2017-2018 Monitoring Program

Upper Trinity South (New Harbour) Waste Disposal Site
New Harbour Barrens, NL

NL Department of Municipal Affairs and Environment

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Executive Summary

GHD Limited (GHD) was retained by the Newfoundland and Labrador Department of Municipal Affairs and Environment (MAE) to complete the 2017-2018 Monitoring Program at the Upper Trinity South (New Harbour) Waste Disposal Site (Site) located on Route 73, approximately 5 km from the junction of Route 80 and Route 73, in the Community of New Harbour, Newfoundland and Labrador (NL).

The scope of work involved one groundwater and surface water monitoring event, as well as the inspection of monitor wells and the leachate control system. The 2017-2018 monitoring event was conducted in October 2017.

The Site operated as a domestic waste disposal Facility (Facility) from the early 1970s until November 2009. The Facility accepted waste from the communities of Blaketown, Dildo, Green's Harbour, Hopeall, Markland, New Harbour, Old Shop, South Dildo, and from the Towns of Bay Roberts and Cupids.

During operations, the Site was managed by a local contractor who collected waste from residents and businesses in the area and disposed of the material in excavated cells or pits. Waste delivered to the Facility by private individuals and businesses was often placed on the ground and left in the open. Historically, open burning was a common practice carried out at the Site to reduce waste volumes and control pests.

A dedicated portion of the Facility was used for metals disposal, including car wrecks and bulk items. The Facility was also used by a local seal processing plant to dispose of seal pelt trim and fat, sawdust and sludge. In addition to municipal solid waste disposed at the Facility, a quantity of low-level polychlorinated biphenyl (PCB)-impacted scrap metal and transformer casings originating from the Makinsons scrap yard, were disposed on the northwest area of the grounds from 1992 to 1995.

GHD understands the waste disposal Site is unlined; however, potential leachate impacts were not effectively managed until interception ditches and a leachate collection pond was constructed between 2006 and 2007. In addition, seven monitor wells (MW-01 to MW-07) were installed around the perimeter of the waste disposal Site to monitor potential leachate impacts in groundwater and one monitor well (MW-08) was installed upgradient of the waste disposal Site to monitor background analyte concentrations. One monitor well (MW-05A) was installed in 2013 to replace MW-05, which was damaged and reported as having heavy siltation. Monitoring of groundwater and surface water quality has been ongoing since 2007.

Closure activities at the Site in 2011 and 2012 included compaction and grading as well as the placement of an interim cover consisting of locally available fill to facilitate consolidation and settling of the municipal solid waste. In 2013, a final soil cover was placed over the entire Site along with an engineered cap liner system over the PCB impacted area. All infrastructure and site access was removed and a soil berm was installed to block the view of the Site from the adjacent highway. Signage was installed indicating the Site as a former landfill and that no trespassing is permitted.

The area surrounding the waste disposal Site is comprised mostly of vacant, undeveloped dense forest with numerous wetlands (bogs, ponds, streams, etc.).

E.1 2017-2018 Monitoring Program Summary

E.1.1 Groundwater

Groundwater sampling was initially conducted from a network of seven monitor wells located around the footprint of the disposal site; however, only six groundwater samples plus one field duplicate were collected from the on-Site monitor wells. It is noted that a groundwater sample was not collected from one monitor well because of insufficient water. Background groundwater quality was established by sampling at an off-Site monitor well, which is located approximately 1.5 km northeast and hydraulically upgradient of the Site.

Groundwater samples were submitted for analysis of PCBs, dissolved metals and total mercury. A review of the historical groundwater analytical data that included the October 2017 sampling event confirmed PCB and metals concentrations have been within the applicable MOE Guidelines for Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition since the December 2010 sampling event.

Based on the historical metals exceedances reported in groundwater, GHD recommends that all monitor wells continue to be sampled and analyzed for metals including mercury during future monitoring activities at the Site. In addition, GHD recommends that PCBs continue to be monitored due to the confirmed presence of PCB containing soil in the unlined waste disposal Site.

E.1.2 Surface Water

Surface water sampling was intended to characterize leachate from the Site's leachate collection pond and assess potential leachate infiltration into the nearby surface water by sampling a stream directly down-gradient. Due to an unseasonably dry summer and fall, a surface water sample was not collected from the stream monitoring location downgradient from the collection pond during the October 2017 monitoring event. Background analyte concentrations of the surface water was established by sampling at an upgradient location, which is located approximately 300 m northeast of the Site.

Surface water samples were submitted for analysis of PCBs, general chemistry, and total metals that included mercury. A review of the historical surface water analytical data that included the October 2017 sampling event confirmed metals and general chemistry analytes were often within the CCME CWQGs for FAL, where available. Guidelines for PCBs in surface water are not available; however, PCBs have not been detected in any surface water station since monitoring began in 2007.

Reportable metal concentrations from the collection pond were non-detectable and/or below the available CCME CWQGs for FAL for the October 2017 monitoring event. However, samples from the collection pond frequently exceeded the guidelines for Aluminum, Copper, and Iron during previous monitoring events. Since November 2007, samples from the collection pond exceeded Copper guidelines for all but three monitoring events, and exceeded Iron guidelines for all but four monitoring events. Aluminum concentrations in the collection pond reported exceedances in five of the previous monitoring events. Although a surface water sample was not collected from the

downgradient stream location in October 2017, historically, samples from the downgradient stream location have had fewer exceedances since November 2007 when compared to the collection pond. Reportable concentrations of Copper and Iron from the downgradient stream location have exceeded guideline limits on only three sampling occasions. Aluminum concentrations in the downgradient stream location reported exceedances in six of the previous monitoring events. According to background surface water concentrations for the area, Aluminum, Copper and Iron exceedances are common for the area and are within a range similar to the exceedances encountered at Denny's Pond and Three Corner Pond.

Compared with the upgradient background monitoring station results, the analytes typically reported higher concentrations in the collection pond and the downgradient stream location, with the collection pond samples having the highest concentrations. The elevated presence of Calcium, Magnesium, Potassium, and Sodium concentrations were reported in the surface water samples downgradient from Route 73 compared to the background surface water sample collected upgradient from Route 73. The increased levels of these analytes are likely associated with the application of road salt on Route 73 that has infiltrated the surface water.

The analytical results for general chemistry show Nitrite concentrations in the collection pond reported exceedances in all sampling events from November 2007 to November 2012. Since November 2014, Nitrite concentrations from the collection pond have reported concentrations below the CCME CWQGs for FAL. In comparison, Nitrite concentrations in the downgradient stream only reported exceedances in three of the previous monitoring events; with non-detectable concentrations reported in November 2014 and December 2015. Nitrite was not segregated from the combined Nitrite and Nitrate analysis during the August 2013 sampling event.

The measured pH in the downgradient stream only reported two measurements that were outside the range for the CCME CWQGs for FAL in January 2010 and November 2014 while all other collection pond and downgradient stream surface water reported the pH measurement within the criterion. Conversely, the measured pH in the background surface water sample collected from the upgradient stream location reported pH measurements from all previous monitoring events that were slightly below the applicable range for the CCME CWGQs for FAL. The high concentration of salts reported in the collection pond likely contributed to neutralizing the acidity of the background surface water entering the Site while the downgradient stream was influenced by other surface water within the catchment area of the Site.

Based on the current and historical exceedances reported in surface water at the three sampling locations, GHD recommends the monitoring program be continued at the upgradient, on-Site collection pond, and downgradient locations with analysis to include PCBs, metals including mercury, and general chemistry during future monitoring activities at the Site.

E.1.3 Inspection of Monitor Wells and Leachate Control System

During the October 2017 Site visit, GHD conducted a visual inspection of the monitor wells and deemed them to be in satisfactory condition with a few notable exceptions. One monitor well was observed as being partially damaged with the top of the PVC casing cracked and the top of the casing approximately 200 mm below the top of the steel stick-up casing. A second well was noted to have the well cover partially damaged as the hinge connecting the steel cover to the protective

casing was broken. Lastly, one monitor well was observed to be susceptible to vandalism as the protective well cap cover did not fit over the PVC casing stick-up and could not be properly closed and secured. In addition, the steel protective casing of three monitor wells were not cemented in or were loose and areas near three monitor wells were heavily wooded and overgrown making it difficult to access the monitor wells.

GHD recommends the cracked PVC casing be repaired and a new J-plug installed to allow for improved measurements in relation to the top of casing. The hinged steel cover should be repaired and/or replaced and the PVC casing cut lower than the protective casing to allow the well cap to fit over the casing and be locked. GHD staff placed native material around the base of the loose protective casings; however, consideration should be given to resealing the bases using a combination of silica sand and concrete. In addition, the overgrown areas should be grubbed or cut lines to allow safe access to the monitor wells.

The leachate ditch system and collection pond were observed to be in good condition with no signs of blockages or erosion that would interfere with the proper flow of leachate to the collection pond.

Signs of erosion were evident around the landfill cover and rip rap, but were otherwise observed to be in good condition with no signs of deterioration from differential settlement. GHD recommends the landfill cover area that was washed out should be filled, re-graded, and hydro-seeded during the summer/fall months of 2018 to prevent further erosion of the area.

The wooden sign pole located on the southwest corner of the Site was been sheared off at the base; therefore, the No Trespassing/No Dumping sign was no longer present. Consideration should be given to the replacement of the sign mounted to steel posts our 150 mm square pressure treated timber.

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1. Introduction

GHD Limited (GHD) was retained by the Newfoundland and Labrador Department of Municipal Affairs and Environment (MAE) to complete the 2017-2018 Monitoring Program at the Upper Trinity South (New Harbour) Waste Disposal Site (Site) located on Route 73, approximately 5 km from the junction of Route 80 and Route 73, in the Community of New Harbour, Newfoundland and Labrador (NL). A Site Location Map is shown on Figure 1.

The scope of work involved one groundwater and surface water monitoring event, as well as the inspection of monitor wells and the leachate control system. The 2017-2018 monitoring event was conducted in October 2017.

2. Site Description and History

The Site operated as a domestic waste disposal Facility (Facility) from the early 1970s until November 2009. The Facility accepted waste from the communities of Blaketown, Dildo, Green's Harbour, Hopeall, Markland, New Harbour, Old Shop, South Dildo, and from the Towns of Bay Roberts and Cupids.

During operations, the Site was managed by a local contractor who collected waste from residents and businesses in the area and disposed of the material in excavated cells or pits. Waste delivered to the Facility by private individuals and businesses was often placed on the ground and left in the open. Historically, open burning was a common practice carried out at the Site to reduce waste volumes and control pests.

A dedicated portion of the Facility was used for metals disposal, including car wrecks and bulk items. The Facility was also used by a local seal processing plant to dispose of seal pelt trim and fat, sawdust and sludge. In addition to municipal solid waste disposed at the Facility, a quantity of low-level polychlorinated biphenyl (PCB)-impacted scrap metal and transformer casings originating from the Makinsons scrap yard, were disposed on the northwest area of the grounds from 1992 to 1995.

GHD understands the waste disposal Site is unlined; however, potential leachate impacts were not effectively managed until interception ditches and a leachate collection pond was constructed between 2006 and 2007. In addition, seven monitor wells (MW-01 to MW-07) were installed around the perimeter of the waste disposal Site to monitor potential leachate impacts in groundwater and one monitor well (MW-08) was installed upgradient of the waste disposal Site to monitor background analyte concentrations. One monitor well (MW-05A) was installed in 2013 to replace MW-05, which was damaged and reported as having heavy siltation. Monitoring of groundwater and surface water quality has been ongoing since 2007.

Closure activities at the Site in 2011 and 2012 included compaction and grading as well as the placement of an interim cover consisting of locally available fill to facilitate consolidation and settling of the municipal solid waste. In 2013, a final soil cover was placed over the entire Site along with an engineered cap liner system over the PCB impacted area. All infrastructure and site access was

removed and a soil berm was installed to block the view of the Site from the adjacent highway. Signage was installed indicating the Site as a former landfill and that no trespassing is permitted.

The area surrounding the waste disposal Site is comprised mostly of vacant, undeveloped dense forest with numerous wetlands (bogs, ponds, streams, etc.).

3. Methodology

3.1 Groundwater Monitoring

On October 26, 2017, static water levels were measured using an electronic product/water interface probe at the on-Site and off-Site 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 on-Site monitor wells (MW-01, and MW-03 to MW-07) during the sampling event, including one field duplicate (MW-DUP) from MW-03. It is noted that a groundwater sample was not collected from monitor well MW-02 because the monitor well was dry (insufficient water to collect an adequate sample for laboratory analyses).

One groundwater sample was also collected from the off-Site monitor well (MW-08) intended to demonstrate background analyte concentrations from the upgradient sample location.

All groundwater samples collected from the existing monitor wells were submitted for analysis of PCBs, dissolved metals, and total mercury. Groundwater samples were submitted to Maxxam Analytics Inc. (Maxxam) in Bedford, Nova Scotia (NS) for analysis.

Groundwater sample locations are presented on Figure 2 and GPS co-ordinates for the monitor wells are included in Table 2.

3.2 Surface Water Monitoring

Surface water sampling was intended to characterize leachate from the Site's leachate collection pond (SW-POND), assess potential leachate infiltration into the nearby surface water by sampling a stream directly down-gradient (SW-STREAM), and assess background analyte concentrations of the surface water in the stream by sampling at an upgradient location (SW-UPSTREAM). Two of the surface water locations (SW-POND and SW-STREAM) are located down-gradient (southwest) of the waste disposal site while the surface water location (SW-UPSTREAM) is located up-gradient (northeast) of the waste disposal site as shown on Figure 2. GPS co-ordinates for each surface water station are presented in Table 2.

Surface water samples (SW-POND and SW-UPSTREAM) were collected on October 26, 2017 with one field duplicate (SW-DUP) collected from SW-POND. Due to unseasonably dry summer and fall conditions, a surface water sample was not collected from the SW-STREAM monitoring location due to the absence of sufficient water to collect a sample.

Surface water samples were submitted for analysis of PCBs, general chemistry, and total metals that included mercury. All surface water samples were submitted to Maxxam in Bedford, NS for analysis.

3.3 Inspection of Monitor Wells and Leachate Control System

An inspection of the monitor wells and leachate control system was completed during the Site visit in October 2017 that assessed the following:

- Damage to monitor wells, including potential collapse
- Condition of leachate ditch system and collection pond (specifically blockage)
- Condition of rip rap to ensure the liner is covered

Select photographs from the site visit (Photos 1 to 10) are presented in Appendix A.

4. Guideline Framework

4.1 Groundwater

PCBs, dissolved metals, and total mercury 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

PCBs, total metals (including mercury), and general chemistry concentrations in surface water were assessed in relation to the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) for the Protection of Aquatic Life (Freshwater or FAL). The FAL were from the Canadian Environmental Quality Guidelines (updated 2007).

5. Analytical Results

Analytical results from the October 2017 sampling event are summarized below. Both groundwater and surface water sample locations are shown on Figure 2. Laboratory Certificates of Analyses are included as Appendix B. Additional discussion is presented in Section 6 regarding historical analytical results in comparison to the October 2017 sampling event.

5.1 Groundwater

Background groundwater quality was established by sampling at monitor well MW-08, which is located approximately 1.5 km northeast and hydraulically upgradient of the Site. In addition, six groundwater samples (MW-01 and MW-03 to MW-07) were collected from the monitor wells located within the boundaries of the Site. Groundwater samples were submitted for analysis of PCBs, dissolved metals, and total mercury.

It is noted that a groundwater sample was not collected from monitor well MW-02 because the monitor well was dry (insufficient water to collect an adequate sample for laboratory analyses).

5.1.1 PCBs in Groundwater

Groundwater analytical results for PCBs from the background monitor well (MW-08) and the six on-Site monitor wells (MW-01 and MW-03 to MW-07) reported non-detectable concentrations, which were also below the applicable guidelines.

In addition, one field duplicate (MW-DUP) collected from MW-03 also reported a non-detectable PCB concentration consistent with the original sample results.

Laboratory analytical results for PCBs in groundwater are presented in Table 3.

5.1.2 Metals in Groundwater

Groundwater analytical results for dissolved metals from the background monitor well (MW-08) and the six monitor wells (MW-01 and MW-03 to MW-07) around the Site reported metals concentrations as below the applicable guidelines.

In addition, one field duplicate (MW-DUP) collected from MW-03 reported dissolved metals concentrations consistent with the original sample results.

Laboratory analytical results for metals in groundwater are presented in Table 4.

5.2 Surface Water

One background surface water sample (SW-UPSTREAM) was collected from approximately 300 metres northeast of the Site to assess background analyte concentrations of the surface water in the stream by sampling at an upgradient location. One surface water sample (SW-POND) was collected from the on-Site collection pond to characterize the leachate. Due to unseasonably dry summer and fall conditions, a surface water sample was not collected from the stream monitoring location downgradient from the collection pond (SW-STREAM) due to insufficient water.

Surface water samples were submitted for analysis of PCBs, general chemistry, and total metals that included mercury.

5.2.1 PCBs in Surface Water

Surface water analytical results for PCBs from the collection pond (SW-POND) and the background upgradient surface water sample (SW-UPSTREAM) reported non-detectable concentrations. Note that CCME CWQGs (FAL) does not specify a criterion for PCBs in surface water.

In addition, one field duplicate (SW-DUP) collected from SW-POND also reported a non-detectable PCB concentration that was consistent with the original sample results.

Laboratory analytical results for PCBs in surface water are presented in Table 5.

5.2.2 Metals in Surface Water

Surface water analytical results for total metals from the collection pond (SW-POND) and the background upgradient surface water sample (SW-UPSTREAM) reported non-detectable concentrations for many of the analytes. Reportable concentrations for the remaining analytes were

below the available CCME CWQGs for FAL from the collection pond (SW-POND) monitoring location. Aluminum was reported above the CCME CWQGs for FAL in the background upgradient (SW-UPSTREAM) surface water sample; however, the reportable concentrations for the remaining analytes were below the available CCME CWQGs for FAL in the background upgradient (SW-UPSTEAM) surface water sample.

One field duplicate (SW-DUP) collected from SW-POND reported total metal concentrations consistent with the original sample results with the exception of Zinc. SW-POND reported a concentration of 8.5 µg/L and SW-DUP reported a concentration of 75 µg/L. To further investigate this anomaly during the current monitoring program, a new surface water sample was collected from the collection pond (SW-POND) on November 29, 2017 that resulted in a non-detectable concentration for Zinc.

Laboratory analytical results for total metals in surface water are summarized in Table 6.

5.2.3 General Chemistry in Surface Water

Surface water analytical results for general chemistry from the collection pond (SW-POND) and the background upgradient surface water sample (SW-UPSTREAM) typically reported analyte concentrations or measurements in the upgradient stream sample as below the collection pond sample. The measured pH for the collection pond sample was within the CCME CWQGs for FAL range and the measured pH for the upgradient sample was outside the CCME CWQGs for FAL range.

One field duplicate (SW-DUP) collected from SW-POND reported analyte concentrations or measurements consistent with the original sample results.

Laboratory analytical results for general chemistry in surface water are summarized in Table 7.

6. Discussion

Groundwater and surface water analytical data from the October 2017 sampling event were compared with historical analytical data to determine the potential for trends. Monitoring of groundwater and surface water quality has been ongoing since 2007. Historical data from previous environmental assessment and/or monitoring is presented in Appendix C.

6.1 Groundwater

A review of the historical groundwater analytical data that included the October 2017 monitoring event confirmed metals concentrations have been within the applicable MOE Guidelines for Full Depth Generic Site Standards in a Non-Potable Ground Water Condition since the December 2010 sampling event. Substantially higher concentrations of Calcium, Magnesium, Potassium, and Sodium continue to be reported in the monitor wells downgradient from Route 73 compared to the background monitor well (MW-08), which is upgradient from Route 73. The increased levels of these analytes are likely associated with the application of road salt on Route 73 that has infiltrated the groundwater.

PCBs have been non-detect for all groundwater samples collected since 2007, with the exception of MW-01 in October 2009 (0.07 µg/L) which was slightly above the guideline limit of 0.05 µg/L.

Historical groundwater data for PCBs and metals, including the October 2017 sampling event, have been summarized in Tables C1 and C2, respectively, of Appendix C.

6.2 Surface Water

A review of the historical surface water analytical data that included the October 2017 sampling event confirmed metals and general chemistry analytes were often within the CCME CWQGs for FAL, where available.

Reportable metal concentrations from the collection pond were non-detectable and/or below the available CCME CWQGs for FAL for the October 2017 monitoring event. However, samples from the collection pond frequently exceeded the guidelines for Aluminum, Copper, and Iron during previous monitoring events from 2007 to 2015.

Aluminum concentrations in the collection pond reported exceedances in five of the previous monitoring events. Since November 2007, samples from the collection pond exceeded Copper guidelines for all but three monitoring events, and exceeded Iron guidelines for all but four monitoring events.

Although a surface water sample was not collected from the downgradient stream location in October 2017, historically, samples from the downgradient stream location have had fewer exceedances since November 2007 when compared to the collection pond. Reportable concentrations of Copper and Iron from the downgradient stream location have exceeded guideline limits on only three sampling occasions. Aluminum concentrations in the downgradient stream location reported exceedances in six of the previous monitoring events.

According to background surface water concentrations for the area, Aluminum, Copper, and Iron exceedances are common for the area and are within a range similar to the exceedances encountered at Denny's Pond and Three Corner Pond (AMEC, 2011 and SNC Lavalin, 2012), see inset aerial map shown on Figure 2.

