | <(0.05)[3] | <(0.05)[3] | <(0.05)[3] | <(0.15)[3] | - |
| | Aug 19, 2009 | < | < | < | < | < | < | < | < | - |
| | Jul 16, 2010 | < | < | < | < | < | < | < | < | - |
| | Jul 16, 2010[2] | - | - | - | - | - | < | < | - | - |
| | Dec 13, 2010 | < | < | < | < | < | < | < | < | - |
| | Dec 13, 2010[2] | - | - | - | - | - | < | < | - | - |
| | Sep 02, 2011 | < | < | < | < | < | < | < | < | - |

**TABLE E2**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - BTEX/mTPH**
**2017/18 MONITORING 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 $C_{21}$-$C_{32}$ | mTPH | |
| MW 93-2 | Aug 30, 2012 | <(0.0013) | <(0.0013) | <(0.0013) | <(0.0026) | <(0.013) | < | < | | < | - |
| | Aug 28, 2013 | < | < | < | < | < | < | < | | < | - |
| | Nov 25, 2014 | < | < | < | < | < | < | < | | < | - |
| | Dec 08, 2015 | - | - | - | - | - | - | - | | - | - |
| | Oct 12, 2017 | < | < | < | < | < | < | < | | < | - |
| MW 93-2A | Aug 19, 2009 | < | < | < | < | < | < | < | | < | - |
| | Jul 16, 2010 | < | < | < | < | < | < | < | | < | - |
| | Dec 13, 2010 | < | < | < | < | < | < | < | | < | - |
| | Sep 02, 2011 | < | < | < | < | < | < | < | | < | - |
| | Aug 30, 2012 | < | < | < | < | < | < | < | | < | - |
| | Aug 28, 2013 | < | < | < | < | < | < | < | | < | - |
| | Nov 25, 2014 | < | < | < | < | < | < | < | | < | - |
| | Dec 08, 2015 | < | < | < | < | < | < | < | | < | - |
| | Oct 12, 2017 | < | < | < | < | < | < | < | | < | - |
| MW-DUP | Oct 12, 2017[1] | < | < | < | < | < | < | < | | < | - |
| MW 10-1 | Jul 16, 2010 | < | < | < | < | < | < | < | | < | - |
| | Jul 16, 2010[1] | < | < | < | < | < | < | < | | < | - |
| | Dec 13, 2010 | < | < | < | < | < | < | < | | < | - |
| | Sep 02, 2011 | < | < | < | < | < | < | 0.4 | | 0.4 | Possible lube oil fraction |
| | Aug 30, 2012 | < | < | < | < | < | < | < | | < | - |
| | Aug 28, 2013 | < | < | < | < | < | < | < | | < | - |
| DUP-05 | Aug 28, 2013[1] | < | < | < | < | < | < | < | | < | - |
| MW 10-1 | Nov 25, 2014 | < | < | < | < | < | < | < | 0.1 | 0.1 | No resemblance to petroleum products in lube oil range |
| DUP-07 | Nov 25, 2014[1] | < | < | < | < | < | < | < | < | < | |
| MW 10-1 | Dec 08, 2015 | - | - | - | - | - | - | - | | - | - |
| | Oct 12, 2017 | < | < | < | < | < | < | < | | < | - |

**TABLE E2**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - BTEX/mTPH**
**2017/18 MONITORING 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 $C_{21}$-$C_{32}$ | mTPH | |
| MW 10-1A | Jul 16, 2010 | < | < | < | < | < | < | < | | < | - |
| | Dec 13, 2010 | < | < | < | < | < | < | < | | < | - |
| | Dec 13, 2010[1] | < | < | < | < | < | < | < | | < | - |
| | Sep 02, 2011 | < | < | < | < | < | < | < | | < | - |
| DUP-A | Sep 02, 2011[1] | < | < | < | < | < | < | < | | < | |
| MW 10-1A | Aug 30, 2012 | < | < | < | < | < | < | < | | < | - |
| | Aug 28, 2013 | < | < | < | < | < | < | < | | < | - |
| | Nov 25, 2014 | < | < | < | < | < | < | < | | < | - |
| | Dec 08, 2015 | < | < | < | < | < | < | < | | < | - |
| DUP1 | Dec 08, 2015[1] | < | < | < | < | < | < | < | | < | - |
| MW 10-1A | Oct 12, 2017 | < | < | < | < | < | < | < | | < | - |
| RDL | | 0.001 | 0.001 | 0.001 | 0.002 | 0.01 | 0.05 | 0.05 | 0.1 | 0.1 | - |
| **Atlantic RBCA Tier I RBSLs[4] (Commercial, Non-Potable)** | | **20** | **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. Lab Duplicate.
3. Assumed transcript error by factor of 1,000 from Pinchin LeBlanc Environmental Table 2 from March 2010 OMM Report.
4. Atlantic Risk-Based Corrective Action (RBCA) 2015 Tier I Risk-Based Screening Levels (RBSLs) Table values {coarse-grained soil}.

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E3**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 93-1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | Dec 08, 2015 | Oct 12, 2017 |
| 1-Methylnaphthalene | 0.05 | 1,800 | < | < | < | < | < | < | < | < | - | < |
| 2-Methylnaphthalene | 0.05 | 1,800 | < | < | < | < | < | < | < | < | - | < |
| Acenaphthene | 0.01 | 600 | < | < | < | < | 0.01 | < | < | < | - | < |
| Acenaphthylene | 0.01 | 2 | < | < | < | < | < | < | < | < | - | < |
| Acridine | 0.05 | - | - | - | < | < | - | - | < | < | - | - |
| Anthracene | 0.01 | 2 | < | < | < | < | < | < | < | < | - | < |
| Benzo(a)anthracene | 0.01 | 5 | < | < | < | < | < | < | < | < | - | < |
| Benzo(a)pyrene | 0.01 | 0.8 | < | 0.01 | < | < | < | < | < | < | - | < |
| Benzo(b)fluoranthene | 0.01 | 1 | < | 0.02 | < | < | < | < | < | < | - | < |
| Benzo(g,h,i)perylene | 0.01 | 0.2 | < | 0.02 | < | < | < | < | < | < | - | < |
| Benzo(k)fluoranthene | 0.01 | 0.4 | < | 0.02 | < | < | < | < | < | < | - | < |
| Chrysene | 0.01 | 1 | < | < | < | < | < | < | < | < | - | < |
| Dibenz(a,h)anthracene | 0.01 | 0.52 | < | 0.03 | < | < | < | < | < | < | - | < |
| Fluoranthene | 0.01 | 130 | < | < | < | < | < | < | < | < | - | < |
| Fluorene | 0.01 | 400 | < | < | < | < | < | < | < | < | - | < |
| Indeno(1,2,3-cd)pyrene | 0.01 | 0.20 | < | 0.02 | < | < | < | < | < | < | - | < |
| Naphthalene | 0.20 | 1,400 | < | < | < | < | < | < | < | < | - | < |
| Perylene | 0.01 | - | < | < | < | < | < | < | < | < | - | < |
| Phenanthrene | 0.01 | 580 | 0.01 | < | < | < | < | < | < | < | - | < |
| Pyrene | 0.01 | 68 | < | < | < | < | < | < | < | < | - | < |
| Quinoline | 0.05 | - | - | - | < | < | - | - | - | - | - | - |

**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
MW = Monitor Well
<(#) = Parameter below AMEC laboratory detection limit
< = Parameter below detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E3**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 93-1A | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | Dec 08, 2015 | Oct 12, 2017 |
| 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 | - | - | < | < | < | < | < | < | < | < | < | < |
| Phenanthrene | 0.01 | 580 | <0.04 | 0.01 | < | < | < | < | < | < | < | 0.013 | < |
| Pyrene | 0.01 | 68 | <0.01 | < | < | < | < | < | < | < | < | < | < |
| Quinoline | 0.05 | - | - | - | < | < | - | - | - | - | - | - | - |

**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
MW = Monitor Well
<(#) = Parameter below AMEC laboratory detection limit
< = Parameter below detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E3**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 93-2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AMEC 2008 | Aug 19, 2009 | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Aug 30, 2012 | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Oct 12, 2017 |
| 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 | - | - | < | < | < | < | < | < | < | - | < |
| Phenanthrene | 0.01 | 580 | <0.04 | 0.01 | < | < | < | < | < | < | - | < |
| Pyrene | 0.01 | 68 | <0.01 | < | < | < | < | < | < | < | - | < |
| Quinoline | 0.05 | - | - | - | < | < | - | - | - | - | - | - |

**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
MW = Monitor Well
<(#) = Parameter below AMEC laboratory detection limit
< = Parameter below detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E3**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 93-2A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Aug 19, 2009 | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Aug 30, 2012 | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Oct 12, 2017 | Oct 12, 2017 MW-DUP |
| 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 | - | < | < | < | 0.02 | < | < | < | < | < | < |
| Phenanthrene | 0.01 | 580 | 0.01 | < | < | < | 0.012 | < | < | < | 0.011 | < |
| Pyrene | 0.01 | 68 | < | < | < | < | < | < | < | < | < | < |
| Quinoline | 0.05 | - | - | < | < | - | - | - | - | - | - | - |

**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
MW = Monitor Well
<(#) = Parameter below AMEC laboratory detection limit
< = Parameter below detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E3**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 10-1 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | Dec 08, 2015 | Oct 12, 2017 |
| **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 | < | < | < | < | < | < | - | < |
| **Phenanthrene** | 0.01 | 580 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Pyrene** | 0.01 | 68 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Quinoline** | 0.05 | - | < | < | < | < | - | - | - | < | - | - | - | - |

**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
MW = Monitor Well
<(#) = Parameter below AMEC laboratory detection limit
< = Parameter below detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E3**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 10-1A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Sep 02, 2011 DUP-A | Aug 30, 2012 | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Dec 08, 2015 DUP1 | Oct 12, 2017 |
| **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 | - | < | < | < | < | 0.017 | 0.019 | < | 0.027 | 0.028 | < |
| **Phenanthrene** | 0.01 | 580 | < | < | < | < | < | 0.013 | < | < | < | < |
| **Pyrene** | 0.01 | 68 | < | < | < | < | < | < | < | < | < | < |
| **Quinoline** | 0.05 | - | < | < | < | < | - | - | - | - | - | - |

**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
MW = Monitor Well
<(#) = Parameter below AMEC laboratory detection limit
< = Parameter below detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E4**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - PCBs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Sample Location | Sample Date | | | | | | | | | | Criteria* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2008 (AMEC) | Aug 19, 2009 | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Aug 30, 2012 | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Oct 12, 2017 | |
| **MW 93-1** | - | < | < | < | < | < | < | < | - | < | 7.8 |
| **Field Dup** | - | < | - | - | - | - | - | - | - | - | |
| **Lab Dup** | - | < | - | - | - | - | - | - | - | - | |
| **MW 93-1A** | <0.04 | 0.1 | < | < | < | < | < | < | < | < | |
| **DUP-03** | - | - | - | - | - | < | - | - | - | - | |
| **MW 93-2** | <0.04 | < | < | < | < | < | < | < | - | < | |
| **Lab Dup** | - | - | < | < | - | - | - | - | - | - | |
| **MW 93-2A** | - | 0.11 | < | < | < | < | < | < | < | < | |
| **MW-DUP** | - | - | - | - | - | - | - | - | - | < | |
| **MW 10-1** | - | - | < | < | < | < | < | < | - | < | |
| **Field Dup** | - | - | < | - | - | - | - | - | - | - | |
| **DUP-05** | - | - | - | - | - | - | < | - | - | - | |
| **DUP-07** | - | - | - | - | - | - | - | < | - | - | |
| **MW 10-1A** | - | - | < | < | < | < | < | < | < | < | |
| **Field Dup** | - | - | - | < | - | - | - | - | - | - | |
| **DUP-A** | - | - | - | - | < | - | - | - | - | - | |
| **DUP1** | - | - | - | - | - | - | - | - | < | - | |
| **RDL** | 0.05 | | | | | | | | | | |

**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
MW = Monitor Well
<(#) = Parameter below AMEC laboratory detection limit

< = Parameter below detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E5**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - VOCs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 93-1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | Dec 08, 2015 | Oct 12, 2017 |
| **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) | < | < | < | - | < |
| **Chloroform** | 1.00 | 2 | < | < | < | < | < | < | < | < | - | < |
| **Chloromethane** | 8.00 | - | < | < | < | < | <10 (1) | < | < | < | - | < |
| **Dibromochloromethane** | 1.00 | 82,000 | < | < | < | < | < | < | < | < | - | < |
| **1,2-Dichlorobenzene** | 0.50 | 4,600 | < | < | < | < | <0.7 (1) | < | < | < | - | < |
| **1,3-Dichlorobenzene** | 1.00 | 9,600 | < | < | < | < | < | < | < | < | - | < |
| **1,4-Dichlorobenzene** | 1.00 | 8 | < | < | < | < | < | < | < | < | - | < |
| **1,1-Dichloroethane** | 2.00 | 320 | < | < | < | < | <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) | < | < | < | - | < |
| **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) | < | < | < | - | < |
| **o-Xylene** | 1.00 | 4,200 | < | < | < | < | < | < | < | < | - | < |
| **p+m-Xylene** | 2.00 | 4,200 | < | < | < | < | <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) | < | < | < | - | < |
| **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.
(1) = Elevated RDL for analyzed VOC(s).

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E5**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - VOCs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 93-1A | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | Dec 08, 2015 | Oct 12, 2017 |
| **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) | < | < | < | < | < | < |
| **Chloroform** | 1.00 | 2 | < | < | < | < | < | < | < | < | < | < | < |
| **Chloromethane** | 8.00 | - | < | < | < | < | <10 (1) | < | < | < | < | < | < |
| **Dibromochloromethane** | 1.00 | 82,000 | < | < | < | < | < | < | < | < | < | < | < |
| **1,2-Dichlorobenzene** | 0.50 | 4,600 | < | < | < | < | <0.7 (1) | < | < | < | < | < | < |
| **1,3-Dichlorobenzene** | 1.00 | 9,600 | < | < | < | < | < | < | < | < | < | < | < |
| **1,4-Dichlorobenzene** | 1.00 | 8 | < | < | < | < | < | < | < | < | < | < | < |
| **1,1-Dichloroethane** | 2.00 | 320 | < | < | < | < | <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) | < | < | < | < | < | < |
| **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) | < | < | < | < | < | < |
| **o-Xylene** | 1.00 | 4,200 | < | < | < | < | < | < | < | < | < | < | < |
| **p+m-Xylene** | 2.00 | 4,200 | < | < | < | < | <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) | < | < | < | < | < | < |
| **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.
(1) = Elevated RDL for analyzed VOC(s).