Compared with the upgradient background monitoring station results, the analytes in the collection pond and the downgradient stream location typically reported higher concentrations with the collection pond samples having the highest concentrations. The elevated presence of Calcium, Magnesium, Potassium, and Sodium concentrations were reported in the surface water samples downgradient from Route 73 compared to the background surface water sample that was collected upgradient from Route 73. The increased levels of these analytes are likely associated with the application of road salt on Route 73 that has infiltrated the surface water.

The analytical results for general chemistry show Nitrite concentrations in the collection pond reported exceedances in all sampling events from November 2007 to November 2012. Since November 2014, Nitrite concentrations from the collection pond have reported concentrations below the CCME CWQGs for FAL. In comparison, Nitrite concentrations in the downgradient stream only reported exceedances in three of the previous monitoring events; with non-detectable concentrations reported in November 2014 and December 2015. Nitrite was not segregated from

the combined Nitrite and Nitrate analysis during the August 2013 sampling event. Nitrite was not detected in the upstream background surface water samples from November 2014 to October 2017.

The measured pH in the downgradient stream only reported two measurements in the January 2010 and November 2014 sampling event that were outside the range for the CCME CWQGs for FAL while all other collection pond and downgradient stream surface water samples reported the pH measurement within the criterion. Conversely, the measured pH in the background surface water samples collected from the upgradient stream sample location has reported pH measurements from all previous monitoring events that were slightly below the applicable range for the CCME CWGQs for FAL. The high concentration of salts reported in the collection pond likely contributed to neutralizing the acidity of the background surface water entering the Site while the downgradient stream sample was influenced by other surface water within the catchment area of the Site.

Guidelines for PCBs in surface water are not available; however, surface water samples from the collection pond and the upgradient surface water monitoring location have reported PCB concentrations as non-detectable in October 2017. PCBs have not been detected in any surface water station, including the downgradient stream location since monitoring began in 2007.

Historical surface water data for PCBs, metals, and general chemistry, including the October 2017 sampling event, have been summarized in Tables C3 to C5, respectively, of Appendix C.

7. Inspection of Monitor Wells and Leachate Control System

During the October 2017 Site visit, GHD staff conducted a visual inspection of the monitor wells, leachate ditch system/collection pond, and rip rap.

All monitor wells were observed to be in satisfactory condition with a few notable exceptions:

- MW-06 was observed as being partially damaged with the top of the PVC casing cracked, the top of the casing was approximately 200 mm below the top of the steel stick-up casing, and the J-plug is no longer present.
- MW-07 was observed as having the well cover partially damaged as the hinge connecting the steel cover to the protective casing was broken.
- MW-08 was observed as being vulnerable to vandalism as the protective well cap cover does not fit over the PVC casing stick up and cannot be properly closed and secured.
- The steel protective casings at MW-01, MW-05A, and MW-07 were not cemented in place or loose.
- Areas near MW-02, MW-04 and MW-07 are heavily wooded and overgrown, making it very difficult to access the monitor wells.

The leachate ditch system and collection pond were observed to be in good condition with no sign of blockages or erosion that would interfere with the proper flow of leachate to the collection pond.

Signs of erosion were evident around the landfill cover and rip rap, but were otherwise observed to be in good condition with no signs of deterioration from differential settlement.

The wooden sign post located on the southwest corner of the Site has been sheared off at the base; therefore, the No Trespassing / No Dumping sign is no longer present.

8. Summary and Recommendations

GHD was retained by DMAE to complete the 2017-2018 Monitoring Program at the Upper Trinity South (New Harbour) Waste Disposal Site located on Route 73, approximately 5 km from the junction of Route 80 and Route 73, in the community of New Harbour, NL.

The 2017-2018 monitoring event was conducted in October 2017; the findings and recommendations arising from the event are summarized below.

8.1 Groundwater

Groundwater sampling was initially conducted from a network of seven monitor wells located around the footprint of the disposal site; however, only six groundwater samples plus one field duplicate were collected from the on-Site monitor wells. It is noted that a groundwater sample was not collected from one monitor well because of insufficient water. Background groundwater quality was established by sampling at an off-Site monitor well, which is located approximately 1.5 km northeast and hydraulically upgradient of the Site.

Groundwater samples were submitted for analysis of PCBs, dissolved metals and total mercury. A review of the historical groundwater analytical data that included the October 2017 sampling event confirmed PCB and metals concentrations have been within the applicable MOE Guidelines for Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition since the December 2010 sampling event.

Based on the historical metals exceedances reported in groundwater, GHD recommends that all monitor wells continue to be sampled and analyzed for metals including mercury during future monitoring activities at the Site. In addition, GHD recommends that PCBs continue to be monitored due to the confirmed presence of PCB containing soil in the unlined waste disposal Site.

8.2 Surface Water

Surface water sampling was intended to characterize leachate from the Site's leachate collection pond and assess potential leachate infiltration into the nearby surface water by sampling a stream directly down-gradient. Due to an unseasonably dry summer and fall, a surface water sample was not collected from the stream monitoring location downgradient from the collection pond during the October 2017 monitoring event. Background analyte concentrations of the surface water was established by sampling at an upgradient location, which is located approximately 300 m northeast of the Site.

Surface water samples were submitted for analysis of PCBs, general chemistry, and total metals that included mercury. A review of the historical surface water analytical data that included the

October 2017 sampling event confirmed metals and general chemistry analytes were often within the CCME CWQGs for FAL, where available. Guidelines for PCBs in surface water are not available; however, PCBs have not been detected in any surface water station since monitoring began in 2007.

Reportable metal concentrations from the collection pond were non-detectable and/or below the available CCME CWQGs for FAL for the October 2017 monitoring event. However, samples from the collection pond frequently exceeded the guidelines for Aluminum, Copper, and Iron during previous monitoring events. Since November 2007, samples from the collection pond exceeded Copper guidelines for all but three monitoring events, and exceeded Iron guidelines for all but four monitoring events. Aluminum concentrations in the collection pond reported exceedances in five of the previous monitoring events. Although a surface water sample was not collected from the downgradient stream location in October 2017, historically, samples from the downgradient stream location have had fewer exceedances since November 2007 when compared to the collection pond. Reportable concentrations of Copper and Iron from the downgradient stream location have exceeded guideline limits on only three sampling occasions. Aluminum concentrations in the downgradient stream location reported exceedances in six of the previous monitoring events. According to background surface water concentrations for the area, Aluminum, Copper and Iron exceedances are common for the area and are within a range similar to the exceedances encountered at Denny's Pond and Three Corner Pond.

Compared with the upgradient background monitoring station results, the analytes typically reported higher concentrations in the collection pond and the downgradient stream location, with the collection pond samples having the highest concentrations. The elevated presence of Calcium, Magnesium, Potassium, and Sodium concentrations were reported in the surface water samples downgradient from Route 73 compared to the background surface water sample collected upgradient from Route 73. The increased levels of these analytes are likely associated with the application of road salt on Route 73 that has infiltrated the surface water.

The analytical results for general chemistry show Nitrite concentrations in the collection pond reported exceedances in all sampling events from November 2007 to November 2012. Since November 2014, Nitrite concentrations from the collection pond have reported concentrations below the CCME CWQGs for FAL. In comparison, Nitrite concentrations in the downgradient stream only reported exceedances in three of the previous monitoring events; with non-detectable concentrations reported in November 2014 and December 2015. Nitrite was not segregated from the combined Nitrite and Nitrate analysis during the August 2013 sampling event.

The measured pH in the downgradient stream only reported two measurements that were outside the range for the CCME CWQGs for FAL in January 2010 and November 2014 while all other collection pond and downgradient stream surface water reported the pH measurement within the criterion. Conversely, the measured pH in the background surface water sample collected from the upgradient stream location reported pH measurements from all previous monitoring events that were slightly below the applicable range for the CCME CWGQs for FAL. The high concentration of salts reported in the collection pond likely contributed to neutralizing the acidity of the background surface water entering the Site while the downgradient stream was influenced by other surface water within the catchment area of the Site.

Based on the current and historical exceedances reported in surface water at the three sampling locations, GHD recommends the monitoring program be continued at the upgradient, on-Site collection pond, and downgradient locations with analysis to include PCBs, metals including mercury, and general chemistry during future monitoring activities at the Site.

8.3 Inspection of Monitor Wells and Leachate Control System

During the October 2017 Site visit, GHD conducted a visual inspection of the monitor wells and deemed them to be in satisfactory condition with a few notable exceptions. One monitor well was observed as being partially damaged with the top of the PVC casing cracked and the top of the casing approximately 200 mm below the top of the steel stick-up casing. A second well was noted to have the well cover partially damaged as the hinge connecting the steel cover to the protective casing was broken. Lastly, one monitor well was observed to be susceptible to vandalism as the protective well cap cover did not fit over the PVC casing stick-up and could not be properly closed and secured. In addition, the steel protective casing of three monitor wells were not cemented in or were loose and areas near three monitor wells were heavily wooded and overgrown making it difficult to access the monitor wells.

GHD recommends the cracked PVC casing be repaired and a new J-plug installed to allow for improved measurements in relation to the top of casing. The hinged steel cover should be repaired and/or replaced and the PVC casing cut lower than the protective casing to allow the well cap to fit over the casing and be locked. GHD staff placed native material around the base of the loose protective casings; however, consideration should be given to resealing the bases using a combination of silica sand and concrete. In addition, the overgrown areas should be grubbed or cut lines to allow safe access to the monitor wells.

The leachate ditch system and collection pond were observed to be in good condition with no signs of blockages or erosion that would interfere with the proper flow of leachate to the collection pond.

Signs of erosion were evident around the landfill cover and rip rap, but were otherwise observed to be in good condition with no signs of deterioration from differential settlement. GHD recommends the landfill cover area that was washed out should be filled, re-graded, and hydro-seeded during the summer/fall months of 2018 to prevent further erosion of the area.

The wooden sign pole located on the southwest corner of the Site was been sheared off at the base; therefore, the No Trespassing/No Dumping sign was no longer present. Consideration should be given to the replacement of the sign mounted to steel posts our 150 mm square pressure treated timber.

9. References

Canadian Council of Ministers of the Environment. 1999. Canadian Environmental Quality Guidelines. Updated 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008 and 2010.

Ontario Ministry of the Environment, 2011. Rational for the Development of Soil and Groundwater Standards for use at Contaminated Sites in Ontario, Prepared by: Standards Development Branch, Ontario Ministry of the Environment, April 15, 2011.

Report entitled "*2015-16 Monitoring and Maintenance Program, Upper Trinity South (New Harbour) Waste Disposal Site, New Harbour Barrens, NL"* prepared by Fracflow Consultants Inc. for Newfoundland and Labrador Department of Environment and Conservation, dated June 2016.

Report entitled "*2014/2015 Monitoring and Maintenance Program, Upper Trinity South (New Harbour) Waste Disposal Site, New Harbour Barrens, Newfoundland and Labrador"* prepared by CRA for Newfoundland and Labrador Department of Environment and Conservation, dated February 2015.

Report entitled "*2013/2014 Monitoring and Maintenance Program, Upper Trinity South (New Harbour) Waste Disposal Site, New Harbour Barrens, Newfoundland and Labrador"* prepared by CRA for Newfoundland and Labrador Department of Environment and Conservation, dated January 2014.

Report entitled "*2012-2013 Annual Report of Activities, Upper Trinity South (New Harbour) Waste Disposal Site"* prepared by AMEC for Newfoundland and Labrador Department of Environment and Conservation, dated March 2013.

Report entitled *"Human Health and Ecological Risk Assessment of the PCB Area at the Upper Trinity South (New Harbour) Waste Disposal Site, New Harbour Barrens, Newfoundland and Labrador"* prepared by Dillon Consulting Limited for Newfoundland and Labrador Department of Environment and Conservation, dated July 2013.

Report entitled "*2011-2012 Annual Report of Activities, Upper Trinity South (New Harbour) Waste Disposal Site"* prepared by SNC Lavalin Inc. for Newfoundland and Labrador Department of Environment and Conservation, dated July 2012.

Report entitled "*2010-2011 Annual Report of Activities, Upper Trinity South (New Harbour) Waste Disposal Site"* prepared by AMEC for Newfoundland and Labrador Department of Environment and Conservation, dated March 2011.

Report entitled "*Removal of PCB Impacted Material, Upper Trinity South Waste Disposal Facility, New Harbour, NL"* prepared by AMEC for Newfoundland and Labrador Department of Environment and Conservation, dated January 2011.

Report entitled "*2009 Groundwater and Surface Water Sampling Program at the Upper Trinity South (New Harbour) Waste Disposal Site"* prepared by AMEC for Newfoundland and Labrador Department of Environment and Conservation, dated March 2009.

Report entitled *"2008 Groundwater and Surface Water Sampling Program at the Upper Trinity South (New Harbour) Waste Disposal Site"* prepared by AMEC for Newfoundland and Labrador Department of Environment and Conservation, dated February 2009.

Report entitled *"2007 Groundwater and Surface Water Sampling Program at the Upper Trinity South (New Harbour) Waste Disposal Site"* prepared by AMEC for Newfoundland and Labrador Department of Environment and Conservation, dated March 2008.

Report entitled *"Upper Trinity South (New Harbour) Waste Disposal Site. Implementation of the Leachate Control System"* prepared by AMEC for Newfoundland and Labrador Department of Environment and Conservation, dated March 2007.

Report entitled *"Upper Trinity South (New Harbour) Waste Disposal Site. Design of Leachate Control System"* prepared by AMEC for Newfoundland and Labrador Department of Environment and Conservation, dated June 2006.

Report entitled *"2010 Annual Report of Activities, Upper Trinity South (New Harbour) Waste Disposal Site"* prepared by SNC Lavalin Inc. for Newfoundland and Labrador Department of Environment and Conservation, dated March 2010.

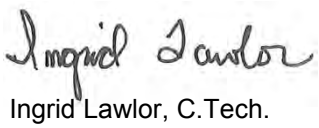
Report entitled *"Implementation of Previous Recommendations, Upper Trinity South (New Harbour) Waste Disposal Site"* prepared by SNC Lavalin Inc. for Newfoundland and Labrador Department of Environment and Conservation, dated May 2010.

10. Closure

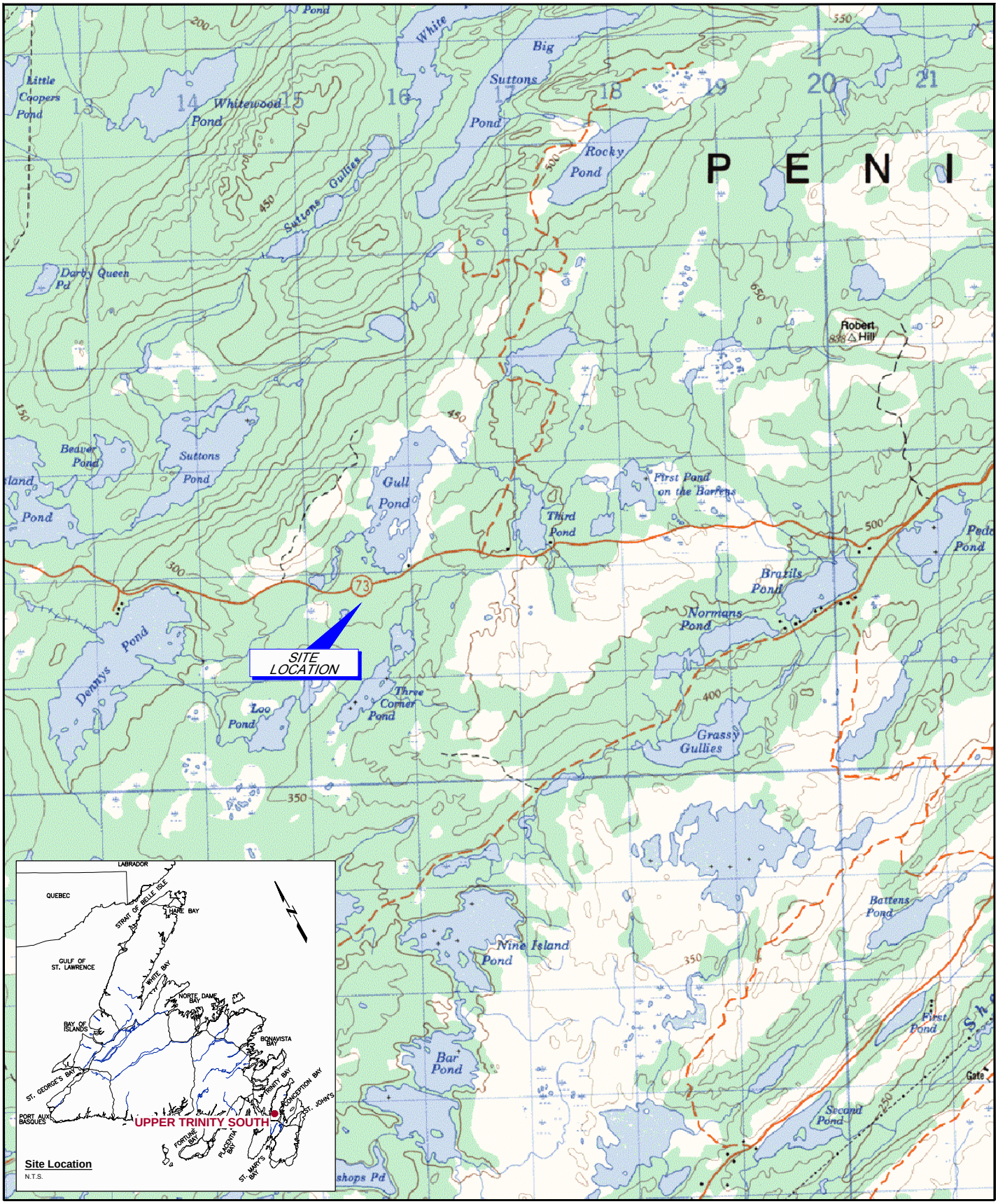
All of Which is Respectfully Submitted,

GHD

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



Ingrid Lawlor, C.Tech.
Environmental Technologist



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SCALE: 1:50,000

DEPT. OF MUNICIPAL AFFAIRS & ENVIRONMENT
UPPER TRINITY SOUTH (NEW HARBOUR),
WASTE DISPOSAL SITE, NEW HARBOUR BARRENS, NL
2017 - 2018 MONITORING PROGRAM

084308(010)

Mar 5, 2018

SITE LOCATION MAP

FIGURE 1

CAD File: I:\CAD\6-chars\08----\0843--\084308\-010\084308(010) GN-NL001.dwg

SW-UPSTREAM

ROUTE 73

MW-07

MW-02

MW-01

WASTE DISPOSAL SITE

MW-04

SW-POND

MW-06

MW-05A

MW-05

MW-03

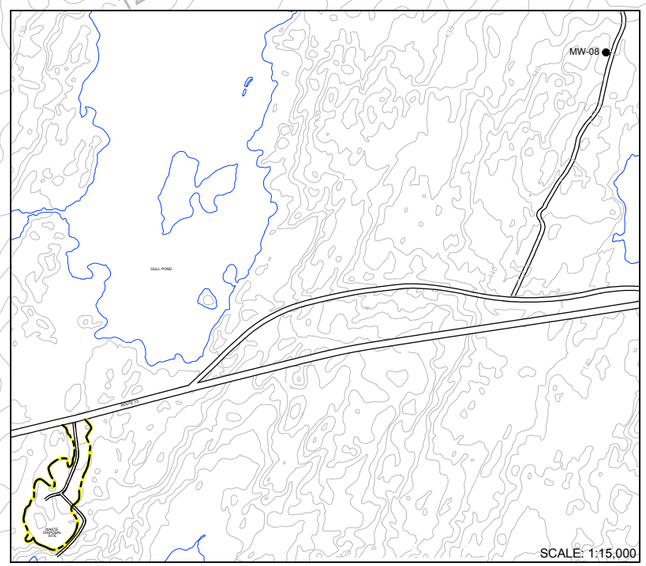
SW-STREAM

THREE CORNER POND

120

110

100



0 40 80 120m

SCALE: 1:4,000

LEGEND:

- PERIMETER OF WASTE DISPOSAL SITE (APPROX.)
- CONTOUR LINE (2 metre INTERVAL)
- POND
- MW ● MONITOR WELL LOCATION (SNC 2012)
- MW ● MONITOR WELL LOCATION (DESTROYED)
- SW △ SURFACE WATER SAMPLE LOCATION
- APPROXIMATE GROUNDWATER FLOW DIRECTION

GHD

DEPT. OF MUNICIPAL AFFAIRS & ENVIRONMENT
UPPER TRINITY SOUTH (NEW HARBOUR)
WASTE DISPOSAL SITE, NEW HARBOUR BARRENS, NL
2017 - 2018 MONITORING PROGRAM

SITE PLAN WITH SAMPLE LOCATIONS

084308(010)

Mar 5, 2018

FIGURE 2

CAD File: I:\CAD\6-chars\08----\0843--\084308\-010\084308(010) GN-NL002.dwg

STATIC WATER LEVELS
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

ID	Ground Surface Elevation	Depth to Water	Depth of Well
		Oct 26, 2017	Oct 26, 2017
	(masl)	(mbTOC)	(mbTOC)
MW-01	120.666	1.461	1.790
MW-02	122.201	3.842	3.950
MW-03	101.323	1.180	3.603
MW-04	117.108	1.104	3.610
MW-05A	Not Surveyed	1.760	5.935
MW-06	111.300	1.150	2.010
MW-07	125.215	1.532	3.560
MW-08	Not Surveyed	1.935	5.675

Notes:

m = Metres

TOC = Top of Casing

masl = Metres Above Sea Level

mbTOC = Metres Below Top of Casing

GPS CO-ORDINATES OF KEY SITE FEATURES
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

ID	NORTHING	EASTING
	(m)	(m)
MW-01	5271867	315787
MW-02	5271887	315459
MW-03	5271518	315342
MW-04	5271711	315468
MW-05A	5271451	315670
MW-06	5271679	315707
MW-07	5272020	315750
MW-08	5272965	316998
SW-POND	5271648	315544
SW-STREAM	5271423	315381
SW-UPSTREAM	5272220	316011

Notes:

-All points recorded using Universal Transverse Mercator Zone 22 as coordinate system

MW = Monitoring Well
SW = Surface Water

TABLE 3

GROUNDWATER ANALYTICAL DATA - PCBs (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL	MW-01	MW-02	MW-03	MW-DUP	MW-04	MW-05A	MW-06	MW-07	MW-08	Criteria*
		Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	
Total PCBs	0.05	<	-	<	<	<	<	<	<	<	7.8

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 MW-03

< = Parameter below detection limit
- = No sample collected
0.0 = Above criteria

TABLE 4

GROUNDWATER ANALYTICAL DATA - DISSOLVED METALS (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL	MW-01	MW-02	MW-03	MW-DUP	MW-04	MW-05A	MW-06	MW-07	MW-08	Criteria*
		Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	
Aluminum (Al)	5.0	320	-	76	76	50	150	140	1,500	<	-
Antimony (Sb)	1.0	<	-	<	<	<	<	<	<	<	20,000
Arsenic (As)	1.0	<	-	13	13	2.7	<	2	<	<	1,900
Barium (Ba)	1.0	1.7	-	13	13	14	3.3	3.1	4.1	<	29,000
Beryllium (Be)	1.0	<	-	<	<	<	<	<	<	<	67
Bismuth (Bi)	2.0	<	-	<	<	<	<	<	<	<	-
Boron (B)	50	<	-	<	<	<	<	<	<	<	45,000
Cadmium (Cd)	0.010	<	-	<	<	0.12	0.027	<	0.012	<	2.7
Calcium (Ca)	100	1,700	-	13,000	12,000	11,000	4,200	14,000	1,100	<	-
Chromium (Cr)	1.0	<	-	<	<	<	<	<	<	<	810
Cobalt (Co)	0.40	<	-	5.9	5.8	8.3	1.2	1.5	0.66	<	66
Copper (Cu)	2.0	<	-	<	<	8.2	3.8	<	<	<	87
Iron (Fe)	50	290	-	8,600	8,600	900	480	11,000	3,000	<	-
Lead (Pb)	0.5	<	-	<	<	<	<	<	1.1	<	25
Magnesium (Mg)	100	640	-	3,500	3,500	2,300	1,400	1,900	630	<	-
Manganese (Mn)	2.0	12	-	3,900	3,800	310	180	260	27	<	-
Mercury (Hg) - Total	0.013	<	-	<	<	0.11	0.022	0.018	0.038	<	0.29
Molybdenum (Mo)	2.0	<	-	<	<	<	<	<	<	<	9,200
Nickel (Ni)	2.0	<	-	<	<	<	2.5	<	<	<	490
Phosphorus (P)	100	<	-	<	<	<	<	250	110	<	-
Potassium (K)	100	<	-	2,000	2,000	1,100	440	1,300	170	<	-
Selenium (Se)	1.0	<	-	<	<	<	<	<	<	<	63
Silver (Ag)	0.10	<	-	<	<	<	<	<	<	<	1.5
Sodium (Na)	100	7,900	-	33,000	32,000	43,000	7,700	21,000	4,700	340	2,300,000
Strontium (Sr)	2.0	6.8	-	34	34	36	15	33	7.5	<	-
Thallium (Tl)	0.10	<	-	<	<	<	<	<	<	<	510
Tin (Sn)	2.0	<	-	<	<	<	<	<	<	<	-
Titanium (Ti)	2.0	4.1	-	7.4	7.1	2.8	2.9	3.8	30	<	-
Uranium (U)	0.10	<	-	<	<	<	<	<	<	<	420
Vanadium (V)	2.0	<	-	<	<	<	<	<	<	<	250
Zinc (Zn)	5.0	7.8	-	6.2	7.1	31	11	<	17	<	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 MW-03

< = Parameter below detection limit
- = No sample collected/No criteria
0.0 = Above criteria

TABLE 5

SURFACE WATER ANALYTICAL DATA - PCBs (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL	SW-POND	SW-DUP	SW-UPSTREAM	Criteria*
		Oct 26, 2017	Oct 26, 2017	Oct 26, 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
SW-DUP = Field Duplicate of SW-POND

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

TABLE 6

SURFACE WATER ANALYTICAL DATA - TOTAL METALS (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL	SW-POND	SW-DUP	SW-UPSTREAM	Criteria*
		Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	
Aluminum (Al)	5.0	9.2	10	**210**	5/100[1]
Antimony (Sb)	1.0	<	<	<	-
Arsenic (As)	1.0	<	<	<	5
Barium (Ba)	1.0	13	13	1.2	-
Beryllium (Be)	1.0	<	<	<	-
Bismuth (Bi)	2.0	<	<	<	-
Boron (B)	50	190	190	<	1,500
Cadmium (Cd)	0.010	<	<	<	0.04/0.17[2]
Calcium (Ca)	100	67,000	65,000	890	-
Chromium (Cr)	1.0	<	<	<	8.9[3]
Cobalt (Co)	0.4	<	<	<	-
Copper (Cu)	2.0	<	<	<	2[4]
Iron (Fe)	50	63	67	150	300
Lead (Pb)	0.50	<	<	<	1[5]
Magnesium (Mg)	100	5,800	5,800	460	-
Manganese (Mn)	2.0	210	240	9	-
Mercury (Hg)	0.013	<	<	<	0.026
Molybdenum (Mo)	2.0	<	<	<	73
Nickel (Ni)	2.0	<	<	<	25, 65[6]
Phosphorus (P)	100	<	<	<	-
Potassium (K)	100	6,500	6,400	160	-
Selenium (Se)	1.0	<	<	<	1
Silver (Ag)	0.1	<	<	<	0.1
Sodium (Na)	100	35,000	36,000	4,700	-
Strontium (Sr)	2.0	170	170	4.3	-
Thallium (Tl)	0.1	<	<	<	0.8
Tin (Sn)	2.0	<	<	<	-
Titanium (Ti)	2.0	<	<	3.1	-
Uranium (U)	0.10	<	<	<	15
Vanadium (V)	2.0	<	<	<	-
Zinc (Zn)	5.0	< [1]	< [1]	<	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).
(1) New sample collected on November 29, 2017 resulted in Zinc concentration below RDL.

RDL = Reportable Detection Limit
SW-DUP = Field Duplicate of SW-POND

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

(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.

SURFACE WATER ANALYTICAL DATA - GENERAL CHEMISTRY
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL	Units	SW-POND	SW-DUP	SW-UPSTREAM	Criteria*
			Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	
Anion Sum	N/A	me/L	6.05	6.09	0.23	-
Bicarb. Alkalinity (calc. as CaCO3)	1	mg/L	160	160	<	-
Calculated TDS	1	mg/L	340	340	16	-
Carb. Alkalinity (calc. as CaCO3)	1	mg/L	<	<	<	-
Cation Sum	N/A	me/L	5.62	5.59	0.3	-
Hardness (CaCO3)	1	mg/L	190	190	4.1	-
Ion Balance (% Difference)	N/A	%	3.68	4.28	13.2	-
Langelier Index (@ 20C)	N/A	N/A	0.38	0.32	NC (2)	-
Langelier Index (@ 4C)	N/A	N/A	0.132	0.071	NC (2)	-
Nitrate (N)	0.05	mg/L	4	4	<	13
Saturation pH (@ 20C)	N/A	N/A	7.4	7.41	NC (2)	-
Saturation pH (@ 4C)	N/A	N/A	7.65	7.66	NC (2)	-
Total Alkalinity (Total as CaCO3)	25	mg/L	160 (1)	160 (1)	<	-
Dissolved Chloride (Cl)	1	mg/L	50	50	8	-
Colour	5	TCU	14	13	56 (1)	-
Nitrate + Nitrite (N)	0.05	mg/L	4	4	<	-
Nitrite (N)	0.01	mg/L	0.048	0.049	<	0.06
Nitrogen (Ammonia Nitrogen)	0.05	mg/L	1.5	1.7	<	-
Total Organic Carbon (C)	0.5	mg/L	6.2	6	8.7	-
Orthophosphate (P)	0.01	mg/L	<	<	<	-
pH	N/A	pH	7.78	7.73	**6.35**	6.5 - 9
Reactive Silica (SiO2)	0.5	mg/L	5.9	6	1.8	-
Dissolved Sulphate (SO4)	10	mg/L	54 (1)	54 (1)	<	-
Turbidity	0.1	NTU	1.4	0.6	1.1	-
Conductivity	1	uS/cm	600	600	37	-

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) Elevated reporting limit due to sample matrix.
(2) RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

RDL = Reportable Detection Limit
NC - Not Calculated
SW-DUP = Field Duplicate of SW-POND

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

Appendices

Appendix A
Site Photographs

Photo 1 - View of MW-03 facing west during the October 2017 monitoring event.

Photo 2 - View of MW-04 facing north during the October 2017 monitoring event.

Site Photographs

Photo 3 - View of MW-07 facing east during the October 2017 monitoring event.

Photo 4 - View of MW-08 facing south during the October 2017 monitoring event. Note the well cap does not fit over the PVC casing stick up.

Site Photographs

Photo 5 - View of leachate collection pond facing north during the October 2017 monitoring event where SW-POND was collected.

Photo 6 - View of SW-STREAM location facing east during the October 2017 monitoring event where sample could not be collected.

Site Photographs

Photo 7 - View of SW-UPSTREAM location facing north during the October 2017 monitoring event.

Photo 8 - View of Site entrance facing southeast during the October 2017 monitoring event.

Site Photographs

Photo 9 - View of missing No Trespassing/No Dumping sign on southwest corner of the landfill cover.

Photo 10 - View of the waste disposal slope looking southeast showing erosion of the landfill cover.

Site Photographs

Appendix B
Laboratory Certificates of Analyses

Your P.O. #: 73509542
Your Project #: 084308-02
Site Location: New Harbour, NL
Your C.O.C. #: 16203

Attention:Brian Luffman

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

Report Date: 2017/11/13
Report #: R4851447
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B7O1486
Received: 2017/10/27, 13:05

Sample Matrix: Ground Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Mercury - Total (CVAA,LL) (1)	8	2017/11/01	2017/11/02	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Diss. MS (as rec'd) (1)	8	N/A	2017/11/02	ATL SOP 00058	EPA 6020A R1 m
PCBs in water by GC/ECD (1)	7	2017/11/01	2017/11/02	ATL SOP 00107	EPA 8082A m
PCBs in water by GC/ECD (1)	1	2017/11/01	2017/11/03	ATL SOP 00107	EPA 8082A m
PCB Aroclor sum (water) (1)	7	N/A	2017/11/02	N/A	Auto Calc.
PCB Aroclor sum (water) (1)	1	N/A	2017/11/03	N/A	Auto Calc.

Sample Matrix: Surface Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide (1)	3	N/A	2017/11/02	N/A	SM 22 4500-CO2 D
Alkalinity (1)	3	N/A	2017/11/06	ATL SOP 00013	EPA 310.2 R1974 m
Chloride (1)	3	N/A	2017/11/07	ATL SOP 00014	SM 22 4500-Cl- E m
Colour (1)	3	N/A	2017/11/07	ATL SOP 00020	SM 22 2120C m
Conductance - water (1)	3	N/A	2017/11/01	ATL SOP 00004	SM 22 2510B m
Hardness (calculated as CaCO3) (1)	3	N/A	2017/11/01	ATL SOP 00048	SM 22 2340 B
Mercury - Total (CVAA,LL) (1)	3	2017/11/01	2017/11/02	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Total MS (1)	1	2017/10/31	2017/10/31	ATL SOP 00058	EPA 6020A R1 m
Metals Water Total MS (1)	2	2017/10/31	2017/11/01	ATL SOP 00058	EPA 6020A R1 m
Ion Balance (% Difference) (1)	3	N/A	2017/11/08	N/A	Auto Calc.
Anion and Cation Sum (1)	3	N/A	2017/11/07	N/A	Auto Calc.
Nitrogen Ammonia - water (1)	3	N/A	2017/11/06	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite (1)	3	N/A	2017/11/07	ATL SOP 00016	USGS SOPINCF0452.2 m
Nitrogen - Nitrite (1)	3	N/A	2017/11/07	ATL SOP 00017	SM 22 4500-NO2- B m
Nitrogen - Nitrate (as N) (1)	3	N/A	2017/11/08	ATL SOP 00018	ASTM D3867-16
PCBs in water by GC/ECD (1)	3	2017/11/01	2017/11/03	ATL SOP 00107	EPA 8082A m
PCB Aroclor sum (water) (1)	3	N/A	2017/11/03	N/A	Auto Calc.
pH (1, 2)	3	N/A	2017/11/01	ATL SOP 00003	SM 22 4500-H+ B m
Phosphorus - ortho (1)	3	N/A	2017/11/08	ATL SOP 00021	SM 22 4500-P E m

Maxxam
A Bureau Veritas Group Company

Your P.O. #: 73509542
Your Project #: 084308-02
Site Location: New Harbour, NL
Your C.O.C. #: 16203

Attention:Brian Luffman

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

Report Date: 2017/11/13
Report #: R4851447
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B7O1486
Received: 2017/10/27, 13:05

Sample Matrix: Surface Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Sat. pH and Langelier Index (@ 20C) (1)	1	N/A	2017/11/07	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 20C) (1)	2	N/A	2017/11/08	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C) (1)	1	N/A	2017/11/07	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C) (1)	2	N/A	2017/11/08	ATL SOP 00049	Auto Calc.
Reactive Silica (1)	3	N/A	2017/11/07	ATL SOP 00022	EPA 366.0 m
Sulphate (1)	3	N/A	2017/11/06	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc) (1)	3	N/A	2017/11/08	N/A	Auto Calc.
Organic carbon - Total (TOC) (1, 3)	3	N/A	2017/11/06	ATL SOP 00037	SM 22 5310C m
Turbidity (1)	3	N/A	2017/11/02	ATL SOP 00011	EPA 180.1 R2 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.

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.

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Your P.O. #: 73509542
Your Project #: 084308-02
Site Location: New Harbour, NL
Your C.O.C. #: 16203

Attention:Brian Luffman

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

Report Date: 2017/11/13
Report #: R4851447
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B7O1486
Received: 2017/10/27, 13:05

(1) This test was performed by Maxxam Bedford
(2) 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.
(3) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key

Maxxam
Project Manager Assistant
13 Nov 2017 09:22:13

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 #: B7O1486
Report Date: 2017/11/13

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

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

Maxxam ID		FLB661			FLB662			FLB663	FLB663		
Sampling Date		2017/10/27			2017/10/27			2017/10/27	2017/10/27		
COC Number		16203			16203			16203	16203		
	UNITS	SW-POND	RDL	QC Batch	SW-UPSTREAM	RDL	QC Batch	SW-DUP	SW-DUP Lab-Dup	RDL	QC Batch
Calculated Parameters											
Anion Sum	me/L	6.05	N/A	5238028	0.230	N/A	5238028	6.09		N/A	5238028
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	160	1.0	5238023	<1.0	1.0	5238023	160		1.0	5238328
Calculated TDS	mg/L	340	1.0	5238033	16	1.0	5238033	340		1.0	5238336
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	5238023	<1.0	1.0	5238023	<1.0		1.0	5238328
Cation Sum	me/L	5.62	N/A	5238028	0.300	N/A	5238028	5.59		N/A	5238028
Hardness (CaCO3)	mg/L	190	1.0	5238026	4.1	1.0	5238026	190		1.0	5238329
Ion Balance (% Difference)	%	3.68	N/A	5238027	13.2	N/A	5238027	4.28		N/A	5238330
Langelier Index (@ 20C)	N/A	0.380		5238031	NC		5238031	0.320			5238334
Langelier Index (@ 4C)	N/A	0.132		5238032	NC		5238032	0.0710			5238335
Nitrate (N)	mg/L	4.0	0.10	5238029	<0.050	0.050	5238029	4.0		0.10	5238029
Saturation pH (@ 20C)	N/A	7.40		5238031	NC		5238031	7.41			5238334
Saturation pH (@ 4C)	N/A	7.65		5238032	NC		5238032	7.66			5238335
Inorganics											
Total Alkalinity (Total as CaCO3)	mg/L	160 (1)	25	5250064	<5.0	5.0	5250064	160 (1)		25	5250064
Dissolved Chloride (Cl)	mg/L	50	1.0	5250067	8.0	1.0	5250067	50		1.0	5250067
Colour	TCU	14	5.0	5250083	56 (1)	25	5250083	13		5.0	5250083
Nitrate + Nitrite (N)	mg/L	4.0	0.10	5250092	<0.050	0.050	5250092	4.0		0.10	5250092
Nitrite (N)	mg/L	0.048	0.010	5250094	<0.010	0.010	5250094	0.049		0.010	5250094
Nitrogen (Ammonia Nitrogen)	mg/L	1.5	0.050	5249791	<0.050	0.050	5249791	1.7		0.050	5249791
Total Organic Carbon (C)	mg/L	6.2	0.50	5250175	8.7	0.50	5250175	6.0	6.0	0.50	5250175
Orthophosphate (P)	mg/L	<0.010	0.010	5250088	<0.010	0.010	5250088	<0.010		0.010	5250088
pH	pH	7.78	N/A	5241903	6.35	N/A	5241903	7.73		N/A	5241903
Reactive Silica (SiO2)	mg/L	5.9	0.50	5250081	1.8	0.50	5250081	6.0		0.50	5250081
Dissolved Sulphate (SO4)	mg/L	54 (1)	10	5250068	<2.0	2.0	5250068	54 (1)		10	5250068
Turbidity	NTU	1.4	0.10	5244099	1.1	0.10	5244099	0.60		0.10	5244099
Conductivity	uS/cm	600	1.0	5241904	37	1.0	5241904	600		1.0	5241904
Metals											
Total Aluminum (Al)	ug/L	9.2	5.0	5239770	210	5.0	5239770				
Total Antimony (Sb)	ug/L	<1.0	1.0	5239770	<1.0	1.0	5239770	<1.0		1.0	5239933
Total Arsenic (As)	ug/L	<1.0	1.0	5239770	<1.0	1.0	5239770	<1.0		1.0	5239933
Total Barium (Ba)	ug/L	13	1.0	5239770	1.2	1.0	5239770	13		1.0	5239933

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to sample matrix.

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Maxxam Job #: B7O1486
Report Date: 2017/11/13

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

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

Maxxam ID		FLB661			FLB662			FLB663	FLB663		
Sampling Date		2017/10/27			2017/10/27			2017/10/27	2017/10/27		
COC Number		16203			16203			16203	16203		
	UNITS	SW-POND	RDL	QC Batch	SW-UPSTREAM	RDL	QC Batch	SW-DUP	SW-DUP Lab-Dup	RDL	QC Batch
Total Beryllium (Be)	ug/L	<1.0	1.0	5239770	<1.0	1.0	5239770	<1.0		1.0	5239933
Total Bismuth (Bi)	ug/L	<2.0	2.0	5239770	<2.0	2.0	5239770	<2.0		2.0	5239933
Total Boron (B)	ug/L	190	50	5239770	<50	50	5239770	190		50	5239933
Total Cadmium (Cd)	ug/L	<0.010	0.010	5239770	<0.010	0.010	5239770	<0.010		0.010	5239933
Total Calcium (Ca)	ug/L	67000	100	5239770	890	100	5239770	65000		100	5239933
Total Chromium (Cr)	ug/L	<1.0	1.0	5239770	<1.0	1.0	5239770	<1.0		1.0	5239933
Total Cobalt (Co)	ug/L	<0.40	0.40	5239770	<0.40	0.40	5239770	<0.40		0.40	5239933
Total Copper (Cu)	ug/L	<2.0	2.0	5239770	<2.0	2.0	5239770	<2.0		2.0	5239933
Total Iron (Fe)	ug/L	63	50	5239770	150	50	5239770	67		50	5239933
Total Lead (Pb)	ug/L	<0.50	0.50	5239770	<0.50	0.50	5239770	<0.50		0.50	5239933
Total Magnesium (Mg)	ug/L	5800	100	5239770	460	100	5239770	5800		100	5239933
Total Manganese (Mn)	ug/L	210	2.0	5239770	9.0	2.0	5239770	240		2.0	5239933
Total Molybdenum (Mo)	ug/L	<2.0	2.0	5239770	<2.0	2.0	5239770	<2.0		2.0	5239933
Total Nickel (Ni)	ug/L	<2.0	2.0	5239770	<2.0	2.0	5239770	<2.0		2.0	5239933
Total Phosphorus (P)	ug/L	<100	100	5239770	<100	100	5239770	<100		100	5239933
Total Potassium (K)	ug/L	6500	100	5239770	160	100	5239770	6400		100	5239933
Total Selenium (Se)	ug/L	<1.0	1.0	5239770	<1.0	1.0	5239770	<1.0		1.0	5239933
Total Silver (Ag)	ug/L	<0.10	0.10	5239770	<0.10	0.10	5239770	<0.10		0.10	5239933
Total Sodium (Na)	ug/L	35000	100	5239770	4700	100	5239770	36000		100	5239933
Total Strontium (Sr)	ug/L	170	2.0	5239770	4.3	2.0	5239770	170		2.0	5239933
Total Thallium (Tl)	ug/L	<0.10	0.10	5239770	<0.10	0.10	5239770	<0.10		0.10	5239933
Total Tin (Sn)	ug/L	<2.0	2.0	5239770	<2.0	2.0	5239770	<2.0		2.0	5239933
Total Titanium (Ti)	ug/L	<2.0	2.0	5239770	3.1	2.0	5239770	<2.0		2.0	5239933
Total Uranium (U)	ug/L	<0.10	0.10	5239770	<0.10	0.10	5239770	<0.10		0.10	5239933
Total Vanadium (V)	ug/L	<2.0	2.0	5239770	<2.0	2.0	5239770	<2.0		2.0	5239933
Total Zinc (Zn)	ug/L	8.4	5.0	5259026	<5.0	5.0	5239770	75		5.0	5259026