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E5**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - VOCs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 93-2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AMEC 2008 | Aug 19, 2009 | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Aug 30, 2012 | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Oct 12, 2017 |
| **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) | < | < | < | - | < |
| **Chloroform** | 1.00 | 2 | < | < | < | < | < | < | < | < | - | < |
| **Chloromethane** | 8.00 | - | < | < | < | < | <10 (1) | < | < | < | - | < |
| **Dibromochloromethane** | 1.00 | 82,000 | < | < | < | < | < | < | < | < | - | < |
| **1,2-Dichlorobenzene** | 0.50 | 4,600 | < | < | < | < | <0.7 (1) | < | < | < | - | < |
| **1,3-Dichlorobenzene** | 1.00 | 9,600 | < | < | < | < | < | < | < | < | - | < |
| **1,4-Dichlorobenzene** | 1.00 | 8 | < | < | < | < | < | < | < | < | - | < |
| **1,1-Dichloroethane** | 2.00 | 320 | < | < | < | < | <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) | < | < | < | - | < |
| **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) | < | < | < | - | < |
| **o-Xylene** | 1.00 | 4,200 | < | < | < | < | < | < | < | < | - | < |
| **p+m-Xylene** | 2.00 | 4,200 | < | < | < | < | <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) | < | < | < | - | < |
| **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.
(1) = Elevated RDL for analyzed VOC(s).

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E5**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - VOCs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 93-2A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Aug 19, 2009 | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Aug 30, 2012 | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Oct 12, 2017 | Oct 12, 2017 MW-DUP |
| **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) | < | < | < | < | < | < |
| **Chloroform** | 1.00 | 2 | < | < | < | < | < | < | < | < | < | < |
| **Chloromethane** | 8.00 | - | < | < | < | <10 (1) | < | < | < | < | < | < |
| **Dibromochloromethane** | 1.00 | 82,000 | < | < | < | < | < | < | < | < | < | < |
| **1,2-Dichlorobenzene** | 0.50 | 4,600 | < | < | < | <0.7 (1) | < | < | < | < | < | < |
| **1,3-Dichlorobenzene** | 1.00 | 9,600 | < | < | < | < | < | < | < | < | < | < |
| **1,4-Dichlorobenzene** | 1.00 | 8 | < | < | < | < | < | < | < | < | < | < |
| **1,1-Dichloroethane** | 2.00 | 320 | < | < | < | <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) | < | < | < | < | < | < |
| **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) | < | < | < | < | < | < |
| **o-Xylene** | 1.00 | 4,200 | < | < | < | < | < | < | < | < | < | < |
| **p+m-Xylene** | 2.00 | 4,200 | < | < | < | <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) | < | < | < | < | < | < |
| **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.
(1) = Elevated RDL for analyzed VOC(s).

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E5**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - VOCs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 10-1 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | Dec 08, 2015 | Oct 12, 2017 |
| **Benzene** | 1.00 | 44 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Bromodichloromethane** | 1.00 | 85,000 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Bromoform** | 1.00 | 380 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Bromomethane** | 0.50 | 5.6 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Carbon Tetrachloride** | 0.50 | 0.79 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Chlorobenzene** | 1.00 | 630 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Chloroethane** | 8.00 | - | < | < | < | < | <10 (1) | < | < | < | < | < | - | < |
| **Chloroform** | 1.00 | 2.4 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Chloromethane** | 8.00 | - | < | < | < | < | <10 (1) | < | < | < | < | < | - | < |
| **Dibromochloromethane** | 1.00 | 82,000 | < | < | < | < | < | < | < | < | < | < | - | < |
| **1,2-Dichlorobenzene** | 0.50 | 4,600 | < | < | < | < | <0.7 (1) | < | < | < | < | < | - | < |
| **1,3-Dichlorobenzene** | 1.00 | 9,600 | < | < | < | < | < | < | < | < | < | < | - | < |
| **1,4-Dichlorobenzene** | 1.00 | 8 | < | < | < | < | < | < | < | < | < | < | - | < |
| **1,1-Dichloroethane** | 2.00 | 320 | < | < | < | < | <3 (1) | < | < | < | < | < | - | < |
| **1,2-Dichloroethane** | 1.00 | 1.6 | < | < | < | < | < | < | < | < | < | < | - | < |
| **1,1-Dichloroethylene** | 0.50 | 1.6 | < | < | < | < | < | < | < | < | < | < | - | < |
| **cis-1,2-Dichloroethylene** | 0.50 | 1.6 | < | < | < | < | <3 (1) | < | < | < | < | < | - | < |
| **trans-1,2-Dichloroethylene** | 0.50 | 1.6 | < | < | < | < | < | < | < | < | < | < | - | < |
| **1,2-Dichloropropane** | 0.50 | 16 | < | < | < | 4.00 | 2.00 | < | < | < | 1.00 | 1.00 | - | 10 |
| **cis-1,3-Dichloropropene** | 0.50 | 5.2 | < | < | < | < | < | < | < | < | < | < | - | < |
| **trans-1,3-Dichloropropene** | 0.50 | 5.2 | < | < | < | 1.00 | < | < | < | < | < | < | - | < |
| **Ethylbenzene** | 1.00 | 2,300 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Methylene Chloride(Dichloromethane)** | 3.00 | 610 | < | < | < | < | <4 (1) | < | < | < | < | < | - | < |
| **o-Xylene** | 1.00 | - | < | < | < | < | < | < | < | < | < | < | - | < |
| **p+m-Xylene** | 2.00 | - | < | < | < | < | <3 (1) | < | < | < | < | < | - | < |
| **Styrene** | 1.00 | 1,300 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Tetrachloroethylene** | 1.00 | 1.6 | < | < | < | < | < | < | < | < | < | < | - | < |
| **1,1,2,2-Tetrachloroethane** | 0.50 | 3.2 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Toluene** | 1.00 | 18,000 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Trichloroethylene** | 1.00 | 1.6 | < | < | < | < | < | < | < | < | < | < | - | **2.4** |
| **1,1,1-Trichloroethane** | 1.00 | 640 | < | < | < | < | < | < | < | < | < | < | - | < |
| **1,1,2-Trichloroethane** | 1.00 | 4.7 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Trichlorofluoromethane (FREON 11)** | 8.00 | 2,500 | < | < | < | < | <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.
(1) = Elevated RDL for analyzed VOC(s).

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
- = Not analysed/No criteria
**1** = Above criteria for current sampling program

**TABLE E5**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - VOCs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 10-1A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Aug 30, 2012 | Sep 02, 2011 DUP- A | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Dec 08, 2015 DUP1 | Oct 12, 2017 |
| **Benzene** | 1.00 | 44 | < | < | < | < | < | < | < | < | < | < |
| **Bromodichloromethane** | 1.00 | 85,000 | < | < | < | < | < | < | < | < | < | < |
| **Bromoform** | 1.00 | 380 | < | < | < | < | < | < | < | < | < | < |
| **Bromomethane** | 0.50 | 5.6 | < | < | < | < | < | < | < | < | < | < |
| **Carbon Tetrachloride** | 0.50 | 0.79 | < | < | < | < | < | < | < | < | < | < |
| **Chlorobenzene** | 1.00 | 630 | < | < | < | < | < | < | < | < | < | < |
| **Chloroethane** | 8.00 | - | < | < | <10 (1) | < | <10 (1) | < | < | < | < | < |
| **Chloroform** | 1.00 | 2.4 | < | < | < | < | < | < | < | < | < | < |
| **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** | 0.50 | 1.6 | < | < | <3 (1) | < | <3 (1) | < | < | < | < | < |
| **trans-1,2-Dichloroethylene** | 0.50 | 1.6 | < | < | < | < | < | < | < | < | < | < |
| **1,2-Dichloropropane** | 0.50 | 16 | < | 2.00 | 7.00 | 3.00 | 7.00 | 7.1 | < | 3.9 | 3.0 | 5.6 |
| **cis-1,3-Dichloropropene** | 0.50 | 5.2 | < | < | < | < | < | < | < | < | < | < |
| **trans-1,3-Dichloropropene** | 0.50 | 5.2 | < | 1.00 | < | < | < | < | < | < | < | < |
| **Ethylbenzene** | 1.00 | 2,300 | < | < | < | < | < | < | < | < | < | < |
| **Methylene Chloride(Dichloromethane)** | 3.00 | 610 | < | < | <4 (1) | < | <4 (1) | < | < | < | < | < |
| **o-Xylene** | 1.00 | - | < | < | < | < | < | < | < | < | < | < |
| **p+m-Xylene** | 2.00 | - | < | < | <3 (1) | < | <3 (1) | < | < | < | < | < |
| **Styrene** | 1.00 | 1,300 | < | < | < | < | < | < | < | < | < | < |
| **Tetrachloroethylene** | 1.00 | 1.6 | < | < | < | < | < | < | < | < | < | < |
| **1,1,2,2-Tetrachloroethane** | 0.50 | 3.2 | < | < | < | < | < | < | < | < | < | < |
| **Toluene** | 1.00 | 18,000 | < | < | < | < | < | < | < | < | < | < |
| **Trichloroethylene** | 1.00 | 1.6 | < | < | < | < | < | < | < | < | < | < |
| **1,1,1-Trichloroethane** | 1.00 | 640 | < | < | < | < | < | < | < | < | < | < |
| **1,1,2-Trichloroethane** | 1.00 | 4.7 | < | < | < | < | < | < | < | < | < | < |
| **Trichlorofluoromethane (FREON 11)** | 8.00 | 2,500 | < | < | <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.
(1) = Elevated RDL for analyzed VOC(s).

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E6**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | Units | RDL | Criteria* | MW 93-1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 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 | Dec 08, 2015 | Oct 12, 2017 |
| **Anion Sum** | me/L | N/A | - | 6.10 | 7.22 | 5.87 | 5.52 | 7.47 | 6.51 | 6.2 | 6.21 | - | 6.38 |
| **Bicarb. Alkalinity (calc. as CaCO3)** | mg/L | 1.00 | - | 236.0 | 292.0 | 229.0 | 210.0 | 304.0 | 270 | 240 | 250 | - | 250 |
| **Calculated TDS** | mg/L | 1.00 | - | 338.0 | 375.0 | 313.0 | 313.0 | 389.0 | 338 | 330 | 330 | - | 330 |
| **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 | - | 2.9 |
| **Cation Sum** | me/L | N/A | - | 6.60 | 6.77 | 5.62 | 5.90 | 6.90 | 6.14 | 5.82 | 5.72 | - | 5.62 |
| **Hardness (CaCO3)** | mg/L | 1.00 | - | 160 | 160 | 120 | 120 | 180 | 150 | 140 | 130 | - | 130 |
| **Ion Balance (% Difference)** | % | N/A | - | 4.00 | 3.22 | 2.18 | 3.33 | 3.97 | 2.92 | 3.16 | 4.11 | - | 6.33 |
| **Langelier Index (@ 20C)** | N/A | N/A | - | 0.50 | 0.62 | 0.47 | 0.38 | 0.80 | 0.815 | 0.51 | 0.644 | - | 0.537 |
| **Langelier Index (@ 4C)** | N/A | N/A | - | 0.30 | 0.37 | 0.22 | 0.13 | 0.55 | 0.566 | 0.261 | 0.395 | - | 0.288 |
| **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 | - | 7.54 |
| **Saturation pH (@ 4C)** | N/A | N/A | - | 7.80 | 7.66 | 7.89 | 7.89 | 7.57 | 7.69 | 7.79 | 7.81 | - | 7.79 |
| **Total Alkalinity (Total as CaCO3)** | mg/L | 30 | - | 240 | 300 | 230 | 210 | 310 | 280 | 250 | 250 | - | 260 |
| **Dissolved Chloride (Cl)** | mg/L | 1 | - | 36 | 35 | 19 | 15 | 11 | 11 | 24 | 17 | - | 30 |
| **Colour** | TCU | 5.00 | - | < | < | < | < | < | < | < | < | - | < |
| **Nitrate + Nitrite** | mg/L | 0.05 | - | < | < | < | < | < | < | < | < | - | < |
| **Nitrite (N)** | mg/L | 0.01 | - | < | < | < | < | < | < | < | < | - | <0.010 |
| **Nitrogen (Ammonia Nitrogen)** | mg/L | 0.05 | - | 0.10 | < | < | < | < | < | < | < | - | <0.050 |
| **Total Organic Carbon (C)** | mg/L | 0.50 | - | 1.20 | 1.00 | 2.10 | 0.90 | 930.00 | < | 1.1 | 0.86 | - | 5.3 (2) |
| **Orthophosphate (P)** | mg/L | 0.01 | - | < | < | < | < | < | < | 0.013 | < | - | < |
| **pH** | pH | N/A | - | 8.00 | 8.03 | 8.11 | 8.02 | 8.12 | 8.26 | 8.05 | 8.2 | - | 8.08 |
| **Reactive Silica (SiO2)** | mg/L | 0.50 | - | 9.90 | 10.00 | 7.60 | 7.60 | 6.90 | 5.3 | 8.1 | 7.9 | - | 9.1 |
| **Total Suspended Solids (TSS)** | mg/L | 2 | - | - | - | - | - | - | - | - | - | - | - |
| **Dissolved Sulphate (SO4)** | mg/L | 2 | - | 2 | 16 | 33 | 42 | 48 | 33 | 27 | 37 | - | 19 |
| **Turbidity** | NTU | 0.1 | - | 0.5 | 1.3 | 61.0 | 34.0 | <1000 | 590 | 2.1 | 5.1 | - | 47 |
| **Conductivity** | uS/cm | 1 | - | 580 | 580 | 520 | 500 | 630 | 580 | 540 | 520 | - | 570 |

**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.
(1) = Elevated detection limit due to matrix interference.
(2) = Reporting limit was increased due to turbidity.