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

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

Maxxam Job #: B7O1486
Report Date: 2017/11/13

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

MERCURY BY COLD VAPOUR AA (GROUND WATER)

Maxxam ID		FLB653	FLB654	FLB655	FLB656		FLB657	FLB658		
Sampling Date		2017/10/27	2017/10/27	2017/10/27	2017/10/27		2017/10/27	2017/10/27		
COC Number		16203	16203	16203	16203		16203	16203		
	UNITS	MW-01	MW-03	MW-04	MW-05A	QC Batch	MW-06	MW-07	RDL	QC Batch
Metals										
Total Mercury (Hg)	ug/L	<0.013	<0.013	0.11	0.022	5242446	0.018	0.038	0.013	5242448

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		FLB659	FLB659	FLB660		
Sampling Date		2017/10/27	2017/10/27	2017/10/27		
COC Number		16203	16203	16203		
	UNITS	MW-08	MW-08 Lab-Dup	MW-DUP	RDL	QC Batch
Metals						
Total Mercury (Hg)	ug/L	<0.013	<0.013	<0.013	0.013	5242448

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

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Maxxam Job #: B7O1486
Report Date: 2017/11/13

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

ELEMENTS BY ICP/MS (GROUND WATER)

Maxxam ID		FLB653		FLB654	FLB655	FLB656	FLB657	FLB658		
Sampling Date		2017/10/27		2017/10/27	2017/10/27	2017/10/27	2017/10/27	2017/10/27		
COC Number		16203		16203	16203	16203	16203	16203		
	UNITS	MW-01	RDL	MW-03	MW-04	MW-05A	MW-06	MW-07	RDL	QC Batch
Metals										
Dissolved Aluminum (Al)	ug/L	320	50	76	50	150	140	1500	5.0	5241922
Dissolved Antimony (Sb)	ug/L	<1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5241922
Dissolved Arsenic (As)	ug/L	<1.0	1.0	13	2.7	<1.0	2.0	<1.0	1.0	5241922
Dissolved Barium (Ba)	ug/L	1.7	1.0	13	14	3.3	3.1	4.1	1.0	5241922
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5241922
Dissolved Bismuth (Bi)	ug/L	<2.0	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5241922
Dissolved Boron (B)	ug/L	<50	50	<50	<50	<50	<50	<50	50	5241922
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	<0.010	0.12	0.027	<0.010	0.012	0.010	5241922
Dissolved Calcium (Ca)	ug/L	1700	100	13000	11000	4200	14000	1100	100	5241922
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5241922
Dissolved Cobalt (Co)	ug/L	<0.40	0.40	5.9	8.3	1.2	1.5	0.66	0.40	5241922
Dissolved Copper (Cu)	ug/L	<2.0	2.0	<2.0	8.2	3.8	<2.0	<2.0	2.0	5241922
Dissolved Iron (Fe)	ug/L	290	50	8600	900	480	11000	3000	50	5241922
Dissolved Lead (Pb)	ug/L	<0.50	0.50	<0.50	<0.50	<0.50	<0.50	1.1	0.50	5241922
Dissolved Magnesium (Mg)	ug/L	640	100	3500	2300	1400	1900	630	100	5241922
Dissolved Manganese (Mn)	ug/L	12	2.0	3900	310	180	260	27	2.0	5241922
Dissolved Molybdenum (Mo)	ug/L	<2.0	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5241922
Dissolved Nickel (Ni)	ug/L	<2.0	2.0	<2.0	<2.0	2.5	<2.0	<2.0	2.0	5241922
Dissolved Phosphorus (P)	ug/L	<100	100	<100	<100	<100	250	110	100	5241922
Dissolved Potassium (K)	ug/L	<100	100	2000	1100	440	1300	170	100	5241922
Dissolved Selenium (Se)	ug/L	<1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5241922
Dissolved Silver (Ag)	ug/L	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5241922
Dissolved Sodium (Na)	ug/L	7900	100	33000	43000	7700	21000	4700	100	5241922
Dissolved Strontium (Sr)	ug/L	6.8	2.0	34	36	15	33	7.5	2.0	5241922
Dissolved Thallium (Tl)	ug/L	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5241922
Dissolved Tin (Sn)	ug/L	<2.0	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5241922
Dissolved Titanium (Ti)	ug/L	4.1	2.0	7.4	2.8	2.9	3.8	30	2.0	5241922
Dissolved Uranium (U)	ug/L	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5241922
Dissolved Vanadium (V)	ug/L	<2.0	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5241922
Dissolved Zinc (Zn)	ug/L	7.8	5.0	6.2	31	11	<5.0	17	5.0	5241922

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B7O1486
Report Date: 2017/11/13

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

ELEMENTS BY ICP/MS (GROUND WATER)

Maxxam ID		FLB659		FLB660	FLB660		
Sampling Date		2017/10/27		2017/10/27	2017/10/27		
COC Number		16203		16203	16203		
	UNITS	MW-08	QC Batch	MW-DUP	MW-DUP Lab-Dup	RDL	QC Batch
Metals							
Dissolved Aluminum (Al)	ug/L	<5.0	5244092	76	75	5.0	5241922
Dissolved Antimony (Sb)	ug/L	<1.0	5244092	<1.0	<1.0	1.0	5241922
Dissolved Arsenic (As)	ug/L	<1.0	5244092	13	13	1.0	5241922
Dissolved Barium (Ba)	ug/L	<1.0	5244092	13	13	1.0	5241922
Dissolved Beryllium (Be)	ug/L	<1.0	5244092	<1.0	<1.0	1.0	5241922
Dissolved Bismuth (Bi)	ug/L	<2.0	5244092	<2.0	<2.0	2.0	5241922
Dissolved Boron (B)	ug/L	<50	5244092	<50	<50	50	5241922
Dissolved Cadmium (Cd)	ug/L	<0.010	5244092	<0.010	<0.010	0.010	5241922
Dissolved Calcium (Ca)	ug/L	<100	5244092	12000	12000	100	5241922
Dissolved Chromium (Cr)	ug/L	<1.0	5244092	<1.0	<1.0	1.0	5241922
Dissolved Cobalt (Co)	ug/L	<0.40	5244092	5.8	5.7	0.40	5241922
Dissolved Copper (Cu)	ug/L	<2.0	5244092	<2.0	<2.0	2.0	5241922
Dissolved Iron (Fe)	ug/L	<50	5244092	8600	8500	50	5241922
Dissolved Lead (Pb)	ug/L	<0.50	5244092	<0.50	<0.50	0.50	5241922
Dissolved Magnesium (Mg)	ug/L	<100	5244092	3500	3500	100	5241922
Dissolved Manganese (Mn)	ug/L	<2.0	5244092	3800	3800	2.0	5241922
Dissolved Molybdenum (Mo)	ug/L	<2.0	5244092	<2.0	<2.0	2.0	5241922
Dissolved Nickel (Ni)	ug/L	<2.0	5244092	<2.0	<2.0	2.0	5241922
Dissolved Phosphorus (P)	ug/L	<100	5244092	<100	<100	100	5241922
Dissolved Potassium (K)	ug/L	<100	5244092	2000	1900	100	5241922
Dissolved Selenium (Se)	ug/L	<1.0	5244092	<1.0	<1.0	1.0	5241922
Dissolved Silver (Ag)	ug/L	<0.10	5244092	<0.10	<0.10	0.10	5241922
Dissolved Sodium (Na)	ug/L	340	5244092	32000	32000	100	5241922
Dissolved Strontium (Sr)	ug/L	<2.0	5244092	34	33	2.0	5241922
Dissolved Thallium (Tl)	ug/L	<0.10	5244092	<0.10	<0.10	0.10	5241922
Dissolved Tin (Sn)	ug/L	<2.0	5244092	<2.0	<2.0	2.0	5241922
Dissolved Titanium (Ti)	ug/L	<2.0	5244092	7.1	6.8	2.0	5241922
Dissolved Uranium (U)	ug/L	<0.10	5244092	<0.10	<0.10	0.10	5241922
Dissolved Vanadium (V)	ug/L	<2.0	5244092	<2.0	<2.0	2.0	5241922
Dissolved Zinc (Zn)	ug/L	<5.0	5244092	7.1	8.0	5.0	5241922

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

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Maxxam Job #: B7O1486
Report Date: 2017/11/13

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

POLYCHLORINATED BIPHENYLS BY GC-ECD (GROUND WATER)

Maxxam ID		FLB653	FLB654	FLB654	FLB655	FLB656	FLB657	FLB658		
Sampling Date		2017/10/27	2017/10/27	2017/10/27	2017/10/27	2017/10/27	2017/10/27	2017/10/27		
COC Number		16203	16203	16203	16203	16203	16203	16203		
	UNITS	MW-01	MW-03	MW-03 Lab-Dup	MW-04	MW-05A	MW-06	MW-07	RDL	QC Batch
PCBs										
Aroclor 1016	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5241978
Aroclor 1221	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5241978
Aroclor 1232	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5241978
Aroclor 1248	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5241978
Aroclor 1242	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5241978
Aroclor 1254	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5241978
Aroclor 1260	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5241978
Calculated Total PCB	ug/L	<0.050	<0.050		<0.050	<0.050	<0.050	<0.050	0.050	5238331
Surrogate Recovery (%)										
Decachlorobiphenyl	%	45	42 (1)	44 (1)	54 (1)	48 (2)	47 (1)	30 (1)		5241978

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) PCB:Unidentified (possibly halogenated) compounds detected. PCB sample contained sediment.
(2) PCB sample contained sediment.

Maxxam ID		FLB659	FLB660		
Sampling Date		2017/10/27	2017/10/27		
COC Number		16203	16203		
	UNITS	MW-08	MW-DUP	RDL	QC Batch
PCBs					
Aroclor 1016	ug/L	<0.050	<0.050	0.050	5241978
Aroclor 1221	ug/L	<0.050	<0.050	0.050	5241978
Aroclor 1232	ug/L	<0.050	<0.050	0.050	5241978
Aroclor 1248	ug/L	<0.050	<0.050	0.050	5241978
Aroclor 1242	ug/L	<0.050	<0.050	0.050	5241978
Aroclor 1254	ug/L	<0.050	<0.050	0.050	5241978
Aroclor 1260	ug/L	<0.050	<0.050	0.050	5241978
Calculated Total PCB	ug/L	<0.050	<0.050	0.050	5238331
Surrogate Recovery (%)					
Decachlorobiphenyl	%	61	41 (1)		5241978

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) PCB:Unidentified (possibly halogenated) compounds detected. PCB sample contained sediment.

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Maxxam Job #: B7O1486
Report Date: 2017/11/13

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

MERCURY BY COLD VAPOUR AA (SURFACE WATER)

Maxxam ID		FLB661	FLB662	FLB663		
Sampling Date		2017/10/27	2017/10/27	2017/10/27		
COC Number		16203	16203	16203		
	UNITS	SW-POND	SW-UPSTREAM	SW-DUP	RDL	QC Batch
Metals						
Total Mercury (Hg)	ug/L	<0.013	<0.013	<0.013	0.013	5242448

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GHD Limited
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Sampler Initials: HA/

POLYCHLORINATED BIPHENYLS BY GC-ECD (SURFACE WATER)

Maxxam ID		FLB661	FLB662	FLB663		
Sampling Date		2017/10/27	2017/10/27	2017/10/27		
COC Number		16203	16203	16203		
	UNITS	SW-POND	SW-UPSTREAM	SW-DUP	RDL	QC Batch
PCBs						
Aroclor 1016	ug/L	<0.050	<0.050	<0.050	0.050	5241978
Aroclor 1221	ug/L	<0.050	<0.050	<0.050	0.050	5241978
Aroclor 1232	ug/L	<0.050	<0.050	<0.050	0.050	5241978
Aroclor 1248	ug/L	<0.050	<0.050	<0.050	0.050	5241978
Aroclor 1242	ug/L	<0.050	<0.050	<0.050	0.050	5241978
Aroclor 1254	ug/L	<0.050	<0.050	<0.050	0.050	5241978
Aroclor 1260	ug/L	<0.050	<0.050	<0.050	0.050	5241978
Calculated Total PCB	ug/L	<0.050	<0.050	<0.050	0.050	5238331
Surrogate Recovery (%)						
Decachlorobiphenyl	%	65	64	69		5241978

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GHD Limited
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GENERAL COMMENTS

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

Package 1	7.1°C

Revised Report: Changed sample ID from SW-STREAM to SW-UPSTREAM as per request from Ingrid. HWS Nov 9/17

Sample FLB662 [SW-UPSTREAM] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.
Sample FLB661, Metals Water Total MS: Test repeated.
Sample FLB663, Metals Water Total MS: Test repeated.

Results relate only to the items tested.

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Maxxam Job #: B7O1486
Report Date: 2017/11/13

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

			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
5241978	Decachlorobiphenyl	2017/11/02	48 (4,5)	30 - 130	73	30 - 130	80	%				
5239770	Total Aluminum (Al)	2017/10/31	98	80 - 120	104	80 - 120	<5.0	ug/L				
5239770	Total Antimony (Sb)	2017/10/31	106	80 - 120	109	80 - 120	<1.0	ug/L				
5239770	Total Arsenic (As)	2017/10/31	94	80 - 120	95	80 - 120	<1.0	ug/L				
5239770	Total Barium (Ba)	2017/10/31	103	80 - 120	103	80 - 120	<1.0	ug/L				
5239770	Total Beryllium (Be)	2017/10/31	98	80 - 120	97	80 - 120	<1.0	ug/L				
5239770	Total Bismuth (Bi)	2017/10/31	105	80 - 120	108	80 - 120	<2.0	ug/L				
5239770	Total Boron (B)	2017/10/31	98	80 - 120	98	80 - 120	<50	ug/L				
5239770	Total Cadmium (Cd)	2017/10/31	99	80 - 120	100	80 - 120	<0.010	ug/L				
5239770	Total Calcium (Ca)	2017/10/31	100	80 - 120	104	80 - 120	<100	ug/L				
5239770	Total Chromium (Cr)	2017/10/31	96	80 - 120	94	80 - 120	<1.0	ug/L				
5239770	Total Cobalt (Co)	2017/10/31	96	80 - 120	94	80 - 120	<0.40	ug/L				
5239770	Total Copper (Cu)	2017/10/31	NC	80 - 120	92	80 - 120	<2.0	ug/L	0.036 (1)	20		
5239770	Total Iron (Fe)	2017/10/31	95	80 - 120	98	80 - 120	<50	ug/L				
5239770	Total Lead (Pb)	2017/10/31	102	80 - 120	103	80 - 120	<0.50	ug/L	2.3 (1)	20		
5239770	Total Magnesium (Mg)	2017/10/31	95	80 - 120	96	80 - 120	<100	ug/L				
5239770	Total Manganese (Mn)	2017/10/31	97	80 - 120	97	80 - 120	<2.0	ug/L				
5239770	Total Molybdenum (Mo)	2017/10/31	104	80 - 120	106	80 - 120	<2.0	ug/L				
5239770	Total Nickel (Ni)	2017/10/31	94	80 - 120	92	80 - 120	<2.0	ug/L				
5239770	Total Phosphorus (P)	2017/10/31	98	80 - 120	103	80 - 120	<100	ug/L				
5239770	Total Potassium (K)	2017/10/31	99	80 - 120	106	80 - 120	<100	ug/L				
5239770	Total Selenium (Se)	2017/10/31	96	80 - 120	93	80 - 120	<1.0	ug/L				
5239770	Total Silver (Ag)	2017/10/31	101	80 - 120	99	80 - 120	<0.10	ug/L				
5239770	Total Sodium (Na)	2017/10/31	93	80 - 120	95	80 - 120	<100	ug/L				
5239770	Total Strontium (Sr)	2017/10/31	102	80 - 120	104	80 - 120	<2.0	ug/L				
5239770	Total Thallium (Tl)	2017/10/31	105	80 - 120	107	80 - 120	<0.10	ug/L				
5239770	Total Tin (Sn)	2017/10/31	107	80 - 120	110	80 - 120	<2.0	ug/L				
5239770	Total Titanium (Ti)	2017/10/31	105	80 - 120	98	80 - 120	<2.0	ug/L				
5239770	Total Uranium (U)	2017/10/31	106	80 - 120	107	80 - 120	<0.10	ug/L				
5239770	Total Vanadium (V)	2017/10/31	98	80 - 120	97	80 - 120	<2.0	ug/L				

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Maxxam Job #: B7O1486
Report Date: 2017/11/13

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

			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
5239770	Total Zinc (Zn)	2017/10/31	95	80 - 120	96	80 - 120	<5.0	ug/L	8.1 (1)	20		
5239933	Total Antimony (Sb)	2017/11/01	110	80 - 120	109	80 - 120	<1.0	ug/L	NC (1)	20		
5239933	Total Arsenic (As)	2017/11/01	98	80 - 120	96	80 - 120	<1.0	ug/L	NC (1)	20		
5239933	Total Barium (Ba)	2017/11/01	108	80 - 120	102	80 - 120	<1.0	ug/L	3.0 (1)	20		
5239933	Total Beryllium (Be)	2017/11/01	104	80 - 120	98	80 - 120	<1.0	ug/L	NC (1)	20		
5239933	Total Bismuth (Bi)	2017/11/01	111	80 - 120	108	80 - 120	<2.0	ug/L	NC (1)	20		
5239933	Total Boron (B)	2017/11/01	104	80 - 120	101	80 - 120	<50	ug/L	NC (1)	20		
5239933	Total Cadmium (Cd)	2017/11/01	103	80 - 120	100	80 - 120	<0.010	ug/L	13 (1)	20		
5239933	Total Calcium (Ca)	2017/11/01	107	80 - 120	104	80 - 120	<100	ug/L	0.56 (1)	20		
5239933	Total Chromium (Cr)	2017/11/01	98	80 - 120	96	80 - 120	<1.0	ug/L	NC (1)	20		
5239933	Total Cobalt (Co)	2017/11/01	101	80 - 120	97	80 - 120	<0.40	ug/L	NC (1)	20		
5239933	Total Copper (Cu)	2017/11/01	97	80 - 120	94	80 - 120	<2.0	ug/L	NC (1)	20		
5239933	Total Iron (Fe)	2017/11/01	103	80 - 120	101	80 - 120	<50	ug/L	1.2 (1)	20		
5239933	Total Lead (Pb)	2017/11/01	106	80 - 120	103	80 - 120	<0.50	ug/L	NC (1)	20		
5239933	Total Magnesium (Mg)	2017/11/01	101	80 - 120	100	80 - 120	<100	ug/L	2.1 (1)	20		
5239933	Total Manganese (Mn)	2017/11/01	100	80 - 120	99	80 - 120	<2.0	ug/L	0.54 (1)	20		
5239933	Total Molybdenum (Mo)	2017/11/01	110	80 - 120	105	80 - 120	<2.0	ug/L	NC (1)	20		
5239933	Total Nickel (Ni)	2017/11/01	97	80 - 120	95	80 - 120	<2.0	ug/L	NC (1)	20		
5239933	Total Phosphorus (P)	2017/11/01	106	80 - 120	103	80 - 120	<100	ug/L	NC (1)	20		
5239933	Total Potassium (K)	2017/11/01	110	80 - 120	106	80 - 120	<100	ug/L	7.8 (1)	20		
5239933	Total Selenium (Se)	2017/11/01	97	80 - 120	92	80 - 120	<1.0	ug/L	NC (1)	20		
5239933	Total Silver (Ag)	2017/11/01	102	80 - 120	99	80 - 120	<0.10	ug/L	NC (1)	20		
5239933	Total Sodium (Na)	2017/11/01	100	80 - 120	97	80 - 120	<100	ug/L	1.8 (1)	20		
5239933	Total Strontium (Sr)	2017/11/01	105	80 - 120	104	80 - 120	<2.0	ug/L	0.27 (1)	20		
5239933	Total Thallium (Tl)	2017/11/01	110	80 - 120	107	80 - 120	<0.10	ug/L	NC (1)	20		
5239933	Total Tin (Sn)	2017/11/01	115	80 - 120	110	80 - 120	<2.0	ug/L	NC (1)	20		
5239933	Total Titanium (Ti)	2017/11/01	101	80 - 120	104	80 - 120	<2.0	ug/L	NC (1)	20		
5239933	Total Uranium (U)	2017/11/01	112	80 - 120	107	80 - 120	<0.10	ug/L	NC (1)	20		
5239933	Total Vanadium (V)	2017/11/01	101	80 - 120	99	80 - 120	<2.0	ug/L	NC (1)	20		
5241903	pH	2017/11/01							1.0 (1)	N/A	100	97 - 103

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Maxxam Job #: B7O1486
Report Date: 2017/11/13

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

			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
5241904	Conductivity	2017/11/01			104	80 - 120	1.7, RDL=1.0	uS/cm	0.25 (1)	25		
5241922	Dissolved Aluminum (Al)	2017/11/02	103 (2)	80 - 120	101	80 - 120	<5.0	ug/L	1.5 (3)	20		
5241922	Dissolved Antimony (Sb)	2017/11/02	103 (2)	80 - 120	96	80 - 120	<1.0	ug/L	NC (3)	20		
5241922	Dissolved Arsenic (As)	2017/11/02	98 (2)	80 - 120	97	80 - 120	<1.0	ug/L	0.30 (3)	20		
5241922	Dissolved Barium (Ba)	2017/11/02	97 (2)	80 - 120	99	80 - 120	<1.0	ug/L	0.027 (3)	20		
5241922	Dissolved Beryllium (Be)	2017/11/02	102 (2)	80 - 120	101	80 - 120	<1.0	ug/L	NC (3)	20		
5241922	Dissolved Bismuth (Bi)	2017/11/02	102 (2)	80 - 120	103	80 - 120	<2.0	ug/L	NC (3)	20		
5241922	Dissolved Boron (B)	2017/11/02	100 (2)	80 - 120	99	80 - 120	<50	ug/L	NC (3)	20		
5241922	Dissolved Cadmium (Cd)	2017/11/02	100 (2)	80 - 120	100	80 - 120	<0.010	ug/L	NC (3)	20		
5241922	Dissolved Calcium (Ca)	2017/11/02	102 (2)	80 - 120	102	80 - 120	<100	ug/L	0.46 (3)	20		
5241922	Dissolved Chromium (Cr)	2017/11/02	96 (2)	80 - 120	101	80 - 120	<1.0	ug/L	NC (3)	20		
5241922	Dissolved Cobalt (Co)	2017/11/02	97 (2)	80 - 120	101	80 - 120	<0.40	ug/L	0.95 (3)	20		
5241922	Dissolved Copper (Cu)	2017/11/02	95 (2)	80 - 120	101	80 - 120	<2.0	ug/L	NC (3)	20		
5241922	Dissolved Iron (Fe)	2017/11/02	NC (2)	80 - 120	113	80 - 120	<50	ug/L	0.93 (3)	20		
5241922	Dissolved Lead (Pb)	2017/11/02	100 (2)	80 - 120	102	80 - 120	<0.50	ug/L	NC (3)	20		
5241922	Dissolved Magnesium (Mg)	2017/11/02	100 (2)	80 - 120	102	80 - 120	<100	ug/L	0.25 (3)	20		
5241922	Dissolved Manganese (Mn)	2017/11/02	NC (2)	80 - 120	102	80 - 120	<2.0	ug/L	0.71 (3)	20		
5241922	Dissolved Molybdenum (Mo)	2017/11/02	103 (2)	80 - 120	102	80 - 120	<2.0	ug/L	NC (3)	20		
5241922	Dissolved Nickel (Ni)	2017/11/02	96 (2)	80 - 120	101	80 - 120	<2.0	ug/L	NC (3)	20		
5241922	Dissolved Phosphorus (P)	2017/11/02	107 (2)	80 - 120	102	80 - 120	<100	ug/L	NC (3)	20		
5241922	Dissolved Potassium (K)	2017/11/02	104 (2)	80 - 120	102	80 - 120	<100	ug/L	0.45 (3)	20		
5241922	Dissolved Selenium (Se)	2017/11/02	97 (2)	80 - 120	97	80 - 120	<1.0	ug/L	NC (3)	20		
5241922	Dissolved Silver (Ag)	2017/11/02	87 (2)	80 - 120	100	80 - 120	<0.10	ug/L	NC (3)	20		
5241922	Dissolved Sodium (Na)	2017/11/02	NC (2)	80 - 120	101	80 - 120	<100	ug/L	0.23 (3)	20		
5241922	Dissolved Strontium (Sr)	2017/11/02	99 (2)	80 - 120	101	80 - 120	<2.0	ug/L	2.5 (3)	20		
5241922	Dissolved Thallium (Tl)	2017/11/02	105 (2)	80 - 120	103	80 - 120	<0.10	ug/L	NC (3)	20		
5241922	Dissolved Tin (Sn)	2017/11/02	108 (2)	80 - 120	104	80 - 120	<2.0	ug/L	NC (3)	20		
5241922	Dissolved Titanium (Ti)	2017/11/02	100 (2)	80 - 120	102	80 - 120	<2.0	ug/L	3.9 (3)	20		
5241922	Dissolved Uranium (U)	2017/11/02	110 (2)	80 - 120	104	80 - 120	<0.10	ug/L	NC (3)	20		
5241922	Dissolved Vanadium (V)	2017/11/02	97 (2)	80 - 120	102	80 - 120	<2.0	ug/L	NC (3)	20		

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Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B7O1486
Report Date: 2017/11/13

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

			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
5241922	Dissolved Zinc (Zn)	2017/11/02	100 (2)	80 - 120	102	80 - 120	<5.0	ug/L	12 (3)	20		
5241978	Aroclor 1016	2017/11/02					<0.050	ug/L	NC (6)	40		
5241978	Aroclor 1221	2017/11/02					<0.050	ug/L	NC (6)	40		
5241978	Aroclor 1232	2017/11/02					<0.050	ug/L	NC (6)	40		
5241978	Aroclor 1242	2017/11/02					<0.050	ug/L	NC (6)	40		
5241978	Aroclor 1248	2017/11/02					<0.050	ug/L	NC (6)	40		
5241978	Aroclor 1254	2017/11/02	74 (5)	30 - 130	101	30 - 130	<0.050	ug/L	NC (6)	40		
5241978	Aroclor 1260	2017/11/02					<0.050	ug/L	NC (6)	40		
5242446	Total Mercury (Hg)	2017/11/02	98	80 - 120	102	80 - 120	<0.013	ug/L	NC (1)	20		
5242448	Total Mercury (Hg)	2017/11/02	103 (7)	80 - 120	101	80 - 120	<0.013	ug/L	NC (8)	20		
5244092	Dissolved Aluminum (Al)	2017/11/02	103	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20		
5244092	Dissolved Antimony (Sb)	2017/11/02	101	80 - 120	99	80 - 120	<1.0	ug/L	NC (1)	20		
5244092	Dissolved Arsenic (As)	2017/11/02	99	80 - 120	96	80 - 120	<1.0	ug/L	NC (1)	20		
5244092	Dissolved Barium (Ba)	2017/11/02	96	80 - 120	96	80 - 120	<1.0	ug/L	0.45 (1)	20		
5244092	Dissolved Beryllium (Be)	2017/11/02	102	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20		
5244092	Dissolved Bismuth (Bi)	2017/11/02	104	80 - 120	107	80 - 120	<2.0	ug/L	NC (1)	20		
5244092	Dissolved Boron (B)	2017/11/02	101	80 - 120	99	80 - 120	<50	ug/L	NC (1)	20		
5244092	Dissolved Cadmium (Cd)	2017/11/02	101	80 - 120	99	80 - 120	<0.010	ug/L	NC (1)	20		
5244092	Dissolved Calcium (Ca)	2017/11/02	98	80 - 120	102	80 - 120	<100	ug/L	0.42 (1)	20		
5244092	Dissolved Chromium (Cr)	2017/11/02	97	80 - 120	96	80 - 120	<1.0	ug/L	0.69 (1)	20		
5244092	Dissolved Cobalt (Co)	2017/11/02	99	80 - 120	96	80 - 120	<0.40	ug/L	NC (1)	20		
5244092	Dissolved Copper (Cu)	2017/11/02	97	80 - 120	96	80 - 120	<2.0	ug/L	NC (1)	20		
5244092	Dissolved Iron (Fe)	2017/11/02	100	80 - 120	100	80 - 120	<50	ug/L	NC (1)	20		
5244092	Dissolved Lead (Pb)	2017/11/02	100	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20		
5244092	Dissolved Magnesium (Mg)	2017/11/02	103	80 - 120	103	80 - 120	<100	ug/L	0.26 (1)	20		
5244092	Dissolved Manganese (Mn)	2017/11/02	101	80 - 120	101	80 - 120	<2.0	ug/L	NC (1)	20		
5244092	Dissolved Molybdenum (Mo)	2017/11/02	101	80 - 120	101	80 - 120	<2.0	ug/L	NC (1)	20		
5244092	Dissolved Nickel (Ni)	2017/11/02	99	80 - 120	98	80 - 120	<2.0	ug/L	NC (1)	20		
5244092	Dissolved Phosphorus (P)	2017/11/02	107	80 - 120	106	80 - 120	<100	ug/L	NC (1)	20		
5244092	Dissolved Potassium (K)	2017/11/02	103	80 - 120	104	80 - 120	<100	ug/L	0.90 (1)	20		

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Maxxam Job #: B7O1486
Report Date: 2017/11/13

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

			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
5244092	Dissolved Selenium (Se)	2017/11/02	99	80 - 120	98	80 - 120	<1.0	ug/L	NC (1)	20		
5244092	Dissolved Silver (Ag)	2017/11/02	99	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20		
5244092	Dissolved Sodium (Na)	2017/11/02	102	80 - 120	100	80 - 120	<100	ug/L	1.2 (1)	20		
5244092	Dissolved Strontium (Sr)	2017/11/02	NC	80 - 120	99	80 - 120	<2.0	ug/L	1.2 (1)	20		
5244092	Dissolved Thallium (Tl)	2017/11/02	104	80 - 120	105	80 - 120	<0.10	ug/L	NC (1)	20		
5244092	Dissolved Tin (Sn)	2017/11/02	105	80 - 120	107	80 - 120	<2.0	ug/L	NC (1)	20		
5244092	Dissolved Titanium (Ti)	2017/11/02	105	80 - 120	100	80 - 120	<2.0	ug/L	NC (1)	20		
5244092	Dissolved Uranium (U)	2017/11/02	111	80 - 120	106	80 - 120	<0.10	ug/L	5.3 (1)	20		
5244092	Dissolved Vanadium (V)	2017/11/02	98	80 - 120	96	80 - 120	<2.0	ug/L	NC (1)	20		
5244092	Dissolved Zinc (Zn)	2017/11/02	102	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20		
5244099	Turbidity	2017/11/02			93	80 - 120	<0.10	NTU	6.5 (1)	20	92	80 - 120
5249791	Nitrogen (Ammonia Nitrogen)	2017/11/06	NC	80 - 120	106	80 - 120	<0.050	mg/L	1.5 (1)	20		
5250064	Total Alkalinity (Total as CaCO3)	2017/11/06	NC	80 - 120	103	80 - 120	<5.0	mg/L	2.3 (1)	25		
5250067	Dissolved Chloride (Cl)	2017/11/07	NC	80 - 120	106	80 - 120	<1.0	mg/L	2.6 (1)	25	110	80 - 120
5250068	Dissolved Sulphate (SO4)	2017/11/06	97	80 - 120	94	80 - 120	<2.0	mg/L	0.35 (1)	25		
5250081	Reactive Silica (SiO2)	2017/11/07	NC	80 - 120	96	80 - 120	<0.50	mg/L	3.3 (1)	25		
5250083	Colour	2017/11/07			99	80 - 120	<5.0	TCU	1.5 (9,1)	20		
5250088	Orthophosphate (P)	2017/11/08	NC	80 - 120	101	80 - 120	<0.010	mg/L	1.8 (1)	25		
5250092	Nitrate + Nitrite (N)	2017/11/07	92	80 - 120	100	80 - 120	<0.050	mg/L	24 (1)	25		
5250094	Nitrite (N)	2017/11/07	97	80 - 120	100	80 - 120	<0.010	mg/L	NC (1)	25		
5250175	Total Organic Carbon (C)	2017/11/06	95 (10)	80 - 120	99	80 - 120	<0.50	mg/L	0.48 (11)	20		

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Maxxam Job #: B7O1486
Report Date: 2017/11/13

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

			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
5259026	Total Zinc (Zn)	2017/11/10	96	80 - 120	96	80 - 120	<5.0	ug/L				

N/A = Not Applicable

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

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

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

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

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

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

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

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

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [FLB660-02]

(3) Duplicate Parent ID [FLB660-02]

(4) PCB sample contained sediment.

(5) Matrix Spike Parent ID [FLB655-03]

(6) Duplicate Parent ID [FLB654-03]

(7) Matrix Spike Parent ID [FLB662-04]

(8) Duplicate Parent ID [FLB659-01]

(9) Elevated reporting limit due to sample matrix.

(10) Matrix Spike Parent ID [FLB663-02]

(11) Duplicate Parent ID [FLB663-02]

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Maxxam Job #: B7O1486
Report Date: 2017/11/13

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, NL
Your P.O. #: 73509542
Sampler Initials: HA/

VALIDATION SIGNATURE PAGE

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

Eric Dearman, Scientific Specialist

Mike MacGillivray, Scientific Specialist (Inorganics)

Rosemarie MacDonald, Scientific Specialist (Organics)

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Custody Tracking Form

T16203

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: MW-01
Last Sample: SW-DUP
Sample Count: 11

Relinquished By				Received By			
HUBERT ANDERSON	H. Anderson	Date	2017/10/27	Jasmine Redmond	J. Redmond	Date	2017/10/27
		Time (24 HR)	11:45			Time (24 HR)	1:05 PM
		Date				Date	
		Time (24 HR)				Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Submission Triage Information

Sampled By: HA / IL

# of Coolers/Pkgs: 1

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LAB USE ONLY ***

Received At

Comments: B701486

Labeled By

Verified By

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)		1	2	3
			6.9	7.1	7.2

OCT 27 2017

Attempt to Cool:
Yes ✓
No

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NL Coolers

ADDITIONAL COOLER TEMPERATURE RECORD

CHAIN-OF-CUSTODY RECORD

CHAIN OF CUSTODY #	
Page ___ of ___	
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Page ___ of ___	

COOLER OBSERVATIONS:

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 2
INTACT		✓	TEMP 2: 5
ICE PRESENT	✓		TEMP 3: 7

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 4
INTACT		✓	TEMP 2: 4
ICE PRESENT	✓		TEMP 3: 4

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 2
INTACT		✓	TEMP 2: 2
ICE PRESENT	✓		TEMP 3: 1

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 1
INTACT		✓	TEMP 2: 1
ICE PRESENT	✓		TEMP 3: 1

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 0
INTACT		✓	TEMP 2: 1
ICE PRESENT	✓		TEMP 3: 1

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 2
INTACT		✓	TEMP 2: 0
ICE PRESENT	✓		TEMP 3: 2

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 0
INTACT		✓	TEMP 2: 1
ICE PRESENT	✓		TEMP 3: 1

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 0
INTACT		✓	TEMP 2: 0
ICE PRESENT	✓		TEMP 3: 0

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 0
INTACT		✓	TEMP 2: 2
ICE PRESENT	✓		TEMP 3: 4

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 1
INTACT		✓	TEMP 2: 0
ICE PRESENT	✓		TEMP 3: 0

MAXXAM JOB#:

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT			TEMP 1:
INTACT		✓	TEMP 2: 0
ICE PRESENT	✓		TEMP 3: 1

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 1
INTACT		✓	TEMP 2: 1
ICE PRESENT	✓		TEMP 3: 1

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 0
INTACT		✓	TEMP 2: 2
ICE PRESENT			TEMP 3: 0

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT		✓	TEMP 1: 0
INTACT		✓	TEMP 2: 0
ICE PRESENT	✓		TEMP 3: 0

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT			TEMP 1:
INTACT			TEMP 2:
ICE PRESENT			TEMP 3:

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT			TEMP 1:
INTACT			TEMP 2:
ICE PRESENT			TEMP 3:

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT			TEMP 1:
INTACT			TEMP 2:
ICE PRESENT			TEMP 3:

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT			TEMP 1:
INTACT			TEMP 2:
ICE PRESENT			TEMP 3:

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT			TEMP 1:
INTACT			TEMP 2:
ICE PRESENT			TEMP 3:

CUSTODY SEAL	YES	NO	COOLER ID
PRESENT			TEMP 1:
INTACT			TEMP 2:
ICE PRESENT			TEMP 3:

RECEIVED BY (SIGN & PRINT)		DATE (YYYY/MM/DD)	TIME (HH:MM)
[signature]	MARYANN COMEAU	2017/10/13	08:02

Your P.O. #: 73509542
Your Project #: 084308-02
Site Location: New Harbour, NL
Your C.O.C. #: 19428

Attention:Brian Luffman

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

Report Date: 2017/12/07
Report #: R4899877
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7R3902
Received: 2017/12/04, 09:17

Sample Matrix: Surface Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Metals Water Total MS	1	2017/12/06	2017/12/06	ATL SOP 00058	EPA 6020A R1 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.

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.

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Your P.O. #: 73509542
Your Project #: 084308-02
Site Location: New Harbour, NL
Your C.O.C. #: 19428

Attention:Brian Luffman

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

Report Date: 2017/12/07
Report #: R4899877
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7R3902
Received: 2017/12/04, 09:17

Encryption Key

Maxxam
07 Dec 2017 14:36:07

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

==========

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Maxxam Job #: B7R3902
Report Date: 2017/12/07

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

ELEMENTS BY ICP/MS (SURFACE WATER)

Maxxam ID		FRO008		
Sampling Date		2017/11/29 08:10		
COC Number		19428		
	UNITS	SW-POND	RDL	QC Batch
Metals				
Total Zinc (Zn)	ug/L	<5.0	5.0	5301220

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B7R3902
Report Date: 2017/12/07

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

GENERAL COMMENTS

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

Package 1	1.2°C

Results relate only to the items tested.

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Maxxam Job #: B7R3902
Report Date: 2017/12/07

QUALITY ASSURANCE REPORT

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

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5301220	Total Zinc (Zn)	2017/12/06	NC	80 - 120	98	80 - 120	<5.0	ug/L	1.9 (1)	20

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

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

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

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

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

(1) Duplicate Parent ID

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Maxxam Job #: B7R3902
Report Date: 2017/12/07

GHD Limited
Client Project #: 084308-02
Site Location: New Harbour, 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).

Mike MacGillivray, Scientific Specialist (Inorganics)

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Custody Tracking Form

T19428

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: SW-POND
Last Sample: SW-POND
Sample Count: 1

Relinquished By				Received By			
Ingrid Lawson	Ingrid Lawson	Date	2017/12/01	Jasmine Redmond	[illegible]	Date	2017 12 01
		Time (24 HR)	9:30			Time (24 HR)	9:55
		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

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LAB USE ONLY ***

Received At

Labeled By

Verified By

Comments:

Custody Seal		Cooling	Temperature °C		
Present (Y/N)	Intact (Y/N)	Media	1	2	3
			1.1	1.1	1.1

Attempt to Cool:
Yes ✓
No

Job# B7R3902

DEC 0 1 2017

Maxxam
A Bureau Veritas Group Company

NL

ADDITIONAL COOLER TEMPERATURE RECORD

CHAIN-OF-CUSTODY RECORD

CHAIN OF CUSTODY #	
Page ___ of ___	
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COOLER OBSERVATIONS:

MAXXAM JOB#:

CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT		✓	TEMP	4	1	-1
INTACT		✓				
ICE PRESENT	✓					
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT		✓	TEMP	-2	-1	-1
INTACT		✓				
ICE PRESENT	✓					
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT		✓	TEMP	1	1	1
INTACT		✓				
ICE PRESENT	✓					
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT		✓	TEMP	6	-2	2
INTACT		✓				
ICE PRESENT	✓					
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT		✓	TEMP	2	3	0
INTACT		✓				
ICE PRESENT	✓					
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT		✓	TEMP	0	3	-1
INTACT		✓				
ICE PRESENT	✓					
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT		✓	TEMP	1	0	1
INTACT		✓				
ICE PRESENT	✓					
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT		✓	TEMP	1	1	1
INTACT		✓				
ICE PRESENT	✓					
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT		✓	TEMP	0	1	0
INTACT		✓				
ICE PRESENT	✓					
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT		✓	TEMP	-1	4	1
INTACT		✓				
ICE PRESENT	✓					

CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT		✓	TEMP	-2	-1	-2
INTACT		✓				
ICE PRESENT	✓					
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT		✓	TEMP	-1	0	-1
INTACT		✓				
ICE PRESENT	✓					
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT			TEMP			
INTACT						
ICE PRESENT						
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT			TEMP			
INTACT						
ICE PRESENT						
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT			TEMP			
INTACT						
ICE PRESENT						
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT			TEMP			
INTACT						
ICE PRESENT						
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT			TEMP			
INTACT						
ICE PRESENT						
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT			TEMP			
INTACT						
ICE PRESENT						
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT			TEMP			
INTACT						
ICE PRESENT						
CUSTODY SEAL	YES	NO	COOLER ID	1	2	3
PRESENT			TEMP			
INTACT						
ICE PRESENT						

RECEIVED BY (SIGN & PRINT)		DATE (YYYY/MM/DD)	TIME (HH:MM)
DAlbert	Davine Albert	2017/12/18	09:17

Appendix C
Historical Monitoring Data

TABLE C1

HISTORICAL GROUNDWATER ANALYTICAL DATA - PCBs (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Sample Location	Sample Date														Criteria*
	Feb 2007	Nov 2007	May 2008	Mar 2009 [1]	Mar 2009 [2]	Oct 2009	Jan 2010	Dec 2010	Dec 2011	Nov 2012	Aug 2013	Nov 2014	Dec 2015	Oct 2017	
MW-01	-	<	<	<	<	0.07	<	<	< (0.06)	<	<	<	<	<	7.8
MW-02	-	<	<	-	-	<	< (0.06)	-	<	-	<	<	<	-	
MW-03	< (0.4)	<	<	<	-	<	< (0.06)	<	<	<	<	<	<	<	
MW-03 (MW-DUP)	-	-	-	-	-	-	-	-	-	-	-	-	-	<	
MW-04	-	<	<	<	-	<	<	<	<	<	<	<	<	<	
MW-05	<	<	<	<	-	<	<	<	<	-	<	-	-	-	
MW-05A	-	-	-	-	-	-	-	-	-	-	-	<	<	<	
MW-06	-	<	<	-	-	<	<	<	< (0.06)	< (0.06)	<	<	<	<	
MW-06 (DUP-02)	-	-	-	-	-	-	-	-	-	-	-	<	-	-	
MW-06 (DUP-1)	-	-	-	-	-	-	-	-	-	-	-	-	<	-	
MW-07	-	<	<	<	<	<	<	<	<	<	<	<	<	<	
MW-07 (MW-DUP)	-	-	-	-	-	-	<	-	-	-	<	-	-	-	
MW-08	-	-	-	-	-	-	-	<	<	<	<	<	<	<	
MW-08 (DUP-01)	-	-	-	-	-	-	-	-	-	<	-	-	-	-	
RDL	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	

Notes:

Analysis of samples from 2007 to 2012 except March 2009[2] were completed by AMEC.