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E6**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | Units | RDL | Criteria* | MW 93-1A | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 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 | Dec 08, 2015 | Oct 12, 2017 |
| **Anion Sum** | me/L | N/A | - | - | 7.22 | 7.33 | 7.46 | 5.61 | 6.5 | 6.47 | 7.23 | 7.66 | 6.6 | 7.19 |
| **Bicarb. Alkalinity (calc. as CaCO3)** | mg/L | 1.00 | - | - | 285.0 | 293.0 | 297.0 | 216.0 | 260 | 250 | 300 | 320 | 270 | 310 |
| **Calculated TDS** | mg/L | 1.00 | - | 265.0 | 447.0 | 390.0 | 401.0 | 302.0 | 334 | 334 | 380 | 400 | 350 | 380 |
| **Carb. Alkalinity (calc. as CaCO3)** | mg/L | 1.00 | - | - | 3.00 | 3.00 | 2.00 | 3.00 | 5.2 | 5.4 | 2.8 | 3.3 | 2.6 | 3.4 |
| **Cation Sum** | me/L | N/A | - | - | 9.57 | 7.02 | 7.19 | 5.35 | 5.89 | 5.94 | 7.05 | 7.38 | 6.46 | 7.09 |
| **Hardness (CaCO3)** | mg/L | 1.00 | - | 205 | 210 | 170 | 170 | 120 | 140 | 150 | 170 | 180 | 150 | 190 |
| **Ion Balance (% Difference)** | % | N/A | - | - | 14.00 | 2.16 | 1.84 | 2.37 | 4.92 | 4.27 | 1.26 | 1.86 | 1.07 | 0.7 |
| **Langelier Index (@ 20C)** | N/A | N/A | - | - | 0.70 | 0.62 | 0.61 | 0.55 | 0.826 | 0.846 | 0.65 | 0.74 | 0.561 | 0.792 |
| **Langelier Index (@ 4C)** | N/A | N/A | - | - | 0.45 | 0.37 | 0.36 | 0.31 | 0.577 | 0.597 | 0.401 | 0.495 | 0.312 | 0.544 |
| **Nitrate (N)** | mg/L | 0.05 | - | - | < | < | < | < | < | < | < | < | < | < |
| **Saturation pH (@ 20C)** | N/A | N/A | - | - | 7.31 | 7.37 | 7.32 | 7.67 | 7.5 | 7.5 | 7.34 | 7.29 | 7.45 | 7.28 |
| **Saturation pH (@ 4C)** | N/A | N/A | - | - | 7.55 | 7.62 | 7.57 | 7.92 | 7.75 | 7.75 | 7.59 | 7.54 | 7.69 | 7.53 |
| **Total Alkalinity (Total as CaCO3)** | mg/L | 30 | - | 290 | 290 | 300 | 300 | 220 | 260 | 260 | 310 | 320 | 280 | 310 |
| **Dissolved Chloride (Cl)** | mg/L | 1 | - | 11 | 12 | 11 | 11 | 16 | 30 | 30 | 11 | 10 | 11 | 11 |
| **Colour** | TCU | 5.00 | - | - | < | < | <5 | <5 | < | < | < | < | < | < |
| **Nitrate + Nitrite** | mg/L | 0.05 | - | < | < | < | < | < | < | < | < | < | < | < |
| **Nitrite (N)** | mg/L | 0.01 | - | 0.015 | < | < | < | < | < | < | < | < | < | <0.010 |
| **Nitrogen (Ammonia Nitrogen)** | mg/L | 0.05 | - | 0.02 | < | < | <0.05 | <0.05 | < | < | < | < | < | <0.050 |
| **Total Organic Carbon (C)** | mg/L | 0.50 | - | 2.00 | < | <(5) ( 1 ) | <(5) ( 1 ) | <(0.5) | 1.4 | 1.5 | 2.6 ( 1 ) | < | 1.68 | <5.0 (2) |
| **Orthophosphate (P)** | mg/L | 0.01 | - | - | < | < | 0.04 | < | < | < | < | < | 0.011 | < |
| **pH** | pH | N/A | - | 8.02 | 8.00 | 7.99 | 7.93 | 8.22 | 8.33 | 8.35 | 7.99 | 8.03 | 8.01 | 8.07 |
| **Reactive Silica (SiO2)** | mg/L | 0.50 | - | - | 5.00 | 7.10 | 6.80 | 7.70 | 9.1 | 9.1 | 6.3 | 7.7 | 4.4 | 5.9 |
| **Total Suspended Solids (TSS)** | mg/L | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| **Dissolved Sulphate (SO4)** | mg/L | 2 | - | - | 55 | 53 | 56 | 38 | 19 | 20 | 38 | 43 | 35 | 30 |
| **Turbidity** | NTU | 0.1 | - | - | 350.0 | 300.0 | 470.0 | 1.1 | 5.9 | 5.7 | 160 | 490 | >1000 | 690 |
| **Conductivity** | uS/cm | 1 | - | 511 | 610 | 630 | 640 | 500 | 580 | 590 | 620 | 680 | 580 | 640 |

**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.
(1) = Elevated detection limit due to matrix interference.
(2) = Reporting limit was increased due to turbidity.

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E6**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | Units | RDL | Criteria* | MW 93-2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AMEC 2008 | Aug 19, 2009 | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Aug 30, 2012 | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Oct 12, 2017 |
| **Anion Sum** | me/L | N/A | - | - | 6.90 | 6.30 | 6.58 | 6.42 | 6.36 | 6.33 | 6.18 | - | 5.79 |
| **Bicarb. Alkalinity (calc. as CaCO3)** | mg/L | 1.00 | - | - | 232.0 | 205.0 | 219.0 | 210.0 | 210.0 | 220 | 220 | - | 220 |
| **Calculated TDS** | mg/L | 1.00 | - | 331.0 | 380.0 | 346.0 | 368.0 | 361.0 | 353.0 | 350 | 340 | - | 320 |
| **Carb. Alkalinity (calc. as CaCO3)** | mg/L | 1.00 | - | - | 1.00 | 1.00 | 1.00 | 2.00 | 2.60 | 1.3 | 1.7 | - | < |
| **Cation Sum** | me/L | N/A | - | - | 6.50 | 5.66 | 6.19 | 6.10 | 5.99 | 5.97 | 6.01 | - | 5.61 |
| **Hardness (CaCO3)** | mg/L | 1.00 | - | 245 | 270 | 240 | 250 | 260 | 250 | 250 | 250 | - | 230 |
| **Ion Balance (% Difference)** | % | N/A | - | - | 2.60 | 5.35 | 3.05 | 2.56 | 3.00 | 2.93 | 1.39 | - | 1.58 |
| **Langelier Index (@ 20C)** | N/A | N/A | - | - | 0.50 | 0.53 | 0.54 | 0.68 | 0.90 | 0.591 | 0.711 | - | 0.368 |
| **Langelier Index (@ 4C)** | N/A | N/A | - | - | 0.30 | 0.28 | 0.29 | 0.43 | 0.65 | 0.342 | 0.462 | - | 0.119 |
| **Nitrate (N)** | mg/L | 0.05 | - | - | < | < | < | < | < | < | < | - | < |
| **Saturation pH (@ 20C)** | N/A | N/A | - | - | 7.20 | 7.28 | 7.20 | 7.23 | 7.22 | 7.22 | 7.2 | - | 7.24 |
| **Saturation pH (@ 4C)** | N/A | N/A | - | - | 7.40 | 7.53 | 7.45 | 7.47 | 7.47 | 7.47 | 7.45 | - | 7.49 |
| **Total Alkalinity (Total as CaCO3)** | mg/L | 30 | - | 205 | 2,320 | 210 | 220 | 210 | 220 | 220 | 220 | - | 220 |
| **Dissolved Chloride (Cl)** | mg/L | 1 | - | 24 | 24 | 23 | 21 | 20 | 20 | 19 | 18 | - | 16 |
| **Colour** | TCU | 5.00 | - | - | < | < | <5 | <5 | < | < | < | - | > |
| **Nitrate + Nitrite** | mg/L | 0.05 | - | < | < | < | < | < | < | < | < | - | < |
| **Nitrite (N)** | mg/L | 0.01 | - | 0.02 | < | < | < | < | < | < | < | - | <0.010 |
| **Nitrogen (Ammonia Nitrogen)** | mg/L | 0.05 | - | <0.01 | < | < | < | < | < | < | < | - | <0.050 |
| **Total Organic Carbon (C)** | mg/L | 0.50 | - | 2.00 | 0.50 | 1.50 | 1.30 | 1.00 | 0.88 | 1 | 1 | - | 1 |
| **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 | - | 7.61 |
| **Reactive Silica (SiO2)** | mg/L | 0.50 | - | - | 19.00 | 18.00 | 19.00 | 19.00 | 18.00 | 18 | 17 | - | 18 |
| **Total Suspended Solids (TSS)** | mg/L | 2 | - | - | - | - | - | - | - | - | - | - | - |
| **Dissolved Sulphate (SO4)** | mg/L | 2 | - | - | 73 | 74 | 76 | 78 | 71 | 68 | 56 | - | 46 |
| **Turbidity** | NTU | 0.1 | - | - | 13.0 | 5.4 | 13.0 | 3.9 | 4.0 | 1.1 | 6.1 | - | 1.7 |
| **Conductivity** | uS/cm | 1 | - | 549 | 560 | 570 | 580 | 570 | 580 | 560 | 550 | - | 530 |

**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.
(1) = Elevated detection limit due to matrix interference.
(2) = Reporting limit was increased due to turbidity.

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E6**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | Units | RDL | Criteria* | MW 93-2A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Aug 19, 2009 | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Aug 30, 2012 | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Oct 12, 2017 | Oct 12, 2017 MW-DUP |
| **Anion Sum** | me/L | N/A | - | 2.69 | 6.43 | 1.31 | 2.42 | 1.37 | 1.72 | 2.27 | 2.22 | 1.88 | 2.05 |
| **Bicarb. Alkalinity (calc. as CaCO3)** | mg/L | 1.00 | - | 62.0 | 212.0 | 14.0 | 61.0 | 11.0 | 14 | 7.7 | 14 | 17 | 25 |
| **Calculated TDS** | mg/L | 1.00 | - | 184.0 | 351.0 | 87.0 | 145.0 | 96.0 | 120 | 150 | 150 | 130 | 140 |
| **Carb. Alkalinity (calc. as CaCO3)** | mg/L | 1.00 | - | < | 1.00 | < | < | < | < | < | < | < | < |
| **Cation Sum** | me/L | N/A | - | 3.43 | 5.70 | 1.15 | 2.09 | 1.44 | 1.87 | 1.96 | 2.31 | 1.88 | 2.08 |
| **Hardness (CaCO3)** | mg/L | 1.00 | - | 120 | 240 | 31 | 73 | 34 | 42 | 61 | 60 | 43 | 52 |
| **Ion Balance (% Difference)** | % | N/A | - | 12.10 | ` | 6.50 | 7.32 | 2.49 | 4.18 | 7.33 | 1.99 | 0 | 0.73 |
| **Langelier Index (@ 20C)** | N/A | N/A | - | -1.51 | 0.48 | -3.48 | -1.21 | -3.03 | -3.37 | -3.6 | -2.85 | -3.09 | -2.46 |
| **Langelier Index (@ 4C)** | N/A | N/A | - | -1.76 | 0.24 | -3.73 | -1.46 | -3.28 | -3.62 | -3.85 | -3.1 | -3.34 | -2.71 |
| **Nitrate (N)** | mg/L | 0.05 | - | < | < | 0.15 | < | < | < | 0.43 | < | < | < |
| **Saturation pH (@ 20C)** | N/A | N/A | - | 8.06 | 7.27 | 9.25 | 8.27 | 9.28 | 9.14 | 9.26 | 9.02 | 9.08 | 8.82 |
| **Saturation pH (@ 4C)** | N/A | N/A | - | 8.31 | 7.52 | 9.50 | 8.52 | 9.53 | 9.39 | 9.51 | 9.28 | 9.33 | 9.07 |
| **Total Alkalinity (Total as CaCO3)** | mg/L | 30 | - | 62 | 210 | 14 | 61 | 12 | 14 | 7.7 | 14 | 17 | 25 |
| **Dissolved Chloride (Cl)** | mg/L | 1 | - | 21 | 23 | 14 | 16 | 17 | 22 | 31 | 31 | 28 | 26 |
| **Colour** | TCU | 5.00 | - | 6.00 | < | 79.00 | 120.00 | 41.00 | 65 | 14 | 36 | > | 110 (2) |
| **Nitrate + Nitrite** | mg/L | 0.05 | - | < | < | < | < | < | < | 0.43 | < | < | < |
| **Nitrite (N)** | mg/L | 0.01 | - | < | < | < | < | < | < | < | < | <0.010 | <0.010 |
| **Nitrogen (Ammonia Nitrogen)** | mg/L | 0.05 | - | 0.24 | < | 0.35 | 0.25 | 0.40 | 0.53 | 0.21 | 0.36 | 0.35 | 0.34 |
| **Total Organic Carbon (C)** | mg/L | 0.50 | - | 6.20 | 1.30 | 16.00 | 17.00 | 22.00 | 16 | 13 | 10.7 | 11 | 10 |
| **Orthophosphate (P)** | mg/L | 0.01 | - | < | < | < | < | < | < | < | 0.012 | < | < |
| **pH** | pH | N/A | - | 6.55 | 7.75 | 5.77 | 7.06 | 6.25 | 5.77 | 5.66 | 6.18 | 5.99 | 6.37 |
| **Reactive Silica (SiO2)** | mg/L | 0.50 | - | 12.00 | 18.00 | 6.40 | 11.00 | 5.70 | 6.4 | 7 | 8 | 7.3 | 8.2 |
| **Total Suspended Solids (TSS)** | mg/L | 2 | - | - | - | - | - | - | - | - | - | - | - |
| **Dissolved Sulphate (SO4)** | mg/L | 2 | - | 41 | 74 | 31 | 36 | 32 | 40 | 58 | 51 | 36 | 39 |
| **Turbidity** | NTU | 0.1 | - | 84.0 | 3.2 | 100.0 | 190.0 | 120.0 | 44 | 70 | 160 | 40 | 35 |
| **Conductivity** | uS/cm | 1 | - | 260 | 570 | 140 | 230 | 150 | 190 | 260 | 250 | 220 | 230 |

**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.
(1) = Elevated detection limit due to matrix interference.
(2) = Reporting limit was increased due to turbidity.

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E6**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | Units | RDL | Criteria* | MW 10-1 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 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 | Dec 08, 2015 | Oct 12, 2017 |
| **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 | - | 2.30 |
| **Bicarb. Alkalinity (calc. as CaCO3)** | mg/L | 1.00 | - | 94.0 | 92.0 | 96.0 | 95.0 | 144.0 | 140 | 120 | 120 | 96 | 98 | - | 92 |
| **Calculated TDS** | mg/L | 1.00 | - | 215.0 | 147.0 | 217.0 | 149.0 | 185.0 | 174 | 160 | 160 | 170 | 170 | - | 130 |
| **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 | - | 2.13 |
| **Hardness (CaCO3)** | mg/L | 1.00 | - | 100 | 110 | 100 | 110 | 150 | 140 | 130 | 130 | 130 | 130 | - | 90 |
| **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 | - | 3.84 |
| **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 | - | -0.424 |
| **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 | - | -0.675 |
| **Nitrate (N)** | mg/L | 0.05 | - | < | 0.24 | < | 0.25 | < | 0.16 | < | < | 0.13 | 0.14 | - | < |
| **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 | - | 7.91 |
| **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 | - | 8.16 |
| **Total Alkalinity (Total as CaCO3)** | mg/L | 30 | - | 95 | 92 | 96 | 96 | 140 | 140 | 120 | 120 | 96 | 98 | - | 93 |
| **Dissolved Chloride (Cl)** | mg/L | 1 | - | 56 | 12 | 56 | 12 | 6 | 3.8 | 5.4 | 5.8 | 26 | 26 | - | 5.3 |
| **Colour** | TCU | 5.00 | - | 10.00 | 9.00 | 6.00 | 13.00 | 9.00 | 5.6 | < | < | < | < | - | 7.2 |
| **Nitrate + Nitrite** | mg/L | 0.05 | - | < | < | < | < | 0.90 | 0.16 | < | < | 0.13 | 0.14 | - | < |
| **Nitrite (N)** | mg/L | 0.01 | - | < | < | < | < | < | < | < | < | < | < | - | <0.010 |
| **Nitrogen (Ammonia Nitrogen)** | mg/L | 0.05 | - | 0.14 | <0.05 | 0.14 | <0.05 | 0.28 | < | < | < | < | < | - | <0.050 |
| **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 | - | 4.2 |
| **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 | - | 7.48 |
| **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 | - | 11.0 |
| **Total Suspended Solids (TSS)** | mg/L | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Dissolved Sulphate (SO4)** | mg/L | 2 | - | 18 | 21 | 19 | 21 | 20 | 17 | 17 | 18 | 21 | 21 | - | 14 |
| **Turbidity** | NTU | 0.1 | - | 640.0 | >1000 | 570.0 | 540.0 | 320.0 | 26 | 110 | 110 | 37 | 38 | - | 38 |
| **Conductivity** | uS/cm | 1 | - | 380 | 250 | 380 | 260 | 320 | 300 | 270 | 280 | 300 | 300 | - | 230 |

**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.
(1) = Elevated detection limit due to matrix interference.
(2) = Reporting limit was increased due to turbidity.