Analysis of samples from March 2009[2] and 2013 to 2017 were completed by Maxxam Analytics Inc. in Bedford, NS.

Data from February 2007 to November 2012 transcribed from the 2012-2013 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by AMEC and dated March 29, 2013.

Data from December 2015 extracted from the 2015-2016 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by Fracflow and dated June 6, 2016.

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

MW = Monitor Well
MW-03 (MW-DUP) = Field Duplicate of MW-03
MW-06 (DUP-02) = Field Duplicate of MW-06
MW-06 (DUP-1) = Field Duplicate of MW-06
MW-07 (MW-DUP) = Field Duplicate of MW-07
MW-08 (DUP-01) = Field Duplicate of MW-08

RDL = Reportable Detection Limit
< = Parameter below detection limit
< (0.00) = Parameter below elevated detection limit

- = No sample collected
Shaded/Bold = Parameter is above applicable criteria
0 = Above criteria for current sampling program

TABLE C2

HISTORICAL GROUNDWATER ANALYTICAL DATA - METALS (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL*	Criteria**	MW-01												
			Feb 2007	Nov 2007	May 2008	Jan 2009	Oct 2009	Jan 2010	Dec 2010	Dec 2011	Nov 2012	Aug 2013	Nov 2014	Dec 2015	Oct 2017
Aluminum (Al)	5.0	-	558,000	3,530	75	72.5	176	109	250	234	130	72.4	59	54	320
Antimony (Sb)	1.0	20,000	<	<	<	< (2)	< (2)	< (2)	<	<	<	<	<	<	<
Arsenic (As)	1.0	1,900	77	<	4	< (2)	< (2)	< (2)	<	<	<	<	<	<	<
Barium (Ba)	1.0	29,000	870	15.1	2.1	< (5)	< (5)	< (5)	2	1.7	3.2	2.2	1.7	2.8	1.7
Beryllium (Be)	1.0	67	36.9	0.2	<	< (2)	< (2)	< (2)	<	<	<	<	<	<	<
Bismuth (Bi)	2.0	-	<	<	<	<	<	<	<	<	<	<	<	<	<
Boron (B)	50	45,000	-	-	-	-	5.6	<	<	< (50)	< (50)	<	<	<	<
Cadmium (Cd)	0.010	2.7	1.792	0.380	0.058	0.021	0.020	0.026	0.020	<	<	0.017	0.046	<	<
Calcium (Ca)	100	-	81,600	2,070	2,400	-	5,200	2,000	2,200	2,040	2,530	2,530	2,600	3,000	1,700
Chromium (Cr)	1.0	810	82	2	<	<	<	<	<	<	<	<	<	<	<
Cobalt (Co)	0.4	66	**79.85**	2	< (1)	<	< (4)	<	<	0.4	0.95	0.65	<	<	<
Copper (Cu)	2.0	87	**1,250**	12	2	5	18.5	3.1	3	<	<	<	<	<	<
Iron (Fe)	50	-	75,000	2,180	246	140	107	<	290	167	968	100	<	70	290
Lead (Pb)	0.5	25	**192.7**	4	< (1)	<	<	<	<	<	<	<	<	<	<
Magnesium (Mg)	100	-	15,500	642	745	-	1,400	600	500	611	602	721	730	940	640
Manganese (Mn)	2.0	-	2,120	58	31	34	20.5	9.7	17	15.9	83.3	52.7	13	21	12
Mercury (Hg)	0.013	0.29	< (0.02)	< (0.02)	0.13	0.08	0.030	0.11	-	-	-	0.033	0.017	0.04	<
Molybdenum (Mo)	2.0	9,200	16	< (5)	< (5)	<	<	<	<	<	<	<	<	<	<
Nickel (Ni)	2.0	490	43	< (5)	< (5)	<	<	<	<	<	<	<	<	<	<
Phosphorus (P)	100	-	32,200	127	<	-	<	200	140	-	<	<	130	<	<
Potassium (K)	100	-	9,180	595	212	-	2,100	200	150	166	275	266	180	250	<
Selenium (Se)	1.0	63	1	<	<	<	<	<	<	<	<	<	<	<	<
Silver (Ag)	0.1	1.5	<	<	<	<	<	<	<	<	<	<	<	<	<
Sodium (Na)	100	2,300,000	11,800	4,090	4,750	-	12,000	3,700	4,300	4,140	5,810	4,390	4,900	6,200	7,900
Strontium (Sr)	2.0	-	-	-	-	-	13.4	6.9	7	6.9	12.3	10.2	9	11	6.8
Thallium (Tl)	0.1	510	-	-	-	-	<	<	<	<	<	<	<	<	<
Tin (Sn)	2.0	-	-	-	-	-	<	<	<	<	<	<	3.2	<	<
Titanium (Ti)	2.0	-	-	-	-	-	6.4	4.8	6	6.8	3.0	2.5	<	<	4.1
Uranium (U)	0.1	420	-	-	-	-	<	<	<	<	<	<	<	<	<
Vanadium (V)	2.0	250	108	< (5)	< (5)	<	<	<	<	<	<	<	<	<	<
Zinc (Zn)	5.0	1,100	825	12	5	6	37.3	8.4	6	5.5	5.2	9.4	6.3	<	7.8
pH	-	6.5 - 9.0	**6.04**	7.3	**5.96**	**6.23**	**6.15**	**6.05**	**6.25**	**5.88**	6.81	-	-	-	-
Hardness	1,000	-	268,000	7,880	9,080	8,370	19,000	7,000	8,000	-	8,800	-	-	-	-

Notes:

MW = Monitor Well
RDL = Reportable Detection Limit
< = Parameter below detection limit
< (0.0) = Parameter below elevated detection limit
- = No sample collected/Not analysed
Shaded/Bold = Parameter is above applicable criteria
Above criteria for current program = **0.0**

Analysis of samples from 2007 to 2012 were completed by AMEC .
Analysis of samples from 2013 to 2017 were completed by Maxxam Analytics Inc. in Bedford, NS.
Data from Feb. 2007 to Nov. 2012 transcribed from the 2012-2013 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by AMEC and dated March 29, 2013.
Data from December 2015 extracted from the 2015-2016 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by Fracflow and dated June 6, 2016.
* Typical Reportable Detection Limit reference based on Maxxam laboratory analysis, but RDL may be lower than shown for original data.
** 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.

TABLE C2

HISTORICAL GROUNDWATER ANALYTICAL DATA - METALS (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL*	Criteria**	MW-02								
			Feb 2007	Nov 2007	May 2008	Oct 2009	Jan 2010	Dec 2011	Nov 2014	Dec 2015	Oct 2017
Aluminum (Al)	5.0	-	3,540	70	34	56.9	45.6	432	77	51	-
Antimony (Sb)	1.0	20,000	<	<	<	< (2)	< (2)	<	<	<	-
Arsenic (As)	1.0	1,900	<	<	<	< (2)	< (2)	<	<	<	-
Barium (Ba)	1.0	29,000	17.6	2.7	3.0	< (5)	< (5)	4.7	2.5	2.4	-
Beryllium (Be)	1.0	67	0.5	<	<	< (2)	< (2)	<	<	<	-
Bismuth (Bi)	2.0	-	<	<	<	<	<	<	<	<	-
Boron (B)	50	45,000	-	-	-	<	<	< (50)	<	<	-
Cadmium (Cd)	0.010	2.7	0.158	1.010	0.057	0.039	<	0.056	0.026	<	-
Calcium (Ca)	100	-	2,670	1,350	1,330	1,700	1,300	1,910	1,900	2,500	-
Chromium (Cr)	1.0	810	10.8	<	<	<	<	<	3.7	<	-
Cobalt (Co)	0.4	66	7	< (1)	< (1)	0.86	1.04	0.53	0.59	<	-
Copper (Cu)	2.0	87	29	1	4	8.3	<	7.1	4.2	<	-
Iron (Fe)	50	-	4,170	64	59	<	<	245	220	<	-
Lead (Pb)	0.5	25	6	< (1)	< (1)	<	<	0.62	<	<	-
Magnesium (Mg)	100	-	1,150	449	479	600	500	258	620	830	-
Manganese (Mn)	2.0	-	150	13	19	8.3	33.4	4.5	24.0	4.6	-
Mercury (Hg)	0.013	0.29	< (0.01)	< (0.02)	0.03	-	0.015	-	<	<	-
Molybdenum (Mo)	2.0	9,200	< (5)	< (5)	< (5)	<	<	<	<	<	-
Nickel (Ni)	2.0	490	5	< (5)	< (5)	<	<	<	<	<	-
Phosphorus (P)	100	-	336	<	<	<	200	-	110	<	-
Potassium (K)	100	-	546	239	148	400	200	238	250	260	-
Selenium (Se)	1.0	63	<	<	<	<	<	<	<	<	-
Silver (Ag)	0.1	1.5	<	<	<	<	<	<	<	<	-
Sodium (Na)	100	2,300,000	12,100	4,510	5,210	5,100	5,200	5,020	5,400	8,800	-
Strontium (Sr)	2.0	-	-	-	-	6	6	5	9.7	9.0	-
Thallium (Tl)	0.1	510	-	-	-	<	<	<	<	<	-
Tin (Sn)	2.0	-	-	-	-	<	<	<	<	<	-
Titanium (Ti)	2.0	-	-	-	-	<	<	24	<	2	-
Uranium (U)	0.1	420	-	-	-	<	<	<	<	<	-
Vanadium (V)	2.0	250	3	< (5)	< (5)	<	<	<	<	<	-
Zinc (Zn)	5.0	1,100	22	4	6	21.1	<	19.5	7.2	<	-
pH	-	6.5 - 9.0	**5.62**	**6.05**	**5.94**	**6.1**	**5.59**	7.15	-	-	-
Hardness	1,000	-	11,500	5,220	5,220	7,000	5,000	-	-	-	-

Notes:

MW = Monitor Well
RDL = Reportable Detection Limit
< = Parameter below detection limit
< (0.0) = Parameter below elevated detection limit
- = No sample collected/Not analysed
Shaded/Bold = Parameter is above applicable criteria
Above criteria for current program = **0.0**

Analysis of samples from 2007 to 2012 were completed by AMEC .
Analysis of samples from : Analysis of samples from 2013 to 2017 were completed by Maxxam Analytics Inc. in Bedford, NS.
Data to Nov. 2012 transcribed from the 2012-2013 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by AMEC and dated March 29, 2013.
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TABLE C2

HISTORICAL GROUNDWATER ANALYTICAL DATA - METALS (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL*	Criteria**	MW-03														MW-DUP
			Feb 2007	Nov 2007	Nov 2007	May 2008	Mar 2009	Oct 2009	Jan 2010	Dec 2010	Dec 2011	Nov 2012	Aug 2013	Nov 2014	Dec 2015	Oct 2017	Oct 2017
Aluminum (Al)	5.0	-	5,450	129	145	45	146	120	87.9	190	163	78.4	167	140	130	76	76
Antimony (Sb)	1.0	20,000	<	<	<	<	< (2)	< (2)	< (2)	<	<	<	<	<	<	<	<
Arsenic (As)	1.0	1,900	3	1	1	<	6	< (2)	7.8	4	7.4	6.6	9.9	1	2.8	13	13
Barium (Ba)	1.0	29,000	64.8	25.5	25.0	7.7	12	29.3	13.4	6	9.8	10.2	12.1	4.9	5.7	13	13
Beryllium (Be)	1.0	67	1.6	<	0.2	0.3	< (2)	< (2)	< (2)	<	<	<	<	<	<	<	<
Bismuth (Bi)	2.0	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Boron (B)	50	45,000	-	-	-	-	-	29.2	22.9	11	< (50)	< (50)	<	<	<	<	<
Cadmium (Cd)	0.010	2.7	0.109	0.067	0.221	0.102	<	0.049	0.018	< (0.02)	0.063	<	0.03	<	<	<	<
Calcium (Ca)	100	-	15,800	11,300	10,500	5,060	-	15,000	13,000	7,000	8,780	10,800	11,900	7,300	5,800	13,000	12,000
Chromium (Cr)	1.0	810	7.0	<	<	<	<	1.7	<	<	<	<	<	<	<	<	<
Cobalt (Co)	0.4	66	12	5	5	9	6	1.98	5.49	4.6	4.75	3.63	6.18	2.6	1.7	5.9	5.8
Copper (Cu)	2.0	87	3	4	4	4	<	5.0	<	<	3.5	<	2.1	<	2.3	<	<
Iron (Fe)	50	-	6,680	2,410	2230	312	1,400	4,390	1,590	1,500	1,030	9,570	3,220	6,800	1,800	8,600	8,600
Lead (Pb)	0.5	25	19	4	4	< (1)	<	1.11	<	<	<	<	0.97	<	<	<	<
Magnesium (Mg)	100	-	4,000	2,470	2,410	1,140	-	3,200	3,600	1,600	2,160	1,610	2,910	690	1,600	3,500	3,500
Manganese (Mn)	2.0	-	2,040	1,010	964	171	3,800	721	3,930	1,900	2,090	1,570	3,020	550	720	3,900	3,800
Mercury (Hg)	0.013	0.29	0.02	< (0.02)	< (0.02)	0.04	**0.68**	0.037	**0.46**	-	-	-	0.26	0.025	0.092	<	<
Molybdenum (Mo)	2.0	9,200	< (5)	< (5)	< (5)	< (5)	<	<	<	<	<	<	<	<	<	<	<
Nickel (Ni)	2.0	490	5	< (5)	< (5)	< (5)	<	<	<	<	6	<	2.8	<	<	<	<
Phosphorus (P)	100	-	1,090	312	199	20	-	200	<	110	-	<	<	130	<	<	<
Potassium (K)	100	-	6,560	3,630	3,540	633	-	4,800	2,400	1,100	1,350	1,730	1,760	280	820	2,000	2,000
Selenium (Se)	1.0	63	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Silver (Ag)	0.1	1.5	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Sodium (Na)	100	2,300,000	189,000	102,000	103,000	24,500	-	96,000	73,000	32,000	32,300	37,000	36,200	7,200	19,000	33,000	32,000
Strontium (Sr)	2.0	-	-	-	-	-	-	56.2	38.0	21	22.9	50.5	38.2	27	19	34	34
Thallium (Tl)	0.1	510	-	-	-	-	-	<	<	<	<	<	<	<	<	<	<
Tin (Sn)	2.0	-	-	-	-	-	-	<	<	<	<	<	<	5.3	<	<	<
Titanium (Ti)	2.0	-	-	-	-	-	-	11.9	2.9	4	7.4	2.5	8.6	2.6	4.4	7.4	7.1
Uranium (U)	0.1	420	-	-	-	-	-	<	0.11	<	<	<	0.13	<	<	<	<
Vanadium (V)	2.0	250	9	< (5)	< (5)	< (5)	<	2.4	<	<	<	<	<	<	<	<	<
Zinc (Zn)	5.0	1,100	41	6	5	30	<	58.2	7.4	9	18.3	<	9.1	<	<	6.2	7.1
pH	**-**	6.5 - 9.0	6.66	6.6	6.61	**5.96**	6.95	6.94	6.57	7.27	6.93	7.11	-	-	-	-	-
Hardness	1,000	-	56,000	38,400	38,401	17,400	70,700	51,000	48,000	24,000	-	3,400	-	-	-	-	-

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TABLE C2

HISTORICAL GROUNDWATER ANALYTICAL DATA - METALS (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL*	Criteria**	MW-04												
			Feb 2007	Nov 2007	Jul 2008	Jan 2009	Oct 2009	Jan 2010	Dec 2010	Dec 2011	Nov 2012	Aug 2013	Nov 2014	Dec 2015	Oct 2017
Aluminum (Al)	5.0	-	275,000	1,580	41	105	197	131	60	84.1	1,610	53.8	53	85	50
Antimony (Sb)	1.0	20,000	<	<	<	< (2)	< (2)	< (2)	<	<	<	<	<	<	<
Arsenic (As)	1.0	1,900	15	2	13	8	11.1	3.1	2	2	3.2	2.3	<	<	2.7
Barium (Ba)	1.0	29,000	356.0	14.7	34.8	92	20.4	25.8	12	14.9	51.1	11.7	6.1	7.3	14
Beryllium (Be)	1.0	67	40.5	0.3	<	< (2)	< (2)	< (2)	<	<	<	<	<	<	<
Bismuth (Bi)	2.0	-	<	<	0.8	<	<	<	<	<	<	<	<	<	<
Boron (B)	50	45,000	-	-	-	-	22.4	37.1	22	< (50)	< (50)	<	<	<	<
Cadmium (Cd)	0.010	2.7	1.013	0.059	0.166	<	<	<	< (0.02)	<	0.101	<	0.052	0.029	0.12
Calcium (Ca)	100	-	34,600	17,500	32,500	-	19,000	9,400	6,700	8,710	15,700	8,970	5,900	6,800	11,000
Chromium (Cr)	1.0	810	37.0	1	1	<	1.1	<	<	<	2.9	<	<	<	<
Cobalt (Co)	0.4	66	100	4	14	8.38	7.21	2.87	1.9	2.42	11.1	4.11	2.9	3.4	8.3
Copper (Cu)	2.0	87	137	6	<	2	2.6	<	<	<	5.3	<	4.1	3.4	8.2
Iron (Fe)	50	-	64,100	1,170	2,430	7,600	2,030	2,020	1,100	1,950	6,530	1,680	590	660	900
Lead (Pb)	0.5	25	63	2	3	0.8	<	1.14	0.6	0.68	2.44	<	<	0.84	<
Magnesium (Mg)	100	-	7,680	5,380	10,100	-	5,000	1,900	1,200	1,740	3,160	1,860	1,200	1,600	2,300
Manganese (Mn)	2.0	-	8,950	2,370	6,740	2,500	4,510	925	370	549	1,300	465	190	130	310
Mercury (Hg)	0.013	0.29	< (0.01)	< (0.02)	< (0.02)	0.01	0.18	0.083	-	-	-	0.022	0.037	<	0.11
Molybdenum (Mo)	2.0	9,200	8	< (5)	< (5)	<	2.4	<	<	<	<	<	<	<	<
Nickel (Ni)	2.0	490	22	< (5)	< (5)	3	<	<	<	<	3.3	<	<	<	<
Phosphorus (P)	100	-	11,100	93	28	-	<	100	130	-	335	104	110	<	<
Potassium (K)	100	-	4,810	3,150	4,440	-	3,600	2,900	1,500	2,130	2,900	1200	660	670	1100
Selenium (Se)	1.0	63	<	<	<	<	<	<	<	<	<	<	<	<	<
Silver (Ag)	0.1	1.5	0.1	<	0.7	<	<	<	<	<	<	<	<	<	<
Sodium (Na)	100	2,300,000	60,700	91,200	149,000	-	88,000	77,000	40,000	41,900	43,500	32,800	23,000	29,000	43,000
Strontium (Sr)	2.0	-	-	-	-	-	51.9	34	24	29	89.7	29.1	21	23	36
Thallium (Tl)	0.1	510	-	-	-	-	<	<	<	<	<	<	<	<	<
Tin (Sn)	2.0	-	-	-	-	-	<	<	<	<	<	<	8.6	<	<
Titanium (Ti)	2.0	-	-	-	-	-	10.2	30.6	6	8.6	56.0	3.5	<	3.6	2.8
Uranium (U)	0.1	420	-	-	-	-	<	<	<	<	0.19	<	<	<	<
Vanadium (V)	2.0	250	43	< (5)	5	4	<	3	<	<	3.6	<	<	<	<
Zinc (Zn)	5.0	1,100	212	4	8	6	16.2	<	7	7.7	19.3	7	23	16	31
pH	-	6.5 - 9.0	**6.01**	6.53	6.69	6.84	6.8	6.75	7.45	6.68	7.08	-	-	-	-
Hardness	1,000	-	118	65,900	50,700	37,700	69,000	31,000	22,000	-	52,000	-	-	-	-

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TABLE C2

HISTORICAL GROUNDWATER ANALYTICAL DATA - METALS (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL*	Criteria**	MW-05									MW-05A		
			Feb 2007	Nov 2007	May 2008	Jan 2009	Oct 2009	Jan 2010	Dec 2010	Dec 2011	Aug 2013	Nov 2014	Dec 2015	Oct 2017
Aluminum (Al)	5.0	-	57,100	7,880	288	209	168	95.7	200	133	191	91	360	150
Antimony (Sb)	1.0	20,000	<	<	<	< (2)	< (2)	< (2)	<	<	<	<	<	<
Arsenic (As)	1.0	1,900	17	1	<	< (2)	< (2)	< (2)	<	<	1.6	<	<	<
Barium (Ba)	1.0	29,000	114.0	23.4	1.4	< (5)	< (5)	< (5)	2	4	22.4	3.6	4.9	3.3
Beryllium (Be)	1.0	67	20.8	0.2	<	< (2)	< (2)	< (2)	<	<	<	<	<	<
Bismuth (Bi)	2.0	-	<	<	<	<	<	<	<	<	<	<	<	<
Boron (B)	50	45,000	-	-	-	-	<	<	<	<	<	<	<	<
Cadmium (Cd)	0.010	2.7	0.627	0.192	0.059	0.020	0.067	<	< (0.02)	0.061	0.032	0.041	0.013	0.027
Calcium (Ca)	100	-	14,300	2,330	1,310	-	3,700	2,300	2,800	3,740	19,800	2,700	3,900	4,200
Chromium (Cr)	1.0	810	15.0	5.0	<	<	<	<	<	<	<	1.3	<	<
Cobalt (Co)	0.4	66	27	4	< (1)	1.06	0.63	<	<	0.48	0.66	2.2	<	1.2
Copper (Cu)	2.0	87	**237**	39	7	7	16.0	2.8	3	9.2	4.1	9.7	4.9	3.8
Iron (Fe)	50	-	12,390	2,940	124	120	105	< (50)	79	65	3,640	890	170	480
Lead (Pb)	0.5	25	**57**	11	< (1)	0.5	<	<	<	<	1.36	0.92	0.5	<
Magnesium (Mg)	100	-	3,490	616	502	-	1,300	800	790	825	1,090	860	1,300	1,400
Manganese (Mn)	2.0	-	487	77	15	35	26.3	11.8	20	10.7	283	580	7	180
Mercury (Hg)	0.013	0.29	< (0.01)	0.06	**1.44**	**0.85**	0.013	0.078	-	-	0.17	0.042	0.022	0.022
Molybdenum (Mo)	2.0	9,200	3	< (5)	< (5)	<	13.6	<	<	<	8.2	<	<	<
Nickel (Ni)	2.0	490	20	< (5)	< (5)	<	<	<	<	<	2.3	7.5	<	2.5
Phosphorus (P)	100	-	3,550	373	6	-	<	100	<	-	<	150	<	<
Potassium (K)	100	-	1,530	405	446	-	900	100	210	524	<	1900	360	440
Selenium (Se)	1.0	63	<	<	<	<	<	<	<	<	<	<	<	<
Silver (Ag)	0.1	1.5	<	<	<	<	<	<	<	<	<	<	<	<
Sodium (Na)	100	2,300,000	6,800	10,200	4,030	-	8,200	4,900	5,400	5,200	9,050	14,000	15,000	7,700
Strontium (Sr)	2.0	-	-	-	-	-	10.2	7.8	8	8.1	136	12	13	15
Thallium (Tl)	0.1	510	-	-	-	-	<	<	<	<	<	<	<	<
Tin (Sn)	2.0	-	-	-	-	-	<	<	<	<	<	2.4	<	<
Titanium (Ti)	2.0	-	-	-	-	-	3.3	<	4	2	5.8	5.3	5	2.9
Uranium (U)	0.1	420	-	-	-	-	<	<	<	<	0.52	<	0.14	<
Vanadium (V)	2.0	250	19	6	< (5)	<	<	<	<	<	<	<	<	<
Zinc (Zn)	5.0	1,100	163	25	6	10	20.2	5.2	12	28	19.6	49	5.4	11
pH	-	6.5 - 9.0	**6.09**	**6.1**	**6.3**	**6.09**	**6.18**	**5.92**	6.7	6.34	-	-	-	-
Hardness	1,000	-	50,100	8,350	5,330	6,840	14,000	9,000	10,000	-	-	-	-	-

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TABLE C2

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2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL*	Criteria**	MW-06										MW-DUP02					
			Feb 2007	Nov 2007	May 2008	Jan 2009	Oct 2009	Jan 2010	Dec 2010	Dec 2010	Dec 2011	Nov 2012	Aug 2013	Nov 2014	Nov 2014	Dec 2015	Dec 2015	Oct 2017
Aluminum (Al)	5.0	-	8,540	485	179	44.1	112	< (50)	160	180	176	247	1,910	180	160	120	120	140
Antimony (Sb)	1.0	20,000	<	<	<	< (2)	< (2)	< (2)	<	<	<	<	<	<	<	<	<	<
Arsenic (As)	1.0	1,900	3	<	<	< (2)	< (2)	< (20)	2	2	1.7	2.9	2.3	1.8	1.8	2.1	1.7	2
Barium (Ba)	1.0	29,000	55.9	9.6	6.9	16	26.4	< (50)	8	8	4.6	7.4	3.4	2.4	1.8	7	7.2	3.1
Beryllium (Be)	1.0	67	0.7	<	<	< (2)	< (2)	< (20)	<	<	<	<	<	<	<	<	<	<
Bismuth (Bi)	2.0	-	<	<	<	<	<	< (20)	<	<	<	<	<	<	<	<	<	<
Boron (B)	50	45,000	-	-	-	-	468	693	170	180	142	96	<	<	<	<	<	<
Cadmium (Cd)	0.010	2.7	0.364	0.122	0.082	0.051	0.038	<	< (0.02)	< (0.02)	<	<	0.2	0.014	<	<	<	<
Calcium (Ca)	100	-	52,000	30,900	26,600	-	79,000	150,000	28,000	28,000	22,400	14,800	1,170	13,000	14,000	13,000	13,000	14,000
Chromium (Cr)	1.0	810	14.6	<	<	<	<	< (10)	<	<	<	<	1.7	<	<	<	<	<
Cobalt (Co)	0.4	66	12	6	4	3.68	6.35	< (4)	4.2	4	2.93	2.58	0.83	2.20	2.1	0.86	1	1.5
Copper (Cu)	2.0	87	42	5	7	7	5.5	< (20)	2	2	2.7	<	3.1	2.2	<	<	2.1	<
Iron (Fe)	50	-	10,276	513	178	< (50)	637	< (500)	3,100	3,200	2,870	8,380	3,330	8,000	8,600	10,000	11,000	11,000
Lead (Pb)	0.5	25	**26**	< (1)	< (1)	<	<	< (5)	<	<	<	1.19	1.82	1.80	<	0.52	0.61	<
Magnesium (Mg)	100	-	11,400	5,840	5,210	-	15,000	30,000	4,600	4,800	3,920	2,400	644	2,300	2,400	2,500	2,500	1,900
Manganese (Mn)	2.0	-	1,830	905	520	890	1,060	889	380	400	355	480	32.4	400	410	350	350	260
Mercury (Hg)	0.013	0.29	< (0.01)	< (0.02)	0.04	< (0.01)	0.11	0.047	-	-	-	-	0.072	0.017	0.013	0.053	0.018	0.018
Molybdenum (Mo)	2.0	9,200	< (5)	< (5)	< (5)	<	<	< (20)	<	<	<	<	<	<	<	<	<	<
Nickel (Ni)	2.0	490	6	< (5)	< (5)	<	2.3	< (20)	<	<	<	2.5	<	<	<	<	<	<
Phosphorus (P)	100	-	1,340	60	30	-	100	<	<	180	-	182	123	450	410	120	<	250
Potassium (K)	100	-	20,100	9,220	10,200	-	22,000	33,000	9,000	9,000	5,180	3,540	159	2,600	2500	2100	2100	1300
Selenium (Se)	1.0	63	<	<	<	<	<	< (10)	<	<	<	<	<	<	<	<	<	<
Silver (Ag)	0.1	1.5	<	<	<	<	<	< (1)	<	<	<	<	<	<	<	<	<	<
Sodium (Na)	100	2,300,000	53,400	27,600	21,800	-	56,000	72,000	20,000	20,000	11,800	10,000	6,220	6,200	6,000	9,500	9,200	21,000
Strontium (Sr)	2.0	-	-	-	-	-	228	392	70	71	56	51.9	8.7	34.0	35	38	38	33
Thallium (Tl)	0.1	510	-	-	-	-	<	< (1)	<	<	<	<	<	<	<	<	<	<
Tin (Sn)	2.0	-	-	-	-	-	<	< (20)	<	<	<	<	3.7	2.5	2.5	<	<	<
Titanium (Ti)	2.0	-	-	-	-	-	7.0	< (20)	6	6	5.6	7.8	46.9	7.3	5.7	5.2	5.3	3.8
Uranium (U)	0.1	420	-	-	-	-	<	< (1)	<	<	<	<	0.22	<	<	<	<	<
Vanadium (V)	2.0	250	10	< (5)	< (5)	<	<	< (20)	<	<	<	<	2.6	<	<	<	<	<
Zinc (Zn)	5.0	1,100	52	10	14	8	46.5	< (50)	15	14	8.9	6.1	17.3	9.1	<	<	<	<
pH	-	6.5 - 9.0	**6.13**	**6.11**	**6.31**	**6.42**	**6.36**	6.82	7.1	7.02	6.98	6.96	-	-	-	-	-	-
Hardness	1,000	-	177,000	101,000	87,900	94,450	260,000	510,000	88,000	91,000	-	47,000	-	-	-	-	-	-

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TABLE C2

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2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL*	Criteria**	MW-07										MW-DUP					
			Feb 2007	Nov 2007	May 2008	May 2008	Jan 2009	Jan 2009	Oct 2009	Jan 2010	Dec 2010	Dec 2011	Dec 2011	Nov 2012	Aug 2013	Aug 2013	Nov 2014	Dec 2015	Oct 2017
Aluminum (Al)	5.0	-	4,527	1,740	982	1,170	830	822	2,460	1,100	2,900	1,760	1,860	4,320	1,910	1,930	2,300	2,100	1,500
Antimony (Sb)	1.0	20,000	<	<	<	<	< (2)	< (2)	< (2)	< (2)	<	<	<	<	<	<	1.4	<	<
Arsenic (As)	1.0	1,900	2	<	2	1	< (2)	< (2)	< (2)	< (2)	1	<	<	2.5	2.3	1.9	2.3	1.4	<
Barium (Ba)	1.0	29,000	18.7	4.8	2.4	2.8	< (5)	< (5)	< (5)	< (5)	5	3.5	3.4	9.1	3.4	4.1	13	6.7	4.1
Beryllium (Be)	1.0	67	0.4	0.1	<	<	< (2)	< (2)	< (2)	< (2)	<	<	<	<	<	<	<	<	<
Bismuth (Bi)	2.0	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Boron (B)	50	45,000	-	-	-	-	-	-	< (10)	<	<	< (50)	< (50)	< (50)	<	<	<	<	<
Cadmium (Cd)	0.010	2.7	0.122	0.024	0.118	0.103	0.020	0.019	0.032	<	0.03	<	<	0.068	0.2	0.023	0.17	0.017	0.012
Calcium (Ca)	100	-	3,690	1,040	791	758	-	-	1,200	500	2,000	1,130	1,080	2,040	1,170	1,170	6,000	4,700	1,100
Chromium (Cr)	1.0	810	4.0	1	<	1	<	<	2.4	<	2	1.4	1.3	4.5	1.7	1.7	6.1	2.1	<
Cobalt (Co)	0.4	66	4	2	< (1)	1	0.93	0.93	0.87	0.48	0.7	0.64	0.60	1.28	0.83	0.9	1.6	<	0.7
Copper (Cu)	2.0	87	14	5	3	3	<	3	4.0	<	2	2.9	2.7	7.1	3.1	3.2	44	5.3	<
Iron (Fe)	50	-	2,910	1,130	2,120	2,490	1,200	1,200	1,820	1,280	2,300	1,990	1,980	4,680	3,330	3,310	4,500	720	3,000
Lead (Pb)	0.5	25	3	1	< (1)	1	<	<	2.26	0.63	1.9	1.64	1.66	5.02	1.82	1.78	4.9	1.3	1.1
Magnesium (Mg)	100	-	962	837	490	354	-	-	700	500	450	312	323	430	644	656	740	1,300	630
Manganese (Mn)	2.0	-	67	19	38	45	23	22	28.9	18.7	36	30.3	29.2	78.2	32.4	33.4	110	8.8	27
Mercury (Hg)	0.013	0.29	< (0.01)	< (0.02)	0.13	0.09	0.07	0.08	0.13	0.043	-	-	-	-	0.072	0.072	0.097	0.17	0.038
Molybdenum (Mo)	2.0	9,200	< (5)	< (5)	< (5)	< (5)	<	<	<	<	<	<	<	<	<	<	<	<	<
Nickel (Ni)	2.0	490	7	< (5)	< (5)	< (5)	<	<	<	<	<	<	<	3.5	<	6.1	9.3	<	<
Phosphorus (P)	100	-	383	104	55	66	-	-	100	100	< (1,000)	-	-	146	123	143	420	110	110
Potassium (K)	100	-	463	221	170	290	-	-	300	<	< (1,000)	180	190	320	159	251	5500	300	170
Selenium (Se)	1.0	63	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Silver (Ag)	0.1	1.5	<	<	<	<	<	<	<	<	<	<	<	<	<	<	0.13	<	<
Sodium (Na)	100	2,300,000	4,220	4,680	3,830	3,950	-	-	9,200	5,800	9, 300	8,270	8,090	21,700	6,220	6,210	27,000	12,000	4,700
Strontium (Sr)	2.0	-	-	-	-	-	-	-	9.1	< (5)	13	7.6	7.8	12.5	8.7	8.5	22	16	7.5
Thallium (Tl)	0.1	510	-	-	-	-	-	-	<	<	<	<	<	<	<	<	<	<	<
Tin (Sn)	2.0	-	-	-	-	-	-	-	<	<	<	<	<	<	3.7	3.3	4.4	<	<
Titanium (Ti)	2.0	-	-	-	-	-	-	-	54.8	19.1	49	40.4	40.6	120	46.9	45	89	52	30
Uranium (U)	0.1	420	-	-	-	-	-	-	0.14	<	0.2	0.17	0.18	0.82	0.22	0.21	0.59	0.23	<
Vanadium (V)	2.0	250	6	< (5)	< (5)	< (5)	<	<	2.6	<	<	<	<	6.9	2.6	2.3	5.5	2.6	<
Zinc (Zn)	5.0	1,100	15	9	8	19	11	15	24	8.6	17	8.3	10.8	26.6	17.3	14.8	140	7.1	17
pH	-	6.5 - 9.0	**4.92**	**5.01**	**5.2**	**5.45**	**4.65**	**4.47**	**4.71**	**4.86**	**6.05**	**5.59**	**5.59**	**5.74**	-	-	-	-	-
Hardness	1,000	-	13,200	5,890	3,990	3,870	5,740	5,500	6,000	3,000	7,000	-	-	6,900	-	-	-	-	-

Notes:

MW = Monitor Well
RDL = Reportable Detection Limit
< = Parameter below detection limit
< (0.0) = Parameter below elevated detection limit
- = No sample collected/Not analysed
Shaded/Bold = Parameter is above applicable criteria
Above criteria for current program = **0.0**

Analysis of samples from 2007 to 2012 were completed by AMEC .
Analysis of samples from 2013 to 2017 were completed by Maxxam Analytics Inc. in Bedford, NS.
Data to Nov. 2012 transcribed from the 2012-2013 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by AMEC and dated March 29, 2013.
Data from December 2015 extracted from the 2015-2016 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by Fracflow and dated June 6, 2016.
* Typical Reportable Detection Limit reference based on Maxxam laboratory analysis, but RDL may be lower than shown for original data.
** 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.

TABLE C2

HISTORICAL GROUNDWATER ANALYTICAL DATA - METALS (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL*	Criteria**	MW-08								
			Mar 2010	Dec 2010	Dec 2011	Nov 2012	Nov 2012	Aug 2013	Nov 2014	Dec 2015	Oct 2017
Aluminum (Al)	5.0	-	626	640	1,210	1,160	1,190	1,410	1,100	1,400	<
Antimony (Sb)	1.0	20,000	< (2)	<	<	<	<	<	<	<	<
Arsenic (As)	1.0	1,900	< (2)	<	<	1.1	1.1	3.3	<	<	<
Barium (Ba)	1.0	29,000	< (5)	6	7.2	7.0	7.1	5.1	5.7	2.7	<
Beryllium (Be)	1.0	67	< (2)	<	<	<	<	<	<	<	<
Bismuth (Bi)	2.0	-	<	<	<	<	<	<	<	<	<
Boron (B)	50	45,000	6	<	< (50)	< (50)	< (50)	<	<	<	<
Cadmium (Cd)	0.010	2.7	0.018	0.02	0.022	0.043	0.040	0.036	0.0274	<	<
Calcium (Ca)	100	-	800	810	840	729	711	593	1,400	1,700	<
Chromium (Cr)	1.0	810	<	<	<	<	<	<	1.3	<	<
Cobalt (Co)	0.4	66	0.58	1.1	0.61	0.57	0.63	0.4	<	<	<
Copper (Cu)	2.0	87	8.8	7	15.4	13.1	12.9	11.7	7.3	6.7	<
Iron (Fe)	50	-	411	590	513	399	415	791	290	270	<
Lead (Pb)	0.5	25	1.2	<	0.6	<	0.52	<	<	<	<
Magnesium (Mg)	100	-	34.7	560	546	484	518	403	530	610	<
Manganese (Mn)	2.0	-	200	41	30.9	24.8	27.7	12.7	18	6	<
Mercury (Hg)	0.013	0.29	<	-	-	-	-	0.048	0.013	0.025	<
Molybdenum (Mo)	2.0	9,200	<	<	<	<	<	<	<	<	<
Nickel (Ni)	2.0	490	2.7	6	5	5.3	5.5	2.9	<	<	<
Phosphorus (P)	100	-	<	<	-	<	<	<	130	<	<
Potassium (K)	100	-	500	310	334	242	281	202	260	230	<
Selenium (Se)	1.0	63	<	<	<	<	<	<	<	<	<
Silver (Ag)	0.1	1.5	<	<	0.2	<	<	0.13	<	0.11	<
Sodium (Na)	100	2,300,000	5,400	4,400	4,340	5,000	5,210	3,700	4,900	5,600	340
Strontium (Sr)	2.0	-	< (5)	8	7.1	7.9	8.4	6.5	8.4	6.7	<
Thallium (Tl)	0.1	510	<	<	<	<	<	<	<	<	<
Tin (Sn)	2.0	-	<	<	<	<	<	<	<	<	<
Titanium (Ti)	2.0	-	7.8	8	18.2	18.2	15.9	21.9	15	22	<
Uranium (U)	0.1	420	0.1	<	0.1	<	<	<	<	<	<
Vanadium (V)	2.0	250	<	<	<	<	<	<	<	<	<
Zinc (Zn)	5.0	1,100	16.5	30	20.2	28.2	28.6	19.2	19	5.1	<
pH	-	6.5 - 9.0	**5.21**	**5.21**	**5.74**	**5.15**	**5.16**	-	-	-	-
Hardness	1,000	-	4,000	4,000	-	3,800	3,900	-	-	-	-

Notes:

MW = Monitor Well
RDL = Reportable Detection Limit
< = Parameter below detection limit
< (0.0) = Parameter below elevated detection limit
- = No sample collected/Not analysed
Shaded/Bold = Parameter is above applicable criteria
Above criteria for current program = **0.0**

Analysis of samples from 2007 to 2012 were completed by AMEC .
Analysis of samples from 2013 to 2017 were completed by Maxxam Analytics Inc. in Bedford, NS.
Data to Nov. 2012 transcribed from the 2012-2013 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by AMEC and dated March 29, 2013.
Data from December 2015 extracted from the 2015-2016 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by Fracflow and dated June 6, 2016.
* Typical Reportable Detection Limit reference based on Maxxam laboratory analysis, but RDL may be lower than shown for original data.
** 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.

TABLE C3

HISTORICAL SURFACE WATER ANALYTICAL DATA - PCBs (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Sample Location	Sample Date													Criteria**
	Feb 2007	Nov 2007	May 2008	Mar 2009	Sep 2009	Jan 2010	Nov 2010	Dec 2011	Nov 2012	Aug 2013	Nov 2014	Dec 2015	Oct 2017	
SW-POND	-	<	<	<	<	<	<	< (0.06)	<	<	<	<	<	NA
SW-POND-1	-	-	-	-	<	-	-	< (0.06)	-	-	-	-	-	
SW-DUP	-	-	-	-	-	-	-	-	-	-	-	-	<	
SW-UPSTREAM	-	-	-	-	-	-	-	-	-	-	<	<	<	
SW-STREAM	-	<	<	<	<	< (0.06)	<	<	<	<	<	<	*	
RDL	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	

Notes:

Analysis of samples from 2007 to 2012 were completed by AMEC .

Analysis of samples from 2013 to 2017 were completed by Maxxam Analytics Inc. in Bedford, NS.

Data from Feb. 2007 to Nov. 2012 transcribed from the 2012-2013 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by AMEC and dated March 29, 2013.

Data from December 2015 extracted from the 2015-2016 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by Fracflow and dated June 6, 2016.

* Sample could not be collected at SW-STREAM as location did not have any surface water.