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E6**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | Units | RDL | Criteria* | MW 10-1A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Aug 30, 2012 | Sep 02, 2011 DUP-A | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Dec 08, 2015 DUP1 | Oct 12, 2017 |
| **Anion Sum** | me/L | N/A | - | 3.86 | 3.08 | 1.43 | 2.11 | 1.44 | 1.66 | 2.92 | 2.22 | 2.20 | 1.79 |
| **Bicarb. Alkalinity (calc. as CaCO3)** | mg/L | 1.00 | - | 94.0 | 114.0 | 50.0 | 77.0 | 51.0 | 49 | 90 | 72 | 71 | 67 |
| **Calculated TDS** | mg/L | 1.00 | - | 215.0 | 171.0 | 95.0 | 122.0 | 95.0 | 100 | 160 | 130 | 130 | 110 |
| **Carb. Alkalinity (calc. as CaCO3)** | mg/L | 1.00 | - | < | < | < | < | < | < | < | < | < | < |
| **Cation Sum** | me/L | N/A | - | 3.61 | 3.08 | 1.57 | 1.98 | 1.59 | 1.61 | 2.76 | 2.05 | 2.05 | 1.68 |
| **Hardness (CaCO3)** | mg/L | 1.00 | - | 100 | 140 | 61 | 84 | 61 | 68 | 120 | 85 | 85 | 65 |
| **Ion Balance (% Difference)** | % | N/A | - | 3.35 | 0.00 | 4.67 | 3.18 | 4.95 | 1.53 | 2.82 | 3.98 | 3.53 | 3.17 |
| **Langelier Index (@ 20C)** | N/A | N/A | - | -0.36 | -0.18 | -1.18 | -0.60 | -1.11 | -1.51 | -0.083 | -0.792 | -0.799 | -0.898 |
| **Langelier Index (@ 4C)** | N/A | N/A | - | -0.61 | -0.43 | -1.43 | -0.85 | -1.36 | -1.76 | -0.333 | -1.04 | -1.05 | -1.15 |
| **Nitrate (N)** | mg/L | 0.05 | - | < | 0.26 | 0.10 | 0.08 | 0.08 | 0.068 | 0.069 | 0.11 | 0.11 | 0.064 |
| **Saturation pH (@ 20C)** | N/A | N/A | - | 7.92 | 7.64 | 8.32 | 8.00 | 8.31 | 8.29 | 7.76 | 8.04 | 8.05 | 8.19 |
| **Saturation pH (@ 4C)** | N/A | N/A | - | 8.17 | 7.89 | 8.57 | 8.25 | 8.56 | 8.54 | 8.01 | 8.3 | 8.3 | 8.44 |
| **Total Alkalinity (Total as CaCO3)** | mg/L | 30 | - | 95 | 110 | 51 | 77 | 51 | 49 | 90 | 72 | 71 | 67 |
| **Dissolved Chloride (Cl)** | mg/L | 1 | - | 56 | 14 | 3 | 4 | 3 | 5.7 | 27 | 11 | 11 | 4.9 |
| **Colour** | TCU | 5.00 | - | 7.00 | 5.00 | 22.00 | 7.70 | 18.00 | 8.2 | 16 | 7.4 | 8.1 | 10 |
| **Nitrate + Nitrite** | mg/L | 0.05 | - | < | < | 0.11 | 0.08 | 0.08 | 0.068 | 0.069 | 0.11 | 0.11 | 0.064 |
| **Nitrite (N)** | mg/L | 0.01 | - | < | < | < | < | < | < | < | < | < | <0.010 |
| **Nitrogen (Ammonia Nitrogen)** | mg/L | 0.05 | - | 0.15 | 0.09 | < | 0.11 | < | < | < | 0.13 | 0.11 | 0.16 |
| **Total Organic Carbon (C)** | mg/L | 0.50 | - | 8 (1) | 2.30 | 15.00 | 8.70 | 18.00 | 34 ( 1 ) | 7.1 (2) | 14.9 | 18.5 | <50 (2) |
| **Orthophosphate (P)** | mg/L | 0.01 | - | < | < | < | < | < | < | < | 0.012 | 0.012 | < |
| **pH** | pH | N/A | - | 7.56 | 7.46 | 7.14 | 7.40 | 7.20 | 6.78 | 7.68 | 7.25 | 7.25 | 7.29 |
| **Reactive Silica (SiO2)** | mg/L | 0.50 | - | 7.10 | 7.60 | 10.00 | 10.00 | 10.00 | 11 | 2.9 | 9.7 | 10 | 11 |
| **Total Suspended Solids (TSS)** | mg/L | 2 | - | - | - | 7,000 | - | 9,400 | - | - | - | - | - |
| **Dissolved Sulphate (SO4)** | mg/L | 2 | - | 19 | 19 | 22 | 21 | 22 | 24 | 16 | 22 | 22 | 14 |
| **Turbidity** | NTU | 0.1 | - | 520.0 | 110.0 | >1000 | 240.0 | >1000 | >1000 | 310 | 710 | >1000 | 800 |
| **Conductivity** | uS/cm | 1 | - | 380 | 300 | 150 | 200 | 150 | 160 | 280 | 200 | 200 | 160 |

**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.

(1) = Elevated detection limit due to matrix interference.

(2) = Reporting limit was increased due to turbidity.

RDL = Reportable Detection Limit
MW = Monitor Well

< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit

- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E7**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - DISSOLVED METALS (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 93-1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | Dec 08, 2015 | Oct 12, 2017 |
| **Aluminum (Al)** | 5.0 | - | 100 | 120 | 37 | 17 | 73.7 | 73.7 | 8.3 | 14 | - | 9.5 |
| **Antimony (Sb)** | 1.0 | 20,000 | < | < | < | < | < | < | < | < | - | < |
| **Arsenic (As)** | 1.0 | 1,900 | < | < | < | < | < | < | < | 1.2 | - | < |
| **Barium (Ba)** | 1.0 | 29,000 | 130 | 150 | 88 | 70 | 77.9 | 77.9 | 100 | 85 | - | 100 |
| **Beryllium (Be)** | 1.0 | 67 | < | < | < | < | <1 | <1 | < | < | - | < |
| **Bismuth (Bi)** | 2.0 | - | < | < | < | < | <2 | <2 | < | < | - | < |
| **Boron (B)** | 50 | 45,000 | 120 | 120 | 100 | 99 | 63 | 63 | 110 | 98 | - | 120 |
| **Cadmium (Cd)** | 0.010 | 2.7 | 0.4 | < | 0.02 | 0.05 | < | < | 0.044 | 0.022 | - | < |
| **Calcium (Ca)** | 100 | - | - | - | 26,000 | 29,000 | 43,500 | 43,500 | 31,000 | 30,000 | - | 30,000 |
| **Chromium (Cr)** | 1.0 | 810/140[(1)] | < | < | < | < | < | < | < | < | - | < |
| **Cobalt (Co)** | 0.4 | 66 | < | < | < | < | 0.44 | 0.44 | < | < | - | < |
| **Copper (Cu)** | 2.0 | 87 | 6 | 3 | < | < | <2 | <2 | < | < | - | < |
| **Iron (Fe)** | 50 | - | 670 | 550 | < | < | 65 | 65 | 570 | 330 | - | < |
| **Lead (Pb)** | 0.5 | 25 | 4.6 | 1 | < | < | < | < | < | < | - | < |
| **Magnesium (Mg)** | 100 | - | - | - | 14,000 | 12,000 | 16,400 | 16,400 | 15,000 | 14,000 | - | 14,000 |
| **Manganese (Mn)** | 2.0 | - | 110 | 120 | 120 | 81 | 60 | 60 | 110 | 120 | - | 87 |
| **Molybdenum (Mo)** | 2.0 | 9,200 | 6 | 6 | 20 | 18 | 16.3 | 16.3 | 15 | 15 | - | 15 |
| **Nickel (Ni)** | 2.0 | 490 | 6 | < | < | < | < | < | < | < | - | < |
| **Phosphorus (P)** | 100 | - | - | - | < | < | - | - | < | < | - | < |
| **Potassium (K)** | 100 | - | - | - | 1,900 | 2,000 | 2,680 | 2,680 | 1,800 | 1,700 | - | 1,600 |
| **Selenium (Se)** | 1.0 | 63 | < | < | < | < | < | < | < | < | - | < |
| **Silver (Ag)** | 0.1 | 1.5 | < | < | < | < | < | < | < | < | - | < |
| **Sodium** | 100 | 2,300,000 | - | - | - | - | 76,100 | 70,400 | 69,000 | 69,000 | - | 68,000 |
| **Strontium (Sr)** | 2.0 | - | 250 | 260 | 230 | 220 | 263 | 263 | 240 | 220 | - | 230 |
| **Thallium (Tl)** | 0.1 | 510 | < | < | < | < | < | < | < | < | - | < |
| **Tin (Sn)** | 2.0 | - | < | < | < | < | <2 | <2 | < | < | - | < |
| **Titanium (Ti)** | 2.0 | - | 3 | 3 | < | < | 2.6 | 2.6 | < | < | - | < |
| **Uranium (U)** | 0.1 | 420 | 0.2 | 0.2 | 0.3 | 0.2 | 3.06 | 3.06 | 0.16 | 0.34 | - | 0.28 |
| **Vanadium (V)** | 2.0 | 250 | < | < | < | < | < | < | < | < | - | < |
| **Zinc (Zn)** | 5.0 | 1,100 | 360 | 32 | 10 | 10 | < | < | 12 | 10 | - | < |

**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.
(1) Criteria for Total Chromium = 2000 µg/L, Criteria for Chromium (VI) = 110 µg/L.

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E7**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - DISSOLVED METALS (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 93-1A | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | Dec 08, 2015 | Oct 12, 2017 |
| **Aluminum (Al)** | 5.0 | - | 42000 | 13,000 | 15 | 31 | 5.9 | 5.9 | 13.0 | 10 | 18 | 33 | 9.8 |
| **Antimony (Sb)** | 1.0 | 20,000 | < | < | < | < | < | < | < | < | < | < | < |
| **Arsenic (As)** | 1.0 | 1,900 | 36 | 7 | < | < | < | < | < | < | < | < | < |
| **Barium (Ba)** | 1.0 | 29,000 | 426 | 240 | 79 | 73 | 68.6 | 68.6 | 107 | 83 | 71 | 74 | 71 |
| **Beryllium (Be)** | 1.0 | 67 | 2 | < | < | < | < | < | < | < | < | < | < |
| **Bismuth (Bi)** | 2.0 | - | - | < | < | < | < | < | < | < | < | < | < |
| **Boron (B)** | 50 | 45,000 | - | 58 | 56 | 57 | 96 | 96 | 118 | 69 | 64 | 59 | 79 |
| **Cadmium (Cd)** | 0.010 | 2.7 | 3 | < | 0.03 | 0.07 | < | < | < | < | 0.012 | < | 0.013 |
| **Calcium (Ca)** | 100 | - | - | - | 40,000 | 45,000 | 26,300 | 26,300 | 33,000 | 42,000 | 45,000 | 35,000 | 47,000 |
| **Chromium (Cr)** | 1.0 | 810/140[(1)] | 54 | 39 | < | < | < | < | < | < | < | < | < |
| **Cobalt (Co)** | 0.4 | 66 | **110** | **170** | 0.7 | 0.4 | < | < | < | 1 | < | 3 | 1 |
| **Copper (Cu)** | 2.0 | 87 | **370** | **170** | 2 | < | < | < | 6.8 | < | < | < | 3 |
| **Iron (Fe)** | 50 | - | 370 | 37000 | < | < | < | < | 55 | 530 | < | < | 110 |
| **Lead (Pb)** | 0.5 | 25 | **45** | 17 | < | < | < | < | < | < | < | < | < |
| **Magnesium (Mg)** | 100 | - | - | - | 17,000 | 14,000 | 12,200 | 12,200 | 15,400 | 17,000 | 17,000 | 16,000 | 17,000 |
| **Manganese (Mn)** | 2.0 | - | 2,620 | 1200 | 160 | 57 | 259 | 259 | 103 | 160 | 71 | 68 | 140 |
| **Molybdenum (Mo)** | 2.0 | 9,200 | 20 | 11 | 15 | 14 | 19.2 | 19.2 | 10.7 | 16 | 15 | 18 | 15 |
| **Nickel (Ni)** | 2.0 | 490 | 154 | 87 | < | < | < | < | < | < | < | 3.1 | 2 |
| **Phosphorus (P)** | 100 | - | - | - | < | 130 | - | - | < | < | < | < | < |
| **Potassium (K)** | 100 | - | - | - | 2,500 | 2,700 | 1,830 | 1,830 | 1,730 | 2,700 | 2,500 | 2,400 | 2,500 |
| **Selenium (Se)** | 1.0 | 63 | <1 | < | < | < | < | < | < | < | < | < | < |
| **Silver (Ag)** | 0.1 | 1.5 | 1 | < | < | < | < | < | < | < | < | < | < |
| **Sodium** | 100 | 2,300,000 | - | - | - | - | 68,600 | 68,200 | 68,600 | 80,000 | 85,000 | 77,000 | 75,000 |
| **Strontium (Sr)** | 2.0 | - | - | 300 | 300 | 280 | 192 | 192 | 249 | 280 | 280 | 230 | 290 |
| **Thallium (Tl)** | 0.1 | 510 | - | - | < | < | < | < | < | < | < | < | < |
| **Tin (Sn)** | 2.0 | - | - | < | < | < | < | < | < | < | < | < | < |
| **Titanium (Ti)** | 2.0 | - | - | 720 | < | 2 | < | < | < | < | < | < | < |
| **Uranium (U)** | 0.1 | 420 | - | 6 | 2.9 | 2.8 | 0.4 | 0.4 | 0.21 | 2.3 | 3.1 | 5.0 | 2.4 |
| **Vanadium (V)** | 2.0 | 250 | 155 | 28 | < | < | < | < | < | < | < | < | < |
| **Zinc (Zn)** | 5.0 | 1,100 | 443 | 250 | < | < | < | < | < | < | < | < | 10 |

**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.
(1) Criteria for Total Chromium = 2000 µg/L, Criteria for Chromium (VI) = 110 µg/L.

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E7**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - DISSOLVED METALS (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 93-2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AMEC 2008 | Aug 19, 2009 | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Aug 30, 2012 | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Oct 12, 2017 |
| **Aluminum (Al)** | 5.0 | - | 484 | 460 | 9 | < | < | < | 5.4 | 6.2 | - | 7.8 |
| **Antimony (Sb)** | 1.0 | 20,000 | < | < | < | < | < | < | < | < | - | < |
| **Arsenic (As)** | 1.0 | 1,900 | 3 | 2 | 2 | 2 | 1.2 | 1.2 | 1.9 | 3.0 | - | 2.3 |
| **Barium (Ba)** | 1.0 | 29,000 | 131 | 180 | 170 | 160 | 171 | 171 | 170 | 190 | - | 150 |
| **Beryllium (Be)** | 1.0 | 67 | <0.1 | < | < | < | < | < | < | < | - | < |
| **Bismuth (Bi)** | 2.0 | - | <0.5 | < | < | < | < | < | < | < | - | < |
| **Boron (B)** | 50 | 45,000 | - | 1100 | 980 | 1100 | < | < | 1,100 | 980 | - | 1,000 |
| **Cadmium (Cd)** | 0.010 | 2.7 | - | < | 0.15 | 0.1 | **1160** | **1160** | <0.010 | < | - | < |
| **Calcium (Ca)** | 100 | - | - | - | 69,000 | 80,000 | 77,300 | 77,400 | 75,000 | 76,000 | - | 70,000 |
| **Chromium (Cr)** | 1.0 | 810/140[(1)] | 1 | < | < | < | < | < | < | < | - | < |
| **Cobalt (Co)** | 0.4 | 66 | 1 | < | < | 0.4 | < | < | < | < | - | 0.4 |
| **Copper (Cu)** | 2.0 | 87 | 8 | 5 | < | < | 0.56 | 0.56 | < | < | - | < |
| **Iron (Fe)** | 50 | - | 1300 | 980 | < | < | < | < | 57 | 130 | - | 120 |
| **Lead (Pb)** | 0.5 | 25 | 5 | 2 | < | < | < | < | < | < | - | < |
| **Magnesium (Mg)** | 100 | - | - | - | 16,000 | 13,000 | 15,600 | 15,600 | 15,000 | 15,000 | - | 14,000 |
| **Manganese (Mn)** | 2.0 | - | 15,300 | 1200 | 880 | 950 | 1,120 | 1,120 | 980 | 720 | - | 1,000 |
| **Molybdenum (Mo)** | 2.0 | 9,200 | 2 | < | < | < | < | < | < | < | - | < |
| **Nickel (Ni)** | 2.0 | 490 | 1 | < | < | < | < | < | < | < | - | < |
| **Phosphorus (P)** | 100 | - | - | - | < | 150 | - | - | < | < | - | < |
| **Potassium (K)** | 100 | - | - | - | 1,200 | 1,400 | 1,560 | 1,560 | 1,300 | 1,300 | - | 1,300 |
| **Selenium (Se)** | 1.0 | 63 | 1 | < | < | < | < | < | < | < | - | < |
| **Silver (Ag)** | 0.1 | 1.5 | - | < | < | < | < | < | < | < | - | < |
| **Sodium** | 100 | 2,300,000 | - | - | - | - | 21,000 | 20,300 | 22,000 | 22,000 | - | 22,000 |
| **Strontium (Sr)** | 2.0 | - | - | 230 | 240 | 230 | 210 | 210 | 220 | 230 | - | 200 |
| **Thallium (Tl)** | 0.1 | 510 | - | < | < | < | < | < | < | < | - | < |
| **Tin (Sn)** | 2.0 | - | - | < | < | < | < | < | < | < | - | < |
| **Titanium (Ti)** | 2.0 | - | - | 21 | < | < | < | < | < | < | - | < |
| **Uranium (U)** | 0.1 | 420 | - | 0 | 0.3 | 0.2 | 0.24 | 0.24 | 0.26 | 0.23 | - | 0.2 |
| **Vanadium (V)** | 2.0 | 250 | 2 | < | < | < | < | < | < | < | - | < |
| **Zinc (Zn)** | 5.0 | 1,100 | 33 | 41 | 19 | 18 | 5 | 5 | < | < | - | 5.6 |

**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.
(1) Criteria for Total Chromium = 2000 µg/L, Criteria for Chromium (VI) = 110 µg/L.

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E7**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - DISSOLVED METALS (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 93-2A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Aug 19, 2009 | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Aug 30, 2012 | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Oct 12, 2017 | Oct 12, 2017 MW-DUP |
| **Aluminum (Al)** | 5.0 | - | 630 | < | 150 | 86.6 | | 290 | 270 | 170 | 220 | 180 |
| **Antimony (Sb)** | 1.0 | 20,000 | < | < | < | < | < | < | < | < | < | < |
| **Arsenic (As)** | 1.0 | 1,900 | < | 2 | < | < | < | < | < | < | 1.2 | 1.1 |
| **Barium (Ba)** | 1.0 | 29,000 | 69 | 180 | 39 | 54.1 | 54.1 | 48 | 90 | 54 | 49 | 51 |
| **Beryllium (Be)** | 1.0 | 67 | < | < | < | < | < | < | < | < | < | < |
| **Bismuth (Bi)** | 2.0 | - | < | < | < | < | < | < | < | < | < | < |
| **Boron (B)** | 50 | 45,000 | 440.0 | 1000 | 24 | 317 | 317 | < | < | 110 | 95 | 150 |
| **Cadmium (Cd)** | 0.010 | 2.7 | **11** | 0.15 | **3.5** | 0.304 | 0.304 | 0.32 | **11** | 0.80 | 0.31 | 0.32 |
| **Calcium (Ca)** | 100 | - | - | 69,000 | 9,000 | 20,600 | 20,600 | 11,000 | 16,000 | 15,000 | 11,000 | 14,000 |
| **Chromium (Cr)** | 1.0 | 810/140[(1)] | < | < | < | < | < | < | < | < | < | < |
| **Cobalt (Co)** | 0.4 | 66 | 1 | < | 1.4 | 1.19 | 1.19 | 0.93 | 5.2 | 2.9 | 2.2 | 2.3 |
| **Copper (Cu)** | 2.0 | 87 | 6 | < | < | < | < | < | < | < | < | < |
| **Iron (Fe)** | 50 | - | 9900 | < | 1900 | 3000 | 3000 | 12,000 | 730 | 7,700 | 8,600 | 8,900 |
| **Lead (Pb)** | 0.5 | 25 | 6.9 | < | 0.8 | 1.17 | 1.17 | 1 | 1 | < | < | < |
| **Magnesium (Mg)** | 100 | - | | 16,000 | 2,200 | 5,220 | 5,220 | 3,300 | 4,900 | 5,200 | 3,600 | 4,200 |
| **Manganese (Mn)** | 2.0 | - | 4300 | 890 | 4,000 | 4,190 | 4,190 | 5,000 | 6,700 | 5,700 | 5,100 | 5,300 |
| **Molybdenum (Mo)** | 2.0 | 9,200 | < | < | < | < | < | < | < | < | < | < |
| **Nickel (Ni)** | 2.0 | 490 | < | < | < | < | < | < | 4.8 | 2.6 | 2.3 | 2.4 |
| **Phosphorus (P)** | 100 | - | - | < | < | - | - | < | 110 | < | < | < |
| **Potassium (K)** | 100 | - | - | 1,200 | 980 | 1,040 | 1,040 | 1,300 | 1,600 | 1,500 | 1,300 | 1,300 |
| **Selenium (Se)** | 1.0 | 63 | < | < | < | < | < | < | < | < | < | < |
| **Silver (Ag)** | 0.1 | 1.5 | < | < | < | < | < | < | < | < | < | < |
| **Sodium** | 100 | 2,300,000 | - | - | - | 11,000 | 9,100 | 12,000 | 15,000 | 18,000 | 15,000 | 15,000 |
| **Strontium (Sr)** | 2.0 | - | 100 | 240 | 41 | 70.6 | 70.6 | 52 | 77 | 68 | 55 | 61 |
| **Thallium (Tl)** | 0.1 | 510 | < | < | < | < | < | < | < | < | < | < |
| **Tin (Sn)** | 2.0 | - | < | < | < | < | < | < | < | < | < | < |
| **Titanium (Ti)** | 2.0 | - | 20 | < | 2 | < | < | 2.2 | < | < | < | < |
| **Uranium (U)** | 0.1 | 420 | 0.3 | 0.3 | < | < | < | < | < | < | < | < |
| **Vanadium (V)** | 2.0 | 250 | 4 | < | < | < | < | < | < | < | < | < |
| **Zinc (Zn)** | 5.0 | 1,100 | **1,700** | 17 | **1,300** | 568 | 568 | 190 | **2,900** | 290 | 130 | 140 |

**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.
(1) Criteria for Total Chromium = 2000 µg/L, Criteria for Chromium (VI) = 110 µg/L.

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E7**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - DISSOLVED METALS (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 10-1 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | Dec 08, 2015 | Oct 12, 2017 |
| **Aluminum (Al)** | 5.0 | - | 200 | 38 | 160 | 36 | 41.8 | 41.8 | 30 | 26 | 12 | 17 | - | 8.5 |
| **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 | - | 37 |
| **Beryllium (Be)** | 1.0 | 67 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Bismuth (Bi)** | 2.0 | - | < | < | < | < | < | < | < | < | < | < | - | < |
| **Boron (B)** | 50 | 45,000 | 45 | 9 | 38 | 9 | < | < | < | < | < | < | - | < |
| **Cadmium (Cd)** | 0.010 | 2.7 | 0.03 | < | 0.03 | < | 0.032 | 0.032 | 0.037 | 0.053 | < | < | - | 0.027 |
| **Calcium (Ca)** | 100 | - | 31,000 | 41,000 | 32,000 | 42,000 | 51,100 | 51,100 | 45,000 | 45,000 | 46,000 | 47,000 | - | 30,000 |
| **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 | < | < | < | - | 3.3 |
| **Copper (Cu)** | 2.0 | 87 | 5 | 9 | 5 | 9 | 7.3 | 7.3 | 5.8 | 6 | 3.8 | 4 | - | 4 |
| **Iron (Fe)** | 50 | - | 120 | 50 | 140 | 59 | 50 | 50 | 84 | < | < | < | - | 1000 |
| **Lead (Pb)** | 0.5 | 25 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Magnesium (Mg)** | 100 | - | 5,800 | 2,300 | 5,900 | 2,300 | 4,540 | 4,540 | 4,100 | 4,000 | 3,900 | 3,900 | - | 3,500 |
| **Manganese (Mn)** | 2.0 | - | 390 | 190 | 390 | 170 | 239 | 239 | 27 | 26 | 12 | 13 | - | 310 |
| **Molybdenum (Mo)** | 2.0 | 9,200 | 16 | 3 | 16 | 3 | 2.5 | 2.5 | < | < | < | < | - | < |
| **Nickel (Ni)** | 2.0 | 490 | 6 | 6 | 6 | 6 | 6.5 | 6.5 | 2 | 2.1 | < | < | - | 4 |
| **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 | - | 810 |
| **Selenium (Se)** | 1.0 | 63 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Silver (Ag)** | 0.1 | 1.5 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Sodium** | 100 | 2,300,000 | - | - | - | - | 6,570 | 7,020 | 6,600 | 6,600 | 8,000 | 7,800 | - | 6,100 |
| **Strontium (Sr)** | 2.0 | - | 98 | 85 | 99 | 87 | 106 | 106 | 98 | 98 | 98 | 98 | - | 68 |
| **Thallium (Tl)** | 0.1 | 510 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Tin (Sn)** | 2.0 | - | < | < | < | < | < | < | < | < | < | < | - | < |
| **Titanium (Ti)** | 2.0 | - | 3 | < | 3 | < | < | < | < | < | < | < | - | < |
| **Uranium (U)** | 0.1 | 420 | 0.4 | < | 0.4 | < | 0.43 | 0.43 | 0.29 | 0.29 | 0.2 | 0.21 | - | 0.1 |
| **Vanadium (V)** | 2.0 | 250 | < | < | < | < | < | < | < | < | < | < | - | < |
| **Zinc (Zn)** | 5.0 | 1,100 | 5 | 11 | 6 | 11 | 9 | 9 | 8.2 | 11 | < | < | - | 13 |

**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.
(1) Criteria for Total Chromium = 2000 µg/L, Criteria for Chromium (VI) = 110 µg/L.

RDL = Reportable Detection Limit
MW = Monitor Well
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E7**

**HISTORICAL GROUNDWATER ANALYTICAL DATA - DISSOLVED METALS (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | RDL | Criteria* | MW 10-1A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jul 16, 2010 | Dec 13, 2010 | Sep 02, 2011 | Aug 30, 2012 | Sep 02, 2011 DUP-A | Aug 28, 2013 | Nov 25, 2014 | Dec 08, 2015 | Dec 08, 2015 DUP1 | Oct 12, 2017 |
| **Aluminum (Al)** | 5.0 | - | 100 | 11 | 74.5 | 74.5 | 68.3 | 58 | 75 | 32 | 33 | 17 |
| **Antimony (Sb)** | 1.0 | 20,000 | < | < | < | < | < | < | < | < | < | < |
| **Arsenic (As)** | 1.0 | 1,900 | < | < | < | < | < | < | < | < | < | < |
| **Barium (Ba)** | 1.0 | 29,000 | 110 | 62 | 28.8 | 28.8 | 29.4 | 35 | 22 | 39 | 38 | 40 |
| **Beryllium (Be)** | 1.0 | 67 | < | < | < | < | < | < | < | < | < | < |
| **Bismuth (Bi)** | 2.0 | - | < | < | < | < | < | < | < | < | < | < |
| **Boron (B)** | 50 | 45,000 | 42 | 13 | < | < | < | < | < | < | < | < |
| **Cadmium (Cd)** | 0.010 | 2.7 | 0.02 | 0.03 | 0.039 | 0.039 | 0.036 | 0.033 | < | 0.030 | 0.028 | 0.015 |
| **Calcium (Ca)** | 100 | - | 31,000 | 48,000 | 20,600 | 20,600 | 20,800 | 23,000 | 45,000 | 28,000 | 29,000 | 21,000 |
| **Chromium (Cr)** | 1.0 | 810/140[(1)] | < | < | < | < | < | < | < | < | < | < |
| **Cobalt (Co)** | 0.4 | 66 | 2.5 | 3.3 | 1.54 | 1.54 | 2.07 | 12 | < | 6.3 | 6.2 | 5 |
| **Copper (Cu)** | 2.0 | 87 | 4 | < | 9.4 | 9.4 | 9.1 | 11 | 6.8 | 5.8 | 5.6 | 5.3 |
| **Iron (Fe)** | 50 | - | 82 | < | 96 | 96 | 92 | 560 | 86 | 1,100 | 1,100 | 3600 |
| **Lead (Pb)** | 0.5 | 25 | < | < | < | < | 2.66 | < | < | < | < | < |
| **Magnesium (Mg)** | 100 | - | 5,900 | 3,900 | 2,190 | 2,190 | 2,150 | 2,500 | 1,800 | 3,300 | 3,200 | 2,700 |
| **Manganese (Mn)** | 2.0 | - | 400 | 380 | 106 | 106 | 139 | 860 | 3.3 | 590 | 590 | 530 |
| **Molybdenum (Mo)** | 2.0 | 9,200 | 14 | 5 | 8.5 | 8.5 | 6.1 | 3.2 | < | < | < | < |
| **Nickel (Ni)** | 2.0 | 490 | 5 | 6 | 8.9 | 8.9 | 8.3 | 11 | < | 6.4 | 6.5 | 5.5 |
| **Phosphorus (P)** | 100 | - | < | < | - | - | - | < | < | < | < | < |
| **Potassium (K)** | 100 | - | 6,400 | 1,400 | 714 | 714 | 693 | 720 | 850 | 710 | 690 | 620 |
| **Selenium (Se)** | 1.0 | 63 | < | < | < | < | < | < | < | < | < | < |
| **Silver (Ag)** | 0.1 | 1.5 | < | < | < | < | < | 0.15 | < | < | < | < |
| **Sodium** | 100 | 2,300,000 | - | - | 4,670 | 5,750 | 4,600 | 5,100 | 8,100 | 6,600 | 6,600 | 5,300 |
| **Strontium (Sr)** | 2.0 | - | 99 | 100 | 46.9 | 46.9 | 45.4 | 56 | 85 | 68 | 67 | 53 |
| **Thallium (Tl)** | 0.1 | 510 | < | < | < | < | < | < | < | < | < | < |
| **Tin (Sn)** | 2.0 | - | < | < | < | < | < | < | < | < | < | < |
| **Titanium (Ti)** | 2.0 | - | 2 | < | 2.1 | 2.1 | < | < | 3.9 | < | < | < |
| **Uranium (U)** | 0.1 | 420 | 0.4 | 0.3 | < | < | < | < | 0.14 | < | < | < |
| **Vanadium (V)** | 2.0 | 250 | < | < | < | < | < | < | < | < | < | < |
| **Zinc (Zn)** | 5.0 | 1,100 | 5 | 10 | 8.9 | 8.9 | 10.1 | 6.9 | < | 8.4 | 7.7 | 7.3 |

**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.
(1) Criteria for Total Chromium = 2000 µg/L, Criteria for Chromium (VI) = 110 µg/L.

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< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E8**

**HISTORICAL SURFACE WATER ANALYTICAL DATA - BTEX/mTPH**
**2017/18 MONITORING 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 | | mTPH | |
| | | | | | | $C_6$-$C_{10}$ | $C_{10}$-$C_{16}$ | $C_{16}$-$C_{21}$ | $C_{21}$-$C_{32}$ | | |
| 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 | < | < | < | < | < | < | < | < | < | - |
| | Dec 08, 2015 | < | < | < | < | < | < | < | < | < | - |
| | Oct 12, 2017 | < | < | < | < | < | < | < | < | < | - |
| 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 | < | < | < | < | < | < | < | < | < | - |
| | Dec 08, 2015 | < | < | < | < | < | < | < | < | < | - |
| | Oct 12, 2017 | < | < | < | < | < | < | < | < | < | - |
| SURFACE-DUP | Oct 12, 2017 | < | < | < | < | < | < | < | < | < | - |
| RDL | | 0.001 | 0.001 | 0.001 | 0.002 | 0.01 | 0.05 | 0.1 | 0.1 | 0.1 | - |
| **B.C. Reg. 375/96 Schedule 6 Generic Numberical Water Standards for Aquatic Life[2]** | | **4.00** | **0.39** | **2.00** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| | | | | | | | | | | **-** | **-** |
| | | | | | | | | | | **-** | **-** |
| **2012 RBCA Tier I Ecological Screening Levels for the Protection of Aquatic Life[3]** | | **2.1** | **0.77** | **0.32** | **0.33** | **-** | **-** | **-** | **-** | **1.5** | **Gasoline** |
| | | | | | | | | | | **0.10** | **Diesel/#2** |
| | | | | | | | | | | **0.10** | **#6 oil/lube** |

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

3. Atlantic RBCA (Risk-Based Corrective Action) Version 3.0 (July 2012) Tier I Surface Water Screening Levels for the Protection of Freshwater and Marine Aquatic Life.

RDL = Reportable Detection Limit
SURFACE-DUP = Field Duplicate of SURFACE-DOWN
- = Not analysed/No criteria

< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
**0.0** = Above criteria for current sampling program

**TABLE E9**

**HISTORICAL SURFACE WATER ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING 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 | Dec 08, 2015 | Oct 12, 2017 |
| **1-Methylnaphthalene** | 0.05 | - | <0.03 | < | < | < | < | < | < | < | < | < |
| **2-Methylnaphthalene** | 0.05 | - | <0.03 | < | < | < | < | < | < | < | < | < |
| **Acenaphthene** | 0.01 | 5.8 | <0.04 | < | < | < | < | < | < | < | < | < |
| **Acenaphthylene** | 0.01 | - | <0.03 | < | < | < | < | < | < | < | < | < |
| **Acridine** | 0.05 | 4.4 | - | - | < | < | - | - | < | < | - | - |
| **Anthracene** | 0.01 | 0.012 | <0.01 | < | < | < | < | < | < | < | < | < |
| **Benzo(a)anthracene** | 0.01 | 0.018 | <0.01 | < | < | < | < | < | < | < | < | < |
| **Benzo(a)pyrene** | 0.01 | 0.015 | <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 | < | < | < | < | < | < | < | < | < |
| **Dibenz(a,h)anthracene** | 0.01 | - | - | < | < | < | < | < | < | < | < | < |
| **Fluoranthene** | 0.01 | 0.04 | <0.03 | < | < | < | < | < | < | < | < | < |
| **Fluorene** | 0.01 | 3.0 | <0.03 | < | < | < | < | < | < | < | < | < |
| **Indeno(1,2,3-cd)pyrene** | 0.01 | - | <0.05 | < | < | < | < | < | < | < | < | < |
| **Naphthalene** | 0.2 | 1.1 | - | < | < | < | < | < | < | < | < | < |
| **Perylene** | 0.01 | - | - | < | 0.01 | < | < | < | < | < | < | < |
| **Phenanthrene** | 0.01 | 0.4 | <0.04 | < | < | < | < | 0.011 | < | < | < | < |
| **Pyrene** | 0.01 | 0.025 | < | < | < | < | < | < | < | < | < | < |
| **Quinoline** | 0.05 | 3.4 | - | - | < | < | - | - | < | < | - | - |

**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 for current sampling program

**TABLE E9**

**HISTORICAL SURFACE WATER ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| 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 | Dec 08, 2015 | Oct 12, 2017 | SURFACE-DUP Oct 12, 2017 |
| **1-Methylnaphthalene** | 0.05 | - | <0.03 | < | < | < | < | < | < | < | < | < | < |
| **2-Methylnaphthalene** | 0.05 | - | <0.03 | < | < | < | < | < | < | < | < | < | < |
| **Acenaphthene** | 0.01 | 5.8 | <0.04 | < | < | < | < | < | < | < | < | < | < |
| **Acenaphthylene** | 0.01 | - | <0.03 | < | < | < | < | < | < | < | < | < | < |
| **Acridine** | 0.05 | 4.4 | - | - | < | < | - | - | < | < | - | - | - |
| **Anthracene** | 0.01 | 0.012 | <0.01 | < | < | < | < | < | < | < | < | < | < |
| **Benzo(a)anthracene** | 0.01 | 0.018 | <0.01 | < | < | < | < | < | < | < | < | < | < |
| **Benzo(a)pyrene** | 0.01 | 0.015 | <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 | < | < | < | < | < | < | < | < | < | < |
| **Dibenz(a,h)anthracene** | 0.01 | - | NA | < | < | < | < | < | < | < | < | < | < |
| **Fluoranthene** | 0.01 | 0.04 | <0.03 | < | < | < | < | < | < | < | < | < | < |
| **Fluorene** | 0.01 | 3.0 | <0.03 | < | < | < | < | < | < | < | < | < | < |
| **Indeno(1,2,3-cd)pyrene** | 0.01 | - | <0.05 | < | < | < | < | < | < | < | < | < | < |
| **Naphthalene** | 0.2 | 1.1 | NA | < | < | < | < | < | < | < | < | < | < |
| **Perylene** | 0.01 | - | NA | < | < | < | < | < | < | < | < | < | < |
| **Phenanthrene** | 0.01 | 0.4 | <0.04 | 0.01 | < | < | < | 0.012 | < | < | < | < | < |
| **Pyrene** | 0.01 | 0.025 | <0.01 | < | < | < | < | < | < | < | < | < | < |
| **Quinoline** | 0.05 | 3.4 | - | - | < | < | - | - | < | < | - | - | - |

**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
SURFACE-DUP = Field Duplicate of SURFACE-DOWN
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E10**

**HISTORICAL SURFACE WATER ANALYTICAL DATA - PCBs (µg/L)**
**2017/18 MONITORING 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 | Dec 08, 2015 | Oct 12, 2017 |
| **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 | Dec 08, 2015 | Oct 12, 2017 | SURFACE-DUP Oct 12, 2017 |
| **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
SURFACE-DUP = Field Duplicate of SURFACE-DOWN
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E11**

**HISTORICAL SURFACE WATER ANALYTICAL DATA - VOCs (µg/L)**
**2017/18 MONITORING 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 | Dec 08, 2015 | Oct 12, 2017 |
| **Benzene** | 1 | 370 | < | < | < | < | < | < | < | < | < | < |
| **Bromodichloromethane** | 1 | - | < | < | < | < | < | < | < | < | < | < |
| **Bromoform** | 1 | - | < | < | < | < | < | < | < | < | < | < |
| **Bromomethane** | 0.5 | - | < | < | < | < | < | < | < | < | < | < |
| **Carbon Tetrachloride** | 0.5 | 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** | 1 | - | < | < | < | < | < | < | < | < | < | < |
| **1,2-Dichloroethane** | 1 | 100 | < | < | < | < | < | < | < | < | < | < |
| **1,1-Dichloroethylene** | 0.5 | - | < | < | < | < | < | < | < | < | < | < |
| **cis-1,2-Dichloroethylene** | 0.5 | - | < | < | < | < | < | < | < | < | < | < |
| **trans-1,2-Dichloroethylene** | 0.5 | - | < | < | < | < | < | < | < | < | < | < |
| **1,2-Dichloropropane** | 0.5 | - | < | < | < | < | < | < | < | < | < | < |
| **cis-1,3-Dichloropropene** | 0.5 | - | < | < | < | < | < | < | < | < | < | < |
| **trans-1,3-Dichloropropene** | 0.5 | - | < | < | < | < | < | < | < | < | < | < |
| **Ethylbenzene** | 1 | 90 | < | < | < | < | < | < | < | < | < | < |
| **Methylene Chloride(Dichloromethane)** | 3 | 98.1 | < | < | < | < | < | < | < | < | < | < |
| **o-Xylene** | 1 | - | < | < | < | < | < | < | < | < | < | < |
| **p+m-Xylene** | 2 | - | < | < | < | < | < | < | < | < | < | < |
| **Styrene** | 1 | 72 | < | < | < | < | < | < | < | < | < | < |
| **Tetrachloroethylene** | 1 | - | < | < | < | < | < | < | < | < | < | < |
| **1,1,2,2-Tetrachloroethane** | 0.5 | - | < | < | < | < | < | < | < | < | < | < |
| **Toluene** | 1 | 2 | < | < | < | < | 2 | < | < | < | < | < |
| **Trichloroethylene** | 1 | - | < | < | < | < | < | < | < | < | < | < |
| **1,1,1-Trichloroethane** | 1 | - | < | < | < | < | < | < | < | < | < | < |
| **1,1,2-Trichloroethane** | 1 | - | < | < | < | < | < | < | < | < | < | < |
| **Trichlorofluoromethane (FREON 11)** | 8 | - | < | < | < | < | < | < | < | < | < | < |
| **Vinyl Chloride** | 0.5 | - | 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
<(#) = Parameter below AMEC laboratory detection limit
**0.0** = Above criteria for current sampling program

**TABLE E11**

**HISTORICAL SURFACE WATER ANALYTICAL DATA - VOCs (µg/L)**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| 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 | Dec 08, 2015 | Oct 12, 2017 | SURFACE-DUP Oct 12, 2017 |
| **Benzene** | 1 | 370 | < | < | < | < | < | < | < | < | < | < | < |
| **Bromodichloromethane** | 1 | - | < | < | < | < | < | < | < | < | < | < | < |
| **Bromoform** | 1 | - | < | < | < | < | < | < | < | < | < | < | < |
| **Bromomethane** | 0.5 | - | < | < | < | < | < | < | < | < | < | < | < |
| **Carbon Tetrachloride** | 0.5 | 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** | 1 | - | < | < | < | < | < | < | < | < | < | < | < |
| **1,2-Dichloroethane** | 1 | 100 | < | < | < | < | < | < | < | < | < | < | < |
| **1,1-Dichloroethylene** | 0.5 | - | < | < | < | < | < | < | < | < | < | < | < |
| **cis-1,2-Dichloroethylene** | 0.5 | - | < | < | < | < | < | < | < | < | < | < | < |
| **trans-1,2-Dichloroethylene** | 0.5 | - | < | < | < | < | < | < | < | < | < | < | < |
| **1,2-Dichloropropane** | 0.5 | - | < | < | < | < | < | < | < | < | < | < | < |
| **cis-1,3-Dichloropropene** | 0.5 | - | < | < | < | < | < | < | < | < | < | < | < |
| **trans-1,3-Dichloropropene** | 0.5 | - | < | < | < | < | < | < | < | < | < | < | < |
| **Ethylbenzene** | 1 | 90 | < | < | < | < | < | < | < | < | < | < | < |
| **Methylene Chloride(Dichloromethane)** | 3 | 98.1 | < | < | < | < | < | < | < | < | < | < | < |
| **o-Xylene** | 1 | - | < | < | < | < | < | < | < | < | < | < | < |
| **p+m-Xylene** | 2 | - | < | < | < | < | < | < | < | < | < | < | < |
| **Styrene** | 1 | 72 | < | < | < | < | < | < | < | < | < | < | < |
| **Tetrachloroethylene** | 1 | - | < | < | < | < | < | < | < | < | < | < | < |
| **1,1,2,2-Tetrachloroethane** | 0.5 | - | < | < | < | < | < | < | < | < | < | < | < |
| **Toluene** | 1 | 2 | < | < | < | < | < | < | < | < | < | < | < |
| **Trichloroethylene** | 1 | - | < | < | < | < | < | < | < | < | < | < | < |
| **1,1,1-Trichloroethane** | 1 | - | < | < | < | < | < | < | < | < | < | < | < |
| **1,1,2-Trichloroethane** | 1 | - | < | < | < | < | < | < | < | < | < | < | < |
| **Trichlorofluoromethane (FREON 11)** | 8 | - | < | < | < | < | < | < | < | < | < | < | < |
| **Vinyl Chloride** | 0.5 | - | 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
SURFACE-DUP = Field Duplicate of SURFACE-DOWN
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E12**

**HISTORICAL SURFACE WATER ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | Units | 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 | Dec 08, 2015 | Oct 12, 2017 |
| **Anion Sum** | me/L | N/A | - | - | 4.8 | 1.14 | 0.34 | 0.68 | 0.610 | 0.64 | 0.82 | 1.02 | 0.94 |
| **Bicarb. Alkalinity (calc. as CaCO3)** | mg/L | 1 | - | - | 118 | 38 | 6 | 17 | 7.6 | 11 | 10 | 9.3 | 18 |
| **Calculated TDS** | mg/L | 1 | - | 53 | 267 | 62 | 23 | 63 | 38.0 | 39 | 51 | 62 | 53 |
| **Carb. Alkalinity (calc. as CaCO3)** | mg/L | 1 | - | - | < | < | < | < | < | < | < | < | < |
| **Cation Sum** | me/L | N/A | - | - | 4.8 | 1.05 | 0.43 | 1.45 | 0.650 | 0.74 | 0.85 | 1.04 | 0.9 |
| **Hardness (CaCO3)** | mg/L | 1 | - | 21.5 | 100 | 41 | 10 | 29 | 14 | 15 | 17 | 22 | 18 |
| **Ion Balance (% Difference)** | % | N/A | - | - | 0.6 | 4.11 | 11.7 | 36.2 | 3.17 | 7.25 | 1.8 | 0.97 | 2.17 |
| **Langelier Index (@ 20C)** | N/A | N/A | - | - | -0.4 | -1.36 | -3.49 | -3.19 | -2.97 | -2.82 | -2.69 | -2.42 | -1.96 |
| **Langelier Index (@ 4C)** | N/A | N/A | - | - | -0.7 | -1.61 | -3.74 | 3.44 | -3.22 | -3.07 | -2.94 | -2.67 | -2.21 |
| **Nitrate (N)** | mg/L | 0.05 | - | < | < | 0.17 | < | < | 0.054 | < | 0.068 | 0.1 | < |
| **Saturation pH (@ 20C)** | N/A | N/A | - | - | 7.8 | 8.62 | 10.1 | 9.18 | 9.83 | 9.61 | 9.61 | 9.54 | 9.32 |
| **Saturation pH (@ 4C)** | N/A | N/A | - | - | 8.1 | 8.87 | 10.3 | 9.43 | 10.1 | 9.86 | 9.86 | 9.79 | 9.57 |
| **Total Alkalinity (Total as CaCO3)** | mg/L | 30 | - | 24 | 120 | 39 | 39 | 17 | 7.6 | 11 | 10 | 9.3 | 18 |
| **Dissolved Chloride (Cl)** | mg/L | 1 | 120 | 8.9 | 79 | 5 | 6 | 7 | 12 | 12 | 17 | 24 | 18 |
| **Colour** | TCU | 5 | - | - | 44 | 38 | 49 | 140 | 67 | 65 | 52 | 44 | 41 |
| **Nitrate + Nitrite** | mg/L | 0.05 | - | - | < | 0.17 | < | < | 0.054 | < | 0.068 | 0.1 | < |
| **Nitrite (N)** | mg/L | 0.01 | 0.06 | <0.015 | < | < | < | < | < | < | < | < | < |
| **Nitrogen (Ammonia Nitrogen)** | mg/L | 0.05 | - | - | 0.1 | < | < | < | < | < | < | < | < |
| **Total Organic Carbon (C)** | mg/L | 0.5 | - | 9.5 | 5.7 | 6 | 6.4 | 41 | 7.9 | 8.2 | 6.4 | 7.16 | 7.5 |
| **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 | 7.12 | 7.36 |
| **Reactive Silica (SiO2)** | mg/L | 0.5 | - | - | 6.3 | 1.5 | 1.5 | 3.5 | 2.1 | 1.5 | 2.3 | 2.3 | 1.8 |
| **Total Suspended Solids (TSS)** | mg/L | 2 | - | - | - | - | - | 840 | - | - | - | - | - |
| **Dissolved Sulphate (SO4)** | mg/L | 2 | - | - | 8 | 11 | 3 | - | 5.7 | 3.2 | 6.7 | 7.0 | 2.8 |
| **Turbidity** | NTU | 0.1 | - | - | 2.9 | 3.8 | 2.2 | 30 | 0.72 | 1.6 | 3 | 1.2 | 0.72 |
| **Conductivity** | uS/cm | 1 | - | 87 | 470 | 110 | 43 | 72 | 66 | 72 | 91 | 120 | 120 |

**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 for current sampling program

**TABLE E12**

**HISTORICAL SURFACE WATER ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | Units | 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 | Dec 08, 2015 | Oct 12, 2017 | SURFACE-DUP Oct 12, 2017 |
| **Anion Sum** | me/L | N/A | - | - | 3.78 | 2.69 | 1.53 | 3.8 | 0.630 | 0.69 | 0.84 | 1.12 | 1.07 | 1.09 |
| **Bicarb. Alkalinity (calc. as CaCO3)** | mg/L | 1 | - | - | 150 | 117 | 12 | 159 | 8.2 | 12 | 10 | 9.1 | 21 | 22 |
| **Calculated TDS** | mg/L | 1 | - | 145 | 205 | 140 | 122 | 204 | 39.0 | 41 | 51 | 66 | 61 | 61 |
| **Carb. Alkalinity (calc. as CaCO3)** | mg/L | 1 | - | - | 3 | < | < | < | < | < | < | < | < | < |
| **Cation Sum** | me/L | N/A | - | - | 3.8 | 2.54 | 2.4 | 3.85 | 0.650 | 0.74 | 0.84 | 1.09 | 1.02 | 1.03 |
| **Hardness (CaCO3)** | mg/L | 1 | - | 138 | 170 | 110 | 70 | 170 | 14 | 16 | 18 | 23 | 21 | 21 |
| **Ion Balance (% Difference)** | % | N/A | - | - | 0.26 | 2.87 | 22.1 | 0.65 | 1.56 | 3.5 | 0.0 | 1.4 | 2.4 | 2.8 |
| **Langelier Index (@ 20C)** | N/A | N/A | - | - | 0.996 | -0.099 | -2.64 | 0.248 | -2.95 | -2.57 | -2.73 | -2.47 | -1.92 | -1.42 |
| **Langelier Index (@ 4C)** | N/A | N/A | - | - | 0.746 | -0.35 | -2.89 | -0.002 | -3.20 | -2.82 | -2.98 | -2.72 | -2.17 | -1.67 |
| **Nitrate (N)** | mg/L | 0.05 | - | < | < | < | 2 | 1.6 | 0.058 | < | 0.076 | 0.072 | < | < |
| **Saturation pH (@ 20C)** | N/A | N/A | - | - | 7.39 | 7.69 | 9.01 | 7.39 | 9.80 | 9.56 | 9.59 | 9.53 | 9.2 | 9.18 |
| **Saturation pH (@ 4C)** | N/A | N/A | - | - | 7.64 | 7.94 | 9.26 | 7.64 | 10.0 | 9.81 | 9.85 | 9.79 | 9.45 | 9.43 |
| **Total Alkalinity (Total as CaCO3)** | mg/L | 30 | - | 136 | 150 | 120 | 120 | 160 | 8.2 | 12 | 10 | 9.1 | 21 | 22 |
| **Dissolved Chloride (Cl)** | mg/L | 1 | 120 | 3.6 | 4 | 1 | 23 | 8 | 12 | 13 | 16 | 26 | 20 | 22 |
| **Colour** | TCU | 5 | - | - | 23 | 39 | 120 | 32 | 78 | 71 | 57 | 47 | 38 | 37 |
| **Nitrate + Nitrite** | mg/L | 0.05 | - | - | < | < | 2 | 1.6 | 0.058 | < | 0.076 | 0.072 | < | < |
| **Nitrite (N)** | mg/L | 0.01 | 0.06 | <0.015 | < | < | < | < | < | < | < | < | < | < |
| **Nitrogen (Ammonia Nitrogen)** | mg/L | 0.05 | - | - | < | 0.19 | 0.06 | < | < | < | < | < | 0.23 | 0.13 |
| **Total Organic Carbon (C)** | mg/L | 0.5 | - | 9.2 | 4.3 | 5.4 | 18 | 2.8 | 7.9 | 7.9 | 6.8 | 7.8 | 7.3 | 7.3 |
| **Orthophosphate (P)** | mg/L | 0.01 | - | - | < | < | < | < | < | < | < | < | < | < |
| **pH** | pH | N/A | 6.5 - 9 | 7.48 | 8.39 | 7.59 | 6.37 | 7.64 | 6.85 | 6.99 | 6.87 | 7.06 | 7.28 | 7.76 |
| **Reactive Silica (SiO2)** | mg/L | 0.5 | - | - | 4 | 3.1 | 7.4 | 1.8 | 2.2 | 1.6 | 2.4 | 2.3 | 2.1 | 2.1 |
| **Total Suspended Solids (TSS)** | mg/L | 2 | - | - | - | - | - | 160 | - | - | - | - | - | - |
| **Dissolved Sulphate (SO4)** | mg/L | 2 | - | - | 29 | 15 | 24 | - | 5.8 | 3.5 | 7.8 | 8.8 | 4.8 | 4.9 |
| **Turbidity** | NTU | 0.1 | - | - | 5.2 | 39 | 140 | 5.6 | 0.88 | 0.77 | 4.4 | 1.7 | 0.55 | 0.73 |
| **Conductivity** | uS/cm | 1 | - | 275 | 290 | 240 | 170 | 340 | 67 | 76 | 94 | 120 | 110 | 140 |

**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
SURFACE-DUP = Field Duplicate of SURFACE-DOWN

< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit

- = Not analysed/No criteria
**0.0** = Above criteria for current sampling program

**TABLE E13**

**HISTORICAL SURFACE WATER ANALYTICAL DATA - METALS**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | Units | 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 | Dec 08, 2015 | Oct 12, 2017 |
| **Aluminum (Al)** | ug/L | 5.0 | 100[1] | **484** | 18 | **108** | **257** | **1,140** | **113** | 86 | **270** | 99 | 43 |
| **Antimony (Sb)** | ug/L | 1.0 | - | < | < | < | < | - | < | < | < | < | < |
| **Arsenic (As)** | ug/L | 1.0 | 5.0 | 3 | < | < | < | 2.50 | < | < | < | < | < |
| **Barium (Ba)** | ug/L | 1.0 | - | 131 | 26 | 22.3 | 9.4 | 132.0 | 8.9 | 9.1 | 11 | 9.1 | 6.9 |
| **Beryllium (Be)** | ug/L | 1.0 | - | <0.1 | < | < | < | < | < | < | < | < | < |
| **Bismuth (Bi)** | ug/L | 2.0 | - | <0.5 | < | < | < | < | < | < | < | < | < |
| **Boron (B)** | ug/L | 50 | - | - | 14 | 9.4 | 6.9 | <50 | < | < | < | < | < |
| **Cadmium (Cd)** | ug/L | 0.010 | 0.04[2] | **0.273** | < | **0.028** | **0.04** | **0.066** | < | < | < | < | < |
| **Calcium (Ca)** | ug/L | 100 | - | - | - | 12,900 | 2,960 | 8,230 | 3,870 | 4,500 | 4,900 | 6,400 | 5,300 |
| **Chromium (Cr)** | ug/L | 1 | 8.9/1.0[3] | 1 | < | < | < | 2.3 | < | < | < | < | < |
| **Hexavalent Chromium ($Cr^{6+}$)** | ug/L | 0.5 | 1.00 | | | | | | < | 0.61 | 0.63 | < | < |
| **Cobalt (Co)** | ug/L | 0.4 | - | 1 | < | < | < | 1.9 | < | < | < | < | < |
| **Copper (Cu)** | ug/L | 2 | 2[4] | 8 | < | < | < | 5.3 | < | < | 5 | < | < |
| **Iron (Fe)** | ug/L | 50 | 300 | **1,300** | **1,300** | 289 | **722** | **16,700** | **387** | **530** | **310** | **440** | **420** |
| **Lead (Pb)** | ug/L | 0.5 | 1, 2[5] | 5 | < | < | < | 0.5 | < | < | < | < | < |
| **Magnesium (Mg)** | ug/L | 100 | - | - | - | 2,140 | 713 | 100 | 1,040 | 1,000 | 1,200 | 1,300 | 1,100 |
| **Manganese (Mn)** | ug/L | 2 | - | 1,260 | 230 | 98 | 142 | 2 | 41 | 110 | 49 | 88 | 85 |
| **Molybdenum (Mo)** | ug/L | 2 | 73.00 | 2 | 3.0 | < | < | 2 | < | < | < | < | < |
| **Nickel (Ni)** | ug/L | 2 | 25, 65[6] | 1 | < | < | < | 2 | < | < | < | < | < |
| **Phosphorus (P)** | ug/L | 100 | - | - | - | < | < | - | < | < | < | < | < |
| **Potassium (K)** | ug/L | 100 | - | - | - | 588 | 295 | 100 | 363 | 310 | 860 | 550 | 340 |
| **Selenium (Se)** | ug/L | 1 | 1.0 | 1 | < | < | < | 1 | < | < | < | < | < |
| **Silver (Ag)** | ug/L | 0.1 | 0.1 | < | < | < | < | 0.1 | < | < | < | < | < |
| **Sodium (Na)** | ug/L | 100 | - | - | - | 4,720 | 3,680 | 100 | 7,930 | 9,300 | 11,000 | 13,000 | 12,000 |
| **Strontium (Sr)** | ug/L | 2 | - | - | 90 | 40.7 | 9.7 | 2 | 13.4 | 16 | 16 | 19 | 17 |
| **Thallium (Tl)** | ug/L | 0.1 | 0.8 | - | < | < | < | 0.1 | < | < | < | < | < |
| **Tin (Sn)** | ug/L | 2 | - | - | < | < | < | 2 | < | < | < | < | < |
| **Titanium (Ti)** | ug/L | 2 | - | - | < | 2.1 | 7.9 | 2 | 3.1 | 2 | 5 | 11 | < |
| **Uranium (U)** | ug/L | 0.1 | - | - | 0.2 | < | < | 0.1 | < | < | < | < | < |
| **Vanadium (V)** | ug/L | 2 | - | < | < | < | < | 2 | < | < | < | < | < |
| **Zinc (Zn)** | ug/L | 5 | 30 | 33 | < | 9.2 | 10.7 | 5 | < | < | 18 | < | < |
| **Hardness (CaCO3)** | mg/L | 1 | - | 21.5 | 100 | 41 | 10 | 29 | 14 | 15 | 17 | ND | 18 |
| **pH** | pH | - | 6.5 - 9 | 6.9 | 7.4 | 7.26 | 6.58 | 5.99 | 6.86 | 6.79 | 6.92 | 7.12 | 7.36 |

**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 = $10^{\{0.83[\log(\text{hardness})]-2.46\}}$.

(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
< = Parameter below detection limit
**3** = Above criteria for current sampling program
- = Not analysed/No criteria
<(#) = Parameter below AMEC laboratory detection limit

**TABLE E13**

**HISTORICAL SURFACE WATER ANALYTICAL DATA - METALS**
**2017/18 MONITORING PROGRAM**
**COME BY CHANCE SECURE LANDFILL**
**COME BY CHANCE, NL**

| Parameter | Units | 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 | Dec 08, 2015 | Oct 12, 2017 | SURFACE-DUP Oct 12, 2017 |
| **Aluminum (Al)** | ug/L | 5.0 | 100[1] | **42,000** | 69 | **527** | **5,210** | **941** | **117** | 83 | **270** | **110** | 61 | 62 |
| **Antimony (Sb)** | ug/L | 1.0 | - | < | < | < | < | < | < | < | < | < | < | < |
| **Arsenic (As)** | ug/L | 1.0 | 5.0 | **36** | < | 1.1 | 3.3 | 2.5 | < | < | < | < | < | < |
| **Barium (Ba)** | ug/L | 1.0 | - | 426 | 82 | 102 | 289 | 179 | 8.6 | 8.6 | 11 | 9.3 | 7.4 | 7.6 |
| **Beryllium (Be)** | ug/L | 1.0 | - | 1.8 | < | < | < | < | < | < | < | < | < | < |
| **Bismuth (Bi)** | ug/L | 2.0 | - | <0.1 | < | < | < | < | < | < | < | < | < | < |
| **Boron (B)** | ug/L | 50 | - | - | 22 | 27.1 | 9 | < | < | < | < | < | < | < |
| **Cadmium (Cd)** | ug/L | 0.010 | 0.04[2] | **2.65** | < | **0.044** | **0.232** | **-** | < | < | < | < | < | < |
| **Calcium (Ca)** | ug/L | 100 | - | - | - | 40,100 | 18,300 | 62,300 | 3,890 | 4,500 | 5,000 | 6,800 | 6,200 | 6,300 |
| **Chromium (Cr)** | ug/L | 1 | 8.9/1.0[3] | 110 | < | < | 8 | 163 | < | < | < | < | < | < |
| **Hexavalent Chromium ($Cr^{6+}$)** | ug/L | 0.5 | 1.00 | | | | | | < | 0.68 | 0.74 | < | < | < |
| **Cobalt (Co)** | ug/L | 0.4 | - | 307 | < | 0.9 | 6.69 | 1.98 | < | < | < | < | < | < |
| **Copper (Cu)** | ug/L | 2 | 2[4] | 370 | < | **12.7** | **32.9** | **3** | < | < | < | < | < | < |
| **Iron (Fe)** | ug/L | 50 | 300 | **59,000** | **380** | **1,820** | **10,900** | **4,130** | **382** | **440** | 300 | 270 | 300 | **310** |
| **Lead (Pb)** | ug/L | 0.5 | 1, 2[5] | 45 | < | 1.48 | **7.64** | **0.69** | < | < | < | < | < | < |
| **Magnesium (Mg)** | ug/L | 100 | - | - | - | 3,320 | 5,840 | 3,830 | 1,050 | 1,100 | 1,300 | 1,500 | 1,300 | 1,300 |
| **Manganese (Mn)** | ug/L | 2 | - | 2,620 | 62 | 481 | 427 | 1,760 | 38 | 66 | 41 | 66 | 55 | 60 |
| **Molybdenum (Mo)** | ug/L | 2 | 73.00 | 0.09 | < | < | < | <2 | < | < | < | < | < | < |
| **Nickel (Ni)** | ug/L | 2 | 25, 65[6] | 2 | < | 3 | 16.7 | - | < | < | < | < | < | < |
| **Phosphorus (P)** | ug/L | 100 | - | - | - | 120 | 852 | - | < | < | < | < | < | < |
| **Potassium (K)** | ug/L | 100 | - | - | - | 1080 | 4060 | 1030 | 400 | 320 | 580 | 430 | 370 | 400 |
| **Selenium (Se)** | ug/L | 1 | 1.0 | < | < | < | < | <1 | < | < | < | < | < | < |
| **Silver (Ag)** | ug/L | 0.1 | 0.1 | 0.5 | < | < | < | < | < | < | < | < | < | < |
| **Sodium (Na)** | ug/L | 100 | - | - | - | 4,300 | 11,500 | 5,820 | 7,880 | 9,100 | 11,000 | 14,000 | 13,000 | 13,000 |
| **Strontium (Sr)** | ug/L | 2 | - | - | 110 | 85.4 | 49.9 | 110 | 13.3 | 17 | 17 | 20 | 20 | 19 |
| **Thallium (Tl)** | ug/L | 0.1 | 0.8 | - | < | < | < | <0.1 | < | < | < | < | < | < |
| **Tin (Sn)** | ug/L | 2 | - | - | < | < | < | <2 | < | < | < | < | < | < |
| **Titanium (Ti)** | ug/L | 2 | - | - | 2.0 | 17.2 | 148 | 37.2 | 2.7 | 2.5 | 3.5 | < | < | < |
| **Uranium (U)** | ug/L | 0.1 | - | - | 0.9 | 0.38 | 0.38 | 0.35 | < | < | < | < | < | < |
| **Vanadium (V)** | ug/L | 2 | - | 155 | < | < | 0.34 | 2.8 | < | < | < | < | < | < |
| **Zinc (Zn)** | ug/L | 5 | 30 | **443** | < | 25.2 | **103** | 12.4 | < | < | < | < | **37** | < |
| **Hardness (CaCO3)** | mg/L | 1 | - | 138 | 170 | 110 | 70 | 170 | 14 | 16 | 18 | 23 | 21 | 21 |
| **pH** | pH | - | 6.5 - 9 | 7.48 | 8.39 | 7.59 | 6.37 | 7.64 | 6.85 | 6.99 | 6.87 | 7.06 | 7.28 | 7.76 |

**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 = $10^{\{0.83[\log(\text{hardness})]-2.46\}}$.

(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
SURFACE-DUP = Field Duplicate of SURFACE-DOWN
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
- = Not analysed/No criteria
**3** = Above criteria for current sampling program

**TABLE E14**

**HISTORICAL LEACHATE ANALYTICAL DATA - BTEX/mTPH**
**2017/18 MONITORING 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 | | mTPH | |
| | | | | | | $C_6$-$C_{10}$ | $C_{10}$-$C_{16}$ | $C_{16}$-$C_{21}$ | $C_{21}$-$C_{32}$ | | |
| 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) | < | < | < | < | < | < | < | < | < | - |
| | Dec 08, 2015 | < | < | < | < | < | < | < | < | < | - |
| | Oct 12, 2017 | < | < | < | < | < | < | 0.067 | 0.17 | 0.24 | One product in fuel/ lube oil range. |
| 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, 2014 | < | < | < | < | < | < | < | < | < | - |
| | Dec 08, 2015 | < | < | < | < | < | < | < | < | < | - |
| | Oct 12, 2017 | < | < | < | < | < | < | < | < | < | - |
| **RDL** | | 0.001 | 0.001 | 0.001 | 0.002 | 0.01 | 0.05 | 0.05 | 0.1 | 0.1 | - |
| **Schedule A Water & Sewer Regulations [3]** | | - | - | - | - | - | - | - | - | 15 | - |
| **2007 CCME Freshwater Aquatic Life Guidelines [4]** | | **0.37** | **0.002** | **0.09** | **-** | **-** | **-** | **-** | **-** | **-** | **Gasoline** |
| | | | | | | | | | | **-** | **Diesel /#2 Fuel Oil** |
| | | | | | | | | | | **-** | **#6 Oil** |

**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. Field Duplicate
3. Schedule A of NL Environmental Control Water and Sewer Regulations, 2003.
4. 2007 CCME Freshwater Aquatic Life Guidelines

NR = No resemblance
WFO = Weathered Fuel Oil

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
**0.0** = Above criteria for current sampling program

**TABLE E15**

**HISTORICAL LEACHATE ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING 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 | Dec 08, 2015 | Oct 12, 2017 |
| 1-Methylnaphthalene | 0.05 | - | - | < | < | < | < | < | < | < | < | < | < | < | < | < | < |
| 2-Methylnaphthalene | 0.05 | - | - | < | < | < | < | < | < | < | < | < | < | < | < | < | < |
| Acenaphthene | 0.01 | - | 580 | < | 0.01 | 0.01 | < | < | < | 0.011 | 0.041 | 0.01 | < | < | < | 0.076 | < |
| Acenaphthylene | 0.01 | - | - | < | < | < | < | < | < | < | < | < | < | < | < | < | < |
| Acridine | 0.05 | | | - | - | - | < | < | < | < | - | < | - | < | < | - | - |
| Anthracene | 0.01 | - | 1.2 | < | 0.05 | 0.06 | < | 0.04 | < | < | <0.15 [3] | <0.040 [3] | < | <0.020 [3] | < | 0.33 | < |
| Benzo(a)anthracene | 0.01 | - | 1.8 | < | 0.01 | 0.02 | < | < | < | < | 0.039 | 0.013 | < | < | < | 0.066 | < |
| 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 | < | < | < | 0.10 | < |
| Dibenz(a,h)anthracene | 0.01 | - | - | < | < | < | < | < | < | < | < | < | < | < | < | < | < |
| Fluoranthene | 0.01 | - | 4 | < | 0.05 | 0.07 | < | 0.04 | < | 0.011 | 0.18 | 0.046 | 0.011 | < | < | 0.28 | < |
| 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 [3] | <0.060 [3] | < | 0.012 | < | 0.59 | < |
| Pyrene | 0.01 | - | 2.5 | < | 0.36 | 0.32 | < | 0.17 | 0.2 | 0.046 | 0.85 | 0.01 | 0.052 | 0.013 | < | 1.4 | 0.012 |
| Quinoline | 0.05 | - | - | < | - | - | < | < | - | - | - | - | - | - | - | - | - |

**Notes:**
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
1. NL = Environmental Control Water and Sewer Regulations, 2003, Schedule "A" under the Water Resources Act, Newfoundland and Labrador Regulation 65/03.
2. CCME = Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1) with a dilution factor of 100 based on distance between ditch and receiving waters and percolation through soil.
3. Elevated PAH RDL(s) due to matrix / co-extractive interference.

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
**0.0** = Above NL criteria for current sampling program
0.0 = Above CCME criteria for surface water for current sampling program

**TABLE E15**

**HISTORICAL LEACHATE ANALYTICAL DATA - PAHs (µg/L)**
**2017/18 MONITORING 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 | Dec 08, 2015 | Oct 12, 2017 |
| 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 | < | < [3] | < |
| 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 [3] | <(0.06) | <(0.15) | < | 0.13 | 0.018 |
| Benzo(a)anthracene | 0.01 | - | 1.8 | <0.01 | < | 0.06 | 0.02 | 0.03 | < | < | < | < | 0.064 | 0.05 | 0.062 | < | 0.045 | < |
| 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 | < | 0.070 | < |
| 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 | 0.23 | 0.037 |
| Fluorene | 0.01 | - | 300 | <0.03 | < | 0.02 | < | < | < | < | < | < | 0.031 | <(0.02) | <(0.04) | < | < [3] | 0.012 |
| 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 [3] | < | <(0.04) | < | < [3] | 0.012 |
| 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 | 1.2 | 0.14 |
| Quinoline | 0.05 | - | - | - | - | - | - | - | < | < | - | - | - | - | - | - | - | - |

**Notes:**
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
1. NL = Environmental Control Water and Sewer Regulations, 2003, Schedule "A" under the Water Resources Act, Newfoundland and Labrador Regulation 65/03.
2. CCME = Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1) with a dilution factor of 100 based on distance between ditch and receiving waters and percolation through soil.
3. Elevated PAH RDL(s) due to matrix / co-extractive interference.

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
**0.0** = Above NL criteria for current sampling program
0.0 = Above CCME criteria for surface water for current sampling program

**TABLE E16**

**HISTORICAL LEACHATE ANALYTICAL DATA - PCBs (µg/L)**
**2017/18 MONITORING 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 | Dec 08, 2015 | Oct 12, 2017 |
| **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 | Dec 08, 2015 | Oct 12, 2017 |
| **Total PCBs** | 0.05 | - | <0.04 | < | < | < | < | < | < | < | < | < | < | < | < | < |

**Notes:**
Analysis completed by Maxxam Analytics Inc. laboratory in Bedford, NS.
* Environmental Control Water and Sewer Regulations, 2003, Schedule "A" under the Water Resources Act, Newfoundland and Labrador Regulation 65/03.

PLCS = Primary Leachate Collection System
SLCS = Secondary Leachate Collection System
RDL = Reportable Detection Limit
- = Not analysed/No criteria
< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
**0.0** = Above criteria for current sampling program

**TABLE E17**

**HISTORICAL LEACHATE ANALYTICAL DATA - VOCs**
**2017/18 MONITORING 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 E17**

**HISTORICAL LEACHATE ANALYTICAL DATA - VOCs**
**2017/18 MONITORING 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 E18**

**HISTORICAL LEACHATE ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING 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 E18**

**HISTORICAL LEACHATE ANALYTICAL DATA - GENERAL CHEMISTRY**
**2017/18 MONITORING 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 E19**

**HISTORICAL LEACHATE ANALYTICAL DATA - TOTAL METALS (µg/L)**
**2017/18 MONITORING 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 E19**

**HISTORICAL LEACHATE ANALYTICAL DATA - TOTAL METALS (µg/L)**
**2017/18 MONITORING 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:**

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
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< = Parameter below detection limit
<(#) = Parameter below AMEC laboratory detection limit
**0.0** = above criteria