** Criteria does not exist, not applicable (NA).

SW = Surface Water
SW-POND-1 = Field Duplicate of SW-POND
SW-DUP = Field Duplicate of SW-POND

RDL = Reportable Detection Limit
< = Parameter below detection limit
< (0.00) = Parameter below elevated detection limit

- = No sample collected
Shaded/Bold = Parameter is above applicable criteria
0 = Above criteria for current sampling program

TABLE C4

HISTORICAL SURFACE WATER ANALYTICAL DATA - METALS (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL *	Criteria**	SW-POND													
			SW-DUP1						SW-POND-1							SW-DUP
			Nov 2007	May 2008	Jan 2009	Sep 2009	Jan 2010	Nov 2010	Nov 2010	Dec 2011	Dec 2011	Nov 2012	Aug 2013	Nov 2014	Dec 2015	Oct 2017	Oct 2017
Aluminum (Al)	5.0	5/100[1]	**190**	76	45.9	**180**	**635**	75.6	74.7	**202**	**262**	49.7	21.3	96	**210**	9.2	10
Antimony (Sb)	1.0	-	<	<	< (2)	< (2)	< (2)	<	<	<	<	<	<	<	<	<	<
Arsenic (As)	1.0	5	<	<	< (2)	< (2)	< (2)	<	<	<	<	<	<	<	<	<	<
Barium (Ba)	1.0	-	24.8	7.9	31	26	32.0	25	25.2	29.1	30.1	23.8	14	<	21	13	13
Beryllium (Be)	1.0	-	<	<	< (2)	< (2)	< (2)	<	<	<	<	<	<	<	<	<	<
Bismuth (Bi)	2.0	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Boron (B)	50	1,500	-	-	-	230	369	332	329	356	362	263	232	100	170	190	190
Cadmium (Cd)	0.010	0.04/0.17[2]	0.064	0.067	0.035	<	0.053	0.022	0.019	0.063	0.065	0.028	<	0.016	**0.054**	<	<
Calcium (Ca)	100	-	51,500	30,600	-	55,000	70,000	77,100	77,400	99,000	97,500	96,000	67,200	39,000	64,000	67,000	65,000
Chromium (Cr)	1.0	8.9[3]	<	<	<	<	1.7	<	<	<	<	<	<	<	12	<	<
Cobalt (Co)	0.4	-	6	2	6.21	4	4.83	2.2	2.13	2.98	3.50	2.18	<	0.54	2.7	<	<
Copper (Cu)	2.0	2[4]	**10**	3	**6**	**6**	**8.9**	**7.9**	**5.1**	**6.4**	**6.7**	**2.4**	<	**2.6**	**4.4**	<	**<**
Iron (Fe)	50	300	**377**	**318**	150	**480**	**1,170**	241	244	**523**	**682**	**405**	116	**320**	**930**	63	67
Lead (Pb)	0.50	1[5]	2	1	<	0.6	2.56	<	<	0.89	1.18	<	<	<	0.85	<	<
Magnesium (Mg)	100	-	6,970	5,520	-	6,100	7,800	6,200	6,190	9,100	8,890	8,220	5,750	3,100	5,700	5,800	5,800
Manganese (Mn)	2.0	-	1,850	1,350	2,400	1,200	1,760	1,170	1,170	1,670	1,750	1310	135	450	2,400	210	240
Mercury (Hg)	0.013	0.026	< (0.02)	< (0.02)	< (0.01)	-	<	-	-	-	-	-	<	<	<	<	<
Molybdenum (Mo)	2.0	73	< (5)	< (5)	<	<	<	<	<	<	<	<	<	<	<	<	<
Nickel (Ni)	2.0	25, 65[6]	< (5)	< (5)	3	<	3.5	2	<	2.2	23	<	<	2.1	2.2	<	<
Phosphorus (P)	100	-	51	24	-	-	<	<	120	<	<	<	<	110	<	<	<
Potassium (K)	100	-	16,900	12,900	-	1,200	15,000	13,600	14,000	12,900	12,700	10,600	7,600	3,700	6,200	6,500	6,400
Selenium (Se)	1.0	1	<	<	<	<	<	1.2	<	<	<	<	<	<	<	<	<
Silver (Ag)	0.1	0.1	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Sodium (Na)	100	-	145,000	129,000	-	78,000	98,000	63,600	65,300	48,700	47,800	44,500	35,300	16,000	27,000	35,000	36,000
Strontium (Sr)	2.0	-	-	-	-	180	198	187	193	261	256	243	180	94	160	170	170
Thallium (Tl)	0.1	0.8	-	-	-	<	<	<	<	<	<	<	<	<	<	<	<
Tin (Sn)	2.0	-	-	-	-	<	<	<	<	<	<	<	<	<	<	<	<
Titanium (Ti)	2.0	-	-	-	-	16	31.7	10.4	10.1	26.3	33.8	7.9	<	9.4	20	<	<
Uranium (U)	0.10	15	-	-	-	<	<	<	<	<	<	<	<	<	<	<	<
Vanadium (V)	2.0	-	< (5)	< (5)	<	<	<	<	<	<	<	<	<	<	<	<	<
Zinc (Zn)	5.0	30	12	9	17	18	24.3	11.8	11.4	21.4	23.1	12.2	<	8.2	27	<	<
pH	-	6.5 - 9.0	7.38	6.92	7.45	7.13	7.13	7.79	7.87	7.66	7.65	7.87	7.31	7.53	7.68	7.78	7.73
Hardness	1,000	-	157,000	99,100	190,000	160,000	210,000	220,000	220,000	280,000	280,000	270,000	230,000	110	180	190	190

Notes:
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* Typical Reportable Detection Limit (RDL) reference based on Maxxam laboratory analysis, but RDL may be lower than shown for original data.
** Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1).
*** Sample could not be collected at SW-STREAM as location did not have any surface water.

SW = Surface Water
- = Not analysed/No criteria
< = Parameter below detection limit
< (0.0) = Parameter below elevated detection limit
Shaded/Bold - Indicates parameter is above applicable criteria
1 = Above criteria for current sampling program

(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.

TABLE C4

HISTORICAL SURFACE WATER ANALYTICAL DATA - METALS (µg/L)
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL *	Criteria**	SW-STREAM												SW-UPSTREAM		
			Nov 2007	May 2008	Jan 2009	Sep 2009	Jan 2010	Nov 2010	Dec 2011	Nov 2012	Aug 2013	Nov 2014	Dec 2015	Oct 2017 ***	Nov 2014	Dec 2015	Oct 2017
Aluminum (Al)	5.0	5/100[1]	89	**132**	60.7	83	**88.3**	**125**	**155**	51.7	26.7	**790**	**610**	-	**240**	**230**	**210**
Antimony (Sb)	1.0	-	<	<	< (2)	< (2)	< (2)	<	<	<	<	<	<	-	<	<	<
Arsenic (As)	1.0	5	<	<	< (2)	< (2)	< (2)	<	<	<	<	<	<	-	<	<	<
Barium (Ba)	1.0	-	12.7	21.2	15	6	17.6	15.8	10.8	5.6	4.1	4.9	4.8	-	1.9	2	1
Beryllium (Be)	1.0	-	<	<	< (2)	< (2)	< (2)	<	<	<	<	<	<	-	<	<	<
Bismuth (Bi)	2.0	-	<	<	<	<	<	<	<	<	<	<	<	-	<	<	<
Boron (B)	50	1,500	-	-	-	140	224	171	203	151	171	<	<	-	<	<	<
Cadmium (Cd)	0.010	0.04/0.17[2]	<	0.099	0.018	<	<	0.020	<	<	<	0.035	0.032	-	<	<	<
Calcium (Ca)	100	-	31,100	46,700	-	20,000	45,000	41,200	43,200	36,200	36,500	5,000	3,900	-	1,000	980	890
Chromium (Cr)	1.0	8.9[3]	<	<	<	<	<	<	<	<	<	<	<	-	<	7.2	<
Cobalt (Co)	0.4	-	3	3	1.77	1	2.55	2.48	1.10	0.52	0.75	0.56	1.3	-	<	<	<
Copper (Cu)	2.0	2[4]	2	**6**	3	<	**3.4**	2.5	2.3	<	<	<	**2.6**	-	<	<	**<**
Iron (Fe)	50	300	167	**411**	100	190	180	235	265	98	63	**860**	**2,900**	-	220	180	150
Lead (Pb)	0.50	1[5]	1	1	<	<	0.51	<	<	<	<	**1.6**	0.89	-	<	<	<
Magnesium (Mg)	100	-	5,590	6,620	-	3,100	6,900	5,020	5,720	4,800	4,530	1,300	1,100	-	550	570	460
Manganese (Mn)	2.0	-	2,560	1,180	850	530	1,170	1,590	331	142	145	230	230	-	12	7	9
Mercury (Hg)	0.013	0.026	< (0.02)	< (0.02)	0.01	-	0.018	-	-	-	<	0.022	<	-	<	<	<
Molybdenum (Mo)	2.0	73	< (5)	< (5)	<	<	<	<	<	<	<	<	<	-	<	<	<
Nickel (Ni)	2.0	25, 65[6]	< (5)	< (5)	<	<	<	<	<	<	<	<	2	-	<	<	<
Phosphorus (P)	100	-	23	42	-	-	<	<	<	<	<	220	<	-	<	<	<
Potassium (K)	100	-	13,900	12,900	-	8,100	14,000	11,800	9,530	7,520	7,970	1,100	6,200	-	220	170	160
Selenium (Se)	1.0	1	<	<	<	<	<	<	<	<	<	<	<	-	<	<	<
Silver (Ag)	0.1	0.1	<	<	<	<	<	<	<	<	<	<	<	-	<	<	<
Sodium (Na)	100	-	152,000	94,000	-	61,000	96,000	71,200	42,600	34,500	40,100	11,000	27,000	-	4,900	5,200	4,700
Strontium (Sr)	2.0	-	-	-	-	62	122	102	116	94.1	103	19	160	-	5.3	5	4
Thallium (Tl)	0.1	0.8	-	-	-	<	<	<	<	<	<	<	<	-	<	<	<
Tin (Sn)	2.0	-	-	-	-	<	<	<	<	<	<	<	<	-	<	<	<
Titanium (Ti)	2.0	-	-	-	-	5	11.0	10.9	16.2	4.7	<	45	20	-	5	2.6	3.1
Uranium (U)	0.10	15	-	-	-	<	<	<	<	<	<	<	<	-	<	<	<
Vanadium (V)	2.0	-	< (5)	< (5)	<	<	<	<	<	<	<	<	<	-	<	<	<
Zinc (Zn)	5.0	30	4	25	6	14	8.7	8	6.2	<	<	9	27	-	<	<	<
pH	-	6.5 - 9.0	6.92	7.43	7.16	6.93	**6.32**	7.12	7.21	7.55	7.13	**5.89**	6.82	-	**6.16**	**6.25**	**6.35**
Hardness	1,000	-	101,000	144,000	155,000	64,000	140,000	120,000	130,000	110,000	110,000	18	14	-	4.8	4.8	4.1

Notes:
Analysis of samples from 2007 to 2012 were completed by AMEC .
Analysis of samples from 2013 to 2017 were completed by Maxxam Analytics Inc. in Bedford, NS.
Data from November 2007 to November 2012 transcribed from the 2012-2013 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by AMEC and dated March 29, 2013.
Data from December 2015 extracted from the 2015-2016 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by Fracflow and dated June 6, 2016.
* Typical Reportable Detection Limit (RDL) reference based on Maxxam laboratory analysis, but RDL may be lower than shown for original data.
** Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1).
*** Sample could not be collected at SW-STREAM as location did not have any surface water.

SW = Surface Water
- = Not analysed/No criteria
< = Parameter below detection limit
< (0.0) = Parameter below elevated detection limit
Shaded/Bold - Indicates parameter is above applicable criteria.
1 = Above criteria for current sampling program.

(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.

TABLE C5

HISTORICAL SURFACE WATER ANALYTICAL DATA - GENERAL CHEMISTRY
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL*	Units	Criteria**	SW-POND														
									SW-DUP1			SW-POND-1						SW-DUP
				Feb 2007	Nov 2007	May 2008	Mar 2009	Sep 2009	Jan 2010	Nov 2010	Nov 2010	Dec 2011	Dec 2011	Nov 2012	Aug 2013	Nov 2014	Dec 2015	Oct 2017	Oct 2017
Anion Sum	N/A	me/L	-	-	-	-	-	-	-	-	-	-	-	-	5.75	3.11	5.75	6.05	6.09
Bicarb. Alkalinity (calc. as CaCO3)	1,000	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	160,000	95,000	160,000	160,000	160,000
Calculated TDS	1,000	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	380,000	180,000	330,000	340,000	340,000
Carb. Alkalinity (calc. as CaCO3)	1,000	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	<	<	<	<	<
Cation Sum	N/A	me/L	-	-	-	-	-	-	-	-	-	-	-	-	7.29	3.07	5.30	5.62	5.59
Colour	5	TCU	-	-	98	77	34	110	75	68	76	72	64	22	13	38	14	14	13
Conductivity	1	µS/cm	-	-	1,190	927	1,010	1,100	1,100	720	720	850	850	770	560	290	490	600	600
Dissolved Chloride (Cl)	1,000	µg/L	-	-	165,000	195,000	104,000	110,000	110,000	63,000	63,000	46,000	46,000	-	24,000	18,000	29,000	50,000	50,000
DOC	500	µg/L		-	22,900	19,600	12,500	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Sulphate (SO4)	2,000	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	73,000	27,000	68,000	54,000	54,000
Hardness (CaCO3)	1,000	µg/L	-	-	157,000	99,100	190,000	160,000	210,000	220,000	220,000	280,000	280,000	270,000	230,000	110,000	180,000	190,000	190,000
Ion Balance (% Difference)	N/A	%	-	-	-	-	-	-	-	-	-	-	-	-	11.8	0.65	4.07	3.68	4.28
Langelier Index (@ 20C)	N/A	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-0.018	-0.284	0.271	0.38	0.32
Langelier Index (@ 4C)	N/A	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-0.266	-0.534	0.022	0.132	0.071
Nitrate as N	50	µg/L	13,000	-	8,650	8,480	8,360	5,200	7,700	6,900	6,900	4,600	4,700	3,600	-	1,700	3,300	4,000	4,000
Nitrite as N	15	µg/L	60	-	**84**	**369**	**69**	**220**	**120**	**190**	**190**	**100**	**90**	**68**	-	31	19	48	49
Nitrate + Nitrite	50	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	4,100	1,700	3,300	4,000	4,000
Nitrogen (Ammonia Nitrogen)	50	µg/L	-	-	33,000	641	30,000	13,000	24,000	12,000	13,000	9,000	11,000	-	4,000	1,300	3,600	1,500	1,700
Orthophosphate (P)	10	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	<	<	<	<	<
pH	N/A	pH	6.5 - 9	-	7.38	6.92	7.45	7.13	7.35	7.79	7.87	7.66	7.65	7.87	7.31	7.53	7.68	7.78	7.73
Reactive Silica (SiO2)	0.5	µg/L	-	-	-	-	-	6,100	6,600	6,800	6,900	6,200	6,300	7,700	5,700	5,000	6,800	5,900	6,000
Saturation pH (@ 20C)	N/A	N/A	-	-	-	-	-	-	-	-	-	-	-	-	7.33	7.81	7.41	7.4	7.41
Saturation pH (@ 4C)	N/A	N/A	-	-	-	-	-	-	-	-	-	-	-	-	7.58	8.06	7.66	7.65	7.66
Sulphate	10,000	µg/L		-	85,300	68,100	121,000	97,000	160,000	160,000	160,000	190,000	190,000	-	-	-	-	-	-
Total Alkalinity (Total as CaCO3)	30,000	µg/L	-	-	214,000	76,600	167,000	150,000	190,000	130,000	130,000	130,000	140,000	180,000	160,000	95,000	160,000	160,000	160,000
Total Dissolved Solids	10,000	µg/L		-	771,000	549,000	658,000	493,000	638,000	518,000	520,000	529,000	532,000	-	-	-	-	-	-
Total Organic Carbon (C)	500	µg/L	-	-	26,500	19,200	12,900	11,000	16,000 (1)	12,000	12,000	10,000	10,000	9,300	14,000	6,900	8,000	6,200	6,000
Total Supended Solids	2,000	µg/L		-	6,000	2,000	3,000	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	0.1	NTU	-	-	5.7	1.4	2.0	4.20	9.40	2.1	1.7	7.0	6.1	1.4	180	2	4.6	1.4	0.6

Notes:

SW = Surface Water
RDL = Reportable Detection Limit
< = Parameter below detection limit
- = No sample collected/Not analysed
Shaded/Bold = Parameter is above applicable criteria
Above criteria for current sampling program = **1**

Analysis of samples from 2007 to 2012 were completed by AMEC .
Analysis of samples from 2013 to 2017 were completed by Maxxam Analytics Inc. in Bedford, NS.
Data from Feb. 2007 to Nov. 2012 transcribed from the 2012-2013 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by AMEC and dated March 29, 2013.
Data from December 2015 extracted from the 2015-2016 Annual Report of Activities for the Upper Trinity South (New Harbour) Waste Disposal Site completed by Fracflow and dated June 6, 2016.
* Typical Reportable Detection Limit reference based on Maxxam laboratory analysis, but RDL may be lower than shown for original data.
** Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1).
(1) Elevated reporting limit due to sample matrix.

TABLE C5

HISTORICAL SURFACE WATER ANALYTICAL DATA - GENERAL CHEMISTRY
2017-2018 MONITORING PROGRAM
UPPER TRINITY SOUTH (NEW HARBOUR) WASTE DISPOSAL SITE
NEW HARBOUR BARRENS, NL

Parameter	RDL*	Units	Criteria**	SW-STREAM													SW-UPSTREAM		
				Feb 2007	Nov 2007	May 2008	Mar 2009	Sep 2009	Jan 2010	Nov 2010	Dec 2011	Nov 2012	Aug 2013	Nov 2014	Dec 2015	Oct 2017	Nov 2014	Dec 2015	Oct 2017
Anion Sum	N/A	me/L	-	-	-	-	-	-	-	-	-	-	3.84	0.71	1.08	-	0.2	0.23	0.23
Bicarb. Alkalinity (calc. as CaCO3)	1,000	µg/L	-	-	-	-	-	-	-	-	-	-	76,000	5,000	27,000	-	<	<	<
Calculated TDS	1,000	µg/L	-	-	-	-	-	-	-	-	-	-	250,000	46,000	70,000	-	17,000	18,000	16,000
Carb. Alkalinity (calc. as CaCO3)	1,000	µg/L	-	-	-	-	-	-	-	-	-	-	<	<	<	-	<	<	<
Cation Sum	N/A	me/L	-	-	-	-	-	-	-	-	-	-	4.04	0.89	1.25	-	0.32	0.33	0.3
Colour	5	TCU	-	-	96	72	49	100	58	57	42	39	28	190	76	-	71	56	56 (1)
Conductivity	1	µS/cm	-	-	1,070	936	1190	470	810	540	530	400	390	82	99	-	35	32	37
Dissolved Chloride (Cl)	1,000	µg/L	-	-	213,000	134,000	206,000	84,000	110,000	77,000	45,000	-	31,000	22,000	17,000	-	7,100	7,900	8,000
DOC	500	µg/L		-	21,700	17,800	17,900	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Sulphate (SO4)	2,000	µg/L	-	-	-	-	-	-	-	-	-	-	49,000	<	2,500	-	<	56	<
Hardness (CaCO3)	1,000	µg/L	-	-	101,000	144,000	155,000	64,000	140,000	120,000	130,000	110,000	110,000	18,000	14,000	-	4,800	4,800	4,100
Ion Balance (% Difference)	N/A	%	-	-	-	-	-	-	-	-	-	-	2.5	11.3	7.3	-	23.1	17.9	13.2
Langelier Index (@ 20C)	N/A	N/A	-	-	-	-	-	-	-	-	-	-	-0.827	-4.01	-2.48	-	NC (2)	NC (2)	NC (2)
Langelier Index (@ 4C)	N/A	N/A	-	-	-	-	-	-	-	-	-	-	-1.08	-4.27	-2.73	-	NC (2)	NC (2)	NC (2)
Nitrate as N	50	µg/L	13,000	-	7,710	7,400	12,500	1,200	13,000	8,000	8,000	4,600	-	<	160	-	55	71	<
Nitrite as N	15	µg/L	60	-	35	**492**	31	<	**110**	**100**	50	13	-	<	<	-	<	<	<
Nitrate + Nitrite	50	µg/L	-	-	-	-	-	-	-	-	-	-	5,800	<	160	-	55	71	<
Nitrogen (Ammonia Nitrogen)	50	µg/L	-	-	10,800	24,100	26,500	<	8,200	780	1.6	-	1,400	<	<	-	<	<	<
Orthophosphate (P)	10	µg/L	-	-	-	-	-	-	-	-	-	-	<	<	<	-	<	<	<
pH	N/A	pH	6.5 - 9	-	6.92	7.43	7.16	6.93	**6.32**	7.12	7.21	7.55	7.13	**5.89**	6.82	-	**6.16**	**6.25**	**6.35**
Reactive Silica (SiO2)	0.5	µg/L	-	-	-	-	-	4,700	5,500	5,200	5,500	5,300	6,300	2,400	5,500	-	2,500	2,500	1,800
Saturation pH (@ 20C)	N/A	N/A	-	-	-	-	-	-	-	-	-	-	7.96	9.9	9.3	-	NC (2)	NC (2)	NC (2)
Saturation pH (@ 4C)	N/A	N/A	-	-	-	-	-	-	-	-	-	-	8.21	10.2	9.55	-	NC (2)	NC (2)	NC (2)
Sulphate	10,000	µg/L		-	59,000	90,100	107,000	57,000	110,000	96,000	100,000	-	-	-	-	-	-	-	-
Total Alkalinity (Total as CaCO3)	30,000	µg/L	-	-	90,900	143,000	129,000	50,000	65,000	41,000	44,000	52,000	76,000	5,000	27,000	-	<	<	<
Total Dissolved Solids	10,000	µg/L		-	698,000	496,000	775,000	274,000	493,000	371,000	321,000	-	-	-	-	-	-	-	-
Total Organic Carbon (C)	500	µg/L	-	-	23,600	17,700	18,100	14,000	19,000	13,000	8,000	9,100	8,200	12,000	8,700	-	7,300	7,700	8,700
Total Supended Solids	2,000	µg/L		-	<	5,000	2,000	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	0.1	NTU	-	-	1.6	3.8	1.8	1.30	13	1.8	1.8	1.2	32	31	30	-	1.2	1.1	1.1

Notes:

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- = No sample collected/Not analysed
Shaded/Bold = Parameter is above applicable criteria
Above criteria for current sampling program = **1**

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* Typical Reportable Detection Limit reference based on Maxxam laboratory analysis, but RDL may be lower than shown for original data.
** Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (2007 - Update 7.1).
(1) Elevated reporting limit due to sample matrix.
(2) NC = Not calculated. RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